Yamaha L2 Switch

Intelligent L2 SWX232x Series

Command Reference

Rev.2.05.07 / Rev.2.06.07

Contents

Preface: Introduction 14

Chapter 1: How to read the command reference 15

1.1 Applicable firmware revision 15
1.2 How to read the command reference 15
1.3 Interface names 15
1.4 Input syntax for commands starting with the word "no" 16

Chapter 2: How to use the commands 17

2.1 Operation via console 17
2.1.1 Access from a console terminal 17
2.1.2 Access from a TELNET client 17
2.1.3 Access from an SSH client 18
2.1.4 Console terminal/VTY settings 18
2.2 Operation via configuration (config) files 19
2.2.1 Access from a TFTP client 19
2.2.2 Reading/writing a configuration file 19
2.3 Login 20
2.4 Command input mode 20
2.4.1 Command input mode basics 20
2.4.2 individual configuration mode 21
2.4.3 Command prompt prefix 22
2.4.4 Executing commands of a different input mode 22
2.5 Keyboard operations when using the console 22
2.5.1 Basic operations for console input 22
2.5.2 Command help 23
2.5.3 Input command completion and keyword candidate list display 23
2.5.4 Entering command abbreviations 23
2.5.5 Command history 23
2.6 Commands that start with the word "show" 24
2.6.1 Modifiers 24

Chapter 3: Configuration 25

3.1 Manage setting values 25
3.2 Default value 25

Chapter 4: Maintenance and operation functions 28

4.1 Passwords 28
4.1.1 Set password for unnamed user 28
4.1.2 Set administrator password 28
4.1.3 Encrypt password 29
4.1.4 Allow login with special password 29
4.2 User account maintenance 30
4.2.1 Set user password 30
4.2.2 Show login user information 31
4.2.3 Set banner 32
4.3 Configuration management 33
4.3.1 Save running configuration 33
4.3.2 Save running configuration 33
4.3.3 Show the running configuration 34
4.3.4 Show startup configuration 35

4.3.5 Erase startup configuration 36
4.3.6 Copy startup configuration 36
4.3.7 Select startup config 37
4.3.8 Set description for startup config 37
4.4 Manage boot information 38
4.4.1 Show boot information 38
4.4.2 Clear boot information 39
4.4.3 Set SD card boot 39
4.4.4 Show the SD card boot setting information 39
4.5 Show unit information 40
4.5.1 Show inventory information 40
4.5.2 Show operating information 40
4.5.3 Disk usage status 41
4.5.4 Show currently-executing processes 41
4.5.5 Display memory usage 42
4.5.6 Show technical support information 42
4.5.7 Save technical support information 44
4.5.8 Show fan operating history 45
4.6 Time management 45
4.6.1 Set clock manually 45
4.6.2 Set time zone 45
4.6.3 Show current time 46
4.6.4 Set NTP server 46
4.6.5 Synchronize time from NTP server (one-shot update) 47
4.6.6 Synchronize time from NTP server (update interval) 47
4.6.7 Show NTP server time synchronization settings 48
4.7 Time synchronization 48
4.7.1 PTP function settings (system) 48
4.7.2 Set PTP function (interface) 49
4.7.3 PTP operation mode settings 49
4.7.4 Forwarding protocol settings for PTP messages 50
4.7.5 Show PTP setting status 51
4.7.6 Show interface PTP information 51
4.8 Terminal settings 52
4.8.1 Move to line mode (console terminal) 52
4.8.2 Set VTY port and move to line mode (VTY port) 52
4.8.3 Set terminal login timeout 53
4.8.4 Change the number of lines displayed per page for the terminal in use 53
4.8.5 Set the number of lines displayed per page on the terminal 54
4.8.6 Changing the serial baud rate 54
4.9 Management 55
4.9.1 Set management VLAN 55
4.10 SYSLOG 55
4.10.1 Set log notification destination (SYSLOG server) 55
4.10.2 Set log output level (debug) 56
4.10.3 Set log output level (informational) 56
4.10.4 Set log output level (error) 56
4.10.5 Set log console output 57
4.10.6 Set log output in event units 57
4.10.7 Back up log 57
4.10.8 Set log backup to SD card 58
4.10.9 Clear log 58

4.10.10 Show log 59
4.11 SNMP 59
4.11.1 Set host that receives SNMP notifications 59
4.11.2 Set notification type to transmit 60
4.11.3 Set system contact 61
4.11.4 Set system location 62
4.11.5 Set SNMP community 62
4.11.6 Set SNMP view 63
4.11.7 Set SNMP group 64
4.11.8 Set SNMP user 64
4.11.9 Show SNMP community information 65
4.11.10 Show SNMP view settings 66
4.11.11 Show SNMP group settings 66
4.11.12 Show SNMP user settings 66
4.12 RMON 67
4.12.1 Set RMON function 67
4.12.2 Set RMON Ethernet statistical information group 68
4.12.3 Set RMON history group 68
4.12.4 Set RMON event group 69
4.12.5 Set RMON alarm group 70
4.12.6 Show RMON function status 72
4.12.7 Show RMON Ethernet statistical information group status 73
4.12.8 Show RMON history group status 73
4.12.9 Show RMON event group status 73
4.12.10 Show RMON alarm group status 74
4.12.11 Clear counters of the RMON Ethernet statistical information group 74
4.13 Telnet server 75
4.13.1 Start Telnet server and change listening port number 75
4.13.2 Show Telnet server settings 75
4.13.3 Set host that can access the Telnet server 76
4.13.4 Restrict access to the TELNET server according to the IP address of the client 76
4.14 Telnet client 77
4.14.1 Start Telnet client 77
4.14.2 Enable Telnet client 77
4.14.3 Remote login to stack slave 78
4.15 TFTP server 78
4.15.1 Start TFTP server and change listening port number 78
4.15.2 Show TFTP server settings 79
4.15.3 Set hosts that can access the TFTP server 79
4.16 HTTP server 80
4.16.1 Start HTTP server and change listening port number 80
4.16.2 Start secure HTTP server and change listening port number 80
4.16.3 Show HTTP server settings 81
4.16.4 Set hosts that can access the HTTP server 81
4.16.5 Restrict access to the HTTP server according to the IP address of the client 82
4.16.6 Web GUI display language 82
4.16.7 Set log-in timeout time for HTTP server 83
4.17 HTTP Proxy 83
4.17.1 Enable HTTP Proxy function 83
4.17.2 Set HTTP Proxy function timeout 84
4.17.3 Show HTTP Proxy function settings 84
4.18 SSH server 85

4.18.1 Start SSH server and change listening port number 85
4.18.2 Show SSH server settings 85
4.18.3 Set host that can access the SSH server 86
4.18.4 Set client that can access the SSH server 86
4.18.5 Generate SSH server host key 87
4.18.6 Clear SSH server host key 87
4.18.7 Show SSH server public key 88
4.18.8 Set SSH client alive checking 89
4.19 SSH client 89
4.19.1 Start SSH client 90
4.19.2 Enable SSH client 90
4.19.3 Clear SSH host information 91
4.20 E-mail notification 91
4.20.1 SMTP e-mail server settings 91
4.20.2 SMTP e-mail server name settings 92
4.20.3 E-mail notification trigger settings 92
4.20.4 E-mail transmission template settings mode 93
4.20.5 E-mail transmission server ID settings 94
4.20.6 E-mail transmission source address setting 94
4.20.7 Destination e-mail address setting for e-mail transmission 94
4.20.8 Setting for subject used when sending e-mails 95
4.20.9 Wait time settings for e-mail transmission 95
4.20.10 E-mail settings when sending certificates 96
4.20.11 E-mail settings for certificate notification 96
4.20.12 Notification timing settings for expired certificates 97
4.20.13 Show e-mail transmission information 97
4.21 LLDP 98
4.21.1 Enable LLDP function 98
4.21.2 Set system description 98
4.21.3 Set system name 99
4.21.4 Create LLDP agent 99
4.21.5 Set automatic setting function by LLDP 99
4.21.6 Set LLDP transmission/reception mode 100
4.21.7 Set type of management address 101
4.21.8 Set basic management TLVs 101
4.21.9 Set IEEE-802.1 TLV 102
4.21.10 Set IEEE-802.3 TLV 102
4.21.11 Set LLDP-MED TLV 103
4.21.12 Set LLDP frame transmission interval 103
4.21.13 Set LLDP frame transmission interval for high speed transmission period 103
4.21.14 Set time from LLDP frame transmission stop until re-initialization 104
4.21.15 Set multiplier for calculating time to live (TTL) of device information 104
4.21.16 Set number of LLDP frames transmitted during the high speed transmission period 105
4.21.17 Set maximum number of connected devices manageable by a port 105
4.21.18 Global interface setting for LLDP function 106
4.21.19 Show interface status 106
4.21.20 Show information for connected devices of all interfaces 109
4.21.21 Clear LLDP frame counters 110
4.22 L2MS (Layer 2 management service) settings 111
4.22.1 Move to L2MS mode 111
4.22.2 Set L2MS function 111
4.22.3 Set role of L2MS function 111

4.22.4 Set L2MS slave watch interval 112
4.22.5 Set number of times that is interpreted as L2MS slave down 113
4.22.6 Set terminal management function 113
4.22.7 Set the device information acquisition time interval 114
4.22.8 Set L2MS control frame transmit/receive 114
4.22.9 Reset slave management 115
4.22.10 Show L2MS information 115
4.22.11 Show L2MS slave config information 116
4.22.12 Set the device information acquisition time interval for downstream of a wireless AP 119
4.22.13 Set event monitoring function 119
4.22.14 Set event information acquisition time interval 120
4.22.15 Set whether to use the L2MS slave's zero config function 120
4.23 Snapshot 121
4.23.1 Set snapshot function 121
4.23.2 Set whether to include terminals in the snapshot comparison 121
4.23.3 Create snapshot 122
4.23.4 Delete snapshot 122
4.24 Firmware update 122
4.24.1 Set firmware update site 122
4.24.2 Execute firmware update 123
4.24.3 Set firmware download timeout duration 123
4.24.4 Allow revision-down 124
4.24.5 Show firmware update function settings 124
4.24.6 Update firmware from SD card 124
4.24.7 Set firmware update reload time 125
4.24.8 Set reload method for firmware update of stack configuration 125
4.25 Stack 126
4.25.1 Set stack function 126
4.25.2 Change ID of stack member 127
4.25.3 Show stack information 127
4.25.4 Set range of IP addresses used by the stack port 128
4.26 Schedule 129
4.26.1 Schedule settings 129
4.26.2 Schedule template description text settings 131
4.26.3 Settings to enable/disable schedule template 131
4.26.4 Schedule template settings 131
4.26.5 Schedule template command execution settings 132
4.26.6 Schedule template script execution settings 133
4.27 General maintenance and operation functions 133
4.27.1 Set host name 133
4.27.2 Reload system 134
4.27.3 Initialize settings 134
4.27.4 Mount SD card 135
4.27.5 Unmount SD card 135
4.27.6 Set default LED mode 135
4.27.7 Show LED mode 136
4.27.8 Show port error LED status 136
4.27.9 Backup system information 137
4.27.10 Restore system information 137
Chapter 5: Interface control 138
5.1 Interface basic settings 138
5.1.1 Set description 138

5.1.2 Shutdown 138
5.1.3 Set communication speed and communication mode 138
5.1.4 Auto negotiation type settings 139
5.1.5 Auto negotiation information display 140
5.1.6 Set MRU 141
5.1.7 Set cross/straight automatic detection 141
5.1.8 Set EEE 142
5.1.9 Show EEE capabilities 142
5.1.10 Show EEE status 143
5.1.11 Set port mirroring 144
5.1.12 Show port mirroring status 144
5.1.13 Show interface status 145
5.1.14 Show brief interface status 147
5.1.15 Resetting an interface 149
5.1.16 Show frame counter 149
5.1.17 Clear frame counters 151
5.1.18 Show SFP module status 151
5.1.19 Set SFP module optical reception level monitoring 152
5.2 Link aggregation 152
5.2.1 Set static logical interface 152
5.2.2 Show static logical interface status 153
5.2.3 Set LACP logical interface 154
5.2.4 Show LACP logical interface status 155
5.2.5 Set LACP system priority order 156
5.2.6 Show LACP system priority 157
5.2.7 LACP different-speed link aggregation settings 157
5.2.8 Set LACP timeout 158
5.2.9 Clear LACP frame counters 159
5.2.10 Show LACP frame counter 159
5.2.11 Set load balance function rules 159
5.2.12 Show protocol status of LACP logical interface 160
5.2.13 Set LACP port priority order 162
5.3 Port authentication 163
5.3.1 Configuring the IEEE 802.1X authentication function for the entire system 163
5.3.2 Configuring the MAC authentication function for the entire system 163
5.3.3 Configuring the Web authentication function for the entire system 163
5.3.4 Set operation mode for the IEEE 802.1X authentication function 164
5.3.5 Set for forwarding control on an unauthenticated port for IEEE 802.1X authentication 164
5.3.6 Set the EAPOL packet transmission count 165
5.3.7 Set the MAC authentication function 166
5.3.8 Set MAC address format during MAC authentication 166
5.3.9 Set the Web authentication function 167
5.3.10 Set host mode 167
5.3.11 Set re-authentication 168
5.3.12 Set dynamic VLAN 169
5.3.13 Set the guest VLAN 169
5.3.14 Suppression period settings following failed authentication 170
5.3.15 Set reauthentication interval 170
5.3.16 Set the reply wait time for the RADIUS server overall 171
5.3.17 Set supplicant reply wait time 171
5.3.18 Set RADIUS server host 172
5.3.19 Set the reply wait time for each RADIUS server 172

5.3.20 Set number of times to resend requests to RADIUS server 173
5.3.21 Set RADIUS server shared password 173
5.3.22 Set time of RADIUS server usage prevention 174
5.3.23 Set NAS-Identifier attribute sent to RADIUS server 174
5.3.24 Show port authentication information 175
5.3.25 Show supplicant information 176
5.3.26 Show statistical information 176
5.3.27 Clear statistical information 177
5.3.28 Show RADIUS server setting information 177
5.3.29 Settings for redirect destination URL following successful Web authentication 178
5.3.30 Clear the authentication state 178
5.3.31 Setting the time for clearing the authentication state (system) 179
5.3.32 Setting the time for clearing the authentication state (interface) 179
5.3.33 Locate the file for customizing the Web authentication screen 179
5.3.34 Delete the file for customizing the Web authentication screen 180
5.3.35 Set EAP pass through 181
5.4 Port security 181
5.4.1 Set port security function 181
5.4.2 Register permitted MAC addresses 182
5.4.3 Set operations used for security violations 182
5.4.4 Show port security information 183
5.5 Error detection function 183
5.5.1 Set automatic recovery from errdisable state 183
5.5.2 Show error detection function information 184
5.6 PoE 184
5.6.1 Set PoE power supply function (system) 184
5.6.2 Set PoE power supply function (interface) 185
5.6.3 Set description of PoE port 186
5.6.4 Set PoE port power supply priority 186
5.6.5 Continuous PoE settings for PoE port 187
5.6.6 Guard band settings 187
5.6.7 Show PoE power supply information 188

Chapter 6: Layer 2 functions 190

6.1 FDB (Forwarding Data Base) 190
6.1.1 Set MAC address acquisition function 190
6.1.2 Set dynamic entry ageing time 190
6.1.3 Clear dynamic entry 191
6.1.4 Set static entry 191
6.1.5 Show MAC address table 192
6.1.6 Show number of MAC addresses 193
6.2 VLAN 193
6.2.1 Move to VLAN mode 193
6.2.2 Set VLAN interface 193
6.2.3 Set private VLAN 194
6.2.4 Set secondary VLAN for primary VLAN 195
6.2.5 Set access port (untagged port) 196
6.2.6 Set associated VLAN of an access port (untagged port) 196
6.2.7 Set trunk port (tagged port) 197
6.2.8 Set associated VLAN for trunk port (tagged port) 198
6.2.9 Set native VLAN for trunk port (tagged port) 199
6.2.10 Set private VLAN port type 199
6.2.11 Set private VLAN host port 200

6.2.12 Set promiscuous port for private VLAN 201
6.2.13 Set voice VLAN 202
6.2.14 Set CoS value for voice VLAN 202
6.2.15 Set DSCP value for voice VLAN 203
6.2.16 Set multiple VALN group 203
6.2.17 Set name of multiple VLAN group 204
6.2.18 Show VLAN information 204
6.2.19 Show private VLAN information 205
6.2.20 Show multiple VLAN group setting information 205
6.3 STP (Spanning Tree Protocol) 206
6.3.1 Set spanning tree for the system 206
6.3.2 Set forward delay time 206
6.3.3 Set maximum aging time 207
6.3.4 Set bridge priority 207
6.3.5 Set spanning tree for an interface 208
6.3.6 Set spanning tree link type 208
6.3.7 Set interface BPDU filtering 209
6.3.8 Set interface BPDU guard 209
6.3.9 Set interface path cost 210
6.3.10 Set interface priority 211
6.3.11 Set edge port for interface 211
6.3.12 Show spanning tree status 212
6.3.13 Show spanning tree BPDU statistics 214
6.3.14 Clear protocol compatibility mode 215
6.3.15 Move to MST mode 215
6.3.16 Generate MST instance 216
6.3.17 Set VLAN for MST instance 216
6.3.18 Set priority of MST instance 217
6.3.19 Set MST region name 217
6.3.20 Set revision number of MST region 217
6.3.21 Set MST instance for interface 218
6.3.22 Set interface priority for MST instance 218
6.3.23 Set interface path cost for MST instance 219
6.3.24 Show MST region information 220
6.3.25 Show MSTP information 220
6.3.26 Show MST instance information 221
6.4 Loop detection 222
6.4.1 Set loop detection function (system) 222
6.4.2 Set loop detection function (interface) 223
6.4.3 Set port blocking for loop detection 224
6.4.4 Reset loop detection status 224
6.4.5 Show loop detection function status 224
Chapter 7: Layer 3 functions 226
7.1 IPv4 address management 226
7.1.1 Set IPv4 address 226
7.1.2 Show IPv4 address 226
7.1.3 Automatically set IPv4 address by DHCP client 227
7.1.4 Show DHCP client status 228
7.1.5 Set auto IP function 228
7.2 IPv4 route control 229
7.2.1 Set static IPv4 route 229
7.2.2 Show IPv4 Forwarding Information Base 230

7.2.3 Show IPv4 Routing Information Base 231
7.2.4 Show summary of the route entries registered in the IPv4 Routing Information Base 231
7.3 ARP 231
7.3.1 Show ARP table 231
7.3.2 Clear ARP table 232
7.3.3 Set static ARP entry 232
7.3.4 Set ARP timeout 232
7.4 IPv4 forwarding control 233
7.4.1 IPv4 forwarding settings 233
7.4.2 Show IPv4 forwarding settings 233
7.5 IPv4 ping 233
7.5.1 IPv4 ping 233
7.5.2 Check IPv4 route 234
7.6 IPv6 address management 235
7.6.1 Set IPv6 235
7.6.2 Set IPv6 address 235
7.6.3 Set RA for IPv6 address 236
7.6.4 Show IPv6 address 236
7.7 IPv6 route control 237
7.7.1 Set IPv6 static route 237
7.7.2 Show IPv6 Forwarding Information Base 238
7.7.3 Show IPv6 Routing Information Base 238
7.7.4 Show summary of the route entries registered in the IPv6 Routing Information Base 239
7.8 Neighbor cache 239
7.8.1 Set static neighbor cache entry 239
7.8.2 Show neighbor cache table 239
7.8.3 Clear neighbor cache table 240
7.9 IPv6 forwarding control 240
7.9.1 IPv6 forwarding settings 240
7.9.2 Show IPv6 forwarding settings 240
7.10 IPv6 ping 241
7.10.1 IPv6 ping 241
7.10.2 Check IPv6 route 242
7.11 DNS client 242
7.11.1 Set DNS lookup function 242
7.11.2 Set DNS server list 243
7.11.3 Set default domain name 243
7.11.4 Set search domain list 244
7.11.5 Show DNS client information 244

Chapter 8: IP multicast control 246

8.1 IP multicast basic settings 246
8.1.1 Set processing method for unknown multicast frames 246
8.2 IGMP snooping 246
8.2.1 Set enable/disable IGMP snooping 246
8.2.2 Set IGMP snooping fast-leave 247
8.2.3 Set multicast router connection destination 247
8.2.4 Set query transmission function 248
8.2.5 Set IGMP query transmission interval 248
8.2.6 Set TTL value verification function for IGMP packets 249
8.2.7 Set IGMP version 249
8.2.8 Show multicast router connection port information 250
8.2.9 Show IGMP group membership information 250

8.2.10 Show an interface's IGMP-related information 251
8.2.11 Clear IGMP group membership entries 252
8.3 MLD snooping 252
8.3.1 Enable/disable MLD snooping 252
8.3.2 Set MLD snooping fast-leave 253
8.3.3 Set multicast router connection destination 253
8.3.4 Set query transmission function 254
8.3.5 Set MLD query transmission interval 254
8.3.6 Set MLD version 255
8.3.7 Show multicast router connection port information 255
8.3.8 Show MLD group membership information 256
8.3.9 Show an interface's MLD-related information 256
8.3.10 Clear MLD group membership entries 257
Chapter 9: Traffic control 258
9.1 ACL 258
9.1.1 Generate IPv4 access list 258
9.1.2 Add comment to IPv4 access list 260
9.1.3 Apply IPv4 access list 260
9.1.4 Generate IPv6 access list 261
9.1.5 Add comment to IPv6 access list 262
9.1.6 Apply IPv6 access list 262
9.1.7 Generate MAC access list 263
9.1.8 Add comment to MAC access list 264
9.1.9 Apply MAC access list 265
9.1.10 Show generated access list 266
9.1.11 Clear counters 266
9.1.12 Show access list applied to interface 266
9.1.13 Set VLAN access map and move to VLAN access map mode 267
9.1.14 Set access list for VLAN access map 267
9.1.15 Set VLAN access map filter 268
9.1.16 Show VLAN access map 268
9.1.17 Show VLAN access map filter 269
9.2 QoS (Quality of Service) 269
9.2.1 Enable/disable QoS 269
9.2.2 Set default CoS 270
9.2.3 Set trust mode 270
9.2.4 Show status of QoS function setting 271
9.2.5 Show QoS information for interface 271
9.2.6 Show egress queue usage ratio 273
9.2.7 Set CoS - egress queue ID conversion table 273
9.2.8 Set DSCP - egress queue ID conversion tabl 274
9.2.9 Set port priority order 275
9.2.10 Specify egress queue of frames transmitted from the switch itself 276
9.2.11 Generate class map (traffic category conditions) 276
9.2.12 Associate class map 277
9.2.13 Set traffic classification conditions (access-list) 277
9.2.14 Set traffic classification conditions (CoS) 278
9.2.15 Set traffic classification conditions (TOS precedence) 278
9.2.16 Set traffic classification conditions (DSCP) 279
9.2.17 Set traffic classification conditions (Ethernet Type) 279
9.2.18 13.2.22 Set traffic classification conditions (VLAN ID) 280
9.2.19 Set traffic classification conditions (VLAN ID range) 280

9.2.20 Show class map information 281
9.2.21 Generate policy map for received frames 282
9.2.22 Apply policy map for received frames 282
9.2.23 Set pre-marking (CoS) 283
9.2.24 Set pre-marking (TOS precedence) 284
9.2.25 Set pre-marking (DSCP) 285
9.2.26 Set individual policers (single rate) 285
9.2.27 Set individual policers (twin rate) 287
9.2.28 Set remarking of individual policers 288
9.2.29 Generate aggregate policer 289
9.2.30 Set aggregate policer (single rate) 290
9.2.31 Set aggregate policer (twin rate) 291
9.2.32 Set remarking of aggregate policers 292
9.2.33 Show aggregate policers 293
9.2.34 Apply aggregate policer 293
9.2.35 Show metering counters 294
9.2.36 Clear metering counters 295
9.2.37 Set egress queue (CoS-Queue) 295
9.2.38 Set egress queue (DSCP-Queue) 296
9.2.39 Show policy map information 296
9.2.40 Show map status 298
9.2.41 Set egress queue scheduling 299
9.2.42 Set traffic shaping (individual port) 300
9.2.43 Sets traffic shaping (per queue) 300
9.3 Flow control 301
9.3.1 Set flow control (IEEE 802.3x PAUSE send/receive) (system) 301
9.3.2 Set flow control (IEEE 802.3x PAUSE send/receive) (interface) 301
9.3.3 Show flow control operating status 302
9.4 Storm control 303
9.4.1 Set storm control 303
9.4.2 Show storm control reception upper limit 303

Chapter 10: Application 305

10.1 Local RADIUS server 305
10.1.1 Local RADIUS server function settings 305
10.1.2 Set access interface 305
10.1.3 Generate a route certificate authority 306
10.1.4 RADIUS configuration mode 306
10.1.5 Authentication method settings 306
10.1.6 RADIUS client (NAS) settings 307
10.1.7 Authenticated user settings 308
10.1.8 Reauthentication interval setting 310
10.1.9 Apply setting data to local RADIUS server 310
10.1.10 Issuing a client certificate 310
10.1.11 Aborting the issue of a client certificate 311
10.1.12 Revoking client certificates 312
10.1.13 Exporting client certificates (copying to SD card) 312
10.1.14 Exporting of client certificates (sending via e-mail) 313
10.1.15 Copying RADIUS data 314
10.1.16 Show RADIUS client (NAS) status 314
10.1.17 Show authenticated user information 315
10.1.18 Client certificate issuance status display 316
10.1.19 Client certificate list display 316

10.1.20 Revoked client certificate list display 317

Preface

Introduction

- Unauthorized reproduction of this document in part or in whole is prohibited.
- The contents of this document are subject to change without notice.
- Yamaha disclaims all responsibility for any damages caused by loss of data or other problems resulting from the use of this product.
  The warranty is limited to this physical product itself. Please be aware of these points.
- The information contained in this document has been carefully checked and is believed to be reliable. However, if you find some of the contents to be missing or have questions regarding the contents, please contact us.
- Ethernet is a registered trademark of Fuji Xerox Corporation.
- Microsoft and Windows are registered trademarks of Microsoft Corporation USA in the United States and in other countries.

Chapter 1

How to read the command reference

1.1 Applicable firmware revision

This command reference applies to firmware Yamaha Intelligent L2 Switch SWX232x of Rev.2.05.07 / Rev.2.06.07.
For the latest firmware released after printing of this command reference, manuals, and items that differ, access the following URL and see the information in the WWW server.
http://www.rtpro.yamaha.co.jp

1.2 How to read the command reference

This command reference describes the commands that you enter from the console of the Yamaha Intelligent L2 Switch SWX232x.

In this manual, “SWX232x” indicates the SWX2320 or the SWX2322P. Substitute either name when reading this manual.

Each command is described by a combination of the following items.

[Syntax]	Explains the command input syntax. Key input can use either uppercase or lowercase characters.
	Command names are shown in bold (**Bold face**).
	The parameter portion is shown in italic (*Italic face*).
	Keywords are shown in normal characters.
	Parameters that can be omitted are enclosed in square brackets ([ ]).
[Keywords]	Explains the type and significance of keywords that can be specified for the command.
[Parameters]	Explains the type and significance of parameters that can be specified for the command.
[Default setting]	Indicates the factory-set state of the command.
[Input mode]	Indicates the modes in which the command can be executed.
[Description]	Explains the command.
[Notes]	Explains points that you should be aware of when using the command.
[Examples]	Provides specific examples of the command.

1.3 Interface names

In the command input syntax, interface names are used to specify each interface of the switch.
The following interface names are handled by the SWX232x.

Interface type	Prefix	Description	Examples
LAN/SFP port	port	Used to specify a physical port. Specify "stack ID" + "." + "port number" after the port number.	When specifying LAN port #1 on LAN port stack #1 : port1.1
VLAN interface	vlan	Used to specify a VLAN. Specify vlan followed by the "VLAN ID".	To specify VLAN #1: vlan1
static logical interface	sa	Used to specify link aggregation that combines multiple LAN/SFP port.	To specify static logical interface #1: sa1
LACP logical interface	po		To specify LACP logical interface #2: po2

Interface type	Prefix	Description	Examples
		Specify sa or po followed by "logical interface ID".	

1.4 Input syntax for commands starting with the word "no"

Many commands also have a form in which the command input syntax starts with the word **no**. If you use a syntax that with begins with the word **no**, the settings of that command are deleted and returned to the default value, unless explained otherwise.

Chapter 2

How to use the commands

The SWX232x lets you perform command operations in the following two ways.

Type of operation	Method of operation	Description
Operation via console	• Access from a console terminal • Access from a TELNET client • Access from a SSH client	Issue commands one by one to interactively make settings or perform operations.
Operation via a config file	• File transfer via TFTP • File transfer via GUI operation • File copy via SD card	A file containing a set of necessary commands (called a configuration or "config" file) is used to specify multiple settings, or to obtain multiple settings from the SWX232x, in a single operation.

This chapter explains how to use each method.

2.1 Operation via console

2.1.1 Access from a console terminal

Use a USB cable or RJ-45/DB-9 console cable when making settings from a terminal that is connected to the CONSOLE port of SWX232x.

For the USB cable connected to the mini-USB CONSOLE port, use a USB cable that supports data communication between a USB Type A connector and a mini-USB Type B (5-pin) connector. Cables for recharging only cannot be used.

If you are using a computer as a console terminal (serial terminal), you'll need a terminal program to control the computer's serial (COM) port. Set the communication settings of the console terminal as follows.

Setting item	Value
Baud rate	9600bps
Data	8-bit
Parity	none
Stop bit	1-bit
Flow control	Xon/Xoff

For settings related to the console terminal, use the **line con** command to move to line mode.

2.1.2 Access from a TELNET client

You can use a TELNET client on a computer to connect to the TELNET server of the SWX232x and control it. In order to make settings using TELNET, you must first set up a connection environment (IP network) and then make TELNET server settings.

The IP address settings of the SWX232x are as follows.

- The default IPv4 address setting is 192.168.100.240/24 for VLAN #1.
- To change the IPv4 address, use the **ip address** command.

The TELNET server settings of the SWX232x are as follows.

- With the default settings of the TELNET server function, it runs on the default port (TCP port 23) and allows access only from VLAN #1 (vlan0.1).
- To change the reception port number, use the **telnet-server** command.
- Access to the TELNET server can be controlled in VLAN units, and can be specified by the **telnet-server interface** command.

A virtual communication port by which a TELNET client connects is called a "virtual terminal (VTY: Virtual TYpewriter) port." The maximum number of simultaneous TELNET client connections depends on the number of VTY ports of the SWX232x. The VTY ports of the SWX232x are as follows.

- With the default VTY port settings, eight VTY ports (ID: 0--7) can be used.
- To check the number of VTY ports, use the **show running-config | include line vty** command.
- To change the number of VTY ports, use the **line vty** command. (maximum 8 (ID: 0--7))

To make VTY port settings, use the **line vty** command to specify the target VTY port, and then move to line mode. ID management for virtual terminal ports is handled within the SWX232x, but since login session and ID assignments depend on the connection timing, you should normally make the same settings for all VTY ports.

2.1.3 Access from an SSH client

You can use an SSH client on a computer to connect to the SSH server of the SWX232x and control it. In order to make settings using SSH, you must first set up a connection environment (IP network) and then make SSH server settings.

The IP address settings of the SWX232x are as follows.

- The default IPv4 address setting is 192.168.100.240/24 for VLAN #1.
- To change the IPv4 address, use the **ip address** command.

The following settings on the SWX232x must be made beforehand when accessing from an SSH client.

- Generate a host key on the SSH server using the **ssh-server host key generate** command.
- Enable the SSH server functions using the **ssh-server** command.
- Register the user name and password using the **username** command.

The SSH server settings of the SWX232x are as follows.

- Access to an SSH server can be controlled for each VLAN, and is set using the **ssh-server interface** command.
- Note that the following functions are not supported.
- SSH protocol version 1
- User authentication aside from password authentication (host response authentication, public key authentication, challenge-response authentication, GSSAPI authentication)
- Port forwarding (X11/TCP forwarding)
- Gateway Ports (Port relay)
- Permitting blank passwords

A virtual communication port by which an SSH client connects is called a "virtual terminal (VTY: Virtual TYpewriter) port." The maximum number of simultaneous SSH client connections depends on the number of VTY ports of the SWX232x. The VTY ports of the SWX232x are as follows.

- With the default VTY port settings, eight VTY ports (ID: 0--7) can be used.
- To check the number of VTY ports, use the **show running-config | include line vty** command.
- To change the number of VTY ports, use the **line vty** command. (maximum 8 (ID: 0--7))

To make VTY port settings, use the **line vty** command to specify the target VTY port, and then move to line mode. ID management for virtual terminal ports is handled within the SWX232x, but since login session and ID assignments depend on the connection timing, you should normally make the same settings for all VTY ports.

2.1.4 Console terminal/VTY settings

The SWX232x lets you make the following settings for console terminals and VTY.

1. Timeout duration interpreted as no operation
2. Number of lines shown in one page of the terminal screen

Setting item	Content of setting
Timeout duration interpreted as no operation	Specifies the time after which the login session is forcibly ended when there has been no key input from the terminal. With the default setting, the session is forcibly disconnected after ten minutes. To make this setting, use the **exec-timeout** command of the line mode; this takes effect from the next session.
Number of lines shown in one page of the terminal screen	Specifies the number of lines shown on one page of the terminal screen. This can be set as 0--512 lines/page, and the default setting is 24 lines/page. When displaying in this state, 23 lines are displayed, then "---More---" is displayed and the system waits for key input. There are two types of this setting, and they are applied to the system starting with the upper type. 1) unprivileged EXEC mode **terminal length** command 2) global configuration mode **service terminal-length**

Setting item	Content of setting
	command Setting 1) is a function that temporarily applies to the user who is using the terminal, and is applied as soon as the command is executed. Setting 2) applies starting with the next session.

2.2 Operation via configuration (config) files

A file containing a set of needed commands is called a configuration (config) file.

The settings that have been made on the SWX232x can be read as a configuration file by a host on the LAN via TFTP. A configuration file on the host can also be loaded into the SWX232x to specify its settings.

A configuration file contains all the settings for the entire unit; it is not possible to partially read or write only the settings for a specific area. The configuration file is a text file consisting of ASCII + line-return (CRLF or LF).

The commands and parameters in a configuration file must be in the correct syntax. If the syntax or content are incorrect, that content is ignored and is not applied to operation.

2.2.1 Access from a TFTP client

In order to transfer a configuration file via TFTP, you must first set up a connection environment (IP network) and then make TFTP server settings.

The IP address settings of the SWX232x are as follows.

- The default IPv4 address setting is 192.168.100.240/24 for VLAN #1.
- To change the IPv4 address, use the **ip address** command.

The TFTP server settings of the SWX232x are as follows.

- With the default settings of the TFTP server function, it is running on the default port (UDP port 69) and does not allow access from anywhere.
- To change the reception port number, use the **tftp-server** command.
- Access to the TFTP server can be controlled in VLAN units, and can be specified by the **tftp-server interface** command. Specify the VLAN ID for which access is allowed.

2.2.2 Reading/writing a configuration file

Reading/writing a configuration file is performed by executing a TFTP command from the host on the LAN.

The following configuration files are read or written.

- configuration file

Applicable configuration	Applicable file	Description
running-config	CONFIG file (.txt)	Setting values for current operation (Basic settings)
startup-config #0, #1, #SD	CONFIG file (.txt)	Saved setting values (Basic settings)
	All settings (.zip)	Saved setting values (All settings)

Specify the following as the remote path of the configuration file read (GET) or write (PUT) destination.

- Remote path for applicable files (No automatic restart)

Applicable configuration	Applicable file	Remote path	Load (GET)	Save (PUT)	Automatic restart
running-config	CONFIG file (.txt)	config	✓	✓	-
startup-config #0	CONFIG file (.txt)	config0	✓	✓	-
	All settings (.zip)	config0-all	✓	✓	-
startup-config #1	CONFIG file (.txt)	config1	✓	✓	-
	All settings (.zip)	config1-all	✓	✓	-
startup-config #SD	CONFIG file (.txt)	configsd	✓	✓	-
	All settings (.zip)	configsd-all	✓	✓	-

If you want to restart the system automatically after applying the CONFIG file, specify the following remote path. The currently running configuration is applicable.

- Remote path for applicable files (with automatic restart)

Applicable configuration	Applicable file	Remote path	Load (GET)	Save (PUT)	Automatic restart
Currently running startup-config	CONFIG file (.txt)	reconfig	-	✓	✓
	All settings (.zip)	reconfig-all	-	✓	✓

When applying (PUT) a CONFIG file, confirm that the target CONFIG and the type of the target file are correct.

If an incorrect file is specified, it cannot be reflected correctly.

The command syntax used depends on the OS of that host (TFTP client). Keep the following points in mind when executing commands.

- IP address of the SWX232x
- Use "binary mode" as the transmission mode.
- If an administrator password is set on the SWX232x, you must specify the administrator password after the remote path in the format "/PASSWORD".
- If you PUT (write) with "config" specified as the remote path, the changes are added or overwritten to the current operating settings.
  Settings that you do not add or change will remain as the current operating settings.
  Since the setting values are not saved, you must use the **write** command etc. if you want to save them.
- The encrypted password (**password 8** or **enable password 8** command format) is not applied to the settings even if it is PUT to running-config via TFTP.
  And, users are not actually registered when making settings for users that include encrypted passwords (**username** command).

2.3 Login

When the SWX232x has finished starting up, a login screen is displayed.

If a user is configured, enter the user name and password. If a user is not configured, omit the user name by pressing the Enter key, and enter the login password instead to log in as an unknown user.

When authentication is successful, the command prompt appears. Since no user password is specified with the default settings, you will be able to log in without a password.

- Login screen

```
Username:
Password:
```

- Console screen following login

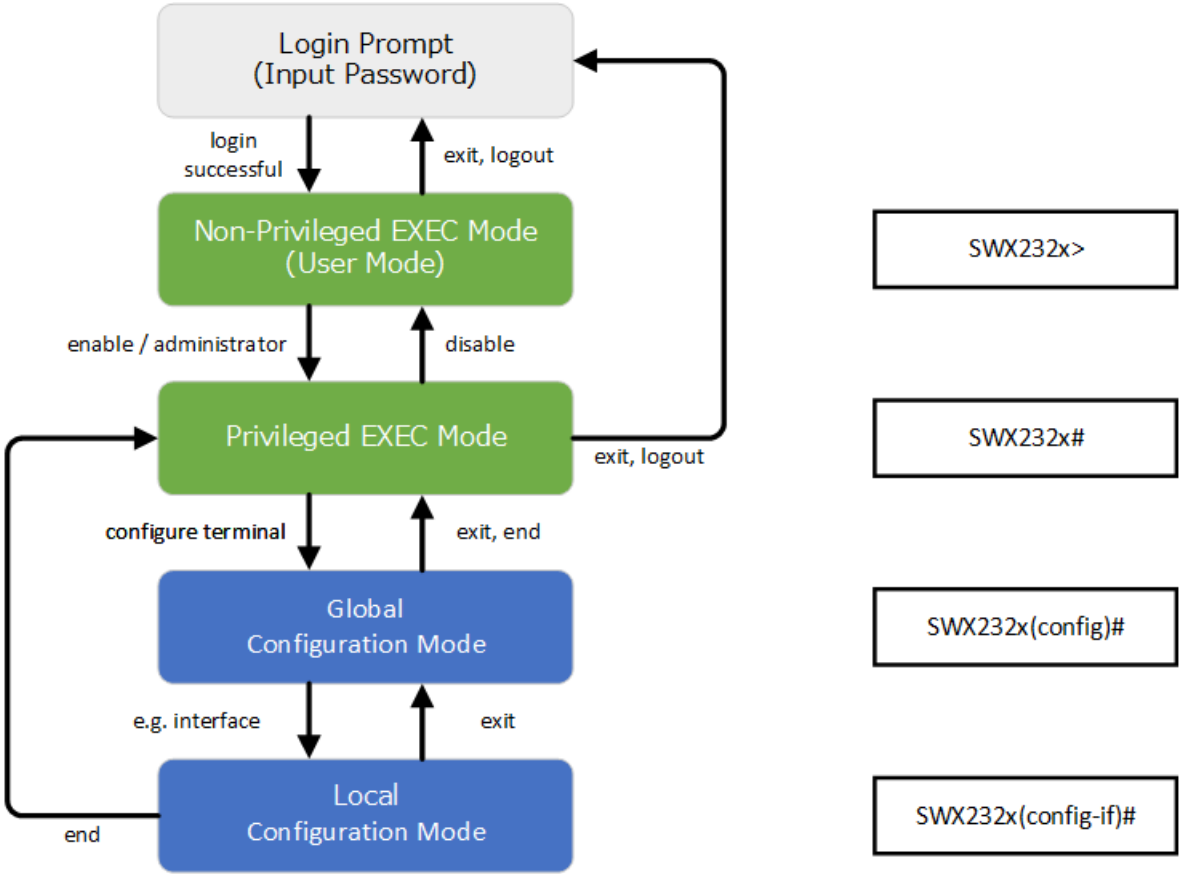
```
SWX2320 Rev.2.05.02 (Mon Dec 14 12:08:51 2020)
  Copyright (c) 2021 Yamaha Corporation. All Rights Reserved.

SWX232x>
```

2.4 Command input mode

2.4.1 Command input mode basics

In order to change the settings of the SWX232x or to reference the status, you must move to the appropriate command input mode and then execute the command. Command input mode is divided into hierarchical levels as shown below, and the commands that can be entered in each mode are different. By noting the prompt, the user can see which mode they are currently in.



The basic commands related to moving between command input modes are described below. For commands that move from global configuration mode mode to individual configuration mode, refer to "individual configuration mode."

- **exit** command
- **logout** command
- **enable** command / **administrator**command
- **disable** command
- **configure terminal** command
- **end** command

2.4.2 individual configuration mode

individual configuration mode is the overall name for the mode in which you can make detailed settings for specific items such as LAN/SFP port, VLAN interface, and QoS. To enter individual configuration mode, issue the command for transitioning to the respective mode from global configuration mode.

On SWX232x, individual configuration mode contains the following modes. Some of the modes within individual configuration mode have a hierarchy. For example, policy map mode → policy map class mode.

individual configuration mode	Transition command	Prompt
interface mode	**interface** command	SWX232x(config-if)#
line mode	**line con** command **line vty** command	SWX232x(config-line)#
VLAN mode	**vlan database** command	SWX232x(config-vlan)#
VLAN access map mode	**vlan access-map** command	SWX232x(config-vlan-access-map)#
MST mode	**spanning-tree mst configuration** command	SWX232x(config-mst)#
class map mode	**class-map** command	SWX232x(config-cmap)#
policy map mode	**policy-map** command	SWX232x(config-pmap)#
policy map class mode	**class** command	SWX232x(config-pmap-c)#
L2MS mode	**l2ms configuration** command	SWX232x(config-l2ms)#

individual configuration mode	Transition command	Prompt
LLDP agent mode	**lldp-agent** command	SWX232x(lldp-agent)#
E-mail template mode	**mail template** command	SWX232x(config-mail)#
RADIUS configuration mode	**radius-server local-profile** command	SWX232x(config-radius)#

2.4.3 Command prompt prefix

he command prompt prefix indicates the host name. In the default state, the host name is the model name "SWX232x". This indication can be changed by using the **hostname** command to specify the host name. In cases where multiple SWX232x units are used, management will be easier if separate names are assigned to each switch.

Changing the host name

```
SWX232x(config)# hostname Switch-012
Switch-012(config)#
```

2.4.4 Executing commands of a different input mode

Because the commands that can be used on the SWX232x differ depending on the mode, you must transition to the mode in which a command can be executed before you execute that command. The **do** command is provided as a way to avoid this requirement.

By using the **do** command you can execute privileged EXEC mode commands from any configuration mode. This allows you to reference the current configuration or save settings from any configuration mode without having to transition to privileged EXEC mode.

However, since the completion function cannot be used with **do**, you must enter the command that follows either in its full spelling or in its abbreviated form.

- Entry in full spelling

  ```
  SWX232x(config)#do show running-config
  ```
- Entry in abbreviated form

  ```
  SWX232x(config)#do sh ru
  ```

2.5 Keyboard operations when using the console

2.5.1 Basic operations for console input

The SWX232x allows the following operations in the command line.

- Moving the cursor

Keyboard operation	Description and notes
→	Move right one character
←	Move left one character
Press Esc, then F	Move right one word (move to the character following the end of the word at the cursor location)
Press Esc, then B	Move left one word (move to the first character of the word at the cursor location)
Ctrl + A	Move to the beginning of the line
Ctrl + E	Move to the end of the line

- Deleting an input character

Keyboard operation	Description and notes
Backspace	Delete the character at the left of the cursor
Ctrl + H	
Ctrl + D	Delete the character at the cursor. If this operation is performed when the command line is empty, the result is the same as the **exit** command.

Keyboard operation	Description and notes
Press Esc, then D	Delete from the cursor position until immediately before the first space
Ctrl + K	Delete from the cursor position until the end of the line
Ctrl + U	Delete all characters that are being entered

- Other

Keyboard operation	Description and notes
Ctrl + T	Exchange the character at the cursor position with the preceding character. If the cursor is at the end of the line, exchange the preceding character with the character that precedes it.
Ctrl + C	In unprivileged EXEC mode and privileged EXEC mode, discard the command being entered and move to the next line. In individual configuration mode, discard the command line being entered and move to privileged EXEC mode. Command processing that is currently being executed will be stopped. (ex: **ping** command)
Ctrl + Z	Move from individual configuration mode to privileged EXEC mode. This is the same operation as the **end** command.

2.5.2 Command help

By entering '?' in the command line you can search for the available commands or parameters.

```
SWX232x#show vlan ?
  <1-4094>      VLAN id
  access-map    Show VLAN Access Map
  brief         VLAN information for all bridges (static and dynamic)
  filter        Show VLAN Access Map Filter
  private-vlan  private-vlan information

SWX232x#show vlan
```

2.5.3 Input command completion and keyword candidate list display

If you press the "Tab" key while entering a command in the console, the command name is completed. If you press the "Tab" key after entering a keyword, a list of keyword candidates that can be entered next is shown. The same operation can also be performed by pressing the "Ctrl + I" key.

- Command name completion

```
SWX232x#con "press the <Tab>key"
      ↓
SWX232x#configure
```

- Keyword candidate list display

```
SWX232x(config)#vlan "press the <Tab> key"
access-map  database    filter
SWX232x(config)#vlan
```

2.5.4 Entering command abbreviations

When you enter commands or parameters in abbreviated form, and the characters you entered can be recognized unambiguously as a command or parameter, that command is executed.

Example of entering a command abbreviation (show running-config)

```
SWX232x# sh run
```

2.5.5 Command history

By using the command history function, you can easily re-execute a command that you previously input, or partially modify a previously input command and re-execute it. Command history is shown as a history that is common to all modes.

Operation is shown below.

Keyboard operation	Description and notes
↑	Move backward through command history
Ctrl + P	
↓	Move forward through command history
Ctrl + N	

2.6 Commands that start with the word "show"

2.6.1 Modifiers

Modifiers send the information produced by the **show** command through a filter, restricting the content that is shown in the screen and making it easier for you to see the desired information.

The SWX232x provides the following three modifiers for the **show** command.

Modifiers	Description
include	Output only the lines that include the specified character string
grep	
exclude	Output only the lines that do not include the specified character string

Modifiers can be used only one at a time. You cannot specify more than one modifier.

- (Example) Using **show running-config** to view information that includes VLAN #1 (vlan1).

```
SWX232x#show running-config | grep vlan1
interface vlan1
http-server interface vlan1
telnet-server interface vlan1
```

- (Example) Using **show spanning-tree** to view information that includes Role.

```
SWX232x# show spanning-tree | include Role
%   po1: Port Number 505 - Ifindex 4601 - Port Id 0x81f9 - Role Disabled - State
Discarding
%   port1.1: Port Number 905 - Ifindex 5001 - Port Id 0x8389 - Role Disabled -
State Forwarding
%   port1.2: Port Number 906 - Ifindex 5002 - Port Id 0x838a - Role Disabled -
State Forwarding
%   port1.3: Port Number 907 - Ifindex 5003 - Port Id 0x838b - Role Disabled -
State Forwarding
%   port1.4: Port Number 908 - Ifindex 5004 - Port Id 0x838c - Role Disabled -
State Forwarding
%   port1.6: Port Number 910 - Ifindex 5006 - Port Id 0x838e - Role Disabled -
State Forwarding
%   port1.7: Port Number 911 - Ifindex 5007 - Port Id 0x838f - Role Disabled -
State Forwarding
%   port1.8: Port Number 912 - Ifindex 5008 - Port Id 0x8390 - Role Disabled -
State Forwarding
%   port1.9: Port Number 913 - Ifindex 5009 - Port Id 0x8391 - Role Disabled -
State Forwarding
%   port1.10: Port Number 914 - Ifindex 5010 - Port Id 0x8392 - Role Disabled -
State Forwarding
```

Chapter 3

Configuration

3.1 Manage setting values

The SWX232x uses the following configurations to manage its settings.

Types of configuration	Description	User operations that can be performed
Running configuration (running-config)	Setting values currently used for operation. Managed in RAM.	Note / Save to startup configuration
Startup configuration (startup-config)	These are the saved setting values. This manages 2 configurations in Flash ROM and 1 configuration on an SD card. The data in Flash ROM to be used is determined using the **startup-config select** command. The single configuration on the SD card is managed in the "/swx2320/startup-config" or "/swx2322p/startup-config" folder.	Note / Delete / Copy
Default configuration (default-config)	Default setting values. Managed in Flash ROM.	No operations possible

The start-up flow for the SWX232x system is as follows.

1. The setting value of the **startup-config select** command is referenced to determine the startup config that will be used.
   If "sd" is specified by the **startup-config select** command, and an SD card on which a startup config is saved is not inserted, startup config #0 is selected.
2. If the startup configuration that was selected exists, the data in question is deployed to RAM as a running configuration.
   If the startup configuration file that was selected according to the setting values in the **startup-config select** command does not exist in Flash ROM, the default configuration is deployed to RAM.

If commands etc. are used to modify the settings while the SWX232x is running, the modified settings are immediately reflected in the running configuration. After modifying the running configuration, executing the **write** or **copy** command will update the startup configuration. If you restart without saving the content that was specified or modified, the settings or modifications are lost. Please be aware of this.

3.2 Default value

The default setting values for the SWX232x are shown in the table below.

- Default setting values for the entire system

Category	Setting item	Default value
CONFIG	CONFIG used at startup	Startup config in SD card
Terminal settings	Console timeout	600 sec
	Number of VTYs	8
	Number of lines displayed	24
Password	Login password of no user	none
	Administrator password	none
	Password encryption	not encrypted
Time management	Time zone	JST (UTC + 9.0H)
	NTP server	none
	NTP update cycle	once per hour
RMON	Behavior	enabled

Category	Setting item	Default value
Firmware update	Download URL	firmware-update url http://www.rtpro.yamaha.co.jp/firmware/revision-up/swx2320.bin (Note: the file for the SWX2322P model is “swx2322p.bin”)
	Allow revision-down	don't allow
	Timeout	300 sec
LLDP	Behavior	enabled
	Automatically set	enabled
L2MS	Behavior	enabled
	Role	slave
SYSLOG	Debug level log output	OFF
	Information level log output	ON
	Error level log output	ON
	SYSLOG server	none
Access control	Telnet server status	run
	Telnet server access	allow only VLAN #1
	SSH server status	do not run
	TFTP server status	do not run
	HTTP server status	run
	HTTP server access	allow only VLAN #1
	Secure HTTP server status	do not run
Maintenance VLAN	VLAN interface	VLAN #1
L2 switching	Automatic MAC address learning	enabled
	Automatic MAC address learning aging time	300 sec
	Spanning tree	enabled
	Proprietary loop detection	disabled
DNS cliant	Behavior	enabled
Interface control	PoE power supply	enabled (only for models that support PoE)
Traffic control	QoS	disabled
	Flow control (IEEE 802.3x)	disabled
Web GUI	Language setting	Japanese (selectable)
Stack	Operation	Disabled
	Stack ID	1
	Range of IP addresses used by the stack port	192.168.250.0/24

- Default settings per LAN/SFP port

Category	Setting item	Default value
Common setting	Speed/duplex mode setting	auto
	Cross/straight automatic detection	enabled

Category	Setting item	Default value
	MRU	1,522 Byte
	Port description	none
	EEE	disabled
	Port Mode	Access
	Associated VLAN ID	1 (default VLAN)
L2MS	L2MS filter	disabled
L2 switching	Spanning tree	enabled
	Proprietary loop detection	enabled
Traffic control	QoS trust mode	CoS
	Flow control (IEEE 802.3x)	disabled
	Storm control	disabled
PoE power supply	Power supply operation	enabled (only for models that support PoE)
	Power supply priority	low (only for models that support PoE)
LLDP agent	Transmit/Receive mode	transmit and receive

- Settings for the default VLAN (vlan1)
  - IPv4 Address : 192.168.100.240/24
  - IGMP Snooping: Enable
    - Querier : Disable
    - Fast-Leave : Disable
    - Check TTL : Enable

Chapter 4

Maintenance and operation functions

4.1 Passwords

4.1.1 Set password for unnamed user

[Syntax]

password *password*
no password

[Parameter]

password : Login password for unnamed user

Single-type alphanumeric characters and " and ' and | and > and ? and single-byte symbols other than space characters (32 characters or less)

The first character must be a single-byte alphanumeric character

[Initial value]

no password

[Input mode]

global configuration mode

[Description]

Sets the password for logging in as an unnamed user.

If this command is executed with the "no" syntax, the unnamed user password for logging is deleted.

[Note]

If the password was encrypted by the **password-encryption** command, it is shown in the configuration in the form "**password** 8 *password*."

The user cannot enter the password in this form when making configuration settings from the command line.

[Example]

Specify user1234 as the unnamed user password.

```
SWX232x(config)#password user1234
```

Delete the unnamed user password.

```
SWX232x(config)#no password
```

4.1.2 Set administrator password

[Syntax]

enable password *password*
no enable password

[Parameter]

password : Administrator password

Single-type alphanumeric characters and " and ' and | and > and ? and single-byte symbols other than space characters (32 characters or less)

The first character must be a single-byte alphanumeric character

[Initial value]

no enable password

[Input mode]

global configuration mode

[Description]

Specifies the administrator password needed to enter privileged EXEC mode.

If this command is executed with the "no" syntax, the administrator password is deleted.

[Note]

If the password was encrypted by the **password-encryption** command, it is shown in the configuration in the form "**enable password** 8 *password*."

The user cannot enter the password in this form when making configuration settings from the command line.

[Example]

Specify admin1234 as the administrator password.

```
SWX232x(config)#enable password admin1234
```

Delete the administrator password.

```
SWX232x(config)#no enable password
```

4.1.3 Encrypt password

[Syntax]

password-encryption *switch*
no password-encryption

[Parameter]

switch : Set password encryption

Setting value	Description
enable	Encrypt
disable	Don't encrypt

[Initial value]

password-encryption disable

[Input mode]

global configuration mode

[Description]

Enables password encryption.

If this is enabled, the password entered by the **password** command, the **enable paassword** command, and the **username** command are saved in the configuration in an encrypted form.

If this command is executed with the "no" syntax, password encryption is disabled, and the password entered by the **password** command, the **enable paassword** command, and the **username** command are saved in the configuration as plaintext.

[Note]

If password encryption is changed from disabled to enabled, previously-entered passwords are converted from plaintext to an encrypted form; however if it is changed from enabled to disabled, previously-encrypted passwords in a configuration file do not return to plaintext.

[Example]

Enables password encryption.

```
SWX232x(config)#password-encryption enable
```

Disabled password encryption.

```
SWX232x(config)#no password-encryption
```

4.1.4 Allow login with special password

[Syntax]

force-password *switch*
no force-password

[Parameter]

switch : Allow login by special password

Setting value	Description
enable	Allow
disable	Don't allow

[Initial value]

force-password enable

[Input mode]

global configuration mode

[Description]

Enable login with special password.

If this is enabled, only when logging in from a serial console, it is possible to log in using "w,lXlma" (lowercase W, comma, lowercase L, uppercase X, and lowercase L, M, and A) instead of the specified user password.

If you login with the special password, you will be in privileged EXEC mode.

If this command is executed with the "no" syntax, login with the special password is disabled.

[Example]

Enable login with special password.

```
SWX232x(config)#force-password enable
```

Disable login with special password.

```
SWX232x(config)#no force-password
```

4.2 User account maintenance

4.2.1 Set user password

[Syntax]

username *username* [privilege *privilege*] [password *password*]

no username *username*

[Keyword]

privilege : Specifies the user's privileges

password : Specifies the user's password

[Parameter]

username : User name

Single-byte alphanumeric characters (32 characters or less)

privilege : Whether to grant privilege

Setting value	Description
on	Password input is not requested when moving to privileged EXEC mode Access to Web GUI is allowed with administrator privileges
off	Password input is requested when moving to privileged EXEC mode Access to Web GUI is allowed with guest

password : User's login password

Single-type alphanumeric characters and " and ' and | and > and ? and single-byte symbols other than space characters (32 characters or less)

The first character must be a single-byte alphanumeric character

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Sets user information.

A maximum of 32 items of user information can be registered.

The following words cannot be registered as user names.

lp, adm, bin, ftp, gdm, man, rpc, sys, xfs, halt, mail, news, nscd, sync, uucp, root, games, daemon, gopher, nobody, ftpuser, mtsuser, rpcuser, mailnull, operator, shutdown

[Note]

If the password was encrypted by the **password-encryption** command, it is shown in the configuration in the form "**username** *username* 8 password *password*."

The user cannot enter the password in this form when making configuration settings from the command line.

[Example]

Set the user "**user1234**".

```
SWX232x(config)#username user1234
```

Grant privileges to user **user1234** and specify a password.

```
SWX232x(config)#username user1234 privilege on password user_pass
```

4.2.2 Show login user information

[Input mode]

unprivileged EXEC mode, privileged EXEC mode, global configuration mode

[Description]

Shows information on the current logged-in users.

The following items are shown.

Item	Description
Line	Shows the login method. **con 0** is the serial console port **vty N** is the VTY port **stk N** is the remote login port **http N** is the Web GUI
Own	An * is shown for the line of one's own connection port.
User	Shows the currently logged-in user names.
Status	Shows the login status. If the user is in use, this indicates **Login**.
Login time	Shows the login time.
IP address	Shows the IP address of the connected user.

[Example]

Show login information for the users when the stack function is disabled.

```
SWX232x>show users

  Line    Own  User                                Status  Login time  IP address
```

```
-------------------------------------------------------------------------------
---------
  con  0       user1234                          Login   02:15:23
  vty  0  *    operators1                        Login   00:12:59    192.168.100.1
  vty  1       abcdefghijklmnopqrstuvwxyzabcdef  Login   00:00:50    192.168.100.24
  vty  2       -                                 Login   00:00:21    192.168.100.10
  vty  3       -                                 -       -
  vty  4       -                                 -       -
  vty  5       -                                 -       -
  vty  6       -                                 -       -
  vty  7       -                                 -       -
  http 0       user1234                          Login   01:12:25    192.168.100.4
  http 1       (noname)                          Login   00:18:04    192.168.100.102
  http 2       -                                 -       -
  http 3       -                                 -       -
```

Show login information for the users when the stack function is enabled.

```
SWX232x>show users

  Line    Own  User                              Status  Login time  IP address
-------------------------------------------------------------------------------
---------
  con  0       user1234                          Login   02:15:23
  vty  0  *    operators1                        Login   00:12:59    192.168.100.1
  vty  1       abcdefghijklmnopqrstuvwxyzabcdef  Login   00:00:50    192.168.100.24
  vty  2       -                                 Login   00:00:21    192.168.100.10
  vty  3       -                                 -       -
  vty  4       -                                 -       -
  vty  5       -                                 -       -
  vty  6       -                                 -       -
  vty  7       -                                 -       -
  stk  0       -                                 Login   00:33:11
  stk  1       -                                 -       -
  stk  2       -                                 -       -
  stk  3       -                                 -       -
  http 0       user1234                          Login   01:12:25    192.168.100.4
  http 1       (noname)                          Login   00:18:04    192.168.100.102
  http 2       -                                 -       -
  http 3       -                                 -       -
```

4.2.3 Set banner

[Syntax]

banner motd *word*

no banner motd

[Parameter]

word : Single-byte alphanumeric characters and single-byte symbols (256 characters or less)

[Initial value]

no banner motd

[Input mode]

global configuration mode

[Description]

Sets the banner that is displayed when logging in to the console.

[Example]

Set the banner display to "Hello World!".

```
Username:
Password:

SWX2320 Rev.2.05.02 (Mon Dec 14 12:08:51 2020)
  Copyright (c) 2021 Yamaha Corporation. All Rights Reserved.
```

```
SWX232x>enable
SWX232x#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
SWX232x(config)#banner motd Hello World!
SWX232x(config)#exit
SWX232x#exit

Username:
Password:

Hello World!

SWX232x>enable
SWX232x#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
SWX232x(config)#no banner motd
SWX232x(config)#exit
SWX232x#exit

Username:
Password:

SWX2320 Rev.2.05.02 (Mon Dec 14 12:08:51 2020)
  Copyright (c) 2021 Yamaha Corporation. All Rights Reserved.

SWX232x>
```

4.3 Configuration management

4.3.1 Save running configuration

[Syntax]

copy running-config startup-config [*config_num*]

[Parameter]

config_num : Configuration number

Setting value	Description
<0-1>	Startup configuration #0-#1
sd	Startup config in SD card

[Input mode]

privileged EXEC mode

[Description]

Saves the current operating settings (running configuration) as the settings for startup (startup configuration).

If *config_num* is omitted, it is saved in the startup config that was used for the current startup.

[Note]

The running configuration can also be saved by executing the **write** command and **save** command.

In a state in which the SD card is not mounted, executing this command on a config that is in the SD card produces an error.

When stack is enabled, this can be executed only on the master switch (Active status).

[Example]

Save the running configuration.

```
SWX232x#copy running-config startup-config
Succeeded to write configuration
SWX232x#
```

4.3.2 Save running configuration

[Syntax]

write [*config_num*]

save [*config_num*]

[Parameter]

config_num : Configuration number

Setting value	Description
<0-1>	Startup configuration #0-#1
sd	Startup config in SD card

[Input mode]

privileged EXEC mode, individual configuration mode

[Description]

Saves the current operating settings (running configuration) as the settings for startup (startup configuration).

If *config_num* is omitted, it is saved in the startup config that was used for the current startup.

[Note]

The running configuration can also be saved by executing the **copy running-config startup-config** command.

In a state in which the SD card is not mounted, executing this command on a config that is in the SD card produces an error.

When stack is enabled, this can be executed only on the master switch (Active status).

[Example]

Save the running configuration.

```
SWX232x#write
Succeeded to write configuration.
SWX232x#
```

4.3.3 Show the running configuration

[Syntax]

show running-config [*section*]

show config

[Parameter]

section : Section to be shown

Setting value	Description
access-list	Access list related
http-server	HTTP server related
interface	Interface related
ip	IP related
ipv6	IPv6 related
key	Authentication key related
l2ms	L2MS related
lldp	LLDP related
mail	E-mail notification-related
radius-server	RADIUS server related
schedule	Schedule related
snmp	SNMP related
spanning-tree	STP related
ssh-server	SSH server related
telnet-sever	TELNET server related

[Input mode]

privileged EXEC mode, individual configuration mode

[Description]

Shows the currently-operating settings (running configuration).

If *section* is not specified, all settings are shown.

[Example]

Show the running configuration.

```
SWX232x#show running-config
!
interface port1.1
 switchport
...
!
line con 0
line vty 0 7
!
end

SWX232x#
```

4.3.4 Show startup configuration

[Syntax]

show startup-config [*config_num*]
show config [*config_num*]

[Parameter]

config_num : Configuration number

Setting value	Description
<0-1>	Startup configuration #0-#1
sd	Startup config in SD card

[Input mode]

privileged EXEC mode

[Description]

Shows the startup settings (startup configuration).

If *config_num* is omitted, the following are displayed.

- show startup-config: Displays the startup configuration for the currently operating configuration number.
- show config: Shows the currently operating running configuration.

[Note]

In a state in which the SD card is not mounted, executing this command on a config that is in the SD card produces an error.

[Example]

Show the startup configuration on the next startup.

```
SWX232x#show startup-config
!
!  Last Modified: 00:00:00 JST Mon Jan 01 2018
!
interface port1.1
 switchport
 switchport mode access
 no shutdown
!

...

!
interface vlan1
```

```
 no switchport
 ip address 192.168.100.240/24
 no shutdown
!
clock timezone JST
!
http-server enable
http-proxy enable
!
telnet-server enable
!
line con 0
line vty 0 7
!
end

SWX232x#
```

4.3.5 Erase startup configuration

[Syntax]

erase startup-config [*config_num*]

[Parameter]

config_num : Configuration number

Setting value	Description
<0-1>	Startup configuration #0-#1
sd	Startup config in SD card

[Input mode]

privileged EXEC mode

[Description]

Erase the settings used at startup (startup config) and the information associated with them.

If *config_num* is omitted, the startup config that was used for the current startup is erased.

[Note]

In a state in which the SD card is not mounted, executing this command on a config that is in the SD card produces an error.

[Example]

Erase the startup configuration.

```
SWX232x#erase startup-config
Succeeded to erase configuration.
SWX232x#
```

4.3.6 Copy startup configuration

[Syntax]

copy startup-config *src_config_num dst_config_num*

[Parameter]

src_config_num : Copy source configuration number

Setting value	Description
<0-1>	Startup configuration #0-#1
sd	Startup config in SD card

dst_config_num : Copy destination configuration number

Setting value	Description
<0-1>	Startup configuration #0-#1
sd	Startup config in SD card

[Input mode]

privileged EXEC mode

[Description]

Copy the startup settings (startup config) and the information associated with them.

[Note]

In a state in which the SD card is not mounted, executing this command on a config that is in the SD card produces an error.

[Example]

Copy startup config #0 to startup config #1.

```
SWX232x#copy startup-config 0 1
Succeeded to copy configuration
SWX232x#
```

4.3.7 Select startup config

[Syntax]

startup-config select *config_num*
no startup-config select

[Parameter]

config_num : Configuration number

Setting	Description
<0-1>	Startup config #0-#1
sd	Startup config on the SD card

[Initial value]

startup-config select sd

[Input mode]

privileged EXEC mode

[Description]

Select the settings to use at startup (startup config), and restart.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

At startup, if "sd" is specified as *config_num* and an SD card on which a startup config is saved is not inserted, startup config #0 is selected.

This command cannot be used if the stack function is enabled.

[Example]

Select startup config #1 and restart.

```
SWX232x#startup-config select 1
reboot system? (y/n): y
```

4.3.8 Set description for startup config

[Syntax]

startup-config description *config_num line*
no startup-config description *config_num*

[Parameter]

config_num	:	<0-1> Configuration number
line	:	Single-byte alphanumeric characters and single-byte symbols (63 characters or less) Description for applicable startup config

[Input mode]

privileged EXEC mode

[Description]

Specify a description for the applicable startup config.

If this command is executed with the "no" syntax, the description is deleted.

The description is shown at the beginning of the execution result of the **show startup-config** command.

[Example]

Specify a description for startup config #1.

```
SWX232x#startup-config description 1 TEST_CONFIG_1
```

4.4 Manage boot information

4.4.1 Show boot information

[Syntax]

show boot *num*
show boot all
show boot list

[Keyword]

all	:	Shows up to five entries of the boot information history
list	:	Shows a simplified version of up to five entries of the boot information history

[Parameter]

num	:	<0-4> Shows the boot history entry of the specified number

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Show the boot information.

[Note]

This history is cleared when you execute the **cold start** command or the **clear boot list** command.

[Example]

Show the current boot information.

```
SWX232x>show boot
 Running EXEC: SWX2320 Rev.2.05.02 (Mon Dec 14 12:08:51 2020)
Previous EXEC: SWX2320 Rev.2.05.02 (Mon Dec 14 12:08:51 2020)
Restart by reload command
```

Shows a list of the boot history.

```
SWX232x>show boot list
No. Date       Time     Info
--- ---------- -------- --------------------------------------------------
  0 2018/03/15 09:50:29 Restart by reload command
  1 2018/03/14 20:24:40 Power-on boot
--- ---------- -------- --------------------------------------------------
```

4.4.2 Clear boot information

[Syntax]

clear boot list

[Input mode]

privileged EXEC mode

[Description]

Clears the boot information history.

[Example]

Clear the boot information.

```
SWX232x#clear boot list
```

4.4.3 Set SD card boot

[Syntax]

boot prioritize sd *switch*
no boot prioritize sd

[Parameter]

switch : Enable or disable SD card boot

Setting	Description
enable	Enable SD card boot
disable	Disable SD card boot

[Initial value]

boot prioritize sd enable

[Input mode]

privileged EXEC mode

[Description]

Enable or disable the SD card boot function of the firmware.

After this command is executed, the system will restart.

Since this setting is common to the system, it cannot be specified individually for each startup configuration (startup-config #0 ~ strtup-config #1).

By default, SD card boot is enabled.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

The SD card boot function enabled/disabled status can be viewed by using the **show boot prioritize sd** command.

[Example]

Enable the SD card boot function of the firmware.

```
SWX232x#boot prioritize sd enable
reboot system? (y/n): y
```

4.4.4 Show the SD card boot setting information

[Syntax]

show boot prioritize sd

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the setting of the SD card boot function.

[Example]

Show the setting of the SD card boot function.

```
SWX232x#show boot prioritize sd
SD boot configuration:
  firmware  :  enable
```

4.5 Show unit information

4.5.1 Show inventory information

[Syntax]

show inventory

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows inventory information for this unit and the SFP modules.

The following items are shown.

Item	Description
NAME	Name
DESCR	Description
Vendor	Vendor name
PID	Product ID
VID	Version ID, 0 if invalid
SN	Serial number

[Example]

Show inventory information.

```
SWX232x>show inventory
NAME: L2 switch
DESCR: SWX2320-16MT
Vendor: Yamaha
PID: SWX2320-16MT
VID: 0000
SN: S00000000

SWX232x>
```

4.5.2 Show operating information

[Syntax]

show environment

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows information about the system's operating environment.

The following items are shown.

- Boot version
- Firmware revision
- Serial number
- MAC address
- CPU usage ratio
- Memory usage ratio
- Fan status
- Fan speed
- Firmware file
- Startup configuration file
- Serial baud rate
- Boot time

- Current time
- Elapsed time from boot
- Temperature status
- Temperature

[Example]

Show operating information.

```
SWX232x>show environment
SWX2320-16MT BootROM Ver.1.00
SWX2320 Rev.2.05.02 (Mon Dec 14 12:08:51 2020)
main=SWX2320-16MT ver=00 serial=S00000000 MAC-Address=00a0.de00.0000
CPU:   7%(5sec)   8%(1min)   8%(5min)    Memory:  18% used
Fan status: Normal
Fan speed: FAN1=4444RPM FAN2=4444RPM FAN3=4444RPM
Startup firmware: exec0
Startup Configuration file: config0
             selected file: config0
Serial Baudrate: 9600
Boot time: 2018/01/01 11:13:44 +09:00
Current time: 2018/01/02 16:19:43 +09:00
Elapsed time from boot: 1days 05:06:04
Temperature status: Normal
Temperature: 28 degree C

SWX232x>
```

4.5.3 Disk usage status

[Syntax]

show disk-usage

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the usage status of the disk used by the system.

- System : Area used by the system
- Config : Settings information area
- Temporary : Temporary area

[Example]

Shows the usage status of the disk used by the system.

```
SWX232x#show disk-usage
  Category    Total    Used     Free     Used (%)
  ----------- -------- -------- -------- --------
  System        46.1M     2.2M    41.5M       5%
  Config       103.4M     2.5M    96.2M       2%
  Temporary     80.0M   152.0K    79.9M       0%
```

4.5.4 Show currently-executing processes

[Syntax]

show process

[Input mode]

privileged EXEC mode

[Description]

Shows all currently-executing processes.

[Example]

Show currently-executing processes.

```
SWX232x#show process
```

4.5.5 Display memory usage

[Syntax]

show memory

[Input mode]

privileged EXEC mode

[Description]

Shows how much memory is used by each process.

The following items are shown.

Item	Explanation
PID	Process ID
NAME	Process name
%MEM	Percentage of physical memory used
SIZE	Amount of physical memory used (current value)
PEAK	Amount of physical memory used (maximum value until now)
DATA	Size of dynamic virtual memory area
STK	Stack size

[Example]

This shows how much memory is used by each process.

```
SWX232x#show memory
```

4.5.6 Show technical support information

[Syntax]

show tech-support

[Input mode]

privileged EXEC mode

[Description]

Show technical support information. The technical support information includes a list of the results of executing the following commands.

If stack functions are enabled, technical support information for all devices configured for the stack is shown.

Note that the commands executed using a master switch or slave switch are different. Refer to the command list below for details.

Command	Stack disabled	Stack enabled	
		Master switch	Slave switch
show running-config	✓	✓	✓
show startup-config	✓	✓	✓
show stack	✓	✓	✓
show environment	✓	✓	✓
show disk-usage	✓	✓	✓
show inventory	✓ (※1)	✓ (※1)	✓ (※1)
show boot all	✓	✓	✓
show boot prioritize sd	✓	✓	✓
show fan history	✓	✓	✓

Command	Stack disabled	Stack enabled	
		Master switch	Slave switch
show logging	✓	✓	✓
show process	✓	✓	✓
show users	✓	✓	✓
show interface	✓	✓	-
show frame-counter	✓	✓	-
show vlan brief	✓	✓	-
show spanning-tree mst detail	✓	✓	-
show etherchannel status detail	✓	✓	-
show loop-detect	✓	✓	-
show mac-address-table	✓	✓	-
show l2ms detail	✓	✓	-
show qos queue-counters	✓	✓	-
show ddm status	✓ (※1)	✓ (※1)	✓ (※1)
show errdisable	✓	✓	-
show auth status	✓	✓	-
show auth supplicant	✓	✓	-
show power-inline	✓ (※2)	✓ (※2)	-
show error port-led	✓	✓	-
show ip interface brief	✓	✓	-
show ip forwarding	✓	✓	-
show ipv6 interface brief	✓	✓	-
show ipv6 forwarding	✓	✓	-
show ip route	✓	✓	-
show ip route database	✓	✓	-
show ipv6 route	✓	✓	-
show ipv6 route database	✓	✓	-
show arp	✓	✓	-
show ipv6 neighbors	✓	✓	-
show ip igmp snooping groups	✓	✓	-
show ip igmp snooping interface	✓	✓	-
show ipv6 mld snooping groups	✓	✓	-
show ipv6 mld snooping interface	✓	✓	-
show radius-server local certificate status	✓	✓	-
show radius-server local nas	✓	✓	-
show radius-server local user	✓	✓	-
show radius-server local certificate list	✓	✓	-
show radius-server local certificate revoke	✓	✓	-

*1: This is not included when using TFTP for acquisition.

*2: Included only with PoE models.

[Example]

Show technical support information.

```
SWX232x#show tech-support
#
# Information for Yamaha Technical Support
#

*** show running-config ***
!
!  - Running Configuration -
!  Current Time:  Fri Jan 1 00:00:00 JST 2021
!
dns-client enable
!
vlan database
 vlan 2 name VLAN0002
 vlan 3 name VLAN0003
!
interface port1.1
 switchport
 switchport mode access
...

*** show startup-config ***
...

*** show stack ***
...

*** show environment ***
...

*** show disk-usage ***
...
...
...

#
# End of Information for Yamaha Technical Support
#

SWX232x#
```

4.5.7 Save technical support information

[Syntax]

copy tech-support sd

[Input mode]

privileged EXEC mode

[Description]

Saves technical support information to the SD card.

This is saved on the SD card with the following file name.

```
   /swx2320/tech-support/YYYYMMDDHHMMSS_techsupport.txt
     or
   /swx2322p/tech-support/YYYYMMDDHHMMSS_techsupport.txt

    YYYYMMDDHHMMSS ... Year month day hour minute second that the command was
executed
```

[Note]

The SD card must be inserted in advance.

[Example]

Save technical support information to the SD card.

```
SWX232x#copy tech-support sd

SWX232x#
```

4.5.8 Show fan operating history

[Syntax]

show fan history

[Input mode]

unprivileged EXEC mode、privileged EXEC mode

[Description]

Shows the fan operating history.

[Example]

Shows the fan operating history.

```
SWX232x>show fan history
2020/10/22 15:45:54: FAN1 status:Low perform:80%
```

4.6 Time management

4.6.1 Set clock manually

[Syntax]

clock set *time month day year*

[Parameter]

time	:	hh:mm:ss
		Time
month	:	<1-12> or Jan, Feb, Mar, ... , Dec
		Month or name of month
day	:	<1-31>
		Day
year	:	Year (four digits)

[Input mode]

privileged EXEC mode

[Description]

Set the system time.

[Example]

Set the time to 0 hours 0 minutes 0 seconds on January 1, 2015.

```
SWX232x#clock set 00:00:00 Jan 1 2015
```

4.6.2 Set time zone

[Syntax]

clock timezone *zone*
clock timezone *offset*
no clock timezone

[Parameter]

zone	:	UTC, JST
		Name of the time zone shown when standard time is in effect
offset	:	-12:00, -11:00, ... , -1:00, +1:00, ... , +13:00

Enter the difference from UTC

[Initial value]

clock timezone UTC

[Input mode]

global configuration mode

[Description]

Sets the time zone.

If this command is executed with the "no" syntax, UTC is specified.

[Example]

Set the time zone to JST.

```
SWX232x(config)#clock timezone JST
```

Set the time zone to UTC+9 hours.

```
SWX232x(config)#clock timezone +9:00
```

4.6.3 Show current time

[Syntax]

show clock

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the current time, year, month, and date.

[Example]

Show current time.

```
SWX232x>show clock
Thu Jan 1 00:00:00 JST 2015
```

4.6.4 Set NTP server

[Syntax]

ntpdate server ipv4 *ipv4_addr*
ntpdate server ipv6 *ipv6_addr*
ntpdate server name *fqdn*
no ntpdate server

[Keyword]

ipv4	:	Specify the NTP server by IPv4 address
ipv6	:	Specify the NTP server by IPv6 address
name	:	Specify the NTP server by host name

[Parameter]

ipv4_addr	:	IPv4 address of the NTP server
ipv6_addr	:	IPv6 address of the NTP server If you specify an IPv6 link local address, you must also specify the output interface (fe80::X%vlanN format)
fqdn	:	Host name of the NTP server As character types, alphabetical characters (uppercase/lowercase), numerals, . (period), and - (hyphen) can be used

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Registers the address or host name of the NTP server.

Up to two instances of this command can be set.

If this command is executed with the "no" syntax, the NTP server setting is deleted.

If time synchronization is performed with two NTP servers specified, they are queried in the order of NTP server 1 and NTP server 2 as shown by the **show ntpdate** command.

The query to NTP server 2 is performed only if synchronization with NTP server 1 fails.

[Example]

Specify 192.168.1.1 as the NTP server.

```
SWX232x(config)#ntpdate server ipv4 192.168.1.1
```

Specify fe80::2a0:deff:fe11:2233%vlan1 as the NTP server.

```
SWX232x(config)#ntpdate server ipv6 fe80::2a0:deff:fe11:2233%vlan1
```

Specify ntp.example.com as the NTP server.

```
SWX232x(config)#ntpdate server name ntp.example.com
```

4.6.5 Synchronize time from NTP server (one-shot update)

[Syntax]

ntpdate oneshot

[Input mode]

privileged EXEC mode

[Description]

Attempts to obtain time information from the registered NTP server.

This is performed only once when this command is executed.

[Example]

Obtain time information from the NTP server.

```
SWX232x#ntpdate oneshot
```

4.6.6 Synchronize time from NTP server (update interval)

[Syntax]

ntpdate interval *interval-time*
no ntpdate interval

[Parameter]

interval-time : <0-24>

Interval (hours) for time synchronization. If this is set to 0 hours, periodic synchronization will not occur.

[Initial value]

ntpdate interval 1

[Input mode]

global configuration mode

[Description]

Specifies the interval (in one-hour units) at which time information is periodically obtained from the registered NTP server.

If this command is executed with the "no" syntax, the setting returns to the default.

When this command is executed, the time is updated immediately, and is subsequently updated at the specified interval.

[Example]

Request the time every two hours.

```
SWX232x(config)#ntpdate interval 2
```

Disable periodic time synchronization.

```
SWX232x(config)#ntpdate interval 0
```

4.6.7 Show NTP server time synchronization settings

[Syntax]

show ntpdate

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the settings that are related to time synchronization from an NTP server.

[Example]

Show time synchronization settings. *If the synchronization update interval is one hour

```
SWX232x#show ntpdate
NTP Server 1 : ntp.nict.jp
NTP Server 2 : none
adjust time : Thu Jan 1 09:00:00 2015 + interval 1 hour
sync server : ntp.nict.jp
```

Show time synchronization settings. *If periodic synchronization is not being performed

```
SWX232x#show ntpdate
NTP Server 1 : ntp.nict.jp
NTP Server 2 : none
adjust time : Thu Jan 1 09:00:00 2015
sync server : ntp.nict.jp
```

4.7 Time synchronization

4.7.1 PTP function settings (system)

[Syntax]

ptp *type*

no ptp

[Parameter]

type : System-wide operations for the PTP function

Setting value	Description
enable	Enables the PTP function for the entire system
disable	Disables the PTP function for the entire system

[Initial value]

ptp disable

[Input mode]

global configuration mode

[Description]

Enables or disables the system-wide PTP function.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

To make the PTP function operate, you must enable the PTP function for the interface as well.

This command cannot be used if the stack function is enabled.

[Example]

Enable the PTP function for the entire system.

```
SWX232x(config)#ptp enable
```

Disable the PTP function for the entire system.

```
SWX232x(config)#ptp disable
```

4.7.2 Set PTP function (interface)

[Syntax]

ptp *type*
no ptp

[Parameter]

type : Operations for the PTP function of the applicable interface

Setting value	Description
enable	Enable PTP function for the applicable interface
disable	Disable PTP function for the applicable interface

[Initial value]

ptp disable

[Input mode]

interface mode

[Description]

Enables or disables the PTP function for the applicable interface.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be specified only for LAN/SFP port.

If the system-wide PTP function is disabled, this will not operate.

This command cannot be used if the stack function is enabled.

[Example]

Enables the PTP function for LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#ptp enable
```

Disables the PTP function for LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#ptp disable
```

4.7.3 PTP operation mode settings

[Syntax]

ptp mode *type* delay-mechanism *mechanism* step *step-mode*
no ptp mode

[Keyword]

delay-mechanism : Specifies the delay mechanism type

step : Specifies the step mode type

[Parameter]

type : PTP operation mode

Setting value	Description
transparent	Transparent clock

mechanism : Delay mechanism

Setting value	Description
e2e	End-to-end mode

step-mode : Step mode

Setting value	Description
one-step	One-step mode

[Initial value]

ptp mode transparent delay-mechanism e2e step one-step

[Input mode]

global configuration mode

[Description]

This configures the PTP operation mode, delay mechanism and step mode.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

If the system-wide PTP function is disabled, this will not operate.

The PTP operation mode only support transparent clocks.

Delay mechanisms only support end-to-end mode.

Step mode only supports one-step mode.

[Example]

This sets the PTP operation mode to transparent clocks, the delay mechanism to end-to-end mode, and step mode to one-step mode.

```
SWX232x(config)#ptp mode transparent delay-mechanism e2e step one-step
```

4.7.4 Forwarding protocol settings for PTP messages

[Syntax]

ptp transport protocol udp *type*
no ptp transport protocol

[Keyword]

udp : Use UDP frames to forward PTP messages

[Parameter]

type : IP address type used for forwarding PTP messages

Setting value	Description
ipv4	Use IPv4 addresses
ipv6	Use IPv6 addresses

[Initial value]

ptp transport protocol udp ipv4

[Input mode]

global configuration mode

[Description]

Sets the forwarding protocol settings for PTP messages.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

If the system-wide PTP function is disabled, this will not operate.

[Example]

This uses IPv6 in UDP to forward PTP messages.

```
SWX232x(config)#ptp transport protocol udp ipv6
```

4.7.5 Show PTP setting status

[Syntax]

show ptp

[Input mode]

unprivileged EXEC mode、privileged EXEC mode

[Description]

Shows the PTP setting status.

[Example]

Shows the PTP setting status.

```
SWX232x>show ptp
  PTP State                 : Enabled
  PTP Mode                  : Transparent Clock
  Delay Mechanism           : End to End
  Step Mode                 : One-step
  Transport Protocol        : UDP (IPv4)
```

4.7.6 Show interface PTP information

[Syntax]

show ptp interface [*ifname*]

[Keyword]

interface	:	Specifies the interface to show

[Parameter]

ifname	:	Name of LAN/SFP port or logical interface Interface to show

[Input mode]

unprivileged EXEC mode、privileged EXEC mode

[Description]

This shows the PTP information for the specified interface.

If "interface" is omitted, information for all interfaces is shown.

[Example]

This shows PTP information for all ports.

```
SWX232x>show ptp interface
Interface  PTP
-------------------
port1.1    Disable
port1.2    Disable
port1.3    Enable
port1.4    Enable
port1.5    Enable
port1.6    Enable
```

```
port1.7    Enable
port1.8    Enable
```

Shows the PTP information for LAN port #1.

```
SWX232x>show ptp interface port1.1
Interface  PTP
-------------------
port1.1    Disable
```

4.8 Terminal settings

4.8.1 Move to line mode (console terminal)

[Syntax]

line con *port*

[Parameter]

port : 0

Serial console port number

[Initial value]

line con 0

[Input mode]

global configuration mode

[Description]

Moves to line mode in order to make console terminal settings.

[Note]

To return from line mode to global configuration mode, use the **exit** command. To return to privileged EXEC mode, use the **end** command.

[Example]

Move to line mode in order to make console terminal settings.

```
SWX232x(config)#line con 0
SWX232x(config-line)#
```

4.8.2 Set VTY port and move to line mode (VTY port)

[Syntax]

line vty *port1* [*port2*]

no line vty *port1* [*port2*]

[Parameter]

port1 : <0-7>

VTY port number

port2 : <0-7>

Last VTY port number when specifying a range

[Initial value]

no line vty 0 7

[Input mode]

global configuration mode

[Description]

After enabling the specified VTY ports, moves to line mode for making VTY port settings.

If this command is executed with the "no" syntax, the specified VTY ports are disabled.

If you specify *port2*, a range of ports is specified; all VTY ports from *port1* through *port2* are specified. *port2* must be a number greater than *port1*.

[Note]

The maximum number of simultaneous Telnet client connections depends on the number of VTY ports that are enabled.

To return from line mode to global configuration mode, use the **exit** command. To return to privileged EXEC mode, use the **end** command.

[Example]

Enable VTY port #0 and then move to line mode.

```
SWX232x(config)#line vty 0
SWX232x(config-line)#
```

4.8.3 Set terminal login timeout

[Syntax]

exec-timeout *min* [*sec*]
no exec-timeout

[Parameter]

min : <0-35791>
Timeout time (minutes)

sec : <0-2147483>
Timeout time (seconds)

[Initial value]

exec-timeout 10

[Input mode]

line mode

[Description]

Sets the time after which automatic logout occurs if there has been no key input from the console terminal or VTY.

If *sec* is omitted, 0 is specified. If *min* and *sec* are both set to 0, automatic logout does not occur.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

After this command is executed, the setting is applied starting at the next login.

[Example]

Set the console timeout time to five minutes.

```
SWX232x(config)#line con 0
SWX232x(config-line)#exec-timeout 5 0
SWX232x(config-line)#
```

4.8.4 Change the number of lines displayed per page for the terminal in use

[Syntax]

terminal length *line*
terminal no length

[Parameter]

line : <0-512>
Number of lines displayed per page on the terminal

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Changes the number of lines displayed per page for the terminal in use.

If *line* is set to 0, the display is not paused per page.

If the **terminal no length** command is executed, the number of lines is set to 24 in the case of a serial console, or to the window size when connected in the case of VTY.

[Note]

When this command is executed, the change applies immediately.

The result of executing this command takes priority over the setting applied by the **service terminal-length** command.

[Example]

Change the number of lines displayed per page for the terminal in use to 100 lines.

```
SWX232x>terminal length 100
SWX232x>
```

4.8.5 Set the number of lines displayed per page on the terminal

[Syntax]

service terminal-length *line*
no service terminal-length

[Parameter]

line : <0-512>
Number of lines displayed per page on the terminal

[Initial value]

no service terminal-length

[Input mode]

global configuration mode

[Description]

Sets the number of lines displayed per page on the terminal.

If *line* is set to 0, the display is not paused per page.

If this command is executed with the "no" syntax, the number of lines is set to 24 in the case of a serial console, or to the window size when connected in the case of VTY.

[Note]

After this command is executed, the setting is applied starting at the next login.

If the **terminal length** command is executed, the result of executing the **terminal length** command takes priority.

[Example]

Change the number of lines displayed per page for the terminal in use to 100 lines.

```
SWX232x(config)#service terminal-length 100
SWX232x(config)#
```

4.8.6 Changing the serial baud rate

[Syntax]

baudrate select *baudrate*

[Parameter]

baudrate : 9600, 19200, 38400, 57600, 115200
Serial baud rate (bps)

[Initial value]

baudrate select 9600

[Input mode]

privileged EXEC mode

[Description]

This sets the serial baud rate.

[Example]

Sets the serial baud rate to 115200.

```
SWX232x#baudrate select 115200
```

4.9 Management

4.9.1 Set management VLAN

[Syntax]

management interface *interface*
no management interface

[Parameter]

interface : VLAN interface name

[Initial value]

management interface vlan1

[Input mode]

global configuration mode

[Description]

Set the VLAN that is used for management.

By setting this command, it will be possible to set and acquire the IP address assigned by the L2MS master to the corresponding VLAN when operating as an L2MS slave.

If this is executed with the "no" syntax, or if the VLAN is deleted, this command also returns to the default settings.

[Example]

Set VLAN #2 as the management VLAN.

```
SWX232x(config)#management interface vlan2
```

4.10 SYSLOG

4.10.1 Set log notification destination (SYSLOG server)

[Syntax]

logging host *host*
no logging host *host*

[Parameter]

host : A.B.C.D

IPv4 address of the SYSLOG server

: X:X::X:X

IPv6 address of the SYSLOG server

If you specify an IPv6 link local address, you must also specify the output interface (fe80::X%vlanN format)

[Initial value]

no logging host

[Input mode]

global configuration mode

[Description]

Specifies the IP address of the SYSLOG server to which log notifications are sent.

Up to 2 entries can be specified.

If this command is executed with the "no" syntax, the setting returns to its default value, and notifications are not sent.

[Example]

Set the SYSLOG server IPv4 address to 192.168.100.1.

```
SWX232x(config)#logging host 192.168.100.1
```

Set the SYSLOG server IPv6 address to fe80::2a0:deff:fe11:2233.

```
SWX232x(config)#logging host fe80::2a0:deff:fe11:2233%vlan1
```

4.10.2 Set log output level (debug)

[Syntax]

logging trap debug
no logging trap debug

[Initial value]

no logging trap debug

[Input mode]

global configuration mode

[Description]

Output the debug level log to SYSLOG. If this command is executed with the "no" syntax, the log is not output.

Since enabling debug level will output a large volume of log data, you should enable this only if necessary.

If you use the **logging host** command to send notifications to the SYSYLOG server, you should ensure that there is sufficient disk space on the host. With the default setting, this is not output.

[Example]

Output the debug level log to SYSLOG.

```
SWX232x(config)#logging trap debug
```

4.10.3 Set log output level (informational)

[Syntax]

logging trap informational
no logging trap informational

[Initial value]

logging trap informational

[Input mode]

global configuration mode

[Description]

Outputs the informational level log to SYSLOG.

If this command is executed with the "no" syntax, the log is not output.

[Note]

This can be output to the console by executing the **logging stdout info** command.

[Example]

Output the informational level log to SYSLOG.

```
SWX232x(config)#logging trap informational
```

4.10.4 Set log output level (error)

[Syntax]

logging trap error
no logging trap error

[Initial value]

logging trap error

[Input mode]

global configuration mode

[Description]

Outputs the error level log to SYSLOG.

If this command is executed with the "no" syntax, the log is not output.

[Example]

Output the error level log to SYSLOG.

```
SWX232x(config)#logging trap error
```

4.10.5 Set log console output

[Syntax]

logging stdout info
no logging stdout info

[Initial value]

no logging stdout info

[Input mode]

global configuration mode

[Description]

Outputs the informational level SYSLOG to the console.

If this command is executed with the "no" syntax, the log is not output.

[Example]

Output the informational level SYSLOG to the console.

```
SWX232x(config)#logging stdout info
```

4.10.6 Set log output in event units

[Syntax]

logging event *type*
no logging *type*

[Parameter]

type : Type of events specified for log output

Setting value	Description
lan-map	LAN map

[Initial value]

no logging event lan-map

[Input mode]

global configuration mode

[Description]

Enables log output for the specified type of events.

If this command is executed with the "no" syntax, the log is not output.

[Example]

Enable log output for LAN map.

```
SWX232x(config)#logging event lan-map
```

4.10.7 Back up log

[Syntax]

save logging

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Saves all logs accumulated in RAM to Flash ROM.

Logs are accumulated in RAM, and are periodically backed up automatically to Flash ROM, but you can use this command to back up this data manually.

If the **logging backup sd enable** command has been set and an SD card is inserted, the log data is saved to Flash ROM and also simultaneously saved to the SD card with the following file name.

```
/swx2320/log/YYYYMMDD_syslog.txt
  or
/swx2322p/log/YYYYMMDD_syslog.txt

 YYYYMMDD … Year month day that the save logging command was executed
```

[Example]

Back up the log.

```
SWX232x#save logging
```

4.10.8 Set log backup to SD card

[Syntax]

logging bakcup sd enable
logging bakcup sd disable
no logging bakcup sd

[Keyword]

enable	:	Enable log backup to SD card
disable	:	Disable log backup to SD card

[Initial value]

logging backup sd disable

[Input mode]

global configuration mode

[Description]

Enables or disables backup of the log to the SD card.

If this is enabled, the log is saved on the SD card when you execute the **save logging** command.

If this command is executed with the "no" syntax, the setting returns to the default.

This is saved on the SD card with the following file name.

```
/swx2320/log/YYYYMMDD_syslog.txt
  or
/swx2322p/log/YYYYMMDD_syslog.txt

 YYYYMMDD … Year month day that the save logging command was executed
```

[Example]

Enable log backup to SD card.

```
SWX232x(config)#logging backup sd enable
```

4.10.9 Clear log

[Syntax]

clear logging

[Input mode]

privileged EXEC mode

[Description]

Clears the log.

[Example]

Clear the log.

```
SWX232x#clear logging
```

4.10.10 Show log

[Syntax]

show logging [reverse]

[Keyword]

reverse : Shows the log in reverse order

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the log that records the operating status of the unit. Normally the log is shown starting with the oldest events, but the display order is reversed if "reverse" is specified.

The log contains a maximum of 10,000 events. If this maximum number is exceeded, the oldest events are successively deleted. In order to save more than the maximum number of logs, you must use the **logging host** command to forward the log to the SYSLOG server and save it on the host.

The level of log events to be output can be specified by the **logging trap** command.

[Note]

Log events are accumulated in RAM, and are automatically backed up to Flash ROM at regular intervals. When the power is turned off, log entries that are not backed up will not be saved, so you must back them up manually if you want to save the log.

The log is maintained when the **reload** command or a firmware update etc. cause a reboot.

[Example]

Show the log.

```
SWX232x#show logging
```

4.11 SNMP

4.11.1 Set host that receives SNMP notifications

[Syntax]

snmp-server host *host_address type* **version** *version community*
snmp-server host *host_address type* **version** *version seclevel user*
no snmp-server host *host_address*
no snmp-server host *host_address type* **version** *version community*
no snmp-server host *host_address type* **version** *version seclevel user*

[Parameter]

host_address : Destination IPv4 address or IPv6 address for notifications

If you specify an IPv6 link local address, you must also specify the output interface (fe80::X%vlanN format)

type : Notification message

Setting value	Description
traps	Send notifications as traps (without response confirmation)
informs	Send notifications as inform requests (with response confirmation). This can be specified if *version* is '2c' or '3'.

version : SNMP version

Setting value	Description
1	Use SNMPv1
2c	Use SNMPv2c
3	Use SNMPv3

community : Community name (maximum 32 characters)

This can be specified if *version* is '1' or '2c'

seclevel : Security level requested for authenticating the notification

This can be specified only if *version* is '3'

Setting value	Description
noauth	No authentication / No encryption (noAuthNoPriv)
auth	Authentication / No encryption (authNoPriv)
priv	Authentication / Encryption (authPriv)

user : User name (maximum 32 characters)

This can be specified only if *version* is '3'

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Set the destination of SNMP notifications.

Up to 8 entries can be specified.

If this command is executed with the "no" syntax, the specified destination hosts are deleted.

[Note]

Note that if this is specified as an IPv6 link local address, and you add a setting that specifies a different transmitting interface for the same address, the combination of address and transmitting interface is considered to have changed, and all settings of the old combination are deleted. For example if there are multiple settings that specify "fe80::10%vlan1" and you newly add the setting "fe80::10%vlan2," all settings for "fe80::10%vlan1" are deleted, and only the settings of the added "fe80::10%vlan2" will remain.

[Example]

Using SNMPv1, set 192.168.100.11 as the destination for traps. Set "snmptrapname" as the trap community name.

```
SWX232x(config)#snmp-server host 192.168.100.11 traps version 1 snmptrapname
```

Using SNMPv2c, set 192.168.100.12 as the destination for notifications. Specify the notification type as informs, and the notification screen community name as "snmpinformsname".

```
SWX232x(config)#snmp-server host 192.168.100.12 informs version 2c snmpinformsname
```

Using SNMPv3, set 192.168.10.13 as the destination for notifications. Set the notification type to traps, set the security level for transmission to priv, and set the user name to "admin1".

```
SWX232x(config)#snmp-server host 192.168.10.13 traps version 3 priv admin1
```

4.11.2 Set notification type to transmit

[Syntax]

snmp-server enable trap *trap_type* [*trap_type*]

no snmp-server enable trap

[Parameter]

trap_type : Type of trap

Setting value	Description
coldstart	When the power is turned on/off, or when firmware is updated
warmstart	When reload command is executed
linkdown	At linkdown
linkup	At linkup
authentication	When authentication fails
l2ms	When L2MS slave is detected or lost
errdisable	When ErrorDisable is detected or canceled
rmon	When RMON event is executed
termmonitor	When terminal monitoring is detected
bridge	When spanning tree root is detected / When topology is changed
temperature	When temperature abnormality is detected or resolved
fan	When fan speed changes / When fan stops
powerethernet	When a change in PoE status occurs or an error is detected
all	All trap types. All of the above trap types are specified in the config.

[Initial value]

no snmp-server enable trap

[Input mode]

global configuration mode

[Description]

Specifies the type of trap notification that is sent.

If this command is executed with the "no" syntax, traps are disabled.

[Note]

powerethernet can only be used on models that support PoE power supply.

[Example]

Enable coldstart trap.

```
SWX232x(config)#snmp-server enable trap coldstart
```

Disable traps.

```
SWX232x(config)#no snmp-server enable trap
```

4.11.3 Set system contact

[Syntax]

snmp-server contact *contact*

no snmp-server contact

[Parameter]

contact : Name (maximum 255 characters) to register as the system contact

[Initial value]

no snmp-server contact

[Input mode]

global configuration mode

[Description]

Sets the MIB variable sysContact.

sysContact is a variable that is typically used to enter the name of the administrator or contact.

If this command is executed with the "no" syntax, the setting is deleted.

[Example]

Set the system contact to "swx_admin@sample.com".

```
SWX232x(config)#snmp-server contact swx_admin@sample.com
```

4.11.4 Set system location

[Syntax]

snmp-server location *location*

no snmp-server location

[Parameter]

location : Name to register as the system location (255 characters or less)

[Initial value]

no snmp-server location

[Input mode]

global configuration mode

[Description]

Sets the MIB variable sysLocation.

sysLocation is a variable that is generally used to enter the installed location of the unit.

If this command is executed with the "no" syntax, the setting is deleted.

[Example]

Set the system location as "MainOffice-1F".

```
SWX232x(config)#snmp-server location MainOffice-1F
```

4.11.5 Set SNMP community

[Syntax]

snmp-server community *community ro_rw*

no snmp-server community *community*

[Parameter]

community : Community name (maximum 32 characters)

ro_rw : Access restriction

Setting value	Description
ro	Read only
rw	Write allowed

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Sets the SNMP community.

Up to 16 communities can be registered.

If this is executed with the "no" syntax, the specified community is deleted.

[Example]

Set the read-only community name to "public".

```
SWX232x(config)#snmp-server community public ro
```

Delete the "public" community.

```
SWX232x(config)#no snmp-server community public
```

4.11.6 Set SNMP view

[Syntax]

snmp-server view *view oid type*
no snmp-server view *view*

[Parameter]

view : View name (maximum 32 characters)

oid : MIB object ID

type : Type

Setting value	Description
include	Include the specified object ID in management
exclude	Exclude the specified object ID from management

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Sets the SNMP MIB view.

The MIB view is the set of MIB objects to specify when allowing access rights.

Up to 16 MIB views can be registered.

The combination of the *oid* parameter and the *type* parameter indicates whether the MIB sub-tree following the specified object ID is or is not subject to management. Taking the *oid* parameter and the *type* parameter together as one entry, you can specify multiple entries for each MIB view, up to a maximum of 8.

When multiple entries are specified, the *type* parameter for the specified object ID takes priority for entries that are contained at a lower level within the specified object ID.

If this command is executed with the "no" syntax, the MIB view is deleted. It is not possible to delete individual entries.

[Example]

Specify the "most" view which shows the internet node (1.3.6.1) and below.

```
SWX232x(config)#snmp-server view most 1.3.6.1 include
```

Specify the "standard" view which shows the mib-2 node (1.3.6.1.2.1) and below.

```
SWX232x(config)#snmp-server view standard 1.3.6.1.2.1 include
```

4.11.7 Set SNMP group

[Syntax]

snmp-server group *group seclevel* read *read_view* [write *write_view*]
snmp-server group *group seclevel* write *write_view* [read *read_view*]
no snmp-server group *group*

[Keyword]

read	:	Specify the MIB view that can be read by users belonging to this group
write	:	Specify the MIB view that can be written by users belonging to this group

[Parameter]

group	:	Group name (maximum 32 characters)
seclevel	:	Security level required of users belonging to this group

Setting value	Description
noauth	No authentication / No encryption (noAuthNoPriv)
auth	Authentication / No encryption (authNoPriv)
priv	Authentication / Encryption (authPriv)

read_view	:	Name of the MIB view (maximum 32 characters) that can be read by users belonging to this group
write_view	:	Name of the MIB view (maximum 32 characters) that can be written by users belonging to this group

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Sets the user group.
Access to MIB objects not included in the MIB view specified by this command is prohibited.
The MIB view is defined by the **snmp-server view** command.
The maximum number of entries is 16.
If this command is executed with the "no" syntax, the specified group setting is deleted.

[Example]

Create the user group "admins," and grant users belonging to the "admins" group full access rights to the "most" view.

```
SWX232x(config)#snmp-server group admins priv read most write most
```

Create the user group "users," and grant users belonging to the "users" group read access rights to the "standard" view.

```
SWX232x(config)#snmp-server group users auth read standard
```

4.11.8 Set SNMP user

[Syntax]

snmp-server user *user group* [auth *auth auth_path* [priv *priv priv_path*]]
no snmp-server user *user*

[Keyword]

auth	:	Set the authentication algorithm
priv	:	Set the encryption algorithm

[Parameter]

user : User name (maximum 32 characters)

group : Group name (maximum 32 characters)

auth : Authentication algorithm

Setting value	Description
md5	HMAC-MD5-96
sha	HMAC-SHA-96

auth_pass : Authentication password (8 or more characters, maximum 32 characters)

priv : Encryption algorithm

Setting value	Description
des	DES-CBC
aes	AES128-CFB

priv_pass : Encryption password (8 or more characters, maximum 32 characters)

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Specifies a user.

The group name of this command specifies the name defined by the snmp-server group command; according to the security level specified by the group setting, it specifies the algorithm and password that are used to authenticate and encrypt the content of communication.

It is not possible to only encrypt without authentication.

The maximum number of entries is 16.

The setting as to whether authentication and encryption are used, the algorithm, and the password, must match the user setting of the SNMP manager that is the other party.

If this command is executed with the "no" syntax, the setting of the specified user is deleted.

[Example]

Create "admin1" as a user. According to the specified group and the security level prescribed for that group, specify the protocol (SHA, AES) and password (passwd1234) used for authentication and encryption.

```
SWX232x(config)#snmp-server user admin1 admins auth sha passwd1234 priv aes
passwd1234
```

Create "user1" as a user. According to the specified group and the security level prescribed for that group, specify the protocol (SHA) and password (passwd5678) used for authentication and encryption.

```
SWX232x(config)#snmp-server user user1 users auth sha passwd5678
```

4.11.9 Show SNMP community information

[Syntax]

show snmp community

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows SNMP community information.

Shows the community name, and access mode.

[Example]

Show SNMP community information.

```
SWX232x#show snmp community
SNMP Community information
  Community Name: public
  Access: Read-Only


  Community Name: private
  Access: Read-Write
```

4.11.10 Show SNMP view settings

[Syntax]

show snmp view

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the contents of the SNMP view settings.

Shows the view name, object ID, and type.

[Example]

Show the contents of the SNMP view settings.

```
SWX232x#show snmp view
SNMP View information
  View Name: most
  OID: 1.6.1
  Type: include

  View Name: standard
  OID: 1.3.6.1.2.1
  Type: include
```

4.11.11 Show SNMP group settings

[Syntax]

show snmp group

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the contents of the SNMP group settings.

Shows the group name, security level, reading view, and writing view.

[Example]

Show the contents of the SNMP group settings.

```
SWX232x#show snmp group
SNMP Group information
  Group Name: admins
  Security Level: priv
  Read View: most
  Write View: most

  Group Name: users
  Security Level: auth
  Read View: standard
  Write View: standard
```

4.11.12 Show SNMP user settings

[Syntax]

show snmp user

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the contents of the SNMP user settings.

Shows the engine ID, user name, affiliated group name, authentication method, and encryption method.

[Example]

Show the contents of the SNMP user settings.

```
SWX232x#show snmp user
SNMP User information
  EngineID: 0x8000049e0300a0deaeb90e

  User Name: admin1
  Group Name: admins
  Auth: sha
  Priv: aes

  User Name: user1
  Group Name: users
  Auth: sha
  Priv: none
```

4.12 RMON

4.12.1 Set RMON function

[Syntax]

rmon *switch*

no rmon

[Parameter]

switch : RMON function operation

Setting value	Description
enable	Enable RMON function
disable	Disable RMON function

[Initial value]

rmon enable

[Input mode]

global configuration mode

[Description]

Sets the system-wide operation of the RMON function.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

If this command is used to disable the system-wide RMON function, the following RMON group operations are disabled.

- Ethernet statistical information group
- History group
- Alarm group
- Event group

This command can be set using the private MIB ysrmonSetting (1.3.6.1.4.1.1182.3.7.1).

[Example]

Enable RMON function.

```
SWX232x(config)#rmon enable
```

Disable RMON function.

```
SWX232x(config)#rmon disable
```

4.12.2 Set RMON Ethernet statistical information group

[Syntax]

rmon statistics *index* [owner *owner*]
no rmon statistics *index*

[Parameter]

index	:	<1 - 65535>
		Index of the Ethernet statistical information group (etherStatsIndex)
owner	:	Name of the Ethernet statistical information group owner (etherStatsOwner)
		Maximum 127 characters
		(if omitted : RMON_SNMP)

[Initial value]

none

[Input mode]

interface mode

[Description]

Enables the RMON Ethernet statistical information group setting for the applicable interface.

If this command is set, statistical information is collected, and the RMON MIB's etherStatsTable can be acquired.

This command can be specified a maximum number of eight times for the same interface.

If this command is executed with the "no" syntax, selete the setting and the collected statistical information.

[Note]

To enable the Ethernet statistical information group setting of the RMON function, it is necessary to enable the system-wide RMON function in addition to this command.

If this command is overwritten, the previously collected statistical information is deleted, and collection is once again started.

If the system-wide RMON function is disabled, collection of statistical information is interrupted. Subsequently, if the system-wide RMON function is enabled, the previously collected statistical data is deleted, and collection is once again started.

[Example]

Enable the RMON Ethernet statistical information group settings for port1.1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#rmon statistics 1
```

4.12.3 Set RMON history group

[Syntax]

rmon history *index* [buckets *buckets*] [interval *interval*] [owner *owner*]
no rmon history *index*

[Parameter]

index	:	<1 - 65535>
		Index of history group (historyControlIndex)
buckets	:	<1 - 65535>
		Number of history group items to maintain (historyControlBucketsRequested)
		(if omitted : 50)
interval	:	<1 - 3600>
		Interval at which to save history group items (seconds) (historyControlInterval)
		(if omitted : 1800)
owner	:	Name of history group owner (historyControlOwner)

Maximum 127 characters

(if omitted : RMON_SNMP)

[Initial value]

none

[Input mode]

interface mode

[Description]

Enables RMON history group settings for the applicable interface.

If this command is set, it will be possible to acquire the RMON MIB's historyControlTable. After setting this command, history information is collected at the specified interval, and the RMON MIB's etherHistoryTable can be acquired.

This command can be specified a maximum number of eight times for the same interface.

If this command is executed with the "no" syntax, delete the setting and the collected historical information.

[Note]

To enable the history group setting of the RMON function, it is necessary to enable the system-wide RMON function in addition to this command.

If this command is overwritten, the previously collected historical information is deleted, and collection is once again started.

If the system-wide RMON function is disabled, collection of historical information is interrupted. Subsequently, if the system-wide RMON function is enabled, the previously collected historical data is deleted, and collection is once again started.

[Example]

Enable the RMON historical group settings for port1.1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#rmon history 1
```

4.12.4 Set RMON event group

[Syntax]

rmon event *index type community* [description *description*] [owner *owner*]

no rmon event *index*

[Parameter]

index : <1 - 65535>

Index of event group (eventIndex)

type : Event type (eventType)

Setting value	Description
log	Record in log
trap	Send SNMP trap
log-trap	Record in log and send SNMP trap

community : Community name (eventCommunity)

Maximum 127 characters

This can be specified if *type* is "trap" or "log-trap".

description : Description of event (eventDescription)

Maximum 127 characters

(if omitted : RMON_SNMP)

owner : Name of event group owner (eventOwner)

Maximum 127 characters

(if omitted : RMON_SNMP)

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Enables the RMON event group settings.

If this command is set, it will be possible to acquire the RMON MIB's eventTable. Use the **rmon alarm** command to set the event group for this command.

If this command is executed with the "no" syntax, the setting value is deleted.

[Note]

To enable the event group setting of the RMON function, it is necessary to enable the system-wide RMON function in addition to this command.

In order for RMON to send an SNMP trap, you must have made SNMP trap transmission settings.

[Example]

After making SNMP trap settings, enable the RMON event group setting. Set the type of event as "log-trap", and the community name of the trap as "public".

```
SWX232x(config)#snmp-server host 192.168.100.3 traps version 2c public
SWX232x(config)#snmp-server enable trap rmon
SWX232x(config)#rmon event 1 log-trap public
```

4.12.5 Set RMON alarm group

[Syntax]

rmon alarm *index variable* interval *interval* [*type*] rising-threshold *rising_threshold* event *rising_event-index* falling-threshold *falling_threshold* event *falling_event_index* [alarmstartup *startup*] [owner *owner*]

rmon alarm *index variable* interval *interval* [*type*] rising-threshold *rising_threshold* event *rising_event-index* [owner *owner*]

rmon alarm *index variable* interval *interval* [*type*] falling-threshold *falling_threshold* event *falling_event_index* [owner *owner*]

no rmon alarm *index*

[Parameter]

index : <1-65535>

Index of alarm group (alarmIndex)

variable : MIB object to be monitored (alarmVariable)

interval : <1-2147483647>

Sampling interval (seconds)(alarmInterval)

type : Sampling type (alarmSampleType)

Setting value	Description
absolute	Compare by absolute value. Directly compare sample value and threshold value
delta	Compare by relative value. Compare the difference between the latest sample value and the previous sample value

(if omitted : absolute)

rising_threshold : <1-2147483647>

Upper threshold value (alarmRisingThreshold)

rising_event_index : <1-65535>

Event index (alarmRisingEventIndex)

falling_threshold : <1-2147483647>

Lower threshold value (alarmFallingThreshold)

falling_event_index : <1-65535>

Event index (alarmFallingEventIndex)

startup : <1-3>

Threshold value used for first alarm decision (alarmStartupAlarm)

Setting value	Description
1	Use only upper threshold value (risingAlarm)
2	Use only lower threshold value (fallingAlarm)
3	Use both upper threshold value and lower threshold value (risingOrFallingAlarm)

(if omitted : 3)

owner : Name of alarm group owner (alarmOwner)

maximum 127 characters

(if omitted : RMON_SNMP)

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Enables the RMON alarm group settings.

Set *variable* as the MIB object that will be the target of monitoring by the RMON alarm group. Of the etherStatsEntry(.1.3.6.1.2.1.16.1.1.1) MIB objects, *variable* can be specified only as a MIB object that has a counter type. This can be specified in the following three formats.

- etherStatsEntry.X.Y
- (OID name under etherStatsEntry).Y
- .1.3.6.1.2.1.16.1.1.1.X.Y

For example, if specifying etherStatsPkts.1(.1.3.6.1.2.1.16.1.1.1.5.1), it can be specified in any of the following formats.

Format	Description
etherStatsEntry.X.Y	etherStatsEntry.5.1
(OID name under etherStatsEntry).Y	etherStatsPkts.1
.1.3.6.1.2.1.16.1.1.1.X.Y	.1.3.6.1.2.1.16.1.1.1.5.1

You can use a format that specifies either *rising_threshold* or *falling_threshold*, not both. In this case, the following values are used for parameters whose setting is omitted.

- Use only *rising_threshold*
  - *falling_threshold* : Same value as *rising_threshold*
  - *falling_event_index* : Same value as *rising_event_index*
  - *startup* : 1 (Use only upper_threshold)
- Use only *falling_threshold*
  - *rising_threshold* : Same value as *falling_threshold*
  - *rising_event_index* : Same value as *falling_event_index*
  - *startup* : 2 (Use only lower_threshold)

If this command is set, it will be possible to acquire the RMON MIB's alarmTable.

If this command is executed with the "no" syntax, the setting value is deleted.

[Note]

To enable the alarm group setting of the RMON function, it is necessary to enable the system-wide RMON function in addition to this command.

The MIB object specified in *variable* is a MIB object of the Ethernet statistical information group. If an Ethernet statistical information group possessing the applicable index has not been created, this command returns an error.

The Ethernet statistical information group can be created by the **rmon statistics** command. If the Ethernet statistical information group being used by this command is deleted, this command is also deleted.

The event index specifies the index that is set by the **rmon event** command. If the event group being used by this command is deleted, this command is also deleted.

The *rising_threshold* value must be a higher value than the *falling_threshold* value.

If this command is overwritten, the previous sampling data is deleted, and sampling is once again started.

If the system-wide RMON function is disabled, sampling is interrupted. Subsequently, if the system-wide RMON function is enabled, the previous sampling data is deleted, and sampling is once again started.

[Example]

Enable the RMON alarm group settings with the following conditions.

- The MIB object to be monitored is etherStatsPkts.1.
- The sampling interval is 180 seconds.
- The sampling type is delta.
- The upper threshold value is 3000, and the event when rising above the upper threshold value is 1.
- The lower threshold value is 2000, and the event when falling below the lower threshold value is 1.

```
SWX232x(config)#rmon alarm 1 etherStatsPkts.1 interval 180 delta rising-threshold
3000 event 1 falling-threshold 2000 event 1
```

4.12.6 Show RMON function status

[Syntax]

show rmon

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the settings and status of the RMON function.

The following items are shown.

- System-wide RMON function settings
- RMON function settings for each group
  - Ethernet statistical information group
  - History group
  - Alarm group
  - Event group

[Example]

```
SWX232x>show rmon
rmon: Enable

statistics:
    rmon collection index 1
    stats->ifindex = 5001
    input packets 7, bytes 600, drop events 0, multicast packets 4
    output packets 17, bytes 2091, multicast packets 17 broadcast packets 0

history:
    history index = 1
    data source ifindex = 5001
    buckets requested = 50
    buckets granted = 50
    Interval = 1800
    Owner RMON_SNMP

event:
    event Index = 1
       Description RMON_SNMP
       Event type Log
       Event community name RMON_SNMP
       Last Time Sent = 00:00:58
       Owner  RMON_SNMP

alarm:
```

```
    alarm Index = 1
      alarm status = VALID
        alarm Interval = 15
        alarm Type is Absolute
        alarm Value  = 0
        alarm Rising Threshold = 10
        alarm Rising Event = 1
        alarm Falling Threshold = 7
        alarm Falling Event = 1
        alarm Startup Alarm = 3
        alarm Owner is RMON_SNMP
```

4.12.7 Show RMON Ethernet statistical information group status

[Syntax]

show rmon statistics

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the settings and status of the RMON Ethernet statistical information group.

The following items are shown.

- Index
- Applicable interface
- Input packets
- Output packets

[Example]

```
SWX232x>show rmon statistics
    rmon collection index 1
    stats->ifindex = 5001
    input packets 7, bytes 600, drop events 0, multicast packets 4
    output packets 17, bytes 2091, multicast packets 17 broadcast packets 0
```

4.12.8 Show RMON history group status

[Syntax]

show rmon history

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the settings and status of the RMON history group.

The following items are shown.

- Index
- Applicable interface
- Number of history group items to maintain
- Interval at which to save history group items
- Owner name

[Example]

```
SWX232x>show rmon history
        history index = 1
        data source ifindex = 5001
        buckets requested = 50
        buckets granted = 50
        Interval = 1800
        Owner RMON_SNMP
```

4.12.9 Show RMON event group status

[Syntax]

show rmon event

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the settings and status of the RMON event group.

The following items are shown.

- Index
- Description of event
- Type of event
- Community name when sending trap
- Time of executing event
- Owner name

[Example]

```
SWX232x>show rmon event
    event Index = 1
       Description RMON_SNMP
       Event type Log
       Event community name RMON_SNMP
       Last Time Sent = 00:00:58
       Owner  RMON_SNMP
```

4.12.10 Show RMON alarm group status

[Syntax]

show rmon alarm

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the settings and status of the RMON alarm group.

The following items are shown.

- Index
- Alarm status
- MIB object to be monitored
- Sampling interval
- Sampling type
- Measured value
- Upper threshold value
- Event for upper threshold value
- Lower threshold value
- Event for lower threshold value
- Startup alarm
- Owner name

[Example]

```
SWX232x>show rmon alarm
      alarm Index = 1
        alarm status = VALID
          alarm Interval = 15
          alarm Type is Absolute
          alarm Value  = 0
          alarm Rising Threshold = 10
          alarm Rising Event = 1
          alarm Falling Threshold = 7
          alarm Falling Event = 1
          alarm Startup Alarm = 3
          alarm Owner is RMON_SNMP
```

4.12.11 Clear counters of the RMON Ethernet statistical information group

[Syntax]

rmon clear counters

[Input mode]

interface mode

[Description]

Clears the counters of the RMON Ethernet statistical information group for the applicable interface.

[Example]

Clear the counters of the RMON Ethernet statistical information group for port1.1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#rmon clear counters
```

4.13 Telnet server

4.13.1 Start Telnet server and change listening port number

[Syntax]

telnet-server enable [*port*]
telnet-server disable
no telnet-server

[Keyword]

enable	:	Telnet server is enabled
disable	:	Telnet server is disable

[Parameter]

port	:	<1-65535>
		Listening port of the Telnet server (if omitted: 23)

[Initial value]

telnet-server disable

[Input mode]

global configuration mode

[Description]

Enables the Telnet server. You can also specify the listening TCP port number.

If this command is executed with the "no" syntax, the function is disabled.

[Example]

Start the Telnet server with 12345 as the listening port number.

```
SWX232x(config)#telnet-server enable 12345
```

4.13.2 Show Telnet server settings

[Syntax]

show telnet-server

[Input mode]

privileged EXEC mode

[Description]

Shows the settings of the Telnet server. The following items are shown.

- Telnet server function enabled/disabled status
- Listening port number
- VLAN interface that is permitted to access the TELNET server
- Filter that controls access to the TELNET server

[Example]

Show the settings of the Telnet server.

```
SWX232x#show telnet-server
Service:Enable
Port:23
```

```
Management interface(vlan): 1
Interface(vlan):1, 2, 3
Access:
    deny   192.168.100.5
    permit 192.168.100.0/24
```

4.13.3 Set host that can access the Telnet server

[Syntax]

telnet-server interface *interface*
no telnet-server interface *interface*

[Parameter]

interface : VLAN interface name

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Sets the VLAN interface that allows access to the Telnet server.

If this command is executed with the "no" syntax, the specified interface is deleted.

This command can be used to specify up to eight items, which are applied in the order that they are specified.

If this command is not set, access is permitted only from the management VLAN.

[Note]

If **telnet-server enable** is not specified, this command does not function.

[Example]

Allow access to the Telnet server from the hosts connected to VLAN #1 and VLAN #2.

```
SWX232x(config)#telnet-server interface vlan1
SWX232x(config)#telnet-server interface vlan2
```

4.13.4 Restrict access to the TELNET server according to the IP address of the client

[Syntax]

telnet-server access *action info*
no telnet-server access [*action info*]

[Parameter]

action : Specifies the action for the access condition

Setting value	Description
deny	"Deny" the condition
permit	"Permit" the condition

info : Specifies the transmission-source IPv4 address or IPv6 address that is the condition.

Setting value	Description
A.B.C.D	Specifies an IPv4 address (A.B.C.D)
A.B.C.D/M	Specifies an IPv4 address (A.B.C.D) with subnet mask length (Mbit)
X:X::X:X	Specifies an IPv6 address (X:X::X:X)
X:X::X:X/M	Specifies an IPv6 address (X:X::X:X) with subnet mask length (Mbit)
any	Applies to all IPv4 addresses and IPv6 addresses

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Restrict access to the TELNET server according to the client terminal's IPv4/IPv6 address.

Up to eight instances of this command can be set, and those that are specified earlier take priority for application.

If this command is set, all access that does not satisfy the registered conditions is denied.

However, if this command is not set, all access is permitted.

If this command is executed with the "no" syntax, the specified setting is deleted.

If this command is executed with the "no" syntax, and parameter is omitted, all settings are deleted.

[Note]

If **telnet-server enable** is not specified, this command does not function.

[Example]

Permit access to the TELNET server only from 192.168.1.1 and the 192.168.10.0/24 segment.

```
SWX232x(config)#telnet-server access permit 192.168.1.1
SWX232x(config)#telnet-server access permit 192.168.10.0/24
```

Deny only access to the TELNET server from the segment 192.168.10.0/24.

```
SWX232x(config)#telnet-server access deny 192.168.10.0/24
SWX232x(config)#telnet-server access permit any
```

4.14 Telnet client

4.14.1 Start Telnet client

[Syntax]

telnet *host* [*port*]

[Parameter]

host	:	Remote host name, IPv4 address (A.B.C.D), or IPv6 address(X:X::X:X) If you specify an IPv6 link local address, you must also specify the output interface (fe80::X%vlanN format)
port	:	<1-65535> Port number to use (if omitted: 23)

[Initial value]

none

[Input mode]

privileged EXEC mode

[Description]

Connects to the specified host via Telnet.

[Example]

Connect via Telnet to port number 12345 of the host at IPv4 address 192.168.100.1.

```
SWX232x#telnet 192.168.100.1 12345
```

Connect via Telnet to port number 12345 of the host at IPv6 address fe80::2a0:deff:fe11:2233.

```
SWX232x#telnet fe80::2a0:deff:fe11:2233%vlan1 12345
```

4.14.2 Enable Telnet client

[Syntax]

telnet-client *switch*

no telnet-client

[Parameter]

switch : Whether to enable TELNET client

Setting value	Description
enable	Enable
disable	Disable

[Initial value]

telnet-client disable

[Input mode]

global configuration mode

[Description]

Enables use of the telnet command as a Telnet client.

If this command is executed with the "no" syntax, the Telnet client is disabled.

[Example]

Enable the Telnet client.

```
SWX232x(config)#telnet-client enable
```

4.14.3 Remote login to stack slave

[Syntax]

remote-login *stack_id*

[Parameter]

stack_id : <1-2>

Stack slave ID

[Initial value]

none

[Input mode]

privileged EXEC mode

[Description]

In a stack configuration, remotely log into the specified stack slave from the stack master using a Telnet client.

When remote login succeeds, the stack ID is automatically shown added to the prompt.

For remote login, user authentication is not performed, and login occurs as an unnamed user. For this reason, if you want to transition to privileged EXEC mode after remote login, you must enter the administrator password.

[Example]

Remotely log into stack slave (ID:2) from the stack master.

```
SWX232x#remote-login 2

...

SWX232x-2>
```

4.15 TFTP server

4.15.1 Start TFTP server and change listening port number

[Syntax]

tftp-server enable [*port*]

tftp-server disable

no tftp-server

[Keyword]

enable	:	TFTP server is enabled
disable	:	TFTP server is disable

[Parameter]

port	:	<1-65535> Listening port number of the TFTP server (if omitted: 69)

[Initial value]

tftp-server disable

[Input mode]

global configuration mode

[Description]

Enables the TFTP server. You can also specify the listening TCP port number.

If this command is executed with the "no" syntax, the TFTP server is disabled.

[Example]

Start the TFTP server with 12345 as the listening port number.

```
SWX232x(config)#tftp-server enable 12345
```

4.15.2 Show TFTP server settings

[Syntax]

show tftp-server

[Input mode]

privileged EXEC mode

[Description]

Shows the settings of the TFTP server. The following items are shown.

- TFTP server function enabled/disabled status
- Listening port number
- VLAN interface that is permitted to access the TFTP server

[Example]

Show the settings of the TFTP server.

```
SWX232x#show tftp-server
Service:Enable
Port:69
Management interface(vlan): 1
Interface(vlan):1, 2, 3
```

4.15.3 Set hosts that can access the TFTP server

[Syntax]

tftp-server interface *interface*
no tftp-server interface *interface*

[Parameter]

interface	:	VLAN interface name

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Sets the VLAN interface that allows access to the TFTP server.

If this command is executed with the "no" syntax, the specified interface is deleted

This command can be used to specify up to eight items, which are applied in the order that they are specified.

If this command is not set, access is permitted only from the management VLAN.

[Example]

Allow access to the TFTP server from the hosts connected to VLAN #1 and VLAN #2.

```
SWX232x(config)#tftp-server interface vlan1
SWX232x(config)#tftp-server interface vlan2
```

4.16 HTTP server

4.16.1 Start HTTP server and change listening port number

[Syntax]

http-server enable [*port*]
http-server disable
no http-server

[Keyword]

enable	:	HTTP server is enabled
disable	:	HTTP server is disabled

[Parameter]

port	:	<1-65535> Listening port number of the HTTP server (if omitted: 80)

[Initial value]

http-server disable

[Input mode]

global configuration mode

[Description]

Enables the HTTP server. You can also specify the listening TCP port number.

If this command is executed with the "no" syntax, the function is disabled.

[Example]

Start the HTTP server with 8080 as the listening port number.

```
SWX232x(config)#http-server enable 8080
```

4.16.2 Start secure HTTP server and change listening port number

[Syntax]

http-server secure enable [*port*]
http-server secure disable
no http-server secure

[Keyword]

enable	:	Enable the secure HTTP server
disable	:	Disable the secure HTTP server

[Parameter]

port	:	<1-65535> Listening port number of the secure HTTP server (if omitted: 443)

[Initial value]

http-server secure disable

[Input mode]

global configuration mode

[Description]

Enables the secure HTTP server. You can also specify the listening TCP port number.

If this command is executed with the "no" syntax, the function is disabled.

If the secure HTTP server is enabled, encryption is performed in software, meaning that depending on the amount of traffic, the CPU usage rate will rise.

To avoid a high usage rate, it is desirable to avoid access by multiple users to an automatically updated web page such as the dashboard or the LAN map.

[Example]

Start the secure HTTP server with 8080 as the listening port number.

```
SWX232x(config)#http-server secure enable 8080
```

4.16.3 Show HTTP server settings

[Syntax]

show http-server

[Input mode]

privileged EXEC mode

[Description]

Shows the settings of the HTTP server. The following items are shown.

- HTTP server function enabled/disabled status
- HTTP server's listening port number
- VLAN interface that is permitted to access the HTTP server
- Filter that controls access to the HTTP server
- Secure HTTP server function enabled/disabled status
- Log-in timeout time

[Example]

Show the settings of the HTTP server.

```
SWX232x#show http-server
HTTP :Enable(80)
HTTPS:Disable
Management interface(vlan): 1
Interface(vlan):1
Access:None
Login timeout:30 min 51 sec
```

4.16.4 Set hosts that can access the HTTP server

[Syntax]

http-server interface *interface*
no http-server interface *interface*

[Parameter]

interface : VLAN interface name

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Sets the VLAN interface that allows access to the HTTP server.

If this command is executed with the "no" syntax, the specified interface is deleted.

This command can be used to specify up to eight items, which are applied in the order that they are specified.

If this command is not set, access is permitted only from the management VLAN.

[Example]

Allow access to the HTTP server from the hosts connected to VLAN #1 and VLAN #2.

```
SWX232x(config)#http-server interface vlan1
SWX232x(config)#http-server interface vlan2
```

4.16.5 Restrict access to the HTTP server according to the IP address of the client

[Syntax]

http-server access *action info*

no http-server access [*action info*]

[Parameter]

action : Specifies the action for the access condition

Setting value	Description
deny	"Deny" the condition
permit	"Permit" the condition

info : Specifies the transmission-source IPv4 address or IPv6 address that is the condition.

Setting value	Description
A.B.C.D	Specifies an IPv4 address (A.B.C.D)
A.B.C.D/M	Specifies an IPv4 address (A.B.C.D) with subnet mask length (Mbit)
X:X::X:X	Specifies an IPv6 address (X:X::X:X)
X:X::X:X/M	Specifies an IPv6 address (X:X::X:X) with subnet mask length (Mbit)
any	Applies to all IPv4 addresses and IPv6 addresses

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Restrict access to the HTTP server according to the client terminal's IPv4/IPv6 address.

Up to eight instances of this command can be set, and those that are specified earlier take priority for application.

If this command is set, all access that does not satisfy the registered conditions is denied.

However, if this command is not set, all access is permitted.

If this command is executed with the "no" syntax, the specified setting is deleted.

If this command is executed with the "no" syntax, and parameter is omitted, all settings are deleted.

[Note]

If **http-server enable** or **http-server secure enable** are not specified, this command does not function.

[Example]

Permit access to the HTTP server only from 192.168.1.1 and the 192.168.10.0/24 segment.

```
SWX232x(config)#http-server access permit 192.168.1.1
SWX232x(config)#http-server access permit 192.168.10.0/24
```

Deny access to the HTTP server only from 192.168.10.0/24 segment.

```
SWX232x(config)#http-server access deny 192.168.10.0/24
SWX232x(config)#http-server access permit any
```

4.16.6 Web GUI display language

[Syntax]

http-server language *lang*

no http-server language

[Parameter]

lang : Specify the language

Setting value	Description
japanese	Japanese
english	English

[Initial value]

http-server language japanese

[Input mode]

global configuration mode

[Description]

Sets the Web GUI display language.

If this command is executed with the "no" syntax, the setting returns to the default.

[Example]

Set the Web GUI display language to English.

```
SWX232x(config)#http-server language english
```

4.16.7 Set log-in timeout time for HTTP server

[Syntax]

http-server login-timeout *min* [*sec*]

no http-server login-timeout

[Parameter]

min : <0-35791>

Timeout time (minutes)

sec : <0-2147483>

Timeout time (seconds)

[Initial value]

http-server login-timeout 5

[Input mode]

global configuration mode

[Description]

Specify the time until automatic logout when there has been no access to the HTTP server.

If sec is omitted, 0 is specified.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

The smallest value that can be specified is one minute.

[Example]

Set the timeout time for the HTTP server to 2 minutes 30 seconds.

```
SWX232x(config)#http-server login-timeout 2 30
```

4.17 HTTP Proxy

4.17.1 Enable HTTP Proxy function

[Syntax]

http-proxy *switch*

no http-proxy

[Parameter]

switch : Whether to enable HTTP Proxy function

Setting value	Description
enable	Enable
disable	Disable

[Initial value]

http-proxy disable

[Input mode]

global configuration mode

[Description]

Enables the HTTP Proxy function of the HTTP server.

If this command is executed with the "no" syntax, the function is disabled.

[Example]

Enable the HTTP Proxy function of the HTTP server.

```
SWX232x(config)#http-proxy enable
```

4.17.2 Set HTTP Proxy function timeout

[Syntax]

http-proxy timeout *time*

no http-proxy timeout [*time*]

[Parameter]

time : <1-180>

Time (seconds) until timeout occurs

[Initial value]

http-proxy timeout 60

[Input mode]

global configuration mode

[Description]

Specifies the timeout time when acquiring the Web GUI of an L2MS slave.

If this command is executed with the "no" syntax, the setting will be 60 seconds.

[Example]

Set HTTP Proxy function's timeout duration to two minutes.

```
SWX232x(config)#http-proxy timeout 120
```

4.17.3 Show HTTP Proxy function settings

[Syntax]

show http-proxy

[Input mode]

privileged EXEC mode

[Description]

Shows the settings of the HTTP Proxy function. The following items are shown.

- HTTP Proxy function enabled/disabled status
- Timeout time

[Example]

Show the settings of the HTTP Proxy function.

```
SWX232x#show http-proxy
Service:Enable
Timeout:60
```

4.18 SSH server

4.18.1 Start SSH server and change listening port number

[Syntax]

ssh-server enable [*port*]
ssh-server disable
no ssh-server

[Keyword]

enable	:	SSH server is enabled
disable	:	SSH server is disable

[Parameter]

port	:	<1-65535> Listening port of the SSH server (if omitted: 22)

[Initial value]

ssh-server disable

[Input mode]

global configuration mode

[Description]

Enables the SSH server. You can also specify the listening TCP port number.

In order to enable the SSH server, the host key must be created in advance (ssh-server host key generate).

If this command is executed with the "no" syntax, disable the SSH server.

[Note]

In order to log in from the SSH client, the user name and password must be registered in advance (username).

[Example]

Start the SSH server with 12345 as the listening port number.

```
SWX232x#ssh-server host key generate
SWX232x#configure terminal
SWX232x(config)#ssh-server enable 12345
```

4.18.2 Show SSH server settings

[Syntax]

show ssh-server

[Input mode]

privileged EXEC mode

[Description]

Shows the settings of the SSH server.

The following items are shown.

- SSH server function enabled/disabled status
- Listening port number
- Whether SSH server host key exists
- VLAN interface permitted to access the SSH server
- Filter that controls access to the SSH server

[Example]

Show the settings of the SSH server.

```
SWX232x#show ssh-server
```

```
Service:Enable
Port:23
Hostkey:Generated
Management interface(vlan): 1
Interface(vlan):1, 2, 3
Access:
    deny   192.168.100.5
    permit 192.168.100.0/24
```

4.18.3 Set host that can access the SSH server

[Syntax]

ssh-server interface *ifname*

no ssh-server interface *ifname*

[Parameter]

ifname : VLAN interface name

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Sets the VLAN interface that allows access to the SSH server.

If this command is executed with the "no" syntax, delete the specified interface.

Up to eight instances of this command can be set, and those that are specified earlier take priority for application.

If this command is not set, access is permitted only from the maintenance VLAN.

[Example]

Allow access to the SSH server from the hosts connected to VLAN #1 and VLAN #2.

```
SWX232x(config)#ssh-server interface vlan1
SWX232x(config)#ssh-server interface vlan2
```

4.18.4 Set client that can access the SSH server

[Syntax]

ssh-server access *action info*

no ssh-server access [*action info*]

[Parameter]

action : Specifies the action for the access condition

Setting value	Description
deny	"Deny" the condition
permit	"Permit" the condition

info : Specifies the transmission-source IPv4 address or IPv6 address that is the condition

Setting value	Description
A.B.C.D	Specifies an IPv4 address (A.B.C.D)
A.B.C.D/M	Specifies an IPv4 address (A.B.C.D) with subnet mask length (Mbit)
X:X::X:X	Specifies an IPv6 address (X:X::X:X)
X:X::X:X/M	Specifies an IPv6 address (X:X::X:X) with subnet mask length (Mbit)
any	Applies to all IPv4 addresses and IPv6 address

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Restrict access to the SSH according to the client terminal's IPv4/IPv6 address.

Up to eight instances of this command can be set, and those that are specified earlier take priority for application.

If this command is set, all access that does not satisfy the registered conditions is denied.

However, if this command is not set, all access is permitted.

If this command is executed with the "no" syntax, the specified setting is deleted.

If parameters are omitted with the "no" syntax, the all setting are deleted.

[Note]

If **ssh-server enable** command is not specified, this command does not function.

[Example]

Permit access to the SSH server only from 192.168.1.1 and the 192.168.10.0/24 segment.

```
SWX232x(config)#ssh-server access permit 192.168.1.1
SWX232x(config)#ssh-server access permit 192.168.10.0/24
```

Deny only access to the SSH server from the segment 192.168.10.0/24.

```
SWX232x(config)#ssh-server access deny 192.168.10.0/24
SWX232x(config)#ssh-server access permit any
```

4.18.5 Generate SSH server host key

[Syntax]

ssh-server host key generate [bit *bit*]

[Parameter]

bit : 1024, 2048

Bit length of RSA key

[Initial value]

none

[Input mode]

privileged EXEC mode

[Description]

Sets the host RSA key and host DSA key of the SSH server.

For the RSA key, the *bit* parameter can be used to specify the number of bits in the generated key. The DSA key generates a 1024-bit key.

[Note]

In order to use the SSH server function, this command must be executed in advance to generate the host keys.

If this command is executed when the host keys have already been specified, the user is asked to confirm whether to update the host keys.

It might take several minutes of time to generate the host keys.

This command can be executed only if the SSH server is disabled.

[Example]

Generate a 2048-bit RSA key and a DSA key.

```
SWX232x#ssh-server host key generate bit 2048
```

4.18.6 Clear SSH server host key

[Syntax]

clear ssh-server host key

[Input mode]

privileged EXEC mode

[Description]

Deletes the host RSA key and host DSA key of the SSH server.

[Note]

This command can be executed only if the SSH server is disabled.

[Example]

Delete the host RSA key and host DSA key.

```
SWX232x#clear ssh-server host key
```

4.18.7 Show SSH server public key

[Syntax]

show ssh-server host key [fingerprint]

[Keyword]

fingerprint	:	Show key fingerprint

[Input mode]

privileged EXEC mode

[Description]

Shows the public key of the SSH server.

If the "fingerprint" keyword is specified, the public key's key length, key fingerprint, and ASCII art are shown.

[Note]

Both the MD5 and SHA256 key fingerprint hash algorithms are shown.

[Example]

Show the public key.

```
SWX232x#show ssh-server host key
ssh-dss XXXXXXXXXX1kc3MAAAEBAPTB9YYdgvE+4bbhF4mtoIJri+ujdAIfgr4hL/0w7Jlvc50eXg
sXJoCqlPlsLRGHOOzxVYbOouPCUV/jPFCatgOIii8eJNzUqSB1e6MOFtGjmESrdYiafyIUhps+YWqd
TlIo0AFnVUKMqAbYODA3Cy7kNVptYRK8rcKWk1ChbatWnT/Z7RcmEVEou0qlOyp79b3DcpFM7ofa4d
9ySb6mj06Y/Ok8lL5qFhCHmGOGtqJTKZsqb5VnPz8FYC8t1s6/tpyrUa5aG2af/yTEa5U5BDYAuc88
wNIUG9alGo/8WIHiBJAm432o7UPqTHWO/5nYEQu44gmEPQrPGJ65GT8AAAAVAOpjE0Jyei+4c5qWSF
PXUgrLf5HAAABAQCnnPO+ZjWZcZwGa6LxTGMczAjDy5uwD4DWBbRxsPKaXlsicJGC0aridnTthIGa8
ARypDjhpL1a37SDezx8yClQ5vh+4SPLdS1hdSSzXXE+MXIICXnOVPdiKC4ia10n81tMxW/EPw4SqFP
77r7VvCE/JpXv82AN2JTJ/HAn3X7lvMyCsKZLoWrEcEcBH5anvAQKByVt7RerToZ4vSgodskv7nyXX
XXXXXXX

ssh-rsa XXXXXXXXXX1yc2EAAAABIwAAAQEAwvAZK18jKTCHIHQfRV4r7UOYChX0oeKjBbuuLSDhSH
WmhpG3xxJO0pDIedSF3Knb7LX2SfymQYJ7XYIqMjmU0oziv/zi+De/z3M7wJHQUwfMZEDAdR6Mx39w
6Q04/ehQcaszjXi+0Al2wG/kk56lAU23CW/i21o//5GZTzkFKyEJUtWauHWEW9glF5Yy7F64PesqoH
6h5oDNK7LhlT7s4QXRnUJphIlINrW278Dnvyry3liR+tgTJAq3cGHfYsaQCdankDilIQhUazUY0vJO
/gjYCjMuWH6Ek/cst+PCtgnt0XV5Bl079uRUmcACs2pDX5EWrwbPXXXXXXXXX==
```

Show the key fingerprint of the public key.

```
SWX232x#show ssh-server host key fingerprint
ssh-dss
1024 MD5:XX:XX:a8:b9:51:93:9d:d2:ec:40:1a:43:66:3a:XX:XX
+---[DSA 1024]----+
|   .* .          |
|=*=+. o          |
|E+X+   o         |
| o . + = + .     |
|.. ..O X .       |
|oo=.B.*.o        |
|  o +   S o      |
|   . o           |
|    E            |
+------[MD5]------+
1024 SHA256:XXXXearwsCXvYTfIKrS6yYSrjMh0fW6W0Bw7aAOXXXX
```

```
+---[DSA 1024]----+
|   . +E.         |
|    o o          |
|     o X S       |
|    + = * .      |
|   o . B * .     |
|       + o .     |
|      * * +      |
|X+.@ +o=         |
|@*o.= o.         |
+----[SHA256]-----+

ssh-rsa
2048 MD5:XX:XX:b8:07:e3:5e:57:b8:80:e3:fc:b3:24:17:XX:XX
+---[RSA 2048]----+
|                 |
|...*             |
|*+.              |
|    .            |
|   .   +         |
|                 |
|        E        |
|     . B..       |
|      . oo       |
+------[MD5]------+
2048 SHA256:XXXXMkUuEbkJggPD68UoR+gobWPhgu7qqXzE8iUXXXX
+---[RSA 2048]----+
|*.==+            |
|*o+= . .         |
|*=o.  . S        |
|      * S . .    |
|     + B * o     |
| = = . . .       |
|    o            |
|     .           |
|. * *            |
+----[SHA256]-----+
```

4.18.8 Set SSH client alive checking

[Syntax]

ssh-server client alive enable [*interval* [*count*]]
ssh-server client alive disable
no ssh-server client alive

[Parameter]

interval : <1-2147483647>
Client alive checking interval (seconds, if omitted: 100)

count : <1-2147483647>
Maximum count for client alive checking (if omitted: 3)

[Initial value]

ssh-server client alive disable

[Input mode]

global configuration mode

[Description]

Sets whether to perform client alive checking.

A message requesting a response is sent to the client at intervals of the number of seconds specified by "interval". If there is no response for a successive number of times specified by "count", the connection with this client is cut and the session is ended.

If this command is executed with the "no" syntax, the setting returns to the default.

4.19 SSH client

4.19.1 Start SSH client

[Syntax]

ssh [*user*@] *host* [*port*]

[Parameter]

user : User name used when logging in to the remote host

host : Remote host name, IPv4 address (A.B.C.D), or IPv6 address (X:X::X:X)

If you specify an IPv6 link local address, you must also specify the output interface (fe80::X%vlanN format)

port : <1-65535>

Port number to use (if omitted: 22)

[Initial value]

none

[Input mode]

privileged EXEC mode

[Description]

Connects to the specified host via SSH.

If *user* is omitted, access the SSH server using the currently logged-in user name.

If *user* is omitted when logged in as an unnamed user, "root" is used.

[Note]

The escape character is the tilde (~). The escape character is recognized only if it is input at the beginning of the line.

If the escape character is input twice in succession at the beginning of the line, the escape character is used as input to the server.

If the escape character followed by a period (.) is input, the connection is forcibly closed.

If the escape character followed by a question mark (?) is input, a list of escape inputs is shown.

[Example]

To the host at IPv4 address 192.168.100.1, connect via SSH using user name "uname" and port number 12345.

```
SWX232x#ssh uname@192.168.100.1 12345
```

To the host at IPv6 address fe80::2a0:deff:fe11:2233, connect via SSH using user name "uname" and port number 12345.

```
SWX232x#ssh uname@fe80::2a0:deff:fe11:2233%vlan1 12345
```

4.19.2 Enable SSH client

[Syntax]

ssh-client *switch*

no ssh-client

[Parameter]

switch : Whether to enable SSH client

Setting value	Description
enable	Enable
disable	Disable

[Initial value]

ssh-client disable

[Input mode]

global configuration mode

[Description]

Enables use of the **ssh** command as an SSH client.

If this command is executed with the "no" syntax, the SSH client is disabled.

[Example]

Enable the SSH client.

```
SWX232x(config)#ssh-client enable
```

4.19.3 Clear SSH host information

[Syntax]

clear ssh host *host*

[Parameter]

host : Remote host name, IPv4 address (A.B.C.D), or IPv6 address (X:X::X:X)

[Input mode]

privileged EXEC mode

[Description]

Delete the public key of the SSH server that is connected as an SSH client.

[Example]

Clear the SSH host information.

```
SWX232x#clear ssh host 192.168.100.1
```

4.20 E-mail notification

4.20.1 SMTP e-mail server settings

[Syntax]

mail server smtp *id* **host** *host* [**port** *port*] [**encrypt** *method*] [**auth** *username password*]

no mail server smtp *id*

[Keyword]

port : Specifying a port number for the e-mail server

encrypt : Specifying an encryption method

auth : Specifying the account information to use for SMTP authentication

[Parameter]

id : <1-10>

Mail server ID

host : Mail server address or host name

IPv4 address (A.B.C.D), IPv6 address (X:X::X:X)

When specifying an IPv6 link local address, the transmitting interface also needs to be specified (in fe80::X%vlanN format).

Host name (64 characters or less, Single-byte alphanumeric characters - . and :)

port : <1-65535>

Port number for e-mail server (this is 25 when omitted, and 465 when over-ssl is specified as *method*)

method : Encryption method

Setting value	Description
over-ssl	Encrypting communication (over SSL)

Setting value	Description
starttls	Encrypting communication (STARTTLS)

username : User name used for SMTP authentication

(64 characters or less, ? " | > and aingle-byte alphanumeric characters and symbols other than spaces)

password : Passwords used for SMTP authentication

(64 characters or less,? " | > and aingle-byte alphanumeric characters and symbols other than spaces)

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Sets server information used when sending e-mails.

[Note]

When performing SMTP authentication, the AUTH LOGIN command is used for authentication.

For the SSL/TLS version, TLSv1, TLSv1.1 and TLSv1.2 are supported.

When setting an IPv6 address as the e-mail server address, encryption using SSL/TLS cannot be used.

[Example]

Sets the e-mail transmission server to “smtp-server-test.com”.

```
SWX232x(config)#mail server smtp 1 host smtp-server-test.com
```

Specify “smtp-server-test2.com” as the e-mail transmission server, and configures settings for using encryption and SMTP authentication.

```
SWX232x(config)#mail server smtp 1 host smtp-server-test2.com encrypt over-ssl auth
test_user test_password
```

4.20.2 SMTP e-mail server name settings

[Syntax]

mail server smtp *id* **name** *server_name*
no mail server smtp *id*

[Parameter]

id : <1-10>

E-mail server ID

server_name : Mail server name

(64 characters or less, single-byte alphanumeric characters and symbols other than ?)

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Sets the name of the server used when sending e-mails.

[Example]

Sets the e-mail transmission server name to “test_mail_server”.

```
SWX232x(config)#mail server smtp 1 name test_mail_server
```

4.20.3 E-mail notification trigger settings

[Syntax]

mail notify *temp-id* **trigger** lan-map
mail notify *temp-id* **trigger** terminal

mail notify *temp-id* **trigger** stack
no mail notify *temp-id* **trigger** lan-map
no mail notify *temp-id* **trigger** terminal
no mail notify *temp-id* **trigger** stack

[Keyword]

lan-map	:	Notify events related to the LAN map
terminal	:	Notify events related to the terminal monitoring function
stack	:	Notify events related to the stack function

[Parameter]

temp-id	:	<1-10> E-mail template ID Specify a template to use for event notification

[Initial value]

no mail notify

[Input mode]

global configuration mode

[Description]

Configures the settings for e-mail notification of event information for the specified function.

[Note]

Event notifications related to the stack function are only for models that support the stack function.

[Example]

Sets the LAN map error detection event trigger for e-mail template #1.

```
SWX232x(config)#mail notify 1 trigger lan-map
```

4.20.4 E-mail transmission template settings mode

[Syntax]

mail temlate *temp-id*
no temlate

[Parameter]

temp-id	:	<1-10> E-mail template ID

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Switches to the mode for setting the template used when sending e-mails.

The following items can be configured after switching to template mode. Up to 10 templates can be created.

- E-mail transmission destination address
- E-mail transmission source address
- Subject of e-mails sent
- Wait time settings for e-mail transmission (only event notification used)

[Example]

Switches to the mode for setting e-mail template #1.

```
SWX232x(config)#mail template 1
SWX232x(config-mail)#
```

4.20.5 E-mail transmission server ID settings

[Syntax]

send server *server-id*
no send server

[Parameter]

server-id : <1-10>
E-mail template ID

[Initial value]

no send server

[Input mode]

E-mail template mode

[Description]

Sets the ID of the e-mail server to be used.

[Example]

Specifies server ID #1 for the e-mail server used in e-mail template #1.

```
SWX232x(config)#mail template 1
SWX232x(config-mail)#send server 1
```

4.20.6 E-mail transmission source address setting

[Syntax]

send from *address*
no send from *address*

[Parameter]

address : Source e-mail address
(256 characters or less, single-byte alphanumeric characters and _ - . @)

[Initial value]

no send from

[Input mode]

E-mail template mode

[Description]

Sets the source e-mail address.

[Example]

Specifies “sample@test.com” as the source e-mail address for e-mail template #1.

```
SWX232x(config)#mail template 1
SWX232x(config-mail)#send from sample@test.com
```

4.20.7 Destination e-mail address setting for e-mail transmission

[Syntax]

send to *address*
no send to

[Parameter]

address : Destination e-mail address
(256 characters or less, single-byte alphanumeric characters and _ - . @)

[Initial value]

no send to

[Input mode]

E-mail template mode

[Description]

Sets the destination e-mail addresses (maximum of four).

[Note]

This setting is used as the destination for event notifications, and is not used for the destinations when distributing certificates or sending notifications.

[Example]

Specifies “user@test.com” as the destination e-mail address for e-mail template #1.

```
SWX232x(config)#mail template 1
SWX232x(config-mail)#send to user@test.com
```

4.20.8 Setting for subject used when sending e-mails

[Syntax]

send subject *subject*
no send subject

[Parameter]

temp-id : Subject used when sending e-mails

(128 characters or less, single-byte alphanumeric characters and symbols other than the characters ? | >)

[Initial value]

no send subject

[Input mode]

E-mail template mode

[Description]

Specifies the subject for e-mails that are sent.

[Note]

The subject shown below will be used if this is not set.

- Event notification : Notification from SWX232x
- Certificate distribution : Certification publishment
- Certificate notification : Certification expiration

[Example]

Sets the subject to “TestMail” for e-mails sent using e-mail template #1.

```
SWX232x(config)#mail template 1
SWX232x(config-mail)#send subject TestMail
```

4.20.9 Wait time settings for e-mail transmission

[Syntax]

send notify wait-time *time*
no send notify wait-time

[Parameter]

time : <1-86400>

Transmission wait time (seconds)

[Initial value]

send notify wait-time 30

[Input mode]

E-mail template mode

[Description]

Sets the wait time before actually sending event-related notification e-mails.

[Note]

This setting is used as the wait time before event-related notification e-mails are sent.

[Example]

Sets the transmission wait time for e-mail template #1 to 60 seconds.

```
SWX232x(config)#mail template 1
SWX232x(config-mail)#send notify wait-time 60
```

4.20.10 E-mail settings when sending certificates

[Syntax]

mail send certificate *temp-id*
no mail send certificate

[Parameter]

temp-id : <1-10>
E-mail template ID

[Initial value]

no mail send certificate

[Input mode]

RADIUS configuration mode

[Description]

Specifies the template ID to use when sending RADIUS server client certificates.

The RADIUS server client certificate is sent to the e-mail address specified by the “user” command of the RADIUS server function.

[Note]

Example of e-mail body text used when sending RADIUS server client certificates
---
Certification is published.
Name : [Name] - Setting value for the NAME option in the “user” command
Account : [User name] - USERID value for the “user” command
MAC address : XX:XX:XX:XX:XX:XX
Expire : YYYY/MM/DD

[Example]

Specifies “#1” for the template ID to use when sending RADIUS server client certificates.

```
SWX232x(config-radius)#mail send certificate 1
```

4.20.11 E-mail settings for certificate notification

[Syntax]

mail send certificate-notify *temp-id*
no mail send certificate-notify

[Parameter]

temp-id : <1-10>
E-mail template ID

[Initial value]

no mail send certificate-notify

[Input mode]

RADIUS configuration mode

[Description]

Specifies the template to use when sending notifications of RADIUS server client certificates by e-mail.

[Note]

Example of e-mail body text used when sending notifications beforehand about expired term of validity for RADIUS server client certificates

---
Your certificate will expire in [X] days.
Name : [Name] - Setting value for the NAME option in the “user” command
Account : [User name] - USERID value for the “user” command
MAC address : XX:XX:XX:XX:XX:XX
Expire : YYYY/MM/DD

[Example]

Specifies “#2” for the template to use when sending notifications of RADIUS server client certificates by e-mail.

```
SWX232x(config-radius)#mail send certificate-notify 2
```

4.20.12 Notification timing settings for expired certificates

[Syntax]

mail certificate expire-notify *day* [*day*] [*day*]
no mail certificate expire-notify

[Parameter]

day : <1-90>
No. of days remaining for notification of expired term of validity

[Initial value]

mail certificate expire-notify 30

[Input mode]

RADIUS configuration mode

[Description]

Specifies the number of days to notify beforehand about expired term of validity for RADIUS server client certificates.

Up to three numbers of days for notifications can be specified.

[Note]

The *day* is displayed in descending order, regardless of the order in which it was inputted.

[Example]

Sets the number of days to notify beforehand about expired term of validity for RADIUS server client certificates to “50 days before” and “10 days before”.

```
SWX232x(config-radius)#mail certificate expire-notify 50 10
```

4.20.13 Show e-mail transmission information

[Syntax]

show mail information [*temp-id*]

[Parameter]

temp-id : <1-10>
E-mail template ID

[Input mode]

privileged EXEC mode

[Description]

Shows e-mail transmission information for the specified template ID.

If the template ID is omitted, this displays all e-mail information.

[Example]

Shows e-mail information for e-mail template #1.

```
SWX232x#show mail information 1
 Template ID         : 1
 Notify trigger      : lan-map, terminal, stack
 Server host         : smtp-server.com
 Server port         : 25
```

```
Encryption          : STARTTLS
Wait time           : 30 sec
Mail address (from) : sample@test.com
Mail address (to)   : user1@test.com
                      user2@test.com
                      user3@test.com
                      user4@test.com
```

4.21 LLDP

4.21.1 Enable LLDP function

[Syntax]

lldp run

no lldp run

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Enable the LLDP function for the entire system.

If this command is executed with the "no" syntax, disable the LLDP function for the entire system.

[Note]

In order to enable the LLDP function for a port, the following command must be set.

Set the **set lldp enable** command's *type* (LLDP agent mode) to "txrx", "txonly", or "rxonly" as necessary.

- **lldp run** (global configuration mode)
- **lldp-agent** (interface mode)
- **set lldp enable** *type* (LLDP agent mode)

[Example]

Enable LLDP function transmission and reception for LAN port #1.

```
SWX232x#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
SWX232x(config)#lldp run
SWX232x(config)#interface port1.1
SWX232x(config-if)#lldp-agent
SWX232x(lldp-agent)#set lldp enable txrx
```

4.21.2 Set system description

[Syntax]

lldp system-description *line*

no lldp system-description

[Parameter]

line : System description text string (255 characters or less)

[Initial value]

no lldp system-description

[Input mode]

global configuration mode

[Description]

Sets the system description used by the LLDP function.

If this command is executed with the "no" syntax, the setting returns to the default.

By default, this is "model name + firmware revision".

[Example]

Set the system description to SWITCH1_POINT_A.

```
SWX232x(config)#lldp system-description SWITCH1_POINT_A
```

4.21.3 Set system name

[Syntax]

lldp system-name *name*
no lldp system-name

[Parameter]

name : System name text string (255 characters or less)

[Initial value]

no lldp system-name

[Input mode]

global configuration mode

[Description]

Sets the system name used by the LLDP function.

If this command is executed with the "no" syntax, the setting returns to the default.

By default, this is "model name".

The specified value is set in "LLDP System Name TLV".

[Example]

Set the system name to SWITCH1.

```
SWX232x(config)#lldp system-name SWITCH1
```

4.21.4 Create LLDP agent

[Syntax]

lldp-agent
no lldp-agent

[Initial value]

none

[Input mode]

interface mode

[Description]

Create an LLDP agent, and transition to LLDP agent mode.

If this command is executed with the "no" syntax, delete the LLDP agent.

[Note]

When you delete the LLDP agent, the commands specified in LLDP agent mode are also deleted.

[Example]

Create an LLDP agent on port1.1, and transition to LLDP agent mode.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#lldp-agent
SWX232x(lldp-agent)#
```

4.21.5 Set automatic setting function by LLDP

[Syntax]

lldp auto-setting *switch*
no lldp auto-setting

[Parameter]

switch : Set automatic setting function by LLDP

Setting value	Description
enable	Enable automatic setting function by LLDP
disable	Disable automatic setting function by LLDP

[Initial value]

lldp auto-setting disable

[Input mode]

global configuration mode

[Description]

Enables the function by which LLDP frames transmitted by specific Yamaha devices can automatically modify the settings of a switch.

The functions that can be set are flow control, QoS, IGMP snooping, and EEE.

If this command is executed with the "no" syntax, the setting returns to the default.

This can be set only for a physical interface.

[Note]

In order to use this function, you must use the **set lldp enable** command to enable reception of LLDP frames.

[Example]

Enable automatic setting function by LLDP.

```
SWX232x(config)#lldp auto-setting enable
```

4.21.6 Set LLDP transmission/reception mode

[Syntax]

set lldp enable *type*
set lldp disable
no set lldp enable

[Parameter]

type : Transmission/reception mode

Setting value	Description
rxonly	Set receive-only mode
txonly	Set transmit-only mode
txrx	Set transmit and receive

[Initial value]

set lldp disable

[Input mode]

LLDP agent mode

[Description]

Sets the LLDP frame transmission/reception mode for the applicable interface.

If you specify **set lldp disable**, LLDP frames are not transmitted or received.

If this command is executed with the "no" syntax, the setting returns to the default.

[Example]

Set the LLDP transmission/reception mode of LAN port #1 to receive-only.

```
SWX232x(config)#lldp run
SWX232x(config)#interface port1.1
SWX232x(config-if)#lldp-agent
SWX232x(lldp-agent)#set lldp enable rxonly
```

4.21.7 Set type of management address

[Syntax]

set management-address-tlv *type*

no set management-address-tlv

[Parameter]

type : Type of management address

Setting value	Description
ip-address	Set IP address as the management address
mac-address	Set MAC address as the management address

[Initial value]

set management-address-tlv ip-address

[Input mode]

LLDP agent mode

[Description]

Sets the type of port management address used by LLDP.

If this command is executed with the "no" syntax, the setting returns to the default.

The specified value is set in "LLDP Management Address TLV".

[Example]

Set the MAC address as the type of management address for LAN port #1.

```
SWX232x(config)#lldp run
SWX232x(config)#interface port1.1
SWX232x(config-if)#lldp-agent
SWX232x(lldp-agent)#set management-address mac-address
```

4.21.8 Set basic management TLVs

[Syntax]

tlv-select basic-mgmt

no tlv-select basic-mgmt

[Initial value]

none

[Input mode]

LLDP agent mode

[Description]

Adds basic management TLVs to transmitted frames.

If this command is executed with the "no" syntax, exclude basic management TLVs from transmitted frames.

This command adds the following TLVs to LLDP frames.

<Basic management TLV>

(1) Port Description TLV : Description of port

(2) System Name TLV : Name of system

(3) System Description TLV : Description of system

(4) System Capabilities TLV : System capabilities

(5) Management Address TLV : Management address of port (MAC address or IP address)

[Example]

Add basic management TLVs to the LLDP frames that are transmitted on LAN port #1.

```
SWX232x(config)#lldp run
SWX232x(config)#interface port1.1
SWX232x(config-if)#lldp-agent
SWX232x(lldp-agent)#tlv-select basic-mgmt
```

4.21.9 Set IEEE-802.1 TLV

[Syntax]

tlv-select ieee-8021-org-specific

no tlv-select ieee-8021-org-specific

[Initial value]

none

[Input mode]

LLDP agent mode

[Description]

Adds IEEE-802.1 TLVs to transmitted frames.

If this command is executed with the "no" syntax, exclude IEEE-802.1 TLVs from transmitted frames.

This command adds the following TLVs to LLDP frames.

<IEEE-802.1 TLV>

(1) Port VLAN ID : ID of port VLAN

(2) Port and Protocol VLAN ID : ID of protocool VLAN

(3) Protocol Identity : List of supported protocols

(4) Link Aggregation : Link aggregation information

(5) VLAN Name : Name of port VLAN

[Example]

Add IEEE-802.1 TLVs to the LLDP frames that are transmitted on LAN port #1.

```
SWX232x(config)#lldp run
SWX232x(config)#interface port1.1
SWX232x(config-if)#lldp-agent
SWX232x(lldp-agent)#tlv-select ieee-8021-org-specific
```

4.21.10 Set IEEE-802.3 TLV

[Syntax]

tlv-select ieee-8023-org-specific

no tlv-select ieee-8023-org-specific

[Initial value]

none

[Input mode]

LLDP agent mode

[Description]

Adds IEEE-802.3 TLVs to transmitted frames.

If this command is executed with the "no" syntax, exclude IEEE-802.3 TLVs from transmitted frames.

This command adds the following TLVs to LLDP frames.

<IEEE-802.3 TLV>

(1) MAC/PHY Configuration/Status : Auto-negotiation support information

(2) Power Via MDI : PoE information (only for models with PoE function)

(3) Link Aggregation : Link aggregation information

(4) Maximum Frame Size : Maximum frame size

[Example]

Add IEEE-802.3 TLVs to the LLDP frames that are transmitted on LAN port #1.

```
SWX232x(config)#lldp run
SWX232x(config)#interface port1.1
SWX232x(config-if)#lldp-agent
SWX232x(lldp-agent)#tlv-select ieee-8023-org-specific
```

4.21.11 Set LLDP-MED TLV

[Syntax]

tlv-select med

no tlv-select med

[Initial value]

none

[Input mode]

LLDP agent mode

[Description]

If this command is executed with the "no" syntax, exclude LLDP-MED TLVs from transmitted frames.

This command adds the following TLVs to LLDP frames.

<LLDP-MED TLV>

(1) Media Capabilities : Type of LLDP-MED TLV transmitted

(2) Network Policy : Voice VLAN information (Only ports for which voice VLAN is specified)

(3) Extended Power-via-MDI : Extended PoE information (only for models with PoE function)

[Note]

Location Identification TLV is set to a value of "Location".

[Example]

Add LLDP-MED TLVs to the LLDP frames that are transmitted on LAN port #1.

```
SWX232x(config)#lldp run
SWX232x(config)#interface port1.1
SWX232x(config-if)#lldp-agent
SWX232x(lldp-agent)#tlv-select med
```

4.21.12 Set LLDP frame transmission interval

[Syntax]

set timer msg-tx-interval *tx_interval*

no set timer msg-tx-interval

[Parameter]

tx_interval : <5-3600>

LLDP frame transmission interval (seconds)

[Initial value]

set timer msg-tx-interval 30

[Input mode]

LLDP agent mode

[Description]

Sets LLDP frame transmission interval.

If this command is executed with the "no" syntax, the setting returns to the default.

[Example]

Set 60 seconds as the LLDP frame transmission interval on LAN port #1.

```
SWX232x(config)#lldp run
SWX232x(config)#interface port1.1
SWX232x(config-if)#lldp-agent
SWX232x(lldp-agent)#set timer msg-tx-interval 60
```

4.21.13 Set LLDP frame transmission interval for high speed transmission period

[Syntax]

set timer msg-fast-tx *fast_tx*

no set timer msg-fast-tx

[Parameter]

fast_tx : <1-3600>

LLDP frame transmission interval for high speed transmission period (seconds)

[Initial value]

set timer msg-fast-tx 1

[Input mode]

LLDP agent mode

[Description]

Sets the LLDP frame transmission interval during the high speed transmission period.

If this command is executed with the "no" syntax, the setting returns to the default.

The high speed transmission period is the period immediately after a port's connected device was newly found, and LLDP frames are transmitted according to the following commands for making high speed transmission period settings.

- **set timerx msg-fast-tx** *fast_tx* : Sets the transmission interval (seconds) during the high speed transmission period.
- **set tx-fast-init** *value* : Sets the number of LLDP frames transmitted during the high speed transmission period.

[Example]

Set 2 seconds as the LLDP frame transmission interval during the high speed transmission period on LAN port #1.

```
SWX232x(config)#lldp run
SWX232x(config)#interface port1.1
SWX232x(config-if)#lldp-agent
SWX232x(lldp-agent)#set timer msg-fast-tx 2
```

4.21.14 Set time from LLDP frame transmission stop until re-initialization

[Syntax]

set timer reinit-delay *reinit_delay*
no set timer reinit-delay

[Parameter]

reinit_delay : <1-10>

Time from LLDP frame transmission stop until re-initialization (seconds)

[Initial value]

set timer reinit-delay 2

[Input mode]

LLDP agent mode

[Description]

Sets the time from when LLDP frame transmission stops until re-initialization occurs.

If this command is executed with the "no" syntax, the setting returns to the default.

[Example]

Set 10 seconds as the time from when LLDP frame transmission stops on LAN port #1 until re-initialization occurs.

```
SWX232x(config)#lldp run
SWX232x(config)#interface port1.1
SWX232x(config-if)#lldp-agent
SWX232x(lldp-agent)#set timer reinit-delay 10
```

4.21.15 Set multiplier for calculating time to live (TTL) of device information

[Syntax]

set msg-tx-hold *value*
no set msg-tx-hold

[Parameter]

value : <1-100>

Multiplier for calculating the time to live (TTL) value of device information

[Initial value]

set msg-tx-hold 4

[Input mode]

LLDP agent mode

[Description]

Sets the multiplier for calculating the time to live (TTL) of device information.

If this command is executed with the "no" syntax, the setting returns to the default.

This setting is multiplied with the LLDP frame transmission interval (msg-tx-interval), and then increased by +1 to become the TTL value (seconds).

The TTL value is set in "Time To Live TLV".

TTL = msg-tx-interval x msg-tx-hold + 1 (seconds)

[Example]

Set 2 as the multiplier used to calculate the time to live (TTL) for device information on LAN port #1.

```
SWX232x(config)#lldp run
SWX232x(config)#interface port1.1
SWX232x(config-if)#lldp-agent
SWX232x(lldp-agent)#set msg-tx-hold 2
```

4.21.16 Set number of LLDP frames transmitted during the high speed transmission period

[Syntax]

set tx-fast-init *value*

no set tx-fast-init

[Parameter]

value : <1-8>

Number of LLDP frames transmitted during the high speed transmission period

[Initial value]

set tx-fast-init 4

[Input mode]

LLDP agent mode

[Description]

Sets the number of LLDP frames transmitted during the high speed transmission period.

If this command is executed with the "no" syntax, the setting returns to the default.

[Example]

Set 2 as the number of LLDP frames transmitted during the high speed transmission period on LAN port #1.

```
SWX232x(config)#lldp run
SWX232x(config)#interface port1.1
SWX232x(config-if)#lldp-agent
SWX232x(lldp-agent)#set tx-fast-init 2
```

4.21.17 Set maximum number of connected devices manageable by a port

[Syntax]

set too-many-neighbors limit *max_value*

no set too-many-neighbors limit

[Parameter]

max_value : <1-1000>

Maximum number of connected devices manageable by a port

[Initial value]

set too-many-neighbors limit 5

[Input mode]

LLDP agent mode

[Description]

Sets the maximum number of connected devices that can be managed by a port.

If this command is executed with the "no" syntax, the setting returns to the default.

If the maximum number of connected device for a port is exceeded, LLDP frames sent from new devices are ignored.

[Note]

When this command is set, the remote device management table is cleared once when the first LLDP frame is received on the applicable port.

[Example]

Set 10 as the maximum number of connected devices that can be managed by a port on LAN port #1.

```
SWX232x(config)#lldp run
SWX232x(config)#interface port1.1
SWX232x(config-if)#lldp-agent
SWX232x(lldp-agent)#set too-many-neighbors limit 10
```

4.21.18 Global interface setting for LLDP function

[Syntax]

lldp interface enable *type*

lldp interface disable

[Keyword]

enable	:	Enable LLDP function
disable	:	Disable LLDP function

[Parameter]

type : Transmission/reception mode

Setting value	Description
rxonly	Set receive-only mode
txonly	Set transmit-only mode
txrx	Set transmit and receive

[Input mode]

global configuration mode

[Description]

Enables or disables the LLDP function for all LAN/SFP port in a single operation.

If this setting is enabled, set the transmission and reception mode of the specified LLDP frames.

[Note]

This command can be executed only for global configuration mode.

This command is for making the LLDP setting of each interface, and is not shown in running-config.

[Example]

Enable the LLDP function of all LAN/SFP port, and set a mode that allows transmission and reception of LLDP frames.

```
SWX232x(config)#lldp interface enable txrx
```

4.21.19 Show interface status

[Syntax]

show lldp interface *ifname* [neighbor]

[Keyword]

neighbor	:	Shows information for connected devices.

[Parameter]

ifname : Interface name of the LAN/SFP port

Interface to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows LLDP information for the interface specified by *ifname*.

If "neighbor" is specified, information for the device connected to the interface is shown.

The following items are shown.

For **show lldp interface** *ifname*

- Interface and its statistical information

Agent Mode	Bridge mode (fixed as nearest bridge)
Enable (tx/rx)	Transmission mode/Reception mode (Y:enable, N:disable)
Message fast transmit time	LLDP frame transmission interval for high speed transmission period (seconds)
Message transmission interval	LLDP frame transmission interval (seconds)
Reinitialisation delay	Time from LLDP frame transmission stop until re-initialization (seconds)
MED Enabled	LLDP-MED TLV transmission enable/disable
Device Type	Device type (fixed as NETWORK_CONNECTIVITY)
Total frames transmitted	Number of LLDP frames transmitted
Total entries aged	Number of devices not received for more than TTL seconds, and deleted from management table
Total frames received	Number of LLDP frames received
Total frames received in error	Number of LLDP frame reception errors
Total frames discarded	Number of LLDP frames discarded
Total discarded TLVs	Number of TLV discarded
Total unrecognised TLVs	Number of TLVs that could not be recognized

For **show lldp interface** *ifname* neighbor

- Basic management information

Interface Name	Received interface name
System Name	System name
System Description	System description
Port Description	Port description
System Capabilities	System capabilities
Interface Numbering	Type of interface number
Interface Number	Number of interface
OID Number	OID number
Management Address	MAC address os IP addresss

- Mandatory TLV information

CHASSIS ID TYPE	CHASSIS ID TLV type and value
PORT ID TYPE	PORT ID TLV type and value
TTL (Time To Live)	Time to maintain device information (seconds)

- 8021 ORIGIN SPECIFIC TLV information

Port Vlan id	ID of port VLAN
PP Vlan id	ID of protocol VLAN
VLAN ID	ID of port VLAN
VLAN Name	Name of port VLAN
Remote Protocols Advertised	List of supported protocols
Remote VID Usage Digestt	VID Usage Digestt value
Remote Management Vlan	Name of management VLAN
Link Aggregation Status	Link aggregation enabled/disabled
Link Aggregation Port ID	ID of link aggregation port

- 8023 ORIGIN SPECIFIC TLV information

AutoNego Support	Auto negotiation enabled/disabled
AutoNego Capability	Communication methods that can be auto-negotiate
Operational MAU Type	Communication speed and duplex mode
MDI power support	Whether PoE function is supported
PSE power pair	PSE power pair
Power class	PoE power supply class
Type/source/priority	PoE power supply type, source, and priority order
PD requested power value	Power requested by PD device (0.1 mW units)
PSE allocated power value	Power that can be supplied by PSE device (0.1 mW units)
Link Aggregation Status	Link aggregation enabled/disabled
Link Aggregation Port ID	ID of link aggregation port
Max Frame Size	Maximum frame size

- LLDP-MED TLV information (shown if LLDP-MED TLV is received)

MED Capabilities	LLDP-MED TLV type list
MED Capabilities Dev Type	LLDP-MED media device type
MED Application Type	Application type
MED Vlan id	ID of VLAN
MED Tag/Untag	VLAN tagged or untagged
MED L2 Priority	L2 priority order
MED DSCP Val	DSCP value priority order
MED Location Data Format	Format of location data
Latitude Res	Resolution of latitude (number of significant upper bits)
Latitude	Latitude (34 bits)
Longitude Res	Resolution of longitude (number of significant upper bits)
Longitude	Longitude (34 bits)
AT	Altitude type
	1: meter
	2: floor of building
Altitude Res	Resolution of altitude (number of significant upper bits)
Altitude	Altitude (30 bits)

Datum	Geodetic datum
	0: USA's World Geodetic System (WGS 84)
	1: North American Datum (NAD 83)
	2: Average historical minimum sea level of North American Datum (NAD 83)
LCI length	Length of location information data
What	Place of reference location
	0: Location of the DHCP server
	1: Position of the network element thought to be nearest the client
	2: Location of client
Country Code	Country code
CA type	CA (Civic Address) type
MED Inventory	Inventory information list

Refer to RFC 3825 for details on location information.

[Example]

Show LLDP information for LAN port #1.

```
SWX232x#show lldp interface port1.1
Agent Mode                    : Nearest bridge
Enable (tx/rx)                : Y/Y
Message fast transmit time    : 1
Message transmission interval : 30
Reinitialisation delay        : 2
MED Enabled                   : Y
Device Type                   : NETWORK_CONNECTIVITY
LLDP Agent traffic statistics
  Total frames transmitted       : 0
  Total entries aged             : 0
  Total frames received          : 0
  Total frames received in error : 0
  Total frames discarded         : 0
  Total discarded TLVs           : 0
  Total unrecognised TLVs        : 0
SWX232x#
```

4.21.20 Show information for connected devices of all interfaces

[Syntax]

show lldp neighbors

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows information for connected devices of all interfaces.

(For the display format, refer to the **show lldp interface** *ifname neighbor* command)

[Example]

Show information for connected devices.

```
SWX232x#show lldp neighbors
Interface Name           : port1.1
System Name              : SWX2320-16MT
System Description       : SWX2320 Rev.2.05.02 (Mon Dec 14 12:08:51 2020)
Port Description         : port1.3
System Capabilities      : L2 Switching
Interface Numbering      : 2
Interface Number         : 5003
OID Number               :
Management MAC Address   : ac44.f230.0000
Mandatory TLVs
```

```
  CHASSIS ID TYPE
    IP ADDRESS           : 0.0.0.0
  PORT ID TYPE
    INTERFACE NAME       : port1.3
  TTL (Time To Live)     : 41
8021 ORIGIN SPECIFIC TLVs
  Port Vlan id               : 1
  PP Vlan id                 : 0
  Remote VLANs Configured
    VLAN ID                  : 1
    VLAN Name                : default
  Remote Protocols Advertised :
    Multiple Spanning Tree Protocol
  Remote VID Usage Digestt   : 0
  Remote Management Vlan     : 0
  Link Aggregation Status    :
  Link Aggregation Port ID   :
8023 ORIGIN SPECIFIC TLVs
  AutoNego Support           : Supported Enabled
  AutoNego Capability        : 27649
  Operational MAU Type       : 30
  Power via MDI Capability (raw data)
    MDI power support        : 0x0
    PSE power pair           : 0x0
    Power class              : 0x0
    Type/source/priority     : 0x0
    PD requested power value : 0x0
    PSE allocated power value : 0x0
  Link Aggregation Status    :
  Link Aggregation Port ID   :
  Max Frame Size             : 1522
LLDP-MED TLVs
  MED Capabilities           :
    Capabilities
    Network Policy
  MED Capabilities Dev Type  : End Point Class-3
  MED Application Type       : Reserved
  MED Vlan id                : 0
  MED Tag/Untag              : Untagged
  MED L2 Priority            : 0
  MED DSCP Val               : 0
  MED Location Data Format   : ECS ELIN
    Latitude Res      : 0
    Latitude          : 0
    Longitude Res     : 0
    Longitude         : 0
    AT                : 0
    Altitude Res      : 0
    Altitude          : 0
    Datum             : 0
    LCI length        : 0
    What              : 0
    Country Code      : 0
    CA type           : 0
  MED Inventory

SWX232x#
```

4.21.21 Clear LLDP frame counters

[Syntax]

clear lldp counters

[Input mode]

privileged EXEC mode

[Description]

Clear the LLDP frame counter of all ports.

[Example]

Clear the LLDP frame counter.

```
SWX232x>clear lldp counters
```

4.22 L2MS (Layer 2 management service) settings

4.22.1 Move to L2MS mode

[Syntax]

l2ms configuration

[Input mode]

global configuration mode

[Description]

Moves to L2MS mode in order to make L2MS settings.

[Note]

To return from L2MS mode to global configuration mode, use the **exit** command. To return to privileged EXEC mode, use the **end** command.

[Example]

Move to L2MS mode.

```
SWX232x(config)#l2ms configuration
SWX232x(config-l2ms)#
```

4.22.2 Set L2MS function

[Syntax]

l2ms enable
l2ms disable
no l2ms

[Keyword]

enable	:	Use the L2MS function
disable	:	Don't use the L2MS function

[Initial value]

l2ms enable

[Input mode]

L2MS mode

[Description]

Sets whether to use the L2MS function.

If this command is executed with the "no" syntax, the setting returns to the default.

[Example]

Use the L2MS function.

```
SWX232x(config)#l2ms configuration
SWX232x(config-l2ms)#l2ms enable
```

4.22.3 Set role of L2MS function

[Syntax]

l2ms role *role*
no l2ms role

[Parameter]

role	:	Role of L2MS function

Setting value	Description
master	Operate as an L2MS master that sets and controls SWR series or SWX series units that are connected subordinate to it
slave	Be managed from a Yamaha device that is operating as an L2MS master, such as a router, firewall, or SWX series unit that is set as the L2MS master

[Initial value]

l2ms role slave

[Input mode]

L2MS mode

[Description]

Sets the role when using the L2MS function.

If this command is executed with the "no" syntax, operate as a slave.

[Note]

If the same network includes multiple Yamaha routers or firewalls on which L2MS (switch controller function) is enabled, or multiple SWX series units that are set to be L2MS masters, the L2MS function will not operate correctly.

Ensure that a single network has only one device that is the L2MS master.

[Example]

Use the L2MS function as master.

```
SWX232x(config)#l2ms configuration
SWX232x(config-l2ms)#l2ms enable
SWX232x(config-l2ms)#l2ms role master
```

4.22.4 Set L2MS slave watch interval

[Syntax]

slave-watch interval *time*
no slave-watch interval

[Parameter]

time : <2-10>
Watch interval (seconds)

[Initial value]

slave-watch interval 3

[Input mode]

L2MS mode

[Description]

Specifies the time interval at which to transmit an L2MS slave query frame.

If this command is executed with the "no" syntax, the setting returns to the default.

If you set *time* to a high value, the query frame is transmitted less often, but it will take longer from when the L2MS slave is connected until the L2MS master recognizes it. If you set *time* to a low value, the opposite will be the case; the query frame is transmitted more often, but it will take less time from when the L2MS slave is connected until the L2MS master recognizes it.

[Note]

L2MS slave watch is performed only if L2MS is operating as master.

[Example]

Set the watch interval to five seconds.

```
SWX232x(config)#l2ms configuration
SWX232x(config-l2ms)#l2ms enable
SWX232x(config-l2ms)#l2ms role master
SWX232x(config-l2ms)#slave-watch interval 5
```

4.22.5 Set number of times that is interpreted as L2MS slave down

[Syntax]

slave-watch down-count *count*
no slave-watch down-count

[Parameter]

count : <2-10>
Number of times that is interpreted as down

[Initial value]

slave-watch down-count 3

[Input mode]

L2MS mode

[Description]

Sets the number of query frames that are transmitted without receiving a response frame from the slave until it is determined that the L2MS slave is down.

If this command is executed with the "no" syntax, the setting returns to the default.

If the number of query frames specified by *count* have been transmitted without receiving a response frame from the slave, it is determined that the corresponding L2MS slave is down.

[Note]

If the port to which the L2MS slave is connected is in a link-down state, determining that the L2MS slave is down might take a shorter time than the setting of this command.

Slave watch is performed only if L2MS is operating as master.

[Example]

Specify "8" as the count used to determine that the slave is down.

```
SWX232x(config)#l2ms configuration
SWX232x(config-l2ms)#l2ms enable
SWX232x(config-l2ms)#l2ms role master
SWX232x(config-l2ms)#slave-watch down-count 8
```

4.22.6 Set terminal management function

[Syntax]

terminal-watch enable
terminal-watch disable
no terminal-watch

[Keyword]

enable : Enable terminal management function

disable : Disable terminal management function

[Initial value]

terminal-watch disable

[Input mode]

L2MS mode

[Description]

Enables the terminal management function. If this is enabled, information about the devices existing on the network is obtained at regular intervals.

If this command is executed with the "no" syntax, disable terminal management function.

[Note]

Terminal management is performed only if L2MS is operating as master.

[Example]

Enable the terminal management function.

```
SWX232x(config)#l2ms configuration
SWX232x(config-l2ms)#l2ms enable
```

```
SWX232x(config-l2ms)#l2ms role master
SWX232x(config-l2ms)#terminal-watch enable
```

4.22.7 Set the device information acquisition time interval

[Syntax]

terminal-watch interval *time*

no terminal-watch interval

[Parameter]

time	:	<1800-86400> Acquisition interval (seconds)

[Initial value]

terminal-watch interval 1800

[Input mode]

L2MS mode

[Description]

Specifies the time interval at which network device information is acquired. Information for the devices existing on the network is acquired when the time specified by *time* has elapsed.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

If the terminal management function is not enabled, terminal information is not acquired, regardless of the setting of this command.

[Example]

Set the watch interval to 3,600 seconds.

```
SWX232x(config)#l2ms configuration
SWX232x(config-l2ms)#l2ms enable
SWX232x(config-l2ms)#l2ms role master
SWX232x(config-l2ms)#terminal-watch enable
SWX232x(config-l2ms)#terminal-watch interval 3600
```

4.22.8 Set L2MS control frame transmit/receive

[Syntax]

l2ms filter enable

l2ms filter disable

no l2ms filter

[Keyword]

enable	:	L2MS control frames cannot be transmitted or received
disable	:	L2MS control frames can be transmitted or received

[Initial value]

l2ms filter disable

[Input mode]

interface mode

[Description]

Prevents L2MS control frames from being transmitted or received.

If this command is executed with the "no" syntax, L2MS control frames can be transmitted and received.

[Note]

This command cannot be specified for the following interfaces.

- VLAN interface
- A physical interface inside a logical interface

A physical interface inside a logical interface operates according to the setting of this command on the interface inside which it exists. If the physical interface is inside the logical interface, the setting of the physical interface returns to the default.

Regardless of the setting of this command, L2MS control frames might not be transmitted or received if any of the following conditions exist.

- The interface is in the Blocking status due to STP or the loop detection function
- The **switchport trunk native vlan none** command has been specified
- It is inside a logical interface

[Example]

Prevent port1.5 from transmitting or receiving L2MS control frames.

```
SWX232x(config)#interface port1.5
SWX232x(config-if)#l2ms filter enable
```

4.22.9 Reset slave management

[Syntax]

l2ms reset

[Input mode]

privileged EXEC mode

[Description]

Removes all L2MS slaves managed by the L2MAS master from management, and searches for L2MS slaves once again.

[Note]

This can be executed only if L2MS is operating as master.

When this command is executed, L2MS slaves that were being managed also remove themselves from the state of being managed by the L2MS master.

After this command is executed, the timing at which L2MS slave watching resumes will depend on the time specified by the **slave-watch interval** command.

[Example]

Reset L2MS slave management.

```
SWX232x#l2ms reset
```

4.22.10 Show L2MS information

[Syntax]

show l2ms [detail]

[Keyword]

detail	:	Also show detailed information

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the following information according to the L2MS operating state.

- If L2MS is operating as master
  - Number of L2MS slaves being managed
  - Information for the L2MS slaves being managed
    - MAC address
    - Model name
    - Device name
    - Route
    - Uplink port
    - Settings applied
- If L2MS is operating as master and "detail" is specified
  - L2MS master information
    - Number of terminals connected to the L2MS master
    - Information of terminals connected to the L2MS master
      - MAC address
      - Ports connected
      - Time at which terminal was discovered
  - Number of L2MS slaves being managed

- Information for the L2MS slaves being managed
  - MAC address
  - Model name
  - Device name
  - Route
  - Linked-up ports
  - Uplink port
  - Downlink port
  - Settings applied
  - Number of terminals connected to the L2MS slave
  - Information of terminals connected to the L2MS slave (in the case of a switch)
    - MAC address
    - Ports connected
    - Time at which terminal was discovered
  - Information of terminals connected to the L2MS slave (in the case of an AP)
    - SSID connected
    - Frequency connected
    - Time at which terminal was discovered
- If L2MS is operating as slave
  - Whether managed by the L2MS master
  - MAC address of L2MS master (if managed)

[Note]

Information is not shown if L2MS is not operating.

Specifying "detail" is valid only if L2MS is operating as master.

[Example]

If L2Ms is operating as master, show detailed L2MS information.

```
SWX232x>show l2ms detail
Role : Master

[Master]
 Number of Terminals   : 0

[Slave]
 Number of Slaves      : 2
  [ac44.f230.00a5]
   Model name          : SWX2100-24G
   Device name         : SWX2100-24G_Z5301050WX
   Route               : port2.1
   LinkUp              : 1, 3, 9
     Uplink            : 1
     Downlink          : 3
   Config              : None
   Appear time         : Tue Mar 13 18:43:18 2018
   Number of Terminals : 1
    [bcae.c5a4.7fb3]
     Port              : 9
     Appear time       : Wed Mar 14 14:01:18 2018

  [00a0.deae.b8bf]
   Model name          : SWX2300-24G
   Device name         : SWX2300-24G_S4L000401
   Route               : port2.1-3
   LinkUp              : 1
     Uplink            : 1
     Downlink          : None
   Config              : None
   Appear time         : Tue Mar 13 18:43:18 2018
   Number of Terminals : 0
```

4.22.11 Show L2MS slave config information

[Syntax]

show l2ms slave-config [*slave*]

[Parameter]

slave : MAC address (HHHH.HHHH.HHHH) or route (portD.D-D.D)

Specify the MAC address or route of the applicable L2MS slave terminal. If omitted, this applies to all L2MS slave terminals.

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Show the config information of the L2MS slave terminal (SWX2200).

The following content is shown.

Item	Description
system-name name	Set name of device
energy-saving mode	Set whether to use the energy-saving mode
led-brightness mode	Adjust LED brightness
port-speed port speed	Set port communication speed and operating mode
port-use port mode	Set whether to use the port
port-auto-crossover port mode	Set whether to use the auto crossover function
port-speed-downshift port mode	Set whether to use the speed downshift function
port-flow-control port mode	Set whether to use flow control
vlan-id vlan_register_num vid	Set VLAN ID
vlan-port-mode port mode	Set the port's VLAN operation mode
vlan-access port vlan_register_num	Set access port
vlan-trunk port vlan_register_num mode	Set trunk port
vlan-multiple-use mode	Set whether to use multiple VLAN
vlan-multiple port group_num mode	Set multiple VLAN group
qos-dscp-remark-type port type	Set DSCP remarking method
qos-dscp-remark-class port class	Set class categorization of received packets
qos-speed-unit unit	Set speed unit when performing bandwidth control
qos-policing-use port mode	Set whether to perform policing of reception traffic
qos-policing-speed port level	Set bandwidth of reception traffic
qos-shaping-use port mode	Set whether to perform shaping of transmission traffic
qos-shaping-speed port level	Set bandwidth of transmission traffic
mirroring-use mode	Set whether to use the mirroring function
mirroring-dest port	Set port that transmits mirroring packets
mirroring-src-rx port mode	Set whether received packets are mirrored
mirroring-src-tx port mode	Set whether transmitted packets are mirrored
counter-frame-rx-type port counter type	Set type of frames counted by reception frame counter
counter-frame-tx-type port counter type	Set type of frames counted by transmission frame counter
loopdetect-count count	Set threshold value per second at which to determine that a loop has occurred
loopdetect-linkdown action	Set operation when loop occurs
loopdetect-recovery-timer time	Set time until recovery after a port's link goes down
loopdetect-port-use port mode	Set whether to use the loop detection function

Item	Description
poe-class port class	Set upper limit for class of power supplied from each port

[Example]

Show the config information of all L2MS slave terminals.

```
SWX232x>show l2ms slave-config

[port1.23-1.23-8]
 system-name TEST3_SWX2200-8G
 vlan-id 2 2
 vlan-id 3 3
 vlan-port-mode 1 hybrid
 vlan-access 5 2
 vlan-access 6 3
 vlan-trunk 1 2 join
 vlan-trunk 1 3 join

[00a0.de00.0001]
 system-name TEST2_SWX2200-8G
 vlan-id 2 2
 vlan-id 3 3
 vlan-port-mode 1 hybrid
 vlan-port-mode 8 hybrid
 vlan-trunk 1 2 join
 vlan-trunk 1 3 join
 vlan-trunk 8 2 join
 vlan-trunk 8 3 join

[00a0.de00.0002]
 system-name TEST1_SWX2200-24G
 port-speed 7 100-hdx
 port-auto-crossover 7 off
 port-speed-downshift 7 off
 port-flow-control 7 on
 vlan-id 2 2
 vlan-id 3 3
 vlan-port-mode 1 hybrid
 vlan-port-mode 23 hybrid
 vlan-trunk 1 2 join
 vlan-trunk 1 3 join
 vlan-trunk 23 2 join
 vlan-trunk 23 3 join
 loopdetect-count 5
 loopdetect-linkdown linkdown-recovery
 loopdetect-recovery-timer 600
 loopdetect-port-use 7 off
```

Show the config information of the L2MS slave terminal whose MAC address is 00a0.de00.0001.

```
SWX232x>show l2ms slave-config 00a0.de00.0001

[00a0.de00.0001]
 system-name TEST2_SWX2200-8G
 vlan-id 2 2
 vlan-id 3 3
 vlan-port-mode 1 hybrid
 vlan-port-mode 8 hybrid
 vlan-trunk 1 2 join
 vlan-trunk 1 3 join
 vlan-trunk 8 2 join
 vlan-trunk 8 3 join
```

Show the config information of the L2MS slave terminal whose route is 1.23-1.23-8.

```
SWX232x>show l2ms slave-config port1.23-1.23-8

[port1.23-1.23-8]
 system-name TEST3_SWX2200-8G
 vlan-id 2 2
 vlan-id 3 3
 vlan-port-mode 1 hybrid
 vlan-access 5 2
```

```
vlan-access 6 3
vlan-trunk 1 2 join
vlan-trunk 1 3 join
```

4.22.12 Set the device information acquisition time interval for downstream of a wireless AP

[Syntax]

wireless-terminal-watch interval *time*
no wireless-terminal-watch interval

[Parameter]

time	:	<10-86400>
		Acquisition interval (seconds)

[Initial value]

wireless-terminal-watch interval 60

[Input mode]

L2MS mode

[Description]

Specifies the time interval at which device information for a device downstream of a wireless AP is acquired. Information for the devices existing downstream the wireless AP is acquired when the time specified by *time* has elapsed.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

If device watch is not operating, device information is not acquired, regardless of the setting of this function.

[Example]

Set the device information acquisition time interval to 3,600 seconds.

```
SWX232x(config)#l2ms configuration
SWX232x(config-l2ms)#l2ms enable
SWX232x(config-l2ms)#l2ms role master
SWX232x(config-l2ms)#terminal-watch enable
SWX232x(config-l2ms)# wireless-terminal-watch interval 3600
```

4.22.13 Set event monitoring function

[Syntax]

event-watch enable
event-watch disable
no event-watch

[Keyword]

enable	:	Enable the event monitoring function
disable	:	Disable the event monitoring function

[Initial value]

event-watch enable

[Input mode]

L2MS mode

[Description]

Sets whether to disable or enable the event monitoring function. If enabled, event information for the L2MS slaves existing on the network is acquired at regular intervals.

If this command is executed with the "no" syntax, the event monitoring function is enabled.

[Note]

Event monitoring is performed only if L2MS is operating as master.

[Example]

Disable the event monitoring function.

```
SWX232x(config)#l2ms configuration
SWX232x(config-l2ms)#l2ms enable
```

```
SWX232x(config-l2ms)#l2ms role master
SWX232x(config-l2ms)#event-watch disable
```

4.22.14 Set event information acquisition time interval

[Syntax]

event-watch interval *time*
no event-watch interval

[Parameter]

time : <60-1800>
Acquisition time interval (seconds)

[Initial value]

event-watch interval 300

[Input mode]

L2MS mode

[Description]

Sets the time interval at which event information is acquired from L2MS slaves existing on the network. When the time specified by *time* elapses, event information is acquired from L2MS slaves existing on the network

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

If the event monitoring function is not enabled, event information is not acquired, regardless of the setting of this command.

[Example]

Set the monitoring time interval to 60 seconds.

```
SWX232x(config)#l2ms configuration
SWX232x(config-l2ms)#l2ms enable
SWX232x(config-l2ms)#l2ms role master
SWX232x(config-l2ms)#event-watch interval 60
```

4.22.15 Set whether to use the L2MS slave's zero config function

[Syntax]

config-auto-set enable
config-auto-set disable
no config-auto-set

[Keyword]

enable : Use the L2MS function

disable : Don't use the L2MS function

[Initial value]

config-auto-set enable

[Input mode]

L2MS mode

[Description]

Sets whether to use the L2MS slave device's zero config function.

If the zero config function is enabled, and the L2MS slave's Yamaha switch or wireless AP settings (config) are saved, the saved settings (config) are automatically applied when the L2MS slave in its factory-set state is connected to the network.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

Synchronization of settings for a slave SWX2200 is performed regardless of this setting.

[Example]

Use the L2MS function.

```
SWX232x(config)#l2ms configuration
SWX232x(config-l2ms)#l2ms enable
```

```
SWX232x(config-l2ms)#l2ms role master
SWX232x(config-l2ms)#config-auto-set enable
```

4.23 Snapshot

4.23.1 Set snapshot function

[Syntax]

snapshot enable
snapshot disable
no snapshot

[Keyword]

enable	:	Snapshot function is enabled
disable	:	Snapshot function is disable

[Initial value]

snapshot disable

[Input mode]

global configuration mode

[Description]

Enables the snapshot function.

If this command is executed with the "no" syntax, disables the snapshot function.

[Note]

This command is valid only if L2MS is operating as master.

[Example]

Enable the snapshot function.

```
SWX232x(config)#snapshot enable
```

4.23.2 Set whether to include terminals in the snapshot comparison

[Syntax]

snapshot trap terminal [except-wireless]
no snapshot trap terminal

[Keyword]

except-wireless	:	Information for wirelessly connected terminals is excluded from the snapshot comparison.

[Initial value]

no snapshot trap terminal

[Input mode]

global configuration mode

[Description]

Terminal information is included in the snapshot comparison.

If the except-wireless option is specified, information for terminals that are wirelessly connected below a wireless access point are excluded from the snapshot comparison.

If this command is executed with the "no" syntax, terminal information is excluded from the snapshot comparison.

[Note]

This command is valid only when operating as the master and the **terminal-watch enable** command and **snapshot enable** command have also been set.

[Example]

Include terminal information in the snapshot comparison.

```
SWX232x(config)#snapshot trap terminal
```

4.23.3 Create snapshot

[Syntax]

snapshot save [after-update]

[Keyword]

after-update : After updating the network's connection state, save it as a snapshot

[Input mode]

privileged EXEC mode

[Description]

Saves a snapshot file that is the base for the LAN map's snapshot function.

If the after-update option is not included, the network connection state currently maintained by the master is saved as the snapshot file.

If the after-update option is included, the network connection state information is updated to the latest information, and then saved as the snapshot file.

[Note]

If the after-update option is included, the network connection state information is updated to the latest information, but depending on the configuration of the network, it might take some time for this update to be completed.

[Example]

After updating the network's connection state, save the snapshot file.

```
SWX232x#snapshot save after-update
```

4.23.4 Delete snapshot

[Syntax]

snapshot delete

[Input mode]

privileged EXEC mode

[Description]

Deletes the snapshot file.

[Example]

Delete the snapshot file.

```
SWX232x#snapshot delete
```

4.24 Firmware update

4.24.1 Set firmware update site

[Syntax]

firmware-update url *url*

no firmware-update url

[Parameter]

url : Single-byte alphanumeric characters and single-byte symbols (255 characters or less)

URL at which the firmware is located

[Initial value]

firmware-update url http://www.rtpro.yamaha.co.jp/firmware/revision-up/swx2320.bin

or

firmware-update url http://www.rtpro.yamaha.co.jp/firmware/revision-up/swx2322p.bin

[Input mode]

global configuration mode

[Description]

Specify the download source URL used when updating the firmware from a firmware file located on a web server.

The input syntax is "http://server IP address or hostname/pathname".

If the server's port number is other than 80, you must specify this within the URL, using the syntax "http://server IP address or hostname:port number/path name".

[Example]

Specify http://192.168.100.1/swx2320.bin as the firmware download URL.

```
SWX232x(config)#firmware-update url http://192.168.100.1/swx2320.bin
SWX232x(config)#
```

4.24.2 Execute firmware update

[Syntax]

firmware-update execute [no-confirm]

[Keyword]

no-confirm	:	Don't confirm the firmware update

[Input mode]

privileged EXEC mode

[Description]

Compares the firmware file located on the web server with the revision of the currently-running firmware, and executes the update if rewriting is possible.

If firmware of a revision that can be rewritten exists, you will be asked for confirmation; enter "Y" if you want to update, or enter "N" if you don't want to update.

If you specify "no-confirm," the update is executed without asking you for confirmation.

[Note]

You can use the **firmware-update url** command to change the download source URL.

If you execute the **firmware-update revision-down enable** command, it will be possible to downgrade to an older revision.

[Example]

Update the firmware using a firmware file located on a web server.

```
SWX232x#firmware-update execute
Found the new revision firmware
Current Revision: Rev.2.05.01
New Revision:     Rev.2.05.03
Downloading...
Update to this firmware? (Y/N)y
Updating...
Finish
SWX232x#
```

4.24.3 Set firmware download timeout duration

[Syntax]

firmware-update timeout *time*
no firmware-update timeout

[Parameter]

time	:	<100-86400>
		Timeout time (seconds)

[Initial value]

firmware-update timeout 300

[Input mode]

global configuration mode

[Description]

Specifies the timeout duration when downloading firmware from a web server.

If this command is executed with the "no" syntax, the setting returns to the default.

[Example]

Set the firmware download timeout duration to 120 seconds.

```
SWX232x(config)#firmware-update timeout 120
SWX232x(config)#
```

4.24.4 Allow revision-down

[Syntax]

firmware-update revision-down enable

no firmware-update revision-down

[Initial value]

no firmware-update revision-down

[Input mode]

global configuration mode

[Description]

When using a firmware file from a web server to update the firmware, this allows the firmware to be changed to a revision that is older than the current revision.

If this is executed with the "no" syntax, revision-down is not allowed.

[Example]

Allow revision-down.

```
SWX232x(config)#firmware-update revision-down enable
SWX232x(config)#
```

4.24.5 Show firmware update function settings

[Syntax]

show firmware-update

[Input mode]

privileged EXEC mode

[Description]

Shows the current settings of the firmware update function.

The following items are shown.

- Download source URL
- Download timeout duration
- Allow revision-down

[Example]

Show the current settings of the firmware update function.

```
SWX232x#show firmware-update
url: http://www.rtpro.yamaha.co.jp/firmware/revision-up/swx2320.bin
timeout: 300 (seconds)
revision-down: Disable
reload-time: -
SWX232x#
```

4.24.6 Update firmware from SD card

[Syntax]

firmware-update sd execute [no-confirm] [sd-unmount]

[Keyword]

no-confirm	:	Don't check for firmware update and SD card mount continuity
sd-unmount	:	Unmount the SD card without checking before firmware update

[Input mode]

privileged EXEC mode

[Description]

Execute firmware update using a firmware file stored on the SD card.

If the parameter is not specified, and rewritable firmware exists on the SD card, you will be asked whether to update and maintain the mounted state of the SD card.

If you want to update the firmware, enter "Y"; if you don't want to update, enter "N."

If you want to maintain the mounted state of the SD card, enter "Y"; if you want to unmount, enter "N."

If you specify no-confirm, the mounted state of the SD card is maintained and the firmware is updated without asking for confirmation.

If you specify sd-unmount, the SD card is unmounted without asking for confirmation.

[Note]

The firmware file references the "/swx2320/firmware/swx2320.bin" or "/swx2322p/firmware/swx2322p.bin" file on the SD card.

A revision check is not performed for the firmware file in the SD card and the currently-running firmware.

If you do not remove the SD card, the unit starts up the next time using the firmware that is in the SD card as specified by the **boot prioritize sd** command.

The firmware update continues even if you unmount and remove the SD card.

[Example]

Update the firmware using the firmware file on the SD card.

```
SWX232x#firmware-update sd execute
Update the firmware.
Current Revision: Rev.2.05.01
New Revision:     Rev.2.05.03

Update to this firmware? (Y/N)y
Continue without unmounting the SD card? (Y/N)n
Unmounted the SD card.  Pull out the SD card.
Updating...
Finish
SWX232x#
```

4.24.7 Set firmware update reload time

[Syntax]

firmware-update reload-time *hour* [*min*]
no firmware-update reload-time

[Parameter]

hour : <0-23>
Firmware update reload time (hour)

min : <0-59>
Firmware update reload time (minutes)

[Input mode]

global configuration mode

[Description]

Sets the time at which the new firmware is applied by restarting after a firmware update.

If this command is executed with the "no" syntax, the new firmware is applied by restarting immediately after the firmware is updated.

[Example]

Specify AM 1:30 as the restart time for updating the firmware.

```
SWX232x(config)#firmware-update reload-time 1 30
SWX232x(config)#
```

4.24.8 Set reload method for firmware update of stack configuration

[Syntax]

firmware-update reload-method *method*
no firmware-update reload-method

[Parameter]

method : Firmware update reload method

Setting value	Description
normal	Reload stack master and slaves simultaneously
sequential	Reload stack master and slaves sequentially

[Initial value]

firmware-update reload-method normal

[Input mode]

global configuration mode

[Description]

Sets the method of restarting after a firmware update when using a stack configuration.

"normal" restarts the master and slaves simultaneously. With the "sequential" setting, the master finishes restarting, and then the slaves are restarted, thereby applying the new firmware in a way that does not affect the currently-operating network service.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be specified only when the stack function is enabled.

[Example]

Specify sequential as the restart method of updating the firmware.

```
SWX232x(config)#firmware-update reload-method sequential
SWX232x(config)#
```

4.25 Stack

4.25.1 Set stack function

[Syntax]

stack *switch*
no stack

[Parameter]

switch : Operation of the stack function

Setting value	Description
enable	Enable stack function
disable	Disable stack function

[Initial value]

stack disable

[Input mode]

global configuration mode

[Description]

Enables or disables the stack function.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be executed only for models that support stacking.

If the unit started up using the config saved on the SD card, and the SD card is subsequently unmounted, executing this command produces an error.

[Example]

Enable stack function.

```
SWX232x(config)#stack enable
```

Disable stack function.

```
SWX232x(config)#stack disable
```

4.25.2 Change ID of stack member

[Syntax]

stack *stack_id* **renumber** *new_stack_id*

[Parameter]

stack_id : <1-2>

Stack member ID to be changed. If a non-existent ID is specified, an error results

new_stack_id : <1-2>

Stack member ID after change

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Changes the ID of the specified stack member.

[Note]

This command can be executed only for models that support stacking.

This command can be executed only if the stack function is disabled.

Only one's own stack member ID can be changed.

If the unit started up using the config saved on the SD card, and the SD card is subsequently unmounted, executing this command produces an error.

[Example]

Change the ID:1 stack member to ID:2.

```
SWX232x(config)#stack 1 renumber 2
```

4.25.3 Show stack information

[Syntax]

show stack

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows stack-related settings and status information.

The following content is shown.

- Set stack function (Stack)
- The unit's own stack ID [set value] (Configured ID)
- The unit's own stack ID [operating value] (Running ID)
- The unit's own status (Status)
- Range of IP addresses used by the unit's own stack port (Subnet on stack port)
- MAC Address during stacking(Virtual MAC-Address)
- Information for each stack member
  - Stack ID [operating value] (ID)
  - Model name (Model)
  - Status (Status)
  - Role (Role)
  - Serial Number(Serial)
  - Physical Address(MAC-Address)
- Information for each stack port
  - Interface Number (Interface)
  - Status (Status)

One of the following items are displayed in the status for each stack member.

Status	Explanation
Setting	Status for carrying out necessary settings to configure stacks between member switches.
Active	Status when stacks are configured between member switches.
Inacive	Status when a fault has occurred on a stacked switch, where this switch is separated from the virtualized switch.
Standalone	Although the stack functions for this switch are enabled, negotiation cannot be made with the member switches, and this switch is thus operating on its own. Indicates that a stack has not been configured once since booting.
Standalone(separated)	Although the stack functions for this switch are enabled, negotiation cannot be made with the member switches, and this switch is thus operating on its own. Indicates that a stack has been configured since booting.
Disable	Status when stack functions are disabled.

[Note]

This command can be executed only for models that support stacking.

[Example]

Show stack information.

```
SWX232x#show stack
Stack: Enable

Configured ID        : 1
Running ID           : 1
Status               : Active
Subnet on stack port : Auto-ip
Virtual MAC-Address  : 00a0.de00.0000

ID  Model          Status      Role     Serial       MAC-Address
-------------------------------------------------------------------------
1   SWX2320-16MT   Active      Master   S000000000   00a0.de00.0000
2   SWX2320-16MT   Active      Slave    S000000000   00a0.de00.0000

Interface    Status
-------------------------------------------------------------------------
port1.15     up
port1.16     up
port2.15     up
port2.16     up
```

4.25.4 Set range of IP addresses used by the stack port

[Syntax]

stack subnet *NETWORK_ADDR*
stack subnet auto-ip
no stack subnet

[Parameter]

NETWORK_ADDR : A.B.C.D

IP address space (A.B.C.0)

[Initial value]

stack subnet auto-ip

[Input mode]

global configuration mode

[Description]

This command can be executed only for models that support stacking.

This command specifies the IP address space used between stacked devices.

The fixed subnet 255.255.255.0 is applied to NETWORK_ADDR. In the case of auto-ip, the Auto IP function is used between the stacked devices.

If this command is executed with the "no" syntax, the setting returns to the default.

The IP address space specified by this command cannot be used by ports other than the stack port.

A restart is required in order to apply the settings of this command to operation.

The IP address spaces of the stacked devices must be set to the same parameters. If different parameters are specified, communication cannot occur correctly between the stacked devices.

[Example]

Set "192.168.101.0" as the IP address range of the stack port.

```
SWX232x(config)#stack subnet 192.168.101.0
```

4.26 Schedule

4.26.1 Schedule settings

[Syntax]

schedule *id* **time** *date time template_id*
schedule *id* **event** *event template_id*
no schedule *id*

[Parameter]

id : <1-10>

Schedule number

date : <1-12> or * / <1-12> or sun, mon, ... , sat or *

Month/day

Month setting examples	Setting contents
1	January
1.2	January and February
2-	From February to December
2-7	From February to July
-7	From January to July
*	Monthly

Day setting examples	Setting contents
1	One day
1.2	The 1st and the 2nd
2-	From the 2nd to the 12th
2-7	From the 2nd to the 7th
-7	From the 1st to the 7th
mon	Monday
sat,sun	Saturday and Sunday
mon-fri	From Monday to Friday
-fri	From Sunday to Friday
*	Monthly

time : <0-23> or * : <0-59> or * : <0-59>

h:m:s (the seconds can be omitted)

Hour setting examples	Setting contents
12	12:00
12.13	12:00 and 13:00
12-	From 12:00 to 23:00
10-20	From 10:00 to 20:00
-20	From 0:00 to 20:00
*	Hourly

Minute setting examples	Setting contents
30	30 minutes
15.45	15 minutes and 45 minutes
30-	From 30 minutes to 59 minutes
15-45	From 15 minutes to 45 minutes
-45	From 0 minutes to 45 minutes
*	Each minute

event : Event

Setting value	Description
startup	When booting
sd-attached	When attaching a microSD card

template_id : <1-10>

Schedule template number

[Initial value]

None

[Input mode]

global configuration mode

[Description]

When setting the schedule using “time,” this executes the actions listed in the specified schedule template at the specified time(s).

When setting the schedule using “event,” this executes the actions listed in the specified schedule template when the specified events occur.

If this command is executed with the "no" syntax, the schedule with the specified ID is deleted.

[Note]

When multiple schedules are executed at the same time, they are executed beginning with the schedule with the smallest ID.

When specifying the day, you cannot specify using a mix of numbers and weekdays.

If the seconds are omitted, the settings will be the same as when specifying “00” seconds.

For the month and days settings, you can specify ranges using “-” and “,” characters, and you can specify all dates using the “*” character. Note that for the seconds setting, you cannot specify ranges using “-” and “,” characters, nor can you specify all dates using the “*” character.

[Example]

This sets schedule #1 to execute schedule template #1 every Monday at exactly 0:00, 1:00, 2:00, 12:00, 21:00, 22:00 and 23:00.

```
SWX232x(config)#schedule time */mon -2,12-14,21-:0 1
```

4.26.2 Schedule template description text settings

[Syntax]

description *line*
no description

[Parameter]

line : Single-byte alphanumeric characters and single-byte symbols (64 characters or less)
Schedule template description text

[Initial value]

no description

[Input mode]

Schedule template mode

[Description]

Sets the schedule template description text.

If this command is executed with the "no" syntax, the description text in the specified schedule template is deleted.

[Example]

This sets the description text for schedule template #1.

```
SWX232x(config)#schedule template 1
SWX232x(config-schedule)#description Get tech-support
```

4.26.3 Settings to enable/disable schedule template

[Syntax]

action *switch*
no action

[Parameter]

switch : Schedule template settings

Setting value	Description
enable	Enable schedule template
disable	Disable schedule template

[Initial value]

action enable

[Input mode]

Schedule template mode

[Description]

This enables or disables the schedule template.

Specifying “disable” with this command makes it possible to stop execution of actions due to trigger startup.

If this command is executed with the "no" syntax, the schedule template is enabled.

[Example]

Disables schedule template #1.

```
SWX232x(config)#schedule template 1
SWX232x(config-schedule)#action disable
```

4.26.4 Schedule template settings

[Syntax]

schedule template *template_id*

no schedule template

[Parameter]

template_id : <1-10>
Schedule template number

[Initial value]

None

[Input mode]

global configuration mode

[Description]

Switches to the mode for setting the schedule template.

If this command is executed with the "no" syntax, the specified schedule template is deleted.

[Example]

This switches to the mode for setting schedule template #1.

```
SWX232x(config)#schedule template 1
SWX232x(config-schedule)#
```

4.26.5 Schedule template command execution settings

[Syntax]

cli-command *id command*
no cli-command *id*

[Parameter]

id : <1-20>
Command no.

command : Command

[Initial value]

None

[Input mode]

Schedule template mode

[Description]

This sets the commands to be executed when the trigger for a schedule function starts.

If this command is executed with the "no" syntax, commands with the specified numbers are deleted.

[Note]

If both the “cli-command” command and “script” command are configured for the same schedule template, the “script” command will be executed, and the “cli-command” will not operate.

If multiple commands are specified, the commands are executed beginning with the command with the smallest command number.

If multiple commands are specified, the remaining commands will still be executed even if the command results in an execution error while running.

As commands are executed in privileged EXEC mode when the trigger starts, some commands may need to be configured along with commands that switch to an appropriate mode.

The last “write” command must be executed to save the settings.

Commands cannot be specified in abbreviated form. For instance, you must write “interface port1.1” and not “int port1.1” when entering the input mode for Port1.1 of the interface.

The following commands cannot be executed.

backup system, baudrate select, boot prioritize sd, no boot prioritize sd, certificate user, commands beginning with “clock,” cold start, copy radius-server local, crypto pki generate ca, no crypto pki generate ca, disable, enable password, no enable password, exit, firmware-update execute, firmware-update sd execute, force-password, no force-password, logout, commands beginning with “ntpdate,” password, no password, password-encryption, no password encryption, ping, ping6, quit, reload, remote-login, restart, restore system, schedule, no schedule, schedule template, no schedule template, commands beginning with “show,” ssh ,

ssh-server host key generate, commands beginning with “stack,” commands beginning with “no stack,” startup-config select, no startup-config select, telnet, traceroute, traceroute6

[Example]

This registers the “copy tech-support sd” command in number #1 of schedule template #1.

```
SWX232x(config)#schedule template 1
SWX232x(config-schedule)#cli-command 1 copy tech-support sd
```

4.26.6 Schedule template script execution settings

[Syntax]

script *ref*
no script

[Parameter]

ref : Location of script file

Setting value	Description
sd	microSD card

[Initial value]

no script

[Input mode]

Schedule template mode

[Description]

This enables/disables execution of scripts when a trigger starts.

If this command is executed with the "no" syntax, script execution is disabled.

[Note]

When a trigger starts for the schedule function, the text located in the /[model name]/schedule/script.txt file on the microSD card will be executed as commands, from the beginning and up through line 100.

If both the “cli-command” command and “script” command are configured for the same schedule template, the “script” command will be executed, and the “cli-command” will not operate.

Commands that are prohibited from being executed through the “cli-command” command cannot be executed.

[Example]

This enables script execution on schedule template #1.

```
SWX232x(config)#schedule template 1
SWX232x(config-schedule)#script sd
```

4.27 General maintenance and operation functions

4.27.1 Set host name

[Syntax]

hostname *hostname*
no hostname [*hostname*]

[Parameter]

hostname : Single-byte alphanumeric characters and single-byte symbols (63characters or less)

Host name

[Initial value]

hostname SWX232x

[Input mode]

global configuration mode

[Description]

Specifies the host name.

The host name specified by this command is used as the command prompt. If SNMP access is possible, this is used as the value of the MIB variable sysName.

If this command is executed with the "no" syntax, the setting returns to the default value.

[Example]

Set the host name as "yamaha."

```
SWX232x(config)#hostname yamaha
yamaha(config)#
```

4.27.2 Reload system

[Syntax]

reload [**stack-member ID**]
restart [**stack-member ID**]

[Keyword]

stack_member	:	Specify stack member to restart in stack configurationIf omitted, all stack members restart

[Parameter]

ID	:	<1-2> Stack ID

[Input mode]

privileged EXEC mode

[Description]

Reboots the system.

[Note]

If the currently-running settings (running configuration) have been changed from the settings at the time of boot (startup configuration), reboot will discard those changes. Therefore, if necessary, you should execute the **copy running-config startup-config** command, the **write** command or the **save** command before you execute the **reload** command.

The "stack-member" option can be specified only when the stack function is enabled.

[Example]

Reboot the system.

```
SWX232x#reload
reboot system? (y/n): y
```

4.27.3 Initialize settings

[Syntax]

cold start

[Input mode]

privileged EXEC mode

[Description]

Reboots with the factory settings. SYSLOG is also initialized.

[Note]

You must enter the administrator password when executing this command.

A special password can be inputted to initialize the settings only when logging in at the command prompt using a special password.

[Example]

Initialize the settings.

```
SWX232x#cold start
Password:
```

4.27.4 Mount SD card

[Syntax]

mount sd

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Mounts the SD card.

When you insert an SD card, this command is executed automatically, so you do not need to execute it. If you have unmounted the card by the **unmount sd** command, you will need to execute this.

[Note]

The SD card cannot be used if the SD card is in an unmounted state.

[Example]

Mount the SD card.

```
SWX232x>mount sd
```

4.27.5 Unmount SD card

[Syntax]

unmount sd

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Unmounts the SD card.

If this command is not executed, or if the SD card is removed from the SD card slot without executing the unmount process from the Web GUI, there are some cases in which the operating system will generate a warning to repair the card's file system.

[Note]

The SD card cannot be used if the SD card is in an unmounted state.

[Example]

Unmount the SD card.

```
SWX232x>unmount sd
```

4.27.6 Set default LED mode

[Syntax]

led-mode default *mode*

no led-mode default

[Parameter]

mode : Default LED mode

Setting value	Description
link-act	LINK/ACT mode
poe	PoE mode
off	OFF mode

[Initial value]

led-mode default link-act

[Input mode]

global configuration mode

[Description]

Set the default LED mode.

When you execute this command, the LEDs are lit in the specified mode. The LEDs are lit in the specified mode even when a loop is detected in STATUS mode and the loop status has been resolved.

If this command is executed with the "no" syntax, the setting returns to the default.

PoE mode can only be used on models that support PoE power supply.

[Example]

Set the default LED mode to OFF mode.

```
SWX232x(config)#led-mode default off
```

4.27.7 Show LED mode

[Syntax]

show led-mode

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the LED mode setting and status.

The following items are shown.

- Default LED mode setting
- Current LED mode status

[Example]

Show the LED mode setting and status.

```
SWX232x>show led-mode
default mode : off
current mode : link-act
```

4.27.8 Show port error LED status

[Syntax]

show error port-led

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the ID of ports that are generating an error, and the following error causes.

Item	Description
loop-detected (blocking)	Detected a loop, and are currently blocking
loop-detected (shutdown)	Detected a loop, and are currently shutdown
sfp rx-power error (low)	SFP optical reception level is below the normal range
sfp rx-power error (high)	SFP optical reception level is above the normal range
poe error (port limit)	Power supply stopped because of PoE port limit
poe error (system limit)	Power supply has stopped due to a PoE system limit, or power supply is suppressed due to guard band
poe error (PD error)	Power supply stopped because PD error detected

[Example]

Show the port error status.

```
SWX232x>show error port-led
 ID             error
----------------------------------------
 port1.1        poe error (PD error)
 port1.2        loop-detected (blocking)
```

4.27.9 Backup system information

[Syntax]

backup system

[Input mode]

privileged EXEC mode

[Description]

Copy the following settings from the unit to the SD card.

- Startup configurations #0 - #1 and information that pertains to them
- **startup-config select** command values
- **boot prioritize sd** command values

If the SD card's "/swx2320/firmware" folder contains "swx2320.bin", copy it to the backup folder.

This can be executed only if the SD card is mounted.

[Note]

Do not edit or delete the files that are backed up to the SD card.

[Example]

Execute a system information backup.

```
SWX232x#backup system
Succeeded to backup system files and firmware file.
```

4.27.10 Restore system information

[Syntax]

restore system

[Input mode]

privileged EXEC mode

[Description]

System information previously backed up to SD card is restored to the unit.

If a firmware file exists in the backup folder of the SD card, the firmware will also be updated using that file.

After restore, restart will occur.

This can be executed only if the SD card is mounted.

[Note]

This command cannot be used if the stack function is enabled.

[Example]

Restore system information into the unit.

```
SWX232x# restore system
restore and reboot system? (y/n) y
Update the firmware.
Current Revision: 2.05.01
New Revision:     2.05.03

Update to this firmware? (Y/N) Y
Unmounted the SD card.  Pull out the SD card.
Updating...
Finish
Succeeded to restore system files.
SWX232x#
```

Chapter 5

Interface control

5.1 Interface basic settings

5.1.1 Set description

[Syntax]

description *line*
no description

[Parameter]

line	:	Single-byte alphanumeric characters and single-byte symbols (80characters or less) Description of the applicable interface

[Initial value]

no description

[Input mode]

interface mode

[Description]

Specifies a description of the applicable interface. If this command is executed with the "no" syntax, the description is deleted.

[Example]

Specify a description for LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#description Connected to rtx1210-router
```

5.1.2 Shutdown

[Syntax]

shutdown
no shutdown

[Initial value]

no shutdown

[Input mode]

interface mode

[Description]

Shut down the applicable interface so that it is not used.

An interface for which this command is specified will not link-up even if it is connected.

If this command is executed with the "no" syntax, the applicable interface can be used.

[Note]

This command can be specified only for LAN/SFP port and logical interface.

If this command is applied to logical interface, the settings of all LAN/SFP port units belonging to that interface are changed.

[Example]

Shut down LAN port #1 so that it is not used.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#shutdown
```

5.1.3 Set communication speed and communication mode

[Syntax]

speed-duplex *type*
no speed-duplex

[Parameter]

type : Communication speed and communication mode types

Communication speed and communication mode types	Description
auto	Auto negotiation
10000-full	10Gbps/Full
100-full	100Mbps/Full
100-half	100Mbps/Half

[Initial value]

speed-duplex auto

[Input mode]

interface mode

[Description]

Sets the communication speed and communication mode.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

When this command is used to change the settings, link-down temporarily occurs for the corresponding interface.

This command can be specified only for LAN/SFP port.

When “auto” is specified for “type,” a communication type supported by auto negotiation can be set using the auto negotiation type settings.

The configurable communication speed/mode will differ depending on the port type. Configurable communication speeds/modes are shown below.

Communication speed and communication mode types	LAN port	SFP+ port
auto	○	○
10000-full	×	○
5000-full	×	-
2500-full	×	-
1000-full	×	-
100-full	○	-
100-half	○	-

Note that when connecting a SFP module to an SFP+ port and specifying 10000-full, the module will run at 1000-full.

[Example]

Set the communication speed and communication mode for LAN port #1 to 100Mbps/Full.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#speed-duplex 100-full
```

5.1.4 Auto negotiation type settings

[Syntax]

negotiation *type* [*type..*]

no negotiation

[Parameter]

type : Communication type

Communication type	Explanation
10000-full	10Gbps/Full
5000-full	5Gbps/Full
2500-full	2.5Gbps/Full
1000-full	1000Mbps/Full
100-full	100Mbps/Full
100-half	100Mbps/Half

[Initial value]

negotiation 10000-full 5000-full 2500-full 1000-full 100-full 100-half

[Input mode]

interface mode

[Description]

Sets the communication type supported by auto negotiation.

If this command is executed with the "no" syntax, the setting returns to the default.

This command can be specified only for a LAN port.

[Note]

When this command is used to change the settings, link-down temporarily occurs for the corresponding interface.

If a setting other than auto negotiation is specified in the communication speed/communication mode settings, this function will not operate.

[Example]

This sets the communication type supported by auto negotiation of LAN port #1 to 1Gbps/Full and 100Mbps/Full.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)negotiation 1000-full 100-full
```

5.1.5 Auto negotiation information display

[Syntax]

show interface [*ifname*]

[Parameter]

ifname : The interface name of the LAN/SFP port. If this is omitted, the command applies to all interfaces.
Interface to show

[Input mode]

unprivileged EXEC mode、 privileged EXEC mode

[Description]

Displays the auto negotiation information for the interface.

The following items are shown.

Item	Explanation
Interface	Interface name
Nego	Auto negotiation enable/disable
Link Advertisement	Communication speed and communication mode supported by auto negotiation

[Example]

Displays the auto negotiation information.

```
SWX232x#show interface negotiation
Codes: Nego - Auto-negotiation
       All  - 10000-full, 5000-full, 2500-full, 1000-full, 100-full, 100-half
```

```
Interface  Nego      Link Advertisement
-------------------------------------------------------------------------
port1.1    Enabled   All
port1.2    Enabled   10000-full, 5000-full, 2500-full, 1000-ful, 100-full
port1.3    Enabled   100-full, 100-half
port1.4    Enabled   All
port1.5    Enabled   --
port1.6    Enabled   --
port1.7    Enabled   --
port1.8    Enabled   --
```

5.1.6 Set MRU

[Syntax]

mru *mru*

no mru

[Parameter]

mru : <64-10240>

Maximum frame size that can be received (the specified value must be an even number)

[Initial value]

mru 1522

[Input mode]

interface mode

[Description]

Specifies the maximum frame size that can be received.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be specified only for LAN/SFP port.

[Example]

Set the LAN port #1 mru to 9000 bytes.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#mru 9000
```

5.1.7 Set cross/straight automatic detection

[Syntax]

mdix auto *action*

no mdix auto

[Parameter]

type : Cross/straight automatic detection operations

Setting value	Description
enable	Enable cross/straight automatic detection
disable	Disable cross/straight automatic detection

[Initial value]

mdix auto enable

[Input mode]

interface mode

[Description]

Enables cross/straight automatic detection. If this is enabled, the necessary cable connection type (straight or cross) is automatically detected, and the connection is specified appropriately.

If this is executed with the "no" syntax, automatic detection is disabled, and MDI is used.

[Note]

This command can be specified only for LAN port.

When this command is used to change the settings, link-down temporarily occurs for the corresponding interface.

[Example]

Disable cross/straight automatic detection for LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#mdix auto disable
```

5.1.8 Set EEE

[Syntax]

eee *action*

no eee

[Parameter]

type : Behavior of the EEE

Setting value	Description
enable	Enable EEE
disable	Disable EEE

[Initial value]

eee disable

[Input mode]

interface mode

[Description]

Enables Energy Efficient Ethernet (EEE).

If this command is executed with the "no" syntax, EEE is disabled.

[Note]

This command can be specified only for LAN port.

When this command is used to change the settings, link-down temporarily occurs for the corresponding interface.

[Example]

Enable EEE for LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#eee enable
```

5.1.9 Show EEE capabilities

[Syntax]

show eee capabilities interface *ifname*

[Parameter]

ifname : LAN port interface name

Interface to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows whether the specified interface supports EEE.

The following items are shown.

Item	Description
interface	Interface name
EEE(efficient-ethernet)	Whether the unit supports EEE
Link Partner	Whether the other unit supports EEE

[Note]

If another unit is not connected, the display indicates that EEE is not supported.

[Example]

Show EEE capabilities for LAN port #1.

[If the other unit supports EEE]

```
SWX232x#show eee capabilities interface port1.1
interface:port1.1
  EEE(efficient-ethernet):  yes (1000-T, 100-TX)
  Link Partner            :  yes (1000-T, 100-TX)
```

[If the other unit does not support EEE]

```
SWX232x#show eee capabilities interface port1.1
interface:port1.1
  EEE(efficient-ethernet):  yes (1000-T, 100-TX)
  Link Partner            :  not enabled
```

5.1.10 Show EEE status

[Syntax]

show eee status interface *ifname*

[Parameter]

ifname : LAN port interface name

Interface to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the EEE status of the specified interface.

The following items are shown.

Item	Description
interface	Interface name
EEE(efficient-ethernet)	Whether EEE is enabled
Rx LPI Status	Low-power mode status of the receiving unit
Tx LPI Status	Low-power mode status of the transmitting unit
Wake Error Count	Error count

[Example]

Show EEE status of LAN port #1.

[If EEE is disabled]

```
SWX232x#show eee status interface port1.1
interface:port1.1
  EEE(efficient-ethernet):  Disabled
  Rx LPI Status           :  None
  Tx LPI Status           :  None
  Wake Error Count        :  0
```

[If EEE is enabled]

```
SWX232x#show eee status interface port1.1
interface:port1.1
  EEE(efficient-ethernet):  Operational
  Rx LPI Status           :  Received
  Tx LPI Status           :  Received
  Wake Error Count        :  0
```

[If EEE is enabled and is transitioning to low-power mode]

```
SWX232x#show eee status interface port1.1
interface:port1.1
  EEE(efficient-ethernet):  Operational
```

```
  Rx LPI Status          :  Interrupted
  Tx LPI Status          :  Interrupted
  Wake Error Count       :  0
```

[If EEE is enabled and has transitioned to low-power mode]

```
SWX232x#show eee status interface port1.1
interface:port1.1
  EEE(efficient-ethernet):  Operational
  Rx LPI Status          :  Low Power
  Tx LPI Status          :  Low Power
  Wake Error Count       :  0
```

5.1.11 Set port mirroring

[Syntax]

mirror interface *ifname* direction *direct*

no mirror interface *ifname* [direction *direct*]

[Keyword]

direction : Specify the direction of traffic that is mirrored

[Parameter]

ifname : LAN/SFP port interface name

Interface whose traffic is mirrored

direct : Direction of traffic that is mirrored

Traffic direction	Description
both	Both receiver and transmitter
receive	Receiver
transmit	Transmitter

[Initial value]

no mirror interface

[Input mode]

interface mode

[Description]

Mirrors the traffic specified by *direct*, with the applicable interface as the mirror port and *ifname* as the monitor port.

If this command is executed with the "no" syntax, the mirroring setting is deleted.

[Note]

This command can be specified only for LAN/SFP port.

Only one interface can be specified as the mirror port.

[Example]

With LAN port #1 as the mirror port, mirror the transmitted and received frames of LAN port #4 and the transmitted frames of LAN port #5.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#mirror interface port1.4 direction both
SWX232x(config-if)#mirror interface port1.5 direction transmit
```

5.1.12 Show port mirroring status

[Syntax]

show mirror [interface *ifname*]

[Keyword]

interface : Specify the monitor port to show

[Parameter]

ifname : Interface name of the LAN/SFP port

Monitor port to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the port mirroring setting. If interface is omitted, the settings for all monitor ports are shown.

The following items are shown for each monitor port.

Item	Description
Monitor Port	Interface name of the monitor port
Mirror Port	Interface name of the mirror port
Mirror Option	Whether port mirroring is enabled or disabled
Mirror Direction	Direction of traffic that is mirrored

[Example]

Show the mirroring port settings.

```
SWX232x#show mirror
Monitor Port  Mirror Port  Mirror Option  Direction
============= ============ ============== ==========
port1.1       port1.4      enable         both
port1.1       port1.5      enable         transmit
```

5.1.13 Show interface status

[Syntax]

show interface [*type* [*index*]]

[Parameter]

type : Interface type

Interface type	Description
port	Physical interface
vlan	VLAN interface
sa	Static logical interface
po	LACP logical interface

index : Index number

Interface ID	Description
S.X	Specifies the stack ID (S) of the physical interface, and the number printed on the chassis (X).
<1－4094>	Specify the VLAN ID.
<1－96>	Speciffy the static logical interface number.
<1－127>	Specify the LACP logical interface number.

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the status of the interface specified by *ifname*. If *ifname* is omitted, shows the status of all interfaces.

The following items are shown.

Item		Description
Interface		Interface name
Link is		Link status *2 (if shutdown, shows the cause) • If shutdown is specified : (by shutdown) • If port error is detected : (by err-disable)
Hardware is		Interface type (e.g., Ethernet, VLAN)
HW addr		Physical (MAC) address *1
Description		Description of interface
ifIndex		Interface index number
MRU		Maximum Receive Unit *4
ARP ageing timeout		ARP timeout time (time that ARP entries are maintained) *3
Speed-Duplex		Speed and duplex mode settings, and operating status *1
Auto MDI/MDIX		Auto MDI/MDIX enabled/disabled *1
IPv4 address		IP address/mask length *3 (shown only if IP address is set)
broadcast		IP broadcast address *3 (shown only if IP address is set)
Switchport mode		Mode of the switchport • access : untagged • trunk : tagged
Ingress filter		Status of ingress filtering • enable : enabled • disable : disabled
Acceptable frame types		Frame types that can be received • all : All frames are received (regardless of whether they are tagged or untagged) • vlan-tagged only : Only frames with a VLAN tag are received
Default Vlan		VLAN ID that handles untagged frames • For an untagged port: VLAN specified by the **switchport access vlan** command • For a tagged port: Native VLAN • For a tagged port and set to receive only tagged packets: None • If unspecified: vlan1
Configured Vlans		List of the VLAN IDs that belong to the corresponding interface
input	packets	Number of received packets *2
	bytes	Number of received bytes *2
	multicast packets	Number of received multicast packets *2
	drop packets	Number of overflowed packets received *2, *5
output	packets	Number of transmitted packets *2

Item		Description
	bytes	Number of transmitted bytes *2
	multicast packets	Number of transmitted multicast packets *2
	broadcast packets	Number of transmitted broadcast packets *2
	drop packets	Number of tail-dropped packets transmitted *2, *5

*1 Shown only for physical interface
*2 Shown only for physical interface and logical interface
*3 Shown only for VLAN interface
*4 In the case of logical interface and VLAN interface, shows the minimum value for the physical interface belonging to that interface
*5 Shows the transmission information when tail dropping is enabled, and the information only for reception when tail dropping is disabled.

[Example]

Show the status of LAN port #1.

```
SWX232x# show interface port 1.1
Interface port1.1
  Link is UP
  Hardware is Ethernet
  HW addr: 00a0.de00.0000
  Description: Connected to router
  ifIndex 5001, MRU 1522
  Speed-Duplex: auto(configured), 1000-full(current)
  Auto MDI/MDIX: on
  Vlan info:
    Switchport mode         : access
    Ingress filter          : enable
    Acceptable frame types  : all
    Default Vlan            :    1
    Configured Vlans        :    1
  Interface counter:
    input  packets          : 320
           bytes            : 25875
           multicast packets: 301
    output packets          : 628
           bytes            : 129895
           multicast packets: 628
           broadcast packets: 0
           drop packets     : 0
```

Show the status of VLAN #1.

```
SWX232x#show interface vlan 1
Interface vlan1
  Hardware is VLAN
  Description: Connected to router(VLAN)
  ifIndex 301, ARP ageing timeout 1200
  IPv4 address 192.168.100.240/24 broadcast 192.168.100.255
                                                (u)-Untagged, (t)-Tagged
VLAN ID  Name                            State   Member ports
======= ================================ ======= ====================
1       default                          ACTIVE  port1.1(u) port1.2(u)
                                                 port1.3(u) port1.4(u)
                                                 port1.5(u) port1.6(u)
                                                 port1.7(u) port1.8(u)
```

5.1.14 Show brief interface status

[Syntax]

show interface brief

[Input mode]

unprivileged EXEC mode, privileged EXEC mode, individual configuration mode

[Description]

Shows brief interface status.

The following items are shown.

Item	Description
Interface	Interface name
Type	Interface type *2
PVID	VLAN ID that handles untagged frames *2
Mode	Mode of the switchport *2 • access : untagged • trunk : tagged
Status	Link status
Reason	Cause of link down • AD: If shutdown is specified • ED: If port error is detected • PD: Other than above
Speed	Communication speed operating status *2
Port Ch	Type of associated logical interface *1 • (S) : Static logical interface • (P) : LACP logical interface ID of associated logical interface
Description	Description of interface

*1 Shown only for physical interface
*2 hown only for physical interface and logical interface

[Example]

Show brief interface status.

```
SWX232x#show interface brief

Codes: ETH - Ethernet, AGG - Aggregate , PVID - Port Vlan-id
       ED - ErrDisabled, PD - Protocol Down, AD - Admin Down



--------------------------------------------------------------------------------
Ethernet   Type  PVID  Mode       Status  Reason  Speed Port    Description
Interface                                                Ch #
--------------------------------------------------------------------------------
port1.1    ETH   1     access     up      --      1g    (S)1    --
port1.2    ETH   1     access     up      --      1g    --      --
port1.3    ETH   1     access     down    PD      auto  --      --
port1.4    ETH   1     access     down    AD      auto  --      --
port1.5    ETH   1     access     up      --      1g    --      --
port1.6    ETH   1     access     up      --      1g    --      --
port1.7    ETH   1     access     up      --      1g    --      --
port1.8    ETH   1     access     up      --      1g    --      --


--------------------------------------------------------------------------------
Interface    Status   Reason  Description
--------------------------------------------------------------------------------
vlan1        up       --      --
vlan2        down     PD      --


--------------------------------------------------------------------------------
Port-channel  Type  PVID  Mode       Status   Reason  Speed  Description
Interface
```

```
--------------------------------------------------------------------------------
sa1           AGG   1     access     up       --      1g     --
```

5.1.15 Resetting an interface

[Syntax]

interface reset *ifname*

[Parameter]

ifname : LAN/SFP port or logical interface
Interface to reset

[Input mode]

privileged EXEC mode

[Description]

This resets the specified interface.

[Note]

The link status for the specified interface will be reset, and the link is re-established.

Note that linkdown will momentarily occur in order to reset.

This cannot be executed for LAN/SFP port that belong to logical interface

[Example]

Reset LAN port #1

```
SWX232x#interface reset port1.1
```

5.1.16 Show frame counter

[Syntax]

show frame-counter [*ifname*]

[Parameter]

ifname : Interface name of the LAN/SFP port
Interface to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows frame counter information for the interface specified by *ifname*. If *ifname* is omitted, shows information for all interfaces.

The following items are shown.

Item	Description
Packets	Number of packets transmitted/received
Octets	Number of octets transmitted/received
Broadcast packets	Number of broadcast packets transmitted/received
Multicast packets	Number of multicast packets transmitted/received
Unicast packets	Number of unicast packets transmitted/received
Undersize packets	Number of undersize packets received (packets smaller than 64 octets)
Oversize packets	Number of oversize packets received (packets larger than 1523 octets*1)
Fragments	Number of fragment packets received (packs smaller than 64 octets with abnormal CRC)
Jabbers	Number of jabber packets received (packs larger than 1523 octets with abnormal CRC*1)

Item	Description
FCS errors	Number of FCS error packets received
RX errors	Number of reception errors
TX errors	Number of transmission errors
Collisions	Number of collision occurrences
Drop packets	Number of tail-dropped packets transmitted, number of packets not received due to buffer overflow *2
64octet packets	Number of packets with 64 octet length transmitted/received
65-127octet packets	Number of packets with 65--127 octet length transmitted/ received
128-255octet packets	Number of packets with 128--255 octet length transmitted/ received
256-511octet packets	Number of packets with 256--511 octet length transmitted/ received
512-1023octet packets	Number of packets with 512--1023 octet length transmitted/ received
1024-MAXoctet packets	Number of packets with 1024--maximum octet length (*1) transmitted/received

*1 Varies depending on the MRU of each interface.
*2 Shows the transmission information when tail dropping is enabled, and the information only for reception when tail dropping is disabled.

[Example]

Show the frame counter of LAN port #1.

```
SWX232x#show frame-counter port1.1
Interface port1.1 Ethernet MAC counters:
  Received:
    Packets               : 84
    Octets                : 6721
    Broadcast packets     : 8
    Multicast packets     : 76
    Unicast   packets     : 0
    Undersize packets     : 0
    Oversize  packets     : 0
    Fragments             : 0
    Jabbers               : 0
    FCS errors            : 0
    RX errors             : 0

  Transmitted:
    Packets               : 91
    Octets                : 11193
    Broadcast packets     : 0
    Multicast packets     : 91
    Unicast   packets     : 0
    TX errors             : 0
    Collisions            : 0
    Drop packets          : 0

  Received and Transmitted:
    64octet       packets : 1
    65-127octet   packets : 166
    128-255octet  packets : 7
    256-511octet  packets : 1
    512-1023octet packets : 0
    1024-MAXoctet packets : 0
```

5.1.17 Clear frame counters

[Syntax]

clear counters *ifname*
clear counters all

[Keyword]

all	:	Clearing the frame counter information for all interfaces

[Parameter]

ifname	:	Interface name of LAN/SFP port or logical interface Applicable interface

[Input mode]

privileged EXEC mode

[Description]

This clears the frame counter for the interfaces.

If *ifname* is specified, the frame counter for that interface is cleared.

If logical interface is specified as the *ifname*, the frame counters of all LAN/SFP port port units associated with that interface are cleared.

[Example]

Clear the frame counters of LAN port #1.

```
SWX232x#clear counters port1.1
```

5.1.18 Show SFP module status

[Syntax]

show ddm status

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the status of the SFP module.

For each item, shows the current value, upper threshold value, and lower threshold value for each SFP port.

Item	Description
Temperature	Internal temperature of the module (°C)
Voltage	Voltage value (V)
Current	Current value (mA)
TX-Power	Strength of light produced (dBm)
RX-Power	Strength of light received (dBm)

[Example]

Show the status of the SFP module.

```
SWX232x#show ddm status
             Temperature  High Alarm   High Warning Low Warning  Low Alarm
Interface    (Celsius)    Threshold    Threshold    Threshold    Threshold
------------ ------------ ------------ ------------ ------------ ------------
 port1.25     42.7         100.0         85.0        -40.0        -55.0
 port1.26         -            -            -            -            -
 port1.27     40.7          95.0         90.0        -20.0        -25.0
 port1.28    Unsupported  Unsupported  Unsupported  Unsupported  Unsupported

             Voltage      High Alarm   High Warning Low Warning  Low Alarm
Interface    (V)          Threshold    Threshold    Threshold    Threshold
------------ ------------ ------------ ------------ ------------ ------------
 port1.25    3.37         3.62         3.46         3.13         2.97
```

```
 port1.26         -            -            -            -            -
 port1.27    3.34         3.89         3.70         2.89         2.70
 port1.28    Unsupported  Unsupported  Unsupported  Unsupported  Unsupported

             Current      High Alarm   High Warning Low Warning  Low Alarm
Interface    (mA)         Threshold    Threshold    Threshold    Threshold
------------ ------------ ------------ ------------ ------------ ------------
 port1.25      4.0          16.0         15.0           2.0          2.0
 port1.26         -            -            -            -            -
 port1.27      6.2          17.0         14.0           2.0          1.0
 port1.28    Unsupported  Unsupported  Unsupported  Unsupported  Unsupported

             TX-Power     High Alarm   High Warning Low Warning  Low Alarm
Interface    (dBm)        Threshold    Threshold    Threshold    Threshold
------------ ------------ ------------ ------------ ------------ ------------
 port1.25     -5.4806       0.4139       0.0000     -10.7058     -12.2184
 port1.26         -            -            -            -            -
 port1.27     -5.4714      -1.9997      -1.9997     -11.0237     -11.7392
 port1.28    Unsupported  Unsupported  Unsupported  Unsupported  Unsupported

             RX-Power     High Alarm   High Warning Low Warning  Low Alarm
Interface    (dBm)        Threshold    Threshold    Threshold    Threshold
------------ ------------ ------------ ------------ ------------ ------------
 port1.25     -7.5696       2.5527       0.0000     -16.9897     -40.0000
 port1.26         -            -            -            -            -
 port1.27     -8.7614       1.0002      -1.0017     -18.0134     -20.0000
 port1.28    Unsupported  Unsupported  Unsupported  Unsupported  Unsupported
```

5.1.19 Set SFP module optical reception level monitoring

[Syntax]

sfp-monitor rx-power *action*

no sfp-monitor rx-power

[Parameter]

action : Operations for SFP module optical reception level monitoring

Setting value	Description
enable	Enables SFP module optical reception level monitoring
disable	Disables SFP module optical reception level monitoring

[Initial value]

sfp-monitor rx-power enable

[Input mode]

global configuration mode

[Description]

Sets the monitoring of SFP module optical reception levels.

[Example]

Disable SFP module optical reception level monitoring.

```
SWX232x(config)#sfp-monitor rx-power disable
```

5.2 Link aggregation

5.2.1 Set static logical interface

[Syntax]

static-channel-group *link-id*

no static-channel-group

[Parameter]

link-id : <1-96>

static logical interface number

[Input mode]

interface mode

[Description]

Associates the applicable interface with the static logical interface specified by *link-id*.

If this command is executed with the "no" syntax, the applicable interface is dissociated from the static logical interface.

[Note]

This command can be specified only for LAN/SFP port.

If a LAN/SFP port is associated to a *link-id* for which a static logical interface does not exist, the static logical interface is newly generated.

If the associated LAN/SFP port is no longer present because it was removed from the static logical interface, the static logical interface is deleted.

Up to eight LAN/SFP port units can be associated with one static logical interface.

If it is to be associated with an already-existing static logical interface, all of the following settings must match between the LAN/SFP port and the static logical interface. If the settings differ, an error occurs.

- VLAN setting
- Set QoS trust mode (including default CoS value and port priority)

If a static logical interface is newly generated, the above settings of the LAN/SFP port are set to the default settings of the static logical interface.

If a LAN/SFP port is associated with a static logical interface, the MSTP settings return to the default values. The MSTP settings also return to the default values if the LAN/SFP port is removed from the static logical interface.

It is not possible to associate a single LAN/SFP port with multiple logical interface units. You must use the "no" syntax to first remove it before associating it with a different logical interface.

[Example]

Associate LAN port #1 with static logical interface #5.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#static-channel-group 5
```

5.2.2 Show static logical interface status

[Syntax]

show static-channel-group

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the static logical interface status.

The following items are shown for each static logical interface that exists.

- static logical interface name
- Load balance function rules
- Interface name of associated LAN/SFP port

For details on the load balance function rules, refer to the *type* parameter of the **port-channel load-balance** command.

[Example]

Show the static logical interface status.

```
SWX232x#show static-channel-group
% Static Aggregator: sa5
% Load balancing: src-dst-mac
% Member:
   port1.1
   port1.2
   port1.3
   port1.4
```

5.2.3 Set LACP logical interface

[Syntax]

channel-group *link-id* **mode** *mode*

no channel-group

[Parameter]

link-id : <1-127>

LACP logical interface number

mode : Operation mode

mode	Description
active	Operate LACP in active mode. In active mode, it actively sends LACP frames to the other device.
passive	Operate LACP in passive mode. In passive mode, it sends LACP frames only if LACP frames are received from the other device.

[Input mode]

interface mode

[Description]

Associates the applicable interface with the LACP logical interface specified by *link-id*.

If this command is executed with the "no" syntax, the applicable interface is dissociated from the LACP logical interface.

[Note]

This command can be specified only for LAN/SFP port.

If a LAN/SFP port is associated with a LACP logical interface, **lacp timeout long** command is specified for the corresponding LAN/SFP port.

If it is dissociated from the LACP logical interface, the **lacp timeout** command setting of the corresponding LAN/SFP port is deleted.

If you associate a LAN/SFP port to a *link-id* for which a LACP logical interface does not exist, the LACP logical interface is newly generated.

If the associated LAN/SFP port is no longer present because it was removed from the LACP logical interface, the LACP logical interface is deleted.

Up to twenty LAN/SFP port units can be associated with one LACP logical interface.

If up to eight associated LAN/SFP ports are combined into an LACP logical interface, they are immediately combined into the LACP logical interface; ports in excess of eight are standby ports used in case of a malfunction.

LAN/SFP port whose communication mode is half duplex do not support LACP link aggregation. (They can be assigned, but do not function as LACP link aggregation.)

If LAN/SFP port with different communication speeds are assigned to the same LACP logical interface, the operation depends on the settings for different-speed link aggregation. See the **lacp multi-speed** command for details.

If a LAN/SFP port is to be associated with an already-existing LACP logical interface, all of the following settings must match between the LAN/SFP port and the LACP logical interface. If the settings differ, an error occurs.

- Setting of VLAN
- Set QoS trust mode (including default CoS value and port priority)

If a LACP logical interface is newly generated, the above settings of the LAN/SFP port are set to the default settings of the LACP logical interface.

If a LAN/SFP port is associated with an LACP logical interface, the MSTP settings return to the default values.

The MSTP settings also return to the default values if the LAN/SFP port is removed from the LACP logical interface.

It is not possible to associate a single LAN/SFP port with multiple logical interface units.

You must use the "no" syntax to first remove it before associating it with a different logical interface.

[Example]

Associate LAN port #1 in ACTIVE mode with LACP logical interface #10.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#channel-group 10 mode active
```

5.2.4 Show LACP logical interface status

[Syntax]

show etherchannel [*ifname*]

[Parameter]

ifname : Interface name of the LAN/SFP port

Interfaces that make up the LACP logical interface

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

If *ifname* is omitted, shows the status of the LACP logical interface.

The following items are shown for each LACP logical interface that exists.

- LACP logical interface name
- Load balance function rules
- Interface name of associated LAN/SFP port

For details on the load balance function rules, refer to the *type* parameter of the **port-channel load-balance** command.

If *ifname* is specified, shows the status of the LAN/SFP port that make up the LACP logical interface.

The following items are shown.

Item	Description
Etherchannel portN.N	LAN/SFP port name
Physical admin key	Key that identifies physical characteristics (created from bandwidth, duplex, mru, and VLAN structure)
Receive machine state	Status of the LACP protocol Receive machine transition variable • "Invalid" • "Initialize" • "Port disabled" • "LACP disabled" • "Expired" • "Defaulted" • "Current"
Periodic Transmission machine state	Status of the LACP protocol Periodic Transmission transition variable • "Invalid" • "No periodic" • "Fast periodic" (transmitted at one-second intervals) • "Slow periodic" (transmitted at 30 second intervals) • "Periodic"
Mux machine state	Status of the LACP protocol Receive machine transition variable • "Detached" • "Waiting" • "Attached" • "Collecting/Distributing"
Selection	Usage status • "Selected" • "Unselectedic" • "Standby"
Information	Refer to the table below (Actor is self, Partner is other party)

Item	Description
Aggregator ID	Distinguishing ID on LACP

Information shows the following items.

Item	Description
LAG	LACP system ID (priority, MAC address)
Admin Key	ID that is the basis of the LACP key (logical port number)
Port priority	LACP port priority order
Ifindex	Interface number
Timeout	Timeout value ("Long"=90 seconds, "Short"=3 seconds)
Active	LACP operation mode("Active", "Passive")
Synchronized	Synchronization flag
Collecting	Collecting flag
Distributing	Distributing flag
Defaulted	Defaulted flag
Expired	Expired flag

[Example]

Shows the status of LACP logical interface.

```
SWX232x#show etherchannel
% Lacp Aggregator: po10
% Load balancing: src-dst-mac
% Member:
   port1.1
   port1.2
   port1.3
   port1.4
```

Shows the status of the LAN/SFP ports that make up the LACP logical interface.

```
SWX232x#show etherchannel port1.1
Etherchannel port1.1
 Physical admin key                        3
 Receive machine state                   Current
 Periodic Transmission machine state     Slow periodic
 Mux machine state                       Collecting/Distributing
 Selection                               Selected
 Information    Actor                         Partner
  LAG           0x8000, 00-a0-de-e0-e0-e0     0x8000, 00-a0-de-11-11-11
  Admin Key       0001                          0001
  Port Priority  32768                         32768
  Ifindex         5001                          5001
  Timeout       Long                          Long
  Active             1                             1
  Synchronized       1                             1
  Collecting         1                             1
  Distributing       1                             1
  Defaulted          0                             0
  Expired            0                             0
```

5.2.5 Set LACP system priority order

[Syntax]

lacp system-priority *priority*

no lacp system-priority

[Parameter]

priority : <1-65535>

LACP system priority irder
Lower numbers have higher priority

[Initial value]

lacp system-priority 32768

[Input mode]

global configuration mode

[Description]

Sets the LACP system priority order.

If this command is executed with the "no" syntax, the setting returns to the default value.

[Note]

If an LACP logical interface is connected to the other device, the system priorities are compared, and control privilege is given to the device with the higher priority.

[Example]

Set the LACP system priority order to 100.

```
SWX232x(config)#lacp system-priority 100
```

5.2.6 Show LACP system priority

[Syntax]

show lacp sys-id

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the LACP system priority and the LACP system ID.

The following items are shown.

- LACP system priority (hexadecimal number starting with 0x)
- LACP system ID

[Note]

The LACP system priority can be set by the **lacp system-priority** command.

The LACP system ID is generated from the MAC address.

[Example]

Show the LACP system priority.

```
SWX232x>show lacp sys-id
% System 0x8000, 00-a0-de-e0-e0-e0
```

5.2.7 LACP different-speed link aggregation settings

[Syntax]

lacp multi-speed *switch*

no lacp multi-speed

[Parameter]

switch : Different-speed link aggregation function enable/disable settings

Setting value	Description
enable	Enabling different-speed link aggregation
disable	Disabling different-speed link aggregation

[Initial value]

lacp multi-speed disable

[Input mode]

global configuration mode

[Description]

Enables or disables different-speed link aggregation in an LACP.

If this command is executed with the "no" syntax, the setting returns to the default value.

[Note]

Operations when different-speed link aggregation is enabled

- All associated ports up to the maximum (eight ports) are set to active, regardless of communication speed.
- Load balancing is handled the same for all associated ports.
- If the opposing device does not accept a different communication speed, a list of associated ports is exchanged between this device and the opposing device, and the ports usable by both devices are enabled.

Operations when different-speed link aggregation is disabled

- Amongst the associated ports, only those with the same communication speed as the port initially linked up are made active.
  - Other ports with different communication speeds are left on standby.
  - When set to auto negotiation, only those ports amongst the associated ports with the same communication speed as that which resulted from the initial auto negotiation are made active.
- When the first group of linked-up ports all link down, the LACP logical interface also links down.

[Example]

This sets different-speed link aggregation to enabled.

```
SWX232x(config)#lacp multi-speed enable
```

5.2.8 Set LACP timeout

[Syntax]

lacp timeout *duration*

[Parameter]

duration : Specify the timeout

duration	Description
short	Sets the timeout to 3 seconds
long	Sets the timeout to 90 seconds

[Input mode]

interface mode

[Description]

Sets the LACP timeout.

[Note]

This command can be set only for a LAN/SFP port that is associated with an LACP logical interface.

If a LAN/SFP port is associated with an LACP logical interface, **lacp timeout long** command is specified for the corresponding LAN/SFP port.

If it is dissociated from the LACP logical interface, the **lacp timeout** command setting of the corresponding LAN/SFP port is deleted.

LACP timeout indicates the time since the last LACP frame received from the other device, after which it is determined that the link has gone down.

The LACP timeout setting is placed in a LACP frame and sent to the other device; after receiving this, the other device will transmit LACP frames at intervals of 1/3 of this LACP timeout.

The interval at which the device itself transmits LACP frames depends on the LACP timeout value inside the LACP frame sent from the other device.

[Example]

Set the LACP timeout of LAN port #1 to short.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#lacp timeout short
```

5.2.9 Clear LACP frame counters

[Syntax]

clear lacp [*link-id*] **counters**

[Parameter]

link-id : <1-127>
LACP logical interface number

[Input mode]

privileged EXEC mode

[Description]

Clears the LACP frame counters.

If *link-id* is omitted, the frame counter of every existing LACP logical interface is cleared.

[Example]

Clear the frame counter for every LACP logical interface.

```
SWX232x#clear lacp counters
```

5.2.10 Show LACP frame counter

[Syntax]

show lacp-counter [*link-id*]

[Parameter]

link-id : <1-127>
LACP logical interface number

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Show the LACP frame counter.

If *link-id* is omitted, the frame counter of every existing LACP logical interface is shown.

The following items are shown for each associated LAN/SFP port.

- LACP frames sent and received
- Marker protocol frames sent and received
- Error frames sent and received

[Example]

Show the frame counter for every LACP logical interface.

```
SWX232x#show lacp-counter
% Traffic statistics
Port       LACPDUs         Marker          Pckt err
        Sent    Recv    Sent    Recv    Sent    Recv
% Aggregator po1 , ID 4601
port1.1  297     298     0       0       0       0
port1.2  306     299     0       0       0       0
port1.3  305     298     0       0       0       0
port1.4  309     1350    0       0       0       0
port1.5  186     186     0       0       0       0
```

5.2.11 Set load balance function rules

[Syntax]

port-channel load-balance *type*
no port-channel loac-balance

[Parameter]

type : Rules to specify the forwarding destination interface

type	Description
dst-ip	Destination IPv4/IPv6 address
dst-mac	Destination MAC address
dst-port	Destination TCP/UDP port number
src-dst-ip	Source and destination IPv4/IPv6 address
src-dst-mac	Source and destination MAC address
src-dst-port	Source and destination TCP/UDP port number
src-ip	Source IPv4/IPv6 address
src-mac	Source MAC address
src-port	Source TCP/UDP port number

[Initial value]

port-channel load-balance src-dst-mac

[Input mode]

global configuration mode

[Description]

Sets rules to specify the forwarding destination interface of the load balance function.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command is a system-wide setting.

In the case of a frame that is not an IPv4/IPv6 packet, the forwarding destination interface is determined according to the forwarding source and destination MAC addresses, regardless of the rules that were specified.

[Example]

With the load balance function, set the system to determine the forwarding destination interface based on the transmission-source and destination IPv4/IPv6 address.

```
SWX232x(config)#port-channel load-balance src-dst-ip
```

5.2.12 Show protocol status of LACP logical interface

[Syntax]

show etherchannel status [*link-id*] [summary | detail]

[Keyword]

summary	:	Abbreviated display
detail	:	Detailed display

[Parameter]

link-id	:	<1-127> LACP logical interface number

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the status of the LACP logical interface specified by *link-id*.

If *link-id* is omitted, shows the status of all LACP logical interface.

If summary is specified, an abbreviated display is shown; if detail is specified, details are shown.

sIf both summary and detail are omitted, the result is as though summary was specified.

The following items are shown.

Item	Description
Aggregator	LACP logical interface
ID	Distinguishing ID on the LACP logical interface
Actor LAG	The actor's own LACP system ID (priority, MAC address)
Admin Key	The ID that is the basis of the actor's own LACP key (logical port number)
Status	Link aggregation status ("Not ready"/"Ready")
Partner LAG	The partner's LACP system ID (priority, MAC address)
Partner Key	The ID that is the basis of the partner's LACP key
Link count	Number of ports currently conveying data / Number of ports able to convey data
Link	List of the constituent LAN/SFP port (see table below for details)

Link shows the following items.

Usage status	Description
"Unselected"	Currently communicating with LACP control protocol.
"Selected"	Selected as a LAN/SFP port with LACP enabled.
"Standby"	Specified as a standby LAN/SFP port with LACP enabled.

Synchronization flag	Description
"no"	Synchronization flag is not set.
"yes"	Synchronization flag is set.

The state of the linked-up LAN/SFP ports are known from the usage status and the Synchronization flag.

Usage status	Synchronization	State of the linked-up LAN/SFP port
Unselected	no	Currently communicating with LACP control protocol.
Selected	no	Selected as a LAN/SFP port with LACP enabled. Currently negotiating to combine for link aggregation.
Standby	no	Selected as a LAN/SFP port with LACP enabled, and specified as a standby port.
Selected	yes	Selected as a LAN/SFP port with LACP enabled. Combined as link aggregation,

[Example]

Show the status of the LACP logical interface.

```
SWX232x#show etherchannel status summary
Aggregator po1
 ID          4601
 Status       Ready
 Partner LAG  0x8000, 00-a0-de-11-11-11
 Partner Key    0001
 Link count    1/  1
Aggregator po2
 ID          4602
 Status       Not ready
 Partner LAG  0x8000, 00-a0-de-11-11-11
 Partner Key    0001
 Link count    0/  1
Aggregator po127
```

```
 ID          4727
 Status       Not ready
 Partner LAG  0x8000, 00-a0-de-11-11-11
 Partner Key    0001
 Link count    0/  1


SWX232x#show etherchannel status detail
Aggregator po1
 ID          4601
 Status       Ready
 Actor   LAG  0x8000, 00-a0-de-e0-e0-e0
 Admin Key      0001
 Partner LAG  0x8000, 00-a0-de-11-11-11
 Partner Key    0001
 Link count    1/  1
 Link
  port1.1     Selected     Synchronized  yes
Aggregator po2
 ID          4602
 Status       Ready
 Actor   LAG  0x8000, 00-a0-de-e0-e0-e0
 Admin Key      0002
 Partner LAG  0x8000, 00-a0-de-11-11-11
 Partner Key    0001
 Link count    0/  1
 Link
  port1.2     Selected     Synchronized  no
  port1.3     Unselected   Synchronized  no
Aggregator po127
 ID          4727
 Status       Ready
 Actor   LAG  0x8000, 00-a0-de-e0-e0-e0
 Admin Key      0127
 Partner LAG  0x8000, 00-a0-de-11-11-11
 Partner Key    0001
 Link count    0/  1
 Link
  port1.4     Selected     Synchronized  no
```

5.2.13 Set LACP port priority order

[Syntax]

lacp port-priority *priority*
no lacp port-priority

[Parameter]

priority : <1-65535>
LACP port priority order
Lower numbers have higher priority

[Initial value]

lacp port-priority 32768

[Input mode]

interface mode

[Description]

Sets the LACP port priority order.

If this command is executed with the "no" syntax, the setting returns to the default value.

[Note]

If up to eight LAN/SFP ports are combined into an LACP logical interface, they are immediately combined into the LACP logical interface; ports in excess of eight are standby ports used in case of a malfunction.

In such cases, the priority order between the LAN/SFP ports are evaluated, and they are combined starting with the highestpriority port.

The priority order is evaluated as follows.

1) Priority is given to ports with a lower LACP port priority.

2) If the LACP port priority is the same, priority is given to the lower interface number.

If an SFP port is to be given priority, its LACP port priority must be set lower than other ports.

[Example]

Set the LACP port priority order to 1024.

```
SWX232x(config-if)#channel-group 1 mode active
SWX232x(config-if)#lacp port-priority 1024
```

5.3 Port authentication

5.3.1 Configuring the IEEE 802.1X authentication function for the entire system

[Syntax]

aaa authentication dot1x

no aaa authentication dot1x

[Initial value]

no aaa authentication dot1x

[Input mode]

global configuration mode

[Description]

Enables IEEE 802.1X authentication for the entire system.

If this command is executed with the "no" syntax, disables IEEE 802.1X authentication for the entire system.

Use a RADIUS server for authentication on which the **radius-server host** command has been configured.

[Note]

In order to actually use IEEE 802.1X authentication, you need to enable IEEE 802.1X authentication on the applicable interface as well.(**dot1x port-control** command)

[Example]

Enable IEEE 802.1X authentication for the entire system.

```
SWX232x(config)#aaa authentication dot1x
```

5.3.2 Configuring the MAC authentication function for the entire system

[Syntax]

aaa authentication auth-mac

no aaa authentication auth-mac

[Initial value]

no aaa authentication auth-mac

[Input mode]

global configuration mode

[Description]

Enables MAC authentication for the entire system.

If this command is executed with the "no" syntax, disables MAC authentication for the entire system.

Use a RADIUS server for authentication on which the **radius-server host** command has been configured.

[Note]

In order to actually use MAC authentication, you need to enable MAC authentication on the applicable interface as well. (**auth-mac enable** command)

[Example]

Enable MAC authentication for the entire system.

```
SWX232x(config)#aaa authentication auth-mac
```

5.3.3 Configuring the Web authentication function for the entire system

[Syntax]

aaa authentication auth-web

no aaa authentication auth-web

[Initial value]

no aaa authentication auth-web

[Input mode]

global configuration mode

[Description]

Enables Web authentication for the entire system.

If this command is executed with the "no" syntax, Disables Web authentication for the entire system.

Use a RADIUS server for authentication on which the **radius-server host** command has been configured.

[Note]

In order to actually use Web authentication, you need to enable Web authentication on the applicable interface as well. (**auth-web enable** command)

[Example]

Enable Web authentication for the entire system.

```
SWX232x(config)#aaa authentication auth-web
```

5.3.4 Set operation mode for the IEEE 802.1X authentication function

[Syntax]

dot1x port-control *mode*
no dot1x port-control

[Parameter]

mode : Operation mode for IEEE 802.1X authentication

Operation mode	Description
auto	Operates as an authenticator for IEEE 802.1X authentication
force-authorized	Sets the authenticated port for IEEE 802.1X authentication to a fixed port
force-unauthorized	Sets the unauthenticated port for IEEE 802.1X authentication to a fixed port

[Initial value]

no dot1x port-control

[Input mode]

interface mode

[Description]

Configures the IEEE 802.1X authentication operation mode for the applicable interface.

If this command is executed with the "no" syntax, the IEEE 802.1X authentication function will be disabled for the applicable interface.

[Note]

This command can be specified only for both LAN/SFP port and logical interface.

[Example]

This command can be specified only for LAN/SFP port.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#dot1x port-control auto
```

5.3.5 Set for forwarding control on an unauthenticated port for IEEE 802.1X authentication

[Syntax]

dot1x control-direction *direction*
no dot1x control-direction

[Parameter]

direction : Sets the packet forwarding operation for unauthenticated ports

Forwarding operation	Description
both	Both send and receive packets are discarded.
in	Only receive packets are discarded.

[Initial value]

dot1x control-direction both

[Input mode]

interface mode

[Description]

Changes the packet forwarding operation for the applicable interface when the IEEE 802.1X authentication is unauthenticated.

If this command is executed with the "no" syntax, the setting returns to the default.

When "both" is specified, the packets received from the supplicant are discarded, and the broadcast/multicast packets to the interface to which the supplicant is connected from other ports are also discarded.

When "in" is specified, only packets received from the supplicant are discarded, and the broadcast/multicast packets to the interface to which the supplicant is connected from other ports are forwarded.

[Note]

This command can be specified only for both LAN/SFP port and logical interface.

If the host mode is set as multi-supplicant mode for the corresponding interface, or if it is used in conjunction with MAC authentication, the "in" setting is automatic.

When the guest VLAN is configured using the applicable interface, the settings for this command will be disabled.

Changing the settings for this command will make the authentication state return to the default.

To use this command, you must enable the port authentication function for the applicable interface. (**dot1x port-control** command)

[Example]

Discard received packets only for the packet forwarding operation on an unauthenticated port of LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#dot1x control-direction in
```

5.3.6 Set the EAPOL packet transmission count

[Syntax]

dot1x max-auth-req *count*
no dot1x max-auth-req

[Parameter]

count : <1-10>

Maximum number of times EAPOL packets are transmitted

[Initial value]

dot1x max-auth-req 2

[Input mode]

interface mode

[Description]

Sets the maximum value for the EAPOL packet transmission count for the applicable interface.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be specified only for both LAN/SFP port and logical interface.

To use this command, you must enable the port authentication function for the applicable interface. (**dot1x port-control** command)

[Example]

Set the EAPOL packet transmission count for LAN port #1 to "3".

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#dot1x max-auth-req 3
```

5.3.7 Set the MAC authentication function

[Syntax]

auth-mac enable
auth-mac disable
no auth-mac enable

[Initial value]

auth-mac disable

[Input mode]

interface mode

[Description]

Enables MAC authentication for the applicable interface.

When this command is executed with the "no" syntax or when disable is specified, MAC authentication is disabled.

[Note]

This command can be specified only for both LAN/SFP port and logical interface.

In order to actually use MAC authentication, you need to enable MAC authentication for the entire system as well. (**aaa authentication auth-mac** command)

[Example]

Enable the LAN port #1 MAC authentication function.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#auth-mac enable
```

5.3.8 Set MAC address format during MAC authentication

[Syntax]

auth-mac auth-user *type case*
no auth-mac auth-user

[Parameter]

type : Specify the format

Setting value	Format
hyphen	xx-xx-xx-xx-xx-xx
colon	xx:xx:xx:xx:xx:xx
unformatted	xxxxxxxxxxxx

case : Specify upper or lowercase

Setting value	Description
lower-case	Lower case(a～f)
upper-case	Upper case(A～F)

[Initial value]

auth-mac auth-user hyphen lower-case

[Input mode]

global configuration mode

[Description]

Changes the format of the user name and password used for authentication during MAC authentication.

During MAC authentication, the MAC address of the supplicant is used as a user name and password, and a request is sent to the RADIUS server for authentication.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

To use this command, you must enable the port authentication function for the applicable interface. (**auth-mac enable** command)

[Example]

Change the MAC address format used for MAC authentication to all uppercase format without hyphens.

```
SWX232x(config)#auth-mac auth-user unformatted upper-case
```

5.3.9 Set the Web authentication function

[Syntax]

auth-web enable
auth-web disable
no auth-web enable

[Initial value]

auth-web disable

[Input mode]

interface mode

[Description]

Enables Web authentication for the applicable interface.

When this command is executed with the "no" syntax or when disable is specified, Web authentication is disabled.

[Note]

This command can be specified only for both LAN/SFP port and logical interface.

In order to actually use Web authentication, you need to enable Web authentication for the entire system as well. (**aaa authentication auth-web** command)

You cannot enable the Web authentication function from any other mode besides multi-supplicant mode.

You cannot use this together with guest VLAN.

[Example]

Enable the LAN port #1 Web authentication function.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#auth-web enable
```

5.3.10 Set host mode

[Syntax]

auth host-mode *mode*
no auth host-mode

[Parameter]

mode : Operating mode for port authentication

Operation mode	Description
single-host	This mode allows communications for only one supplicant per port. Only the first supplicant that passes authentication is allowed.
multi-host	This mode allows communication with multiple supplicants for each port. If the first supplicant passes authentication, all other supplicants of the same port will be allowed to communicate without authentication.

Operation mode	Description
multi-supplicant	This mode allows communication with multiple supplicants for each port. Communication is allowed or denied on a per-supplicant basis.

[Initial value]

auth host-mode single-host

[Input mode]

interface mode

[Description]

Changes the port authentication operation mode for the applicable interface.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be specified only for both LAN/SFP port and logical interface.

Changing the settings for this command will make the authentication state return to the default.

When using dynamic VLAN in multi-supplicant mode, the VLAN can be specified for individual supplicants.

When using dynamic VLAN in multi-host, the VLAN ID applied by the first supplicant will be applied to supplicants from the second onwards.

To use this command, you must enable the port authentication function for the applicable interface. (**dot1x port-control** command, **auth-mac enable** command, **auth-web enable** command)

[Example]

Change the LAN port #1 to multi supplicant mode.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#auth host-mode multi-supplicant
```

5.3.11 Set re-authentication

[Syntax]

auth reauthentication

no auth reauthentication

[Initial value]

no auth reauthentication

[Input mode]

interface mode

[Description]

Enables reauthentication of supplicants for the applicable interface.

If this is executed with the "no" syntax, the re-authentication is disabled.

When this setting is enabled, this periodically reauthenticates supplicants that have been successfully authenticated.

The reauthentication interval can be changed using the **auth timeout reauth-period** command.

[Note]

This command can be specified only for both LAN/SFP port and logical interface.

During IEEE 802.1X authentication, an EAPOL packet is transmitted to the supplicant at the timing for reauthentication to once again retrieve the user information, and an authentication request is sent to the RADIUS server.

During MAC authentication, the supplicant's MAC address is regarded as a user name and password at the timing for reauthentication, and a request is sent to the RADIUS server for authentication.

During Web authentication, the supplicant's authentication state is shifted to unauthorized at the timing of reauthentication.

To use this command, you must enable the port authentication function for the applicable interface. (**dot1x port-control** command, **auth-mac enable** command, **auth-web enable** command)

[Example]

Enable re-authenticatio of LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#auth reauthentication
```

5.3.12 Set dynamic VLAN

[Syntax]

auth dynamic-vlan-creation

no auth dynamic-vlan-creation

[Initial value]

no auth dynamic-vlan-creation

[Input mode]

interface mode

[Description]

Sets dynamic VLAN for the applicable interface.

If this is executed with the "no" syntax, the dynamic VLAN is disabled.

For interfaces on which dynamic VLAN is enabled, the associated VLAN is actively changed based on the property (Tunnel-Private-Group-ID) specified by the RADIUS server.

[Note]

This command can be specified only for both LAN/SFP port and logical interface.

Changing the settings for this command will make the authentication state return to the default.

When using dynamic VLAN in multi-supplicant mode, the VLAN can be specified for individual supplicants.

When using dynamic VLAN in multi-host, the VLAN ID applied by the first supplicant will be applied to supplicants from the second onwards.

To use this command, you must enable the port authentication function for the applicable interface. (**dot1x port-control** command, **auth-mac enable** command, **auth-web enable** command)

[Example]

Enable dynamic VLAN on LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#auth dynamic-vlan-creation
```

5.3.13 Set the guest VLAN

[Syntax]

auth guest-vlan *vlan-id*

no auth guest-vlan

[Parameter]

vlan-id : <1-4094>

VLAN ID for guest VLAN

[Initial value]

no auth guest-vlan

[Input mode]

interface mode

[Description]

If the supplicant connected to the applicable interface is unauthorized or if authorization has failed, this specifies the guest VLAN to which the supplicant is associated.

If this command is executed with the "no" syntax, the guest VLAN setting is deleted.

[Note]

This command can be specified only for both LAN/SFP port and logical interface.

Changing the settings for this command will make the authentication state return to the default.

To use this command, you must enable the port authentication function for the applicable interface. (**dot1x port-control** command, **auth-mac enable** command)

This command cannot be set when Web authentication is enabled.

[Example]

This specifies guest VLAN #10 for LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#auth guest-vlan 10
```

5.3.14 Suppression period settings following failed authentication

[Syntax]

auth timeout quiet-period *time*
no auth timeout quiet-period

[Parameter]

time : <1-65535>
Period during which communication with a supplicant is refused after authentication fails (seconds)

[Initial value]

auth timeout quiet-period 60

[Input mode]

interface mode

[Description]

Sets the period during which authentication is suppressed for the applicable interface after authentication fails.

If this command is executed with the "no" syntax, the setting returns to the default.

All packets received during the authentication suppression period will be discarded.

[Note]

This command can be specified only for both LAN/SFP port and logical interface.

To use this command, you must enable the port authentication function for the applicable interface. (**dot1x port-control** command, **auth-mac enable** command, **auth-web enable** command)

[Example]

Set the suppression period for LAN port #1 to 300.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#auth timeout quiet-period 300
```

5.3.15 Set reauthentication interval

[Syntax]

auth timeout reauth-period *time*
no auth timeout reauth-period

[Parameter]

time : <300-86400>
Supplication reauthentication interval (seconds)

[Initial value]

auth timeout reauth-period 3600

[Input mode]

interface mode

[Description]

Sets the reauthentication interval of the supplicant for the applicable interface.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be specified only for both LAN/SFP port and logical interface.

To use this command, you must enable the port authorization function and the reauthentication function for the applicable interface. (**dot1x port-control** command, **auth-mac enable** command, **auth-web enable** command, **auth reauthentication** command)

[Example]

Set the reauthentication period for LAN port #1 to 1200.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#auth timeout reauth-period 1200
```

5.3.16 Set the reply wait time for the RADIUS server overall

[Syntax]

auth timeout server-timeout *time*
no auth timeout server-timeout

[Parameter]

time : <1-65535>
Reply wait time from the authentication server for the authentication request (seconds)

[Initial value]

auth timeout server-timeout 30

[Input mode]

interface mode

[Description]

Sets the reply wait time for the RADIUS server overall when authenticating a port of the applicable interface.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be specified only for both LAN/SFP port and logical interface.

The value for this setting must be at least equal to (setting of **radius-server timeout** command) x (setting of **radius-server retransmit** command + 1) x (number of radius servers).

To use this command, you must enable the port authentication function for the applicable interface. (**dot1x port-control** command, **auth-mac enable** command, **auth-web enable** command)

[Example]

This sets the reply wait time to the RADIUS server overall to 180 seconds, for authentication requests from LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#auth timeout server-timeout 180
```

5.3.17 Set supplicant reply wait time

[Syntax]

auth timeout supp-timeout *time*
no auth timeout supp-timeout

[Parameter]

time : <1-65535>
Supplicant reply wait time (seconds)

[Initial value]

auth timeout supp-timeout 30

[Input mode]

interface mode

[Description]

Sets the reply wait time from the supplicant during port authentication for the applicable interface.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be specified only for both LAN/SFP port and logical interface.

To use this command, you must enable the port authentication function for the applicable interface. (**dot1x port-control** command, **auth-mac enable** command, **auth-web enable** command)

[Example]

Set the reply wait time from the supplicant of LAN port #1 to 180 seconds.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#auth timeout supp-timeout 180
```

5.3.18 Set RADIUS server host

[Syntax]

radius-server host *host* [auth-port *port*] [timeout *time*] [retransmit *count*] [key *secret*]
no radius-server host

[Keyword]

auth-port	:	Sets the UDP port number used for authenticating the RADIUS server
timeout	:	Sets the reply standby time for requests sent to the RADIUS server
retransmit	:	Sets the number of times to resend the request to the RADIUS server
key	:	Sets the password used for communicating with the RADIUS server

[Parameter]

host	:	IPv4 address (A.B.C.D) or IPv6 address (X:X::X:X) When specifying an IPv6 link local address, the transmitting interface also needs to be specified (fe80::X%vlanN format).
port	:	<0-65535> UDP port number used for authentication (the default value of 1812 is used when this is omitted)
time	:	<1-1000> Reply standby time (in seconds; the settings for the radius-server timeout command--5 sec. at default are used if this is omitted)
count	:	<0-100> Number of times to resend (the settings for the radius-server retransmit command--3 times. at default are used if this is omitted)
secret	:	Single-byte alphanumeric characters, and single-byte symbols other than the characters '?' and spaces (128 characters or less) Shared password (the settings for the radius-server key command are used if this is omitted)

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Adds a server to the authentication server list.

The maximum number of entries is 8.

If this command is executed with the "no" syntax, this deletes the specified server from the authentication server list.

[Example]

Add the server at IP address 192.168.100.100, with a reply standby time of 10 seconds and a number of times to resend requests of 5 seconds to the authentication server list.

```
SWX232x(config)#radius-server host 192.168.100.100 timeout 10 retransmit 5
```

Add the server at IP address 192.168.100.101, with an authentication UDP port of 1645 and a shared password of "abcde" to the authentication server list.

```
SWX232x(config)#radius-server host 192.168.100.101 auth-port 1645 key abcde
```

Adds the local RADIUS server to the authentication server list.

```
SWX232x(config)#radius-server host 127.0.0.1 key secret_local
```

5.3.19 Set the reply wait time for each RADIUS server

[Syntax]

radius-server timeout *time*
no radius-server timeout

[Parameter]

time : <1-1000>

Standby time for replying to requests (seconds)

[Initial value]

radius-server timeout 5

[Input mode]

global configuration mode

[Description]

Sets the reply wait time for each RADIUS server.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

If a server-specific wait time for replying to requests has been set using the **radius-server host** command, the **radius-server host** command settings are used.

The setting needs to be adjusted so that the value of (Setting of **radius-server timeout** command) x (Setting of **radius-server retransmit** command + 1) x (Number of RADIUS servers) falls within the number set in the auth timeout server-timeout command.

[Example]

Set the reply wait time for each RADIUS server to 10 seconds.

```
SWX232x(config)#radius-server timeout 10
```

5.3.20 Set number of times to resend requests to RADIUS server

[Syntax]

radius-server retransmit *count*
no radius-server retransmit

[Parameter]

count : <0-100>

Number of times to resend request

[Initial value]

radius-server retransmit 3

[Input mode]

global configuration mode

[Description]

Sets the number of times to resend requests to a RADIUS server.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

If a server-specific number of resends for requests has been set using the **radius-server host** command, the **radius-server host** command settings are used.

[Example]

Set the number of times to resend requests to a RADIUS server to 5.

```
SWX232x(config)#radius-server retransmit 5
```

5.3.21 Set RADIUS server shared password

[Syntax]

radius-server key *secret*
no radius-server key

[Parameter]

secret : Shared password

Single-byte alphanumeric characters, and single-byte symbols other than the characters '?' and spaces (128 characters or less)

[Initial value]

no radius-server key

[Input mode]

global configuration mode

[Description]

Sets the shared password used when communicating with a RADIUS server.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

If a server-specific shared password has been set using the **radius-server host** command, the **radius-server host** command settings are used.

[Example]

The shared password used with the RADIUS server is "abcde".

```
SWX232x(config)#radius-server key abcde
```

5.3.22 Set time of RADIUS server usage prevention

[Syntax]

radius-server deadtime *time*
no radius-server deadtime

[Parameter]

time : <0-1440>

RADIUS server usage prevention time (minutes)

[Initial value]

radius-server deadtime 0

[Input mode]

global configuration mode

[Description]

Sets the time during which the usage of the relevant server is prevented, when a request to the RADIUS server has timed out.

If this command is executed with the "no" syntax, the setting returns to the default.

[Example]

This sets the usage prevention for the RADIUS server to 1 minute.

```
SWX232x(config)#radius-server deadtime 1
```

5.3.23 Set NAS-Identifier attribute sent to RADIUS server

[Syntax]

auth radius attribute nas-identifier *line*
no auth radius attribute nas-identifier

[Parameter]

line : Identifying text (253 characters or fewer)

The desired text string to be set as the NAS-Identifier attribute

[Initial value]

no auth radius attribute nas-identifier

[Input mode]

global configuration mode

[Description]

Specifies a desired text string that is sent as the NAS-Identifier attribute to the RADIUS server for port authentication.

If this setting is made, it is notified to RADIUS server as the NAS-Identifier attribute. If this setting is deleted, notification is stopped.

If this command is executed with the "no" syntax, the setting returns to the default.

[Example]

Set "Nas-ID-001" as the NAS-Identifier attribute that is sent to the RADIUS server.

```
SWX232x(config)#auth radius attribute nas-identifier Nas-ID-001
```

5.3.24 Show port authentication information

[Syntax]

show auth status [interface *ifname*]

[Keyword]

interface	:	Show information for only a specified interface

[Parameter]

ifname	:	Interface name Interface to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the setting status for port authentication as well as the current authentication state.

[Example]

Show the port authentication information.

```
SWX232x#show auth status
[System information]
  802.1X Port-Based Authentication : Enabled
  MAC-Based Authentication         : Disabled
  WEB-Based Authentication         : Enabled

  Clear-state time : Not configured

  Redirect URL :
    Not configured

  Auth-web custom-file :
    There is no custom-file

  RADIUS server address :
    192.168.100.101 (port:1812)

[Interface information]
  Interface port1.1 (up)
    802.1X Authentication   : Auto (configured:auto)
    MAC Authentication      : Disabled (configured:disable)
    WEB Authentication      : Disabled (configured:disable)
    Host mode               : Single-host
    Dynamic VLAN creation   : Disabled
    Guest VLAN              : Disabled
    Reauthentication        : Disabled
    Reauthentication period : 60 sec
    MAX request             : 2 times
    Supplicant timeout      : 30 sec
    Quiet period            : 60 sec
    Controlled directions   : Both (configured:both)
    Protocol version        : 2
    Authentication status   : Authorized
    Clear-state time        : Not configured

  Interface port1.4 (down)
    802.1X Authentication   : Force Authorized (configured:-)
    MAC Authentication      : Disabled (configured:disable)
    WEB Authentication      : Enabled (configured:enable)
    Host mode               : Multi-supplicant
```

```
    Dynamic VLAN creation   : Disabled
    Guest VLAN              : Disabled
    Reauthentication        : Disabled
    Reauthentication period : 3600 sec
    MAX request             : 2 times
    Supplicant timeout      : 30 sec
    Server timeout          : 30 sec
    Quiet period            : 60 sec
    Controlled directions   : In (configured:both)
    Protocol version        : 2
    Clear-state time        : Not configured
```

5.3.25 Show supplicant information

[Syntax]

show auth supplicant [interface *ifname*]

[Keyword]

interface	:	Show information for only a specified interface

[Parameter]

ifname	:	Interface name Interface to show

[Input mode]

privileged EXEC mode

[Description]

Shows the supplicant information for port authentication.

[Example]

Show supplicant information for LAN port #1.

```
SWX232x#show auth supplicant interface port1.1
Port     MAC address       User name         Status          VLAN Method
-------- ----------------- ----------------- --------------- ---- ------
port1.1  0011.2233.4455    user              Authenticated      1 802.1X
```

5.3.26 Show statistical information

[Syntax]

show auth statistics [interface *ifname*]

[Keyword]

interface	:	Shows statistical information for only the specified interface

[Parameter]

ifname	:	Interface name Interface to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows statistical information for packets during port authentication.

[Example]

Show statistical information for LAN port #1.

```
SWX232x#show auth statistics interface port1.1
Interface port1.1
  EAPOL frames:
    Received frames      : 11
      EAPOL Start        : 1
      EAPOL Logoff       : 0
      EAP Response ID    : 1
```

```
      EAP Response       : 9
      Invalid EAPOL      : 0
      EAP Length error   : 0
      Last EAPOL version : 1
      Last EAPOL source  : 0011.2233.4455
    Transmitted frames   : 11
      EAP Request ID     : 1
      EAP Request        : 9
      EAP Success        : 1
      EAP Fail           : 0

  RADIUS packets:
    Received packets     : 10
      Access Request     : 0
      Access Challenge   : 9
      Access Accept      : 1
      Access Reject      : 0
    Transmitted packets  : 10
      Access Request     : 10
```

5.3.27 Clear statistical information

[Syntax]

clear auth statistics [interface *ifname*]

[Keyword]

interface : Clears statistical information for only the specified interface

[Parameter]

ifname : Interface name

Interface to show

[Input mode]

privileged EXEC mode

[Description]

Clears the packet statistical information during port authentication.

[Example]

Clear the statistical information for LAN port #1.

```
SWX232x#clear auth statistics interface port1.1
```

5.3.28 Show RADIUS server setting information

[Syntax]

show radius-server

[Input mode]

privileged EXEC mode

[Description]

Shows setting information related to the RADIUS server.

Shows setting information (server host, UDP port number for authentication, shared password, wait time for replying to requests, number of times to resend requests, server usage prevention time) for RADIUS servers registered in the authentication server list.

[Example]

Show setting information related to the RADIUS server.

```
SWX232x#show radius-server
Server Host : 192.168.100.101
  Authentication Port : 1812
  Secret Key          : abcde
  Timeout             : 10 sec
  Retransmit Count    : 5
  Deadtime            : 0 min

Server Host : 192.168.100.102
```

```
  Authentication Port : 1645
  Secret Key          : fghij
  Timeout             : 5 sec
  Retransmit Count    : 3
  Deadtime            : 0 min
```

5.3.29 Settings for redirect destination URL following successful Web authentication

[Syntax]

auth-web redirect-url *url*

no auth-web redirect-url

[Parameter]

url	:	Single-byte alphanumeric characters and single-byte symbols (maximum 255 characters) Redirect destination URL

[Initial value]

no auth-web redirect-url

[Input mode]

global configuration mode

[Description]

Specifies the URL to redirect to after successful Web authentication.

If this is executed with the "no" syntax, disables the redirect function after authentication.

[Note]

URLs that include question marks ("?") cannot be specified.

[Example]

Specify the redirect destination after successful Web authentication as http://192.168.100.200.

```
SWX232x(config)#auth-web redirect-url http://192.168.100.200
```

5.3.30 Clear the authentication state

[Syntax]

clear auth state [all] [interface *ifname*] [supplicant *mac-addr*]

[Keyword]

all	:	Clears the authentication state for all supplicants
interface	:	Clears the authentication state for supplicants connected to specific interfaces
supplicant	:	Clear the authentication state for specific supplicant

[Parameter]

ifname	:	Interfacee name Interface to clear
mac-addr	:	hhhh.hhhh.hhhh (h is hexadecimal) Applicable MAC address

[Input mode]

privileged EXEC mode

[Description]

Clears the supplicant authentication state.

[Example]

Clear the authentication state for supplicants connected to LAN port #1.

```
SWX232x#clear auth state interface port1.1
```

5.3.31 Setting the time for clearing the authentication state (system)

[Syntax]

auth clear-state time *time*
no auth clear-state time

[Parameter]

time : <0-23>
Time at which the authentication state is cleared

[Initial value]

no auth clear-state time

[Input mode]

global configuration mode

[Description]

Sets the time at which the authentication state for the supplicant is cleared for the entire system.

If this command is executed with the "no" syntax, deletes the time setting for clearing the authentication state.

[Note]

If a time has been set to clear the interface authentication state, this will clear the authentication state at the time specified in the interface.

[Example]

This sets the time at which the authentication state for the supplicant is cleared for the entire system to 12:00.

```
SWX232x(config)#auth clear-state time 12
```

5.3.32 Setting the time for clearing the authentication state (interface)

[Syntax]

auth clear-state time *time*
no auth clear-state time

[Parameter]

time : <0-23>
Time at which the authentication state is cleared

[Initial value]

no auth clear-state time

[Input mode]

interface mode

[Description]

Sets the time at which the authentication state of the supplicant is cleared for the applicable interface.

If this command is executed with the "no" syntax, deletes the time setting for clearing the authentication state.

[Note]

This command can be specified only for both LAN/SFP port and logical interface.

Even if a time has been set to clear the interface authentication state for the applicable interface system-wide, the authentication state will be cleared at the time specified by this command.

[Example]

This sets the time at which the authentication state of the supplicant connected to LAN port #1 is cleared to 12:00.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#auth clear-state time 12
```

5.3.33 Locate the file for customizing the Web authentication screen

[Syntax]

copy auth-web custom-file all *src_config_num dst_config_num*
copy auth-web custom-file *filename src_config_num dst_config_num*

[Keyword]

all : Copies the file for customizing all Web authentication screens

[Parameter]

filename : Single-byte alphanumeric characters and single-byte symbols

Filename of the file for customizing the Web authentication screen

src_config_num : Copy source configuration number

Setting value	Description
0-1	Number of the start-up config
sd	SD card

dst_config_num : Copy destination configuration number

Setting value	Description
0−1	Number of the start-up config
sd	SD card

[Input mode]

privileged EXEC mode

[Description]

Copies the file for customizing all Web authentication screens.

[Note]

When copying the file for customizing the Web authentication screen from an SD card to the switch, put the respective files in the /[model name]/startup-config/web-auth/ folder on the SD card.

In a state in which the SD card is not mounted, executing this command on a config that is in the SD card produces an error.

[Example]

Copy all of the files for customizing the Web authentication screen from the SD card to startup configuration #0.

```
SWX232x#copy auth-web startup-config all sd 0
```

5.3.34 Delete the file for customizing the Web authentication screen

[Syntax]

erase auth-web custom-file all *config_num*
erase auth-web custom-file *filename config_num*

[Keyword]

all : Deletes the file for customizing all Web authentication screens

[Parameter]

filename : Single-byte alphanumeric characters and single-byte symbols

Filename of the file for customizing the Web authentication screen

config_num : Number of config

Setting value	Description
0-1	Number of the start-up config
sd	SD card

[Input mode]

privileged EXEC mode

[Description]

Deletes the file for customizing the Web authentication screen.

[Note]

In a state in which the SD card is not mounted, executing this command on a config that is in the SD card produces an error.

[Example]

Deletes logo.png from startup configuration #0.

```
SWX232x#erase auth-web startup-config logo.png 0
```

5.3.35 Set EAP pass through

[Syntax]

pass-through eap *switch*
no pass-through eap

[Parameter]

switch : Behavior EAP pass through

Setting value	Description
enable	Enable the EAP pass through
disable	Disable the EAP pass through

[Initial value]

pass-through eap enable

[Input mode]

global configuration mode

[Description]

Enables/disables EAP pass-through, specifying whether EAPOL frames are forwarded.

If "disable" is specified, EAP frames are discarded.

If this is executed with the "no" syntax, or if "enable" is specified, EAPOL frames are forwarded.

[Note]

For interfaces on which 802.1X authentication is enabled, authentication functionality is given priority, and EAP pass-through settings are not applied.

[Example]

Disable the EAP pass through.

```
SWX232x(config)#pass-through eap disable
```

5.4 Port security

5.4.1 Set port security function

[Syntax]

port-security enable
port-security disable
no port-security

[Keyword]

enable : Enables port security function

disable : Disables port security function

[Initial value]

port-security disable

[Input mode]

interface mode

[Description]

Enables the port security function for the applicable interface.

If this is executed with the "no" syntax, or disable is specified, port security will be disabled for the applicable interface.

[Note]

This command can be specified only for both LAN/SFP port and logical interface.

Any unregistered terminals will be discarded at the time when the port security function is enabled.

[Example]

Enable port security for LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#port-security enable
```

5.4.2 Register permitted MAC addresses

[Syntax]

port-security mac-address
no port-security mac-address

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Registers MAC addresses that are allowed to communicate on ports for which port security has been enabled.

If this command is executed with the "no" syntax, deletes the registered address.

[Example]

Register MAC address 00:A0:DE:00:00:01 as a permitted address for LAN port #1.

```
SWX232x(config)#port-security mac-address 00a0.de00.0001 forward port1.1 vlan 1
```

5.4.3 Set operations used for security violations

[Syntax]

port-security violation *action*
no port-security violation

[Parameter]

action : Operation used for port security violations

Operation mode	Description
discard	Discards packets
shutdown	Shuts down the port

[Initial value]

port-security violation discard

[Input mode]

interface mode

[Description]

Sets the action to be taken during a port security violation for the applicable interface.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

When restoring ports in shutdown mode that have been shut down, use the no shutdown command.

This command can be specified only for both LAN/SFP port and logical interface.

[Example]

Change the operation used for a violation on LAN port #1 to "port shutdown."

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#port-security violation shutdown
```

5.4.4 Show port security information

[Syntax]

show port-security status

[Input mode]

privileged EXEC mode

[Description]

Shows the port security information.

[Example]

Show the port security information.

```
SWX232x#show port-security status
 Port     Security  Action    Status    Last violation
 -------- --------- --------- --------- -----------------
 port1.1  Enabled   Discard   Blocking  00a0.de00.0003
 port1.2  Disabled  Discard   Normal
 port1.3  Disabled  Discard   Normal
 port1.4  Disabled  Discard   Normal
 port1.5  Disabled  Discard   Normal
 port1.6  Disabled  Discard   Normal
 port1.7  Disabled  Discard   Normal
 port1.8  Disabled  Discard   Normal
 port1.9  Disabled  Discard   Normal
 port1.10 Disabled  Discard   Normal
```

5.5 Error detection function

5.5.1 Set automatic recovery from errdisable state

[Syntax]

errdisable auto-recovery *function* [interval *interval*]
no errdisable auto-recovery *function*

[Keyword]

interval : Automatic recovery time setting

[Parameter]

function : Functions that can be the cause of errdisable

Setting value	Description
bpduguard	BPDU guard function
loop-detect	Loop detection function

interval : <10-1000000>

Time (seconds) until auto-recovery

[Initial value]

no errdisable auto-recovery bpduguard (BPDU guard function)

errdisable auto-recovery loop-detect 300 (Loop detection function)

[Input mode]

global configuration mode

[Description]

Enables the function that automatically recovers after the error detection function causes the errdisable state, and specifies the time until automatic recovery.

If interval is omitted, 300 seconds is specified.

this is executed with the "no" syntax, the automatic recovery function is disabled.

[Note]

For a LAN/SFP port that was put in the errdisable state by the BPDU guard function before this command was executed, the change in the setting is applied the next time BPDU is detected.

[Example]

Enable automatic recovery after BPDU guard has caused the errdisable state, and set the recovery time to 600 seconds.

```
SWX232x(config)#errdisable auto-recovery bpduguard interval 600
```

Disable automatic recovery after loop detection has caused the errdisable state.

```
SWX232x(config)#no errdisable auto-recovery loop-detect
```

5.5.2 Show error detection function information

[Syntax]

show errdisable

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows information for the error detection function.

The following items are shown.

- Whether automatic recovery from the errdisable state is enabled or disabled
- The interface that is in the errdisable state, and the function that detected the error

[Example]

Show information for the error detection function.

```
SWX232x>show errdisable

function        auto recovery          interval
-----------------------------------------------
BPDU guard      disable
Loop detect     enable                      300
Port-security   disable

port            reason
----------------------------
port1.1         BPDU guard
port1.7         Loop detect
```

5.6 PoE

5.6.1 Set PoE power supply function (system)

[Syntax]

power-inline *switch*

no power-inline

[Parameter]

switch : System-wide PoE power supply function settings

Setting value	Description
enable	Enables the system-wide PoE power supply function
disable	Disables the system-wide PoE power supply function

[Initial value]

power-inline enable

[Input mode]

global configuration mode

[Description]

Set the system-wide PoE power supply function as enabled or disabled.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can only be executed on models that support PoE power supply.

Even if the system-wide PoE power supply function is enabled, power supply will be disabled for each port if the power supply function is disabled for individual ports.

[Example]

Enable the system-wide PoE power supply function.

```
SWX232x(config)#power-inline enable
```

Disable the system-wide PoE power supply function.

```
SWX232x(config)#power-inline disable
```

5.6.2 Set PoE power supply function (interface)

[Syntax]

power-inline *switch*

no power-inline

[Parameter]

switch : PoE power supply function settings for the applicable interface

Setting value	Description
enable	Enables the PoE power supply function for the applicable interface
disable	Disables the PoE power supply function for the applicable interface

[Initial value]

power-inline enable

[Input mode]

interface mode

[Description]

Set the applicable interface PoE power supply function as enabled or disabled.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can only be executed on models that support PoE power supply.

This will result in a command execution error on all other ports besides PoE port.

Even if the power supply function is enabled with interface mode, power will not be supplied in the following circumstances.

- When the system-wide PoE power supply function is disabled

Note: Power supply continues even when a port is shut down.

[Example]

Enable the PoE power supply function for port1.1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#power-inline enable
```

Disables the PoE power supply function for port1.1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#power-inline disable
```

5.6.3 Set description of PoE port

[Syntax]

power-inline description *line*
no power-inline description

[Parameter]

line : Single-byte alphanumeric characters (64 characters or less)

[Initial value]

none

[Input mode]

interface mode

[Description]

Sets the description text of the PD device to connect to PoE port.

[Note]

This command can only be executed on models that support PoE power supply.

The description text that was set is shown with the **show power-inline** command.

[Example]

Set the description of the PD device connected to port1.1 as "AP1".

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#power-inline description AP1
```

5.6.4 Set PoE port power supply priority

[Syntax]

power-inline priority *priority*
no power-inline priority

[Parameter]

priority : Power supply priority

Setting value	Description
critical	Highest
high	High
low	Low

[Initial value]

power-inline priority low

[Input mode]

interface mode

[Description]

Sets the power supply priority for the applicable interface.

If the amount of power used by the PoE power supply has exceeded the maximum, power supply will stop for the port with the lowest priority.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can only be executed on models that support PoE power supply.

Power supply priority is shown using the **show power-inline** command.

[Example]

Set the power supply priority for port1.5 to high.

```
SWX232x(config)#interface port1.5
SWX232x(config-if)#power-inline priority high
```

5.6.5 Continuous PoE settings for PoE port

[Syntax]

power-inline continuous *switch*

no power-inline continuous

[Parameter]

switch : Continuous PoE settings for the applicable interface

Setting value	Description
enable	Enables the continuous PoE management function the applicable interface
disable	Disables the continuous PoE management function for the applicable interface

[Initial value]

power-inline continuous disable

[Input mode]

interface mode

[Description]

This sets the continuous PoE management function for the applicable interface to “enabled” or “disabled.”

For ports on which continuous PoE is enabled, power will continue to be supplied to the ports even if the switch is restarted due to a firmware update or the “reload” command.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can only be executed on models that support PoE power supply.

This will result in a command execution error on all other ports besides PoE port.

The continuous PoE settings are shown using the “show power-inline” command.

[Example]

This enables continuous PoE on port1.2.

```
SWX232x(config)#interface port1.2
SWX232x(config-if)#power-inline continuous enable
```

5.6.6 Guard band settings

[Syntax]

power-inline guardband *watts*

no power-inline guardband

[Parameter]

watts : <0-90>

Guard band value (W)

[Initial value]

power-inline guardband 7

[Input mode]

global configuration mode

[Description]

Sets the guard band.

The guard band serves as a margin in respect to the overall power supply amount, preventing unintended interruptions in power.

If the amount of usable power is equal to or less than the guard band, power will not be supplied even if a new PD device is connected to PoE port.

The guard band will not operate if “0W” is specified.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can only be executed on models that support PoE power supply.

[Example]

Sets the guard band to 30W.

```
SWX232x(config)#power-inline guardband 30
```

Disables the guard band.

```
SWX232x(config)#power-inline guardband 0
```

Resets the guard band to default values.

```
SWX232x(config)#no power-inline guardband
```

5.6.7 Show PoE power supply information

[Syntax]

show power-inline

show power-inline interface *ifname*

[Parameter]

ifname : PoE port

[Input mode]

unprivileged EXEC mode、privileged EXEC mode

[Description]

Shows the PoE port power supply information.

Shows detailed information for the specified PoE port if *ifname* is specified.

[Note]

This command can only be executed on models that support PoE power supply.

[Example]

Shows the PoE power supply information.

```
SWX232x#show power-inline
PoE Status
  Available Power : 250000mW
  Used Power      :  41500mW
  Remaining Power : 208500mW
  Guard Band      :   7000mW
  Operation Status: Enable

PoE Interface
  Interface  Admin    Pri   Continuous  Oper        Class   Power   Max
Description
                                                              (mW)     (mW)
================================================================================
===
  port1.1    Enable   High* Disable     Powered         4   12000   29536* AP1
  port1.2    Enable   Low   Disable     Standby       n/a       0   90000  n/a
  port1.3    Enable   Low   Disable     Powered         5    6800   45000  n/a
  port1.4    Enable   Cri   Enable      Powered         8   22700   90000  n/a
  port1.5    Enable   Low   Disable     Standby       n/a       0   90000  n/a
  port1.6    Enable   Low   Disable     Standby       n/a       0   90000  n/a
  port1.7    Enable   Low   Disable     Standby       n/a       0   90000  n/a
  port1.8    Enable   Low   Disable     Standby       n/a       0   90000  n/a
  port1.9    Enable   Low   Disable     Standby       n/a       0   90000  n/a
  port1.10   Enable   Low   Disable     Standby       n/a       0   90000  n/a
```

```
  port1.11   Enable   Low   Disable     Standby       n/a       0   90000  n/a
  port1.12   Enable   Low   Disable     Standby       n/a       0   90000  n/a

* - Assigned by LLDP.
```

This shows power supply information for port1.1.

```
SWX232x#show power-inline interface port1.1
PoE Status
  Available Power : 250000mW
  Used Power      :  41500mW
  Remaining Power : 208500mW
  Guard Band      :   7000mW
  Operation Status: Enable

PoE Interface port1.1
  Powered device type       : AP1
  PoE admin                 : Enable
  Continuous PoE            : Disable
  Priority                  : High*
  Powering status           : 4-pair single
  Detection status          : Powered
  Current power consumption :  12000 mW
  Powered device class      :      4
  Powered allocated         :  29536 mW*
  Powered pairs             : Both (Alternative A and Alternative B)

* - Assigned by LLDP.
```

Chapter 6

Layer 2 functions

6.1 FDB (Forwarding Data Base)

6.1.1 Set MAC address acquisition function

[Syntax]

mac-address-table learning enable
mac-address-table learning disable
no mac-address-table learning

[Keyword]

enable	:	Enables MAC address learning function
disable	:	Disables MAC address learning function

[Initial value]

mac-address-table learning enable

[Input mode]

global configuration mode

[Description]

Enables/disables the MAC address learning function.

If this is executed with the "no"syntax, the MAC address acquisition function is enabled.

[Note]

If the MAC address acquisition function is disabled, a dynamic entry is not registered in the MAC address table even if a frame is received.

[Example]

Enable the MAC address acquisition function.

```
SWX232x(config)#mac-address-table learning enable
```

6.1.2 Set dynamic entry ageing time

[Syntax]

mac-address-table ageing-time *time*
no mac-address-table ageing-time

[Parameter]

time	:	<10-400> Ageing time (seconds)

[Initial value]

mac-address-table ageing-time 300

[Input mode]

global configuration mode

[Description]

Sets the dynamic entry ageing time.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

In some cases, there might be a discrepancy between the time specified by this command and the time until the dynamic entry is actually deleted from the MAC address table.

[Example]

Set the dynamic entry ageing time to 400 seconds.

```
SWX232x(config)#mac-address-table ageing-time 400
```

6.1.3 Clear dynamic entry

[Syntax]

clear mac-address-table dynamic
clear mac-address-table dynamic adress *mac-addr*
clear mac-address-table dynamic vlan *vlan-id*
clear mac-address-table dynamic interface *ifname* [instance *inst*]

[Keyword]

address	:	Specifies the MAC address
vlan	:	Specifies the VLAN ID
interface	:	Specifies the interface
instance	:	Specifies the MST instance

[Parameter]

mac-addr	:	hhhh.hhhh.hhhh (h is hexadecimal)
		Applicable MAC address
ifname	:	Name of LAN/SFP port or logical interface
		Applicable interface
vlan-id	:	<1-4094>
		Applicable VLAN ID
inst	:	<1-63>
		Applicable MST instance ID

[Input mode]

privileged EXEC mode

[Description]

Deletes a dynamic entry from the MAC address table.

If a keyword is specified, only the entries that match the applicable conditions are deleted.

If no keyword is specified, all dynamic entries are deleted.

[Example]

Delete the dynamic entry whose MAC address is 00a0.de11.2233.

```
SWX232x#clear mac-address-table dynamic address 00a0.de11.2233
```

6.1.4 Set static entry

[Syntax]

mac-address-table static *mac-addr action ifname* [vlan *vlan-id*]
no mac-address-table static *mac-addr action ifname* [vlan *vlan-id*]

[Keyword]

vlan	:	Specifies the VLAN ID

[Parameter]

mac-addr	:	hhhh.hhhh.hhhh (h is hexadecimal)
		Applicable MAC address
action	:	Action applied to frames addressed to mac-addr

Setting value	Description
forward	Forward

Setting value	Description
discard	Discard

ifname : Name of LAN/SFP port or logical interface

Applicable interface

vlan-id : <1-4094>

Applicable VLAN ID

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Registers a static entry in the MAC address table.

If

action is specified as "forward," received frames that match the specified MAC address and VLAN ID are forwarded to the specified interface.
If *action* is specified as "discard," received frames that match the specified MAC address and VLAN ID are discarded.

If this command is executed with the "no" syntax, the static entry is deleted from the MAC address table.

If "vlan" is omitted, VLAN #1 is specified.

[Note]

If *action* is specified as "discard," a multicast MAC address cannot be specified as *mac-addr*.

The following MAC addresses cannot be specified as *mac-addr*.

- 0000.0000.0000
- 0100.5e00.0000 - 0100.5eff.ffff
- 0180.c200.0000 - 0180.c200.000f
- 0180.c200.0020 - 0180.c200.002f
- ffff.ffff.ffff

[Example]

Specify that frames addressed to 00a0.de11.2233 are forwarded to LAN port #2.

```
SWX232x(config)#mac-address-table static 00a0.de11.2233 forward port1.2
```

6.1.5 Show MAC address table

[Syntax]

show mac-address-table

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the MAC address table.

The following items are shown.

- VLAN ID
- Interface name
- MAC address
- Action applied to frames
- Entry type
- Ageing time

[Example]

Show the MAC address table.

```
SWX232x>show mac-address-table
VLAN  port      mac             fwd      type     timeout
   1  port1.1   00a0.de11.2233  forward  static         0
```

```
  1  sa1       1803.731e.8c2b  forward  dynamic     300
  1  sa2       782b.cbcb.218d  forward  dynamic     300
```

6.1.6 Show number of MAC addresses

[Syntax]

show mac-address-table count
show mac-address-table count interface *ifname*
show mac-address-table count vlan *vlan-id*

[Keyword]

interface	:	Show the number of MAC addresses for only a specified interface
vlan	:	Show the number of MAC addresses for only a specific VLAN

[Parameter]

ifname	:	Name of interface to show Only LAN/SFP port or logical interface can be specified
vlan-id	:	<1-4094> VLAN ID to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the number of MAC addresses that are registered in the FDB entries.

The number of dynamic addresses registered by automatic learning and of manually registered static addresses are shown.

[Example]

Show the number of MAC addresses that are registered in the FDB entries.

```
SWX232x>show mac-address-table count
 MAC Entries for all vlans
  Dynamic Address   : 20
  Static Address    : 10
  Total MAC Address : 30
```

6.2 VLAN

6.2.1 Move to VLAN mode

[Syntax]

vlan database

[Input mode]

global configuration mode

[Description]

Moves to VLAN mode in order to make VLAN interface settings.

[Note]

To return from VLAN mode to global configuration mode, use the **exit** command. To return to privileged EXEC mode, use the **end** command.

[Example]

Move to VLAN mode.

```
SWX232x(config)#vlan database
SWX232x(config-vlan)#
```

6.2.2 Set VLAN interface

[Syntax]

vlan *vlan-id* [name *name*] [state *state*]
no vlan *vlan-id*

[Keyword]

name	:	Specifies the name of the VLAN
state	:	Specifies the state of the VLAN

[Parameter]

vlan-id : <2-4094>

VLAN ID

name : Single-byte alphanumeric characters and single-byte symbols(32characters or less)

Name of the VLAN

state : Whether frame forwarding is enabled or disabled

Setting value	Description
enable	Frames are forwarded
disable	Frames are not forwarded

[Initial value]

none

[Input mode]

VLAN mode

[Description]

Sets the VLAN interface.

If this command is executed with the "no" syntax, the VLAN interface is deleted.

If "name" is omitted, the name of the VLAN is specified as "VLANxxxx" (xxxx is the four-digit VLAN ID).

If "state" is omitted, "enable" is specified.

If "disable" is specified, all settings of the VLAN interface are deleted.

[Note]

If this command is executed with "name" omitted for a VLAN ID for which *name* is already specified, the already-specified *name* is not changed.

Multiple VLAN IDs can be specified for *vlan-id*. However, if multiple VLAN IDs are specified, the name cannot be specified.

To specify multiple items, use "-" or "," as shown below

- To select from VLAN #2 through VLAN #4: 2-4
- To select VLAN #2 and VLAN #4: 2,4

[Example]

Set VLAN #1000 with the name "Sales".

```
SWX232x(config-vlan)#vlan 1000 name Sales
```

6.2.3 Set private VLAN

[Syntax]

private-vlan *vlan-id type*

no private-vlan *vlan-id type*

[Parameter]

vlan-id : <2-4094>

VLAN ID set by the **vlan** command

type : Type of private VLAN

Setting value	Description
primary	Primary VLAN
community	Secondary VLAN (community VLAN)

Setting value	Description
isolated	Secondary VLAN (isolated VLAN)

[Initial value]

none

[Input mode]

VLAN mode

[Description]

Uses *vlan-id* as a private VLAN.

If this command is executed with the "no" syntax, the private VLAN setting is deleted, and it is used as a conventional VLAN.

[Note]

If this is set as a community VLAN, it can communicate with the promiscuous port of the primary VLAN and with another interface that is associated with the same community VLAN, but cannot communicate with a different community VLAN or with an interface that is associated with an isolated VLAN.

If this is set as an isolated VLAN, it can communicate with the promiscuous port of the primary VLAN, but cannot communicate with the community VLAN or with another interface that is associated with an isolated VLAN.

[Example]

Set the following private VLANs.

- VLAN #100 : Primary VLAN
- VLAN #101 : Secondary VLAN (community VLAN)
- VLAN #102 : Secondary VLAN (community VLAN)
- VLAN #103 : Secondary VLAN (isolated VLAN)

```
SWX232x(config-vlan)#vlan 100
SWX232x(config-vlan)#vlan 101
SWX232x(config-vlan)#vlan 102
SWX232x(config-vlan)#vlan 103
SWX232x(config-vlan)#private-vlan 100 primary
SWX232x(config-vlan)#private-vlan 101 community
SWX232x(config-vlan)#private-vlan 102 community
SWX232x(config-vlan)#private-vlan 103 isolated
```

6.2.4 Set secondary VLAN for primary VLAN

[Syntax]

private-vlan *vlan-id* **association** add *2nd-vlan-ids*
private-vlan *vlan-id* **association** remove *2nd-vlan-ids*
no private-vlan *vlan-id* **association**

[Keyword]

add	:	Associate the specified VLAN
remove	:	Remove the association of the specified VLAN

[Parameter]

vlan-id	:	<2-4094> VLAN ID specified for the primary VLAN
2nd-vlan-ids	:	<2-4094> VLAN ID specified for the secondary VLAN To specify multiple items, use "-" or "," as shown below • To select from VLAN #2 through VLAN #4: 2-4 • To select VLAN #2 and VLAN #4: 2,4

[Initial value]

none

[Input mode]

VLAN mode

[Description]

Specify the association of the secondary VLAN (isolated VLAN, community VLAN) with the primary VLAN of the private VLAN.

By specifying "add," specify the association of the *vlan-id* with the *2nd-vlan-ids*.

By specifying "remove," remove the association of the *vlan-id* and the *2nd-vlan-ids*.

If this command is executed with the "no" syntax, all associations to the primary VLAN are deleted.

[Example]

After specifying the following private VLAN, associate the secondary VLANs to the primary VLAN.

- VLAN #100 : Primary VLAN
- VLAN #101 : Secondary VLAN (community VLAN)
- VLAN #102 : Secondary VLAN (community VLAN)
- VLAN #103 : Secondary VLAN (isolated VLAN)

```
SWX232x(config-vlan)#vlan 100
SWX232x(config-vlan)#vlan 101
SWX232x(config-vlan)#vlan 102
SWX232x(config-vlan)#vlan 103
SWX232x(config-vlan)#private-vlan 100 primary
SWX232x(config-vlan)#private-vlan 101 community
SWX232x(config-vlan)#private-vlan 102 community
SWX232x(config-vlan)#private-vlan 103 isolated
SWX232x(config-vlan)#private-vlan 100 association add 101
SWX232x(config-vlan)#private-vlan 100 association add 102
SWX232x(config-vlan)#private-vlan 100 association add 103
```

6.2.5 Set access port (untagged port)

[Syntax]

switchport mode access

[Initial value]

switchport mode access

[Input mode]

interface mode

[Description]

Specifies the port type of the applicable interface as an access port.

[Note]

This command can be specified only for LAN/SFP port and logical interface.

If this command is applied to a logical interface, the settings of every LAN/SFP port associated with that interface are changed.

If the port type is changed from a trunk port to an access port, the setting of the **switchport trunk allowed vlan** command and the **switchport trunk native vlan** command return to their default settings.

To specify the VLAN that is associated as an access port, use the **switchport access vlan** command.

[Example]

Set LAN port #1 as an access port.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#switchport mode access
```

6.2.6 Set associated VLAN of an access port (untagged port)

[Syntax]

switchport access vlan *vlan-id*

no switchport access vlan

[Parameter]

vlan-id : <1-4094>

Associated VLAN ID

[Initial value]

switchport access vlan 1

[Input mode]

interface mode

[Description]

Sets the VLAN ID that is associated as an access port with the applicable interface.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be set only for a LAN/SFP port or logical interface for which the **switchport mode access** command is set.

If this command is applied to a logical interface, the settings of every LAN/SFP port associated with that interface are changed.

If the port type is changed to a trunk port, the setting of this command returns to the default setting.

[Example]

Set VLAN #10 as the VLAN to which LAN port #1 is associated as the access port.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#switchport access vlan 10
```

6.2.7 Set trunk port (tagged port)

[Syntax]

switchport mode trunk [ingress-filter *action*]

[Keyword]

ingress-filter : Specifies the behavior of the ingress filter

[Parameter]

action : Behavior of the ingress filter

Setting value	Description
enable	Enable the ingress filter
disable	Disable the ingress filter

[Initial value]

none

[Input mode]

interface mode

[Description]

Specifies the port type of the applicable interface as an trunk port.

If "ingress-filter" is omitted, "enable" is specified.

If ingress filtering is enabled, frames are forwarded only if the VLAN ID of the received frame matches the VLAN associated with the interface.

If ingress filtering is disabled, all frames are forwarded.

[Note]

This command can be specified only for LAN/SFP port and logical interface.

If this command is applied to a logical interface, the settings of every LAN/SFP port associated with that interface are changed.

If the port type is changed from an access port to a trunk port, the setting of the **switchport access vlan** command returns to the default setting.

To specify the VLAN ID that is associated as a trunk port, use the **switchport trunk allowed vlan** command. To specify the native VLAN, use the **switchport trunk native vlan** command.

[Example]

Set LAN port #1 as a trunk port.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#switchport mode trunk
```

6.2.8 Set associated VLAN for trunk port (tagged port)

[Syntax]

switchport trunk allowed vlan all
switchport trunk allowed vlan none
switchport trunk allowed vlan add *vlan-ids*
switchport trunk allowed vlan except *vlan-ids*
switchport trunk allowed vlan remove *vlan-ids*
no switchport trunk

[Keyword]

all	:	vlanAssociate to all VLANs that are set by the vlan command
none	:	Dissociate from all VLANs
add	:	Associate to the specified VLAN
except	:	Associate to all VLANs that are set by the vlan command except for the specified
remove	:	Dissociate from the specified VLAN

[Parameter]

vlan-ids	:	<1-4094> VLAN ID set by the **vlan** command To specify multiple items, use "-" or "," as shown below • To select from VLAN #2 through VLAN #4: 2-4 • To select VLAN #2 and VLAN #4: 2,4

[Initial value]

none

[Input mode]

interface mode

[Description]

Sets the VLAN ID that is associated as a trunk port with the applicable interface.

If this is executed with the "no" syntax, all associated VLAN IDs are deleted and the port type is changed to access port.

[Note]

This command can be set only for a LAN/SFP port or logical interface for which the **switchport mode trunk** command is set.

If this command is applied to a logical interface, the settings of every LAN/SFP port associated with that interface are changed.

If the port type is changed to access port, the setting of this command returns to the default setting.

If this is set with "all" or "except" specified, the content of a subsequently changed **vlan** command is always applied.

If this is set with "all" or "except" specified, making the following settings will change the remaining affiliated VLAN IDs to the settings that were specified by "add."

- If you specify "remove" to delete a VLAN ID that is associated
- If you use the **switchport trunk native vlan** command to specify an associated VLAN ID

If you make this setting with "except" specified, and then associate the VLAN ID that had been excluded by specifying "add", the associated VLAN ID is changed to the setting specified by "add".

If you specify "remove" and then specify an unassociated VLAN ID, an error occurs.

For the setting of this command and the **switchport trunk native vlan** command, the last-specified command takes priority.

- If you use the **switchport trunk native vlan** command to specify a VLAN ID that was associated by this command, it is removed from the specified VLAN ID.
- If you specify and associate a VLAN ID that was set by the **switchport trunk native vlan** command, **switchport trunk native vlan none** is set.

If you specify the **switchport trunk allowed vlan add** command with a combination of "-" or "," in the *vlan-ids*, the command setting will fail if you revert to an older version (Rev.2.00.08 or earlier). As a result, normal communication might become impossible. (Example setting: switchport trunk allowed vlan add 101,103-105)

[Example]

Set LAN port #1 as the trunk port, and associate it to VLAN #2.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#switchport mode trunk
SWX232x(config-if)#switchport trunk allowed vlan add 2
```

6.2.9 Set native VLAN for trunk port (tagged port)

[Syntax]

switchport trunk native vlan *vlan-id*
switchport trunk native vlan none
no switchport trunk native vlan

[Keyword]

none : Disables the native VLAN

[Parameter]

vlan-id : <1-4094>

VLAN ID set by the **vlan** command

[Initial value]

switchport trunk native vlan 1

[Input mode]

interface mode

[Description]

Sets the native VLAN for the applicable interface.

If "none" is specified, the native VLAN is disabled. This means that untagged frames received by the applicable interface are discarded.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be set only for a LAN/SFP port or logical interface for which the **switchport mode trunk** command is set.

If this command is applied to a logical interface, the settings of every LAN/SFP port associated with that interface are changed.

If the port type is changed to access port, the setting of this command returns to the default setting.

For the setting of this command and the setting of the **switchport trunk allowed vlan** command, the last-specified command takes priority.

- If you use the **switchport trunk allowed vlan** command to specify the associated VLAN ID, and then specify this command, it is removed from the specified VLAN ID.
- If the VLAN ID specified by this command is associated using the **switchport trunk allowed vlan** command, **switchport trunk native vlan none** is specified.

[Example]

Set LAN port #1 as the trunk port, and specify VLAN #2 as the native VLAN.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#switchport mode trunk
SWX232x(config-if)#switchport trunk native vlan 2
```

6.2.10 Set private VLAN port type

[Syntax]

switchport mode private-vlan *port-type*
no switchport mode private-vlan *port-type*

[Parameter]

port-type : Port mode

Setting value	Description
promiscuous	Promiscuous port
host	Host port

[Initial value]

none

[Input mode]

interface mode

[Description]

Specifies the private VLAN port type for the applicable interface.

If this is executed with the "no" syntax, the setting of the private VLAN specified for the applicable interface is deleted.

[Note]

This command can be set only for a LAN/SFP port for which the **switchport mode access** command is set.

In addition, promiscuous can be specified for the following interfaces.

- Interface that is operating as a trunk port
- logical interface

[Example]

Set LAN port #1 as a promiscuous port, and LAN port #2 as a host port.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#switchport mode private-vlan promiscuous
SWX232x(config-if)#exit
SWX232x(config)#interface port1.2
SWX232x(config-if)#switchport mode private-vlan host
```

6.2.11 Set private VLAN host port

[Syntax]

switchport private-vlan host-association *pri-vlan-id* add *2nd-vlan-id*
no switchport private-vlan host-association

[Keyword]

add	:	Sets the secondary VLAN for the primary VLAN

[Parameter]

pri-vlan-id	:	<2-4094>
		VLAN ID specified as the primary VLAN
2nd-vlan-id	:	<2-4094>
		VLAN ID specified as the secondary VLAN

[Initial value]

none

[Input mode]

interface mode

[Description]

Specifies the primary VLAN that is associated as the host port of the private VLAN for the applicable interface, and associates the secondary VLAN.

If this is executed with the "no" syntax, the setting of the primary VLAN associated as the host port of the applicable interface, and the association of the secondary VLAN, are deleted.

[Note]

This command can be set only for a LAN/SFP port that has been set as the host port by the **switchport mode private-vlan** command.

pri-vlan-id and *2nd-vlan-id* must be associated by the **private-vlan association** command.

If the **switchport mode private-vlan** command is used to set the port type to something other than host port, the setting of this command is deleted.

[Example]

Specify the following private VLAN for each interface.

- LAN port #1 : Primary VLAN #100, Secondary VLAN #101
- LAN port #2 : Primary VLAN #100, Secondary VLAN #102
- LAN port #3 : Primary VLAN #100, Secondary VLAN #103

```
SWX232x(config)# interface port1.1
SWX232x(config-if)# switchport mode private-vlan host
SWX232x(config-if)# switchport private-vlan host-association 100 add 101
SWX232x(config-if)# interface port1.2
SWX232x(config-if)# switchport mode private-vlan host
SWX232x(config-if)# switchport private-vlan host-association 100 add 102
SWX232x(config-if)# interface port1.3
SWX232x(config-if)# switchport mode private-vlan host
SWX232x(config-if)# switchport private-vlan host-association 100 add 103
```

6.2.12 Set promiscuous port for private VLAN

[Syntax]

switchport private-vlan mapping *pri-vlan-id* add *2nd-vlan-ids*
switchport private-vlan mapping *pri-vlan-id* remove *2nd-vlan-ids*
no switchport private-vlan mapping

[Keyword]

add	:	Sets the secondary VLAN for the primary VLAN
remove	:	Deletes the secondary VLAN for the primary VLAN

[Parameter]

pri-vlan-id	:	<2-4094> VLAN ID specified as the primary VLAN
2nd-vlan-ids	:	<2-4094> VLAN ID specified as the secondary To specify multiple items, use "-" or "," as shown below • To select from VLAN #2 through VLAN #4: 2-4 • select VLAN #2 and VLAN #4: 2,4

[Initial value]

none

[Input mode]

interface mode

[Description]

Specifies the primary VLAN that is associated with the applicable interface as the promiscuous port, and associates the secondary VLAN.

If this is executed with the "no" syntax, the setting of the primary VLAN that is associated with the applicable interface as the promiscuous port, and the association of the secondary VLAN, are deleted.

[Note]

This command can be set only for a LAN/SFP port that has been set as a promiscuous port by the **switchport mode private-vlan** command.

In addition, it can also be set for the following interfaces that are specified as promiscuous ports.

- Interface that is operating as a trunk port
- logical interface

pri-vlan-id and *2nd-vlan-ids* must be associated by the **private-vlan association** command.

If this command is applied to a logical interface, the settings of every LAN/SFP port associated with that interface are changed.

If the **switchport mode private-vlan** command is used to set the port type to something other than promiscuous port, the setting of this command is deleted.

A community VLAN can be associated with multiple promiscuous ports.

Multiple promiscuous ports can be specified for one primary VLAN.

Since an interface in an isolated VLAN can communicate only with one promiscuous port, only one promiscuous port can be associated with one isolated VLAN.

[Example]

Make LAN port #1 operate as a promiscuous port, specify primary VLAN #100, and associate the secondary VLANs #101, #102, and #103.

```
SWX232x(config)# interface port1.1
SWX232x(config-if)# switchport mode private-vlan promiscuous
SWX232x(config-if)# switchport private-vlan mapping 100 add 101
SWX232x(config-if)# switchport private-vlan mapping 100 add 102
SWX232x(config-if)# switchport private-vlan mapping 100 add 103
```

6.2.13 Set voice VLAN

[Syntax]

switchport voice vlan *type*
no switchport voice vlan

[Parameter]

type : Type

Setting value	Description
<1-4094>	VLAN ID
dot1p	Use priority tagged frames
untagged	Use untagged frames

[Initial value]

none

[Input mode]

interface mode

[Description]

Sets voice VLAN. This can be specified only for a physical interface that is specified as an access port.

If a VLAN ID is specified, frames with an 802.1p tag of the specified VLAN are used as voice traffic.

If dot1p is specified, priority tag frames (VLAN ID of 0, and CoS value of the specified 802.1p tag) are used as voice traffic.

If untagged is specified, untagged frames are used as voice traffic.

[Example]

Assign LAN port #1 as voice VLAN to VLAN #100.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#switchport voice vlan 100
```

6.2.14 Set CoS value for voice VLAN

[Syntax]

switchport voice cos *value*
no switchport voice cos

[Parameter]

value : <0-7>

CoS value to specify for connected device

[Initial value]

switchport voice cos 5

[Input mode]

interface mode

[Description]

Specify the CoS value to use for voice traffic by the connected device.

The connected device is notified of the setting via LLDP-MED in the following cases.

- Voice VLAN is specified for the corresponding port.
- LLDP-MED transmission and reception is possible for the corresponding port.

[Example]

Set the CoS value to 6 for using LAN port #1 as voice VLAN.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#switchport voice cos 6
```

6.2.15 Set DSCP value for voice VLAN

[Syntax]

switchport voice dscp *value*

no switchport voice dscp

[Parameter]

value : <0-63>

DSCP value to specify for connected device

[Initial value]

switchport voice dscp 0

[Input mode]

interface mode

[Description]

Specify the DSCP value to use for voice traffic by the connected device.

The connected device is notified of the setting via LLDP-MED in the following cases.

- Voice VLAN is specified for the corresponding port.
- LLDP-MED transmission and reception is possible for the corresponding port.

[Example]

Set the DSCP value to 63 for using LAN port #1 as voice VLAN.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#switchport voice dscp 63
```

6.2.16 Set multiple VALN group

[Syntax]

switchport multiple-vlan group *group-ids*

no switchport multiple-vlan group

[Parameter]

group-ids : <1-256>

Multiple VLAN group ID

To specify multiple items, use "-" or "," as shown below

- To select from group #2 through group #4: 2-4
- To select group #2 and group #4: 2,4

[Initial value]

none

[Input mode]

interface mode

[Description]

Specify the group of multiple VLAN.

If a group is specified for the interface, the corresponding interface can communicate only with interfaces of the same multiple VLAN group. Even if the VLAN is the same, communication is not possible if the multiple VLAN group differs.

This can be specified only for a physical interface or for a link aggregation logical interface.

By default, each interface is not associated with a multiple VLAN group.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This cannot be used in conjunction with the private VLAN.

Ports that are associated with a link aggregation logical interface must be set to the same multiple VLAN group.

The multiple VLAN group is applied only to forwarding between ports. Self-originating packets are not affected by multiple VLAN group settings.

Even if multiple VLAN is specified, correct communication might not be possible due to the following.

- Spanning tree block status
- IGMP snooping or MLD snooping status
- Loop detection block status

[Example]

Assign LAN port #1 to multiple VLAN group #10.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#switchport multiple-vlan group 10
SWX232x(config-if)#exit
```

6.2.17 Set name of multiple VLAN group

[Syntax]

multiple-vlan group *group-id* **name** *name*
no multiple-vlan group *group-id*

[Parameter]

group-id	:	<1-256> Multiple VLAN group ID
name	:	Single-byte alphanumeric characters and single-byte symbols(32characters or less) Name of mulitiple VLAN group

[Initial value]

multiple-vlan group *group-id* name GROUPxxxx (xxxx is the four-digit group ID)

[Input mode]

global configuration mode

[Description]

Sets the name of multiple VLAN group.

If this command is executed with the "no" syntax, the setting returns to the default.

The name that was set is shown with the **show vlan multiple-vlan** command.

[Example]

Set multiple VLAN group #10 with the name "Network1".

```
SWX232x(config)#multiple-vlan group 10 name Network1
```

6.2.18 Show VLAN information

[Syntax]

show vlan *vlan-id*
show vlan brief

[Keyword]

brief	:	Show all VLAN information

[Parameter]

vlan-id	:	<1-4094> VLAN ID to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows information for the specified VLAN ID.

The following items are shown.

Item	Description
VLAN ID	VLAN ID

Item	Description
Name	Name of the VLAN
State	VLAN status (whether frames are forwarded) • ACTIVE : forwarded • SUSPEND : not forwarded
Member ports	Interfaces associated with the VLAN ID • (u) : Access port (untagged port) • (t) : Trunk port (tagged port)

[Example]

Show all VLAN information.

```
SWX232x>show vlan brief
(u)-Untagged, (t)-Tagged

VLAN ID  Name                             State   Member ports
======= ================================ ======= ======================
1       default                          ACTIVE  port1.1(u) port1.2(u)
                                                 port1.3(u) port1.4(u)
                                                 port1.5(u) port1.6(u)
                                                 port1.7(u) port1.8(u)
```

6.2.19 Show private VLAN information

[Syntax]

show vlan private-vlan

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows private VLAN information.

The following items are shown.

Item	Description
PRIMARY	VLAN ID of primary VLAN
SECONDARY	VLAN ID of secondary VLAN
TYPE	Type of secondary VLAN • isolated : Isolated VLAN • community : Community VLAN
INTERFACES	Interfaces that are associated as a host port

[Example]

Show private VLAN information.

```
SWX232x>show vlan private-vlan
PRIMARY       SECONDARY          TYPE         INTERFACES
-------        ---------       ----------      ----------
      2              21         isolated
      2              22         community
```

6.2.20 Show multiple VLAN group setting information

[Syntax]

show vlan multiple-vlan [**group** *group-id*]

[Keyword]

group : Show information for specific multiple VLAN groups

[Parameter]

group-id : <1-256>

Multiple VLAN group ID

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the setting status for multiple VLAN groups.

If the "group" specification is omitted, all groups that are actually assigned to the interface are shown.

[Example]

Shows the setting status for multiple VLAN groups.

```
SWX232x>show vlan multiple-vlan
GROUP ID  Name                             Member ports
========= ================================ ======================
1         GROUP0001                        port1.1 port1.2
                                           port1.5
```

6.3 STP (Spanning Tree Protocol)

6.3.1 Set spanning tree for the system

[Syntax]

spanning-tree shutdown

no spanning-tree shutdown

[Initial value]

no spanning-tree shutdown

[Input mode]

global configuration mode

[Description]

Disables spanning tree for the entire system.

If this command is executed with the "no" syntax, spanning tree is enabled for the entire system.

[Note]

In order to enable spanning tree, spanning tree must be enabled on the interface in addition to this command.

[Example]

Disable spanning tree for the entire system.

```
SWX232x(config)#spanning-tree shutdown
```

6.3.2 Set forward delay time

[Syntax]

spanning-tree forward-time *time*

no spanning-tree forward-time

[Parameter]

time : <4-30>

Forward delay time (seconds)

[Initial value]

spanning-tree forward-time 15

[Input mode]

global configuration mode

[Description]

Sets the forward delay time.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

The setting of this command must satisfy the following conditions.
2 x (hello time + 1) <= maximum aging time <= 2 x (forward delay time - 1)

The maximum aging time can be set by the **spanning-tree max-age** command.

The hello time is always 2 seconds, and cannot be changed.

[Example]

Set the forward delay time to 10 seconds.

```
SWX232x(config)#spanning-tree forward-time 10
```

6.3.3 Set maximum aging time

[Syntax]

spanning-tree max-age *time*
no spanning-tree max-age

[Parameter]

time : <6-40>
Maximum aging time (seconds)

[Initial value]

spanning-tree max-age 20

[Input mode]

global configuration mode

[Description]

Sets the maximum aging time.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

The maximum aging time is the time that the L2 switch waits without receiving a spanning tree configuration message, and after which time it attempts to reconfigure.

The setting of this command must satisfy the following conditions.
2 x (hello time + 1) <= maximum aging time <= 2 x (forward delay time - 1)

The forward delay time can be set by the **spanning-tree forward-time** command.

The hello time is always 2 seconds, and cannot be changed.

[Example]

Set the maximum aging time to 25 seconds.

```
SWX232x(config)#spanning-tree max-age 25
```

6.3.4 Set bridge priority

[Syntax]

spanning-tree priority *priority*
no spanning-tree priority

[Parameter]

priority : <0-61440> (multiple of 4096)
Priority value

[Initial value]

spanning-tree priority 32768

[Input mode]

global configuration mode

[Description]

Sets the bridge priority. Lower numbers have higher priority.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

In the case of MSTP, this is the setting for CIST (instance #0).

[Example]

Set the bridge priority to 4096.

```
SWX232x(config)#spanning-tree priority 4096
```

6.3.5 Set spanning tree for an interface

[Syntax]

spanning-tree *switch*

[Parameter]

switch : Spanning tree operation

Setting value	Description
enable	Enable spanning tree
disable	Disable spanning tree

[Initial value]

spanning-tree enable

[Input mode]

interface mode

[Description]

Sets spanning tree operation for the applicable interface.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be specified only for LAN/SFP port and logical interface.

It is not possible to specify this command for a LAN/SFP port that is associated to a logical interface.

[Example]

Disable spanning tree for LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#spanning-tree disable
```

6.3.6 Set spanning tree link type

[Syntax]

spanning-tree link-type *type*
no spanning-tree link-type

[Parameter]

type : Link type

Setting value	Description
point-to-point	Point-to-point link
shared	Shared link

[Initial value]

spanning-tree link-type point-to-point

[Input mode]

interface mode

[Description]

Sets the link type for the applicable interface.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be specified only for LAN/SFP port and logical interface.

It is not possible to specify this command for a LAN/SFP port that is associated to a logical interface.

If a LAN/SFP port is associated with a logical interface, the setting of this command for the corresponding LAN/SFP port returns to the default.

[Example]

Set the LAN port #1 link type to "shared."

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#spanning-tree link-type shared
```

6.3.7 Set interface BPDU filtering

[Syntax]

spanning-tree bpdu-filter *filter*
no spanning-tree bpdu-filter

[Parameter]

filter : BPDU filtering operation

Setting value	Description
enable	Enables BPDU filtering
disable	Disables BPDU filtering

[Initial value]

spanning-tree bpdu-filter disable

[Input mode]

interface mode

[Description]

Sets BPDU filtering for the applicable interface.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be specified only for LAN/SFP port and logical interface.

It is not possible to specify this command for a LAN/SFP port that is associated to a logical interface.

If a LAN/SFP port is associated with a logical interface, the setting of this command for the corresponding LAN/SFP port returns to the default.

[Example]

Enable BPDU filtering for LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#spanning-tree bpdu-filter enable
```

6.3.8 Set interface BPDU guard

[Syntax]

spanning-tree bpdu-guard *guard*
no spanning-tree bpdu-guard

[Parameter]

guard : BPDU guard operation

Setting value	Description
enable	Enables BPDU guard
disable	Disables BPDU guard

[Initial value]

spanning-tree bpdu-guard disable

[Input mode]

interface mode

[Description]

Sets BPDU guard for the applicable interface.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be specified only for LAN/SFP port and logical interface.

It is not possible to specify this command for a LAN/SFP port that is associated to a logical interface.

If a LAN/SFP port is associated with a logical interface, the setting of this command for the corresponding LAN/SFP port returns to the default.

If a LAN/SFP port is **shutdown** by BPDU guard, it can be brought back by executing the **no shutdown** command for that interface.

If a logical interface is **shutdown** by BPDU guard, it can be brought back by executing the **shutdown** command for that interface and then executing the **no shutdown** command.

[Example]

Enable BPDU guard for LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#spanning-tree bpdu-guard enable
```

6.3.9 Set interface path cost

[Syntax]

spanning-tree path-cost *path-cost*

no spanning-tree path-cost

[Parameter]

path-cost : <1-200000000>

Path cost value

[Initial value]

Use the following values according to the link speed of the interface.

Link speed	Path cost value
1000Mbps	20000
100Mbps	200000
10Mbps	2000000

For a logical interface, the path cost value is calculated based on totaling the link speed of each associated LAN/SFP port.

[Input mode]

interface mode

[Description]

Sets the path cost of the applicable interface.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

In the case of MSTP, this is the setting for CIST (instance #0).

This command can be specified only for LAN/SFP port and logical interface.

It is not possible to specify this command for a LAN/SFP port that is associated to a logical interface.

If a LAN/SFP port is associated with a logical interface, the setting of this command for the corresponding LAN/SFP port returns to the default.

[Example]

Set the path cost of LAN port #1 to 100000.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#spanning-tree path-cost 100000
```

6.3.10 Set interface priority

[Syntax]

spanning-tree priority *priority*
no spanning-tree priority

[Parameter]

priority : <0-240> (multiple of 16)
Priority value

[Initial value]

spanning-tree priority 128

[Input mode]

interface mode

[Description]

Sets the priority of the applicable interface.

If this command is executed with the "no" syntax, the setting returns to the default.

Lower numeric values indicate a higher priority, increasing the probability that the other interface will become the root port.

[Note]

In the case of MSTP, this is the setting for CIST (instance #0).

This command can be specified only for LAN/SFP port and logical interface.

It is not possible to specify this command for a LAN/SFP port that is associated to a logical interface.

If a LAN/SFP port is associated with a logical interface, the setting of this command for the corresponding LAN/SFP port returns to the default.

[Example]

Set the LAN port #1 priority to 64.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#spanning-tree priority 64
```

6.3.11 Set edge port for interface

[Syntax]

spanning-tree edgeport
no spanning-tree edgeport

[Initial value]

no spanning-tree edgeport

[Input mode]

interface mode

[Description]

Sets the edge port of the applicable interface.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be specified only for LAN/SFP port and logical interface.

It is not possible to specify this command for a LAN/SFP port that is associated to a logical interface.

If a LAN/SFP port is associated with a logical interface, the setting of this command for the corresponding LAN/SFP port returns to the default.

[Example]

Set LAN port #1 as the edge port.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#spanning-tree edgeport
```

6.3.12 Show spanning tree status

[Syntax]

show spanning-tree [interface *ifname*]

[Keyword]

interface : Specifies the interface to show

[Parameter]

ifname : Name of LAN/SFP port or logical interface
Interface to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the spanning tree status.

If "interface" is omitted, the status of all interfaces is shown.

In the case of MSTP, shows CIST (instance #0) information.

The following items are shown.

Item	Description
Bridge up	Spanning tree protocol enabled/disabled
Root Path Cost	Path cost of the root bridge
Root Port	Interface index number of the root port. Shows 0 if it is the root bridge. In the case of a logical interface, this is shown as the interface index number of the logical interface.
Bridge Priority	Bridge priority
Forward Delay	Root bridge forwarding delay time setting
Hello Time	Hello time setting of the root bridge
Max Age	Maximum ageing time setting of the root bridge
Root Id	Root bridge identifier. This consists of the root bridge priority (the first four hexadecimal digits) and MAC address
Bridge Id	Bridge identifier. This consists of the bridge priority (the first four hexadecimal digits) and MAC address
topology change(s)	Number of times that a topology change has occurred (to be precise, this indicates the number of BPDU that have the TC flag)
last topology change	Date and time at which the last topology change occurred
Ifindex	Interface index number
Port Id	Interface's port ID
Role	Role of the interface. This is either Disabled, Designated, Rootport, or Alternate
State	State of the interface. This is either Listening, Learning, Forwarding, or Discarding
Designated Path Cost	Path cost
Configured Path Cost	Path cost setting of the interface
Add type Explicit ref count	Number of STP domains associated with the interface
Designated Port Id	ID of the designated port
Priority	Priority of the interface

Item	Description
Root	Root bridge identifier. This consists of the root bridge priority (the first four hexadecimal digits) and MAC address
Designated Bridge	Bridge identifier. This consists of the bridge priority (the first four hexadecimal digits) and MAC address
Message Age	Elapsed time of message
Hello Time	Hello time setting value
Forward Delay	Forward delay time setting value
Forward Timer	Actual forward delay timer
Msg Age Timer	Timer at which the interface destroys BPDU information. With the default setting, count down from 20 seconds for STP, or count down Hello Time x 3 for RSTP/MSTP.
Hello Timer	Timer used to send hello. Hello packet is sent when 0 is reached
topo change timer	Topology change timer
forward-transitions	Number of times that the interface has entered Forward State
Version	Spanning tree protocol operating mode (version)
Received	Type of BPDU that was received
Send	Type of BPDU to transmit
portfast configured	Edge port setting value and current status. This will be either portfast off, portfast on, or edgeport on
bpdu-guard	Setting and current status of the interface's BPDU guard function
bpdu-filter	Setting and current status of the interface's BPDU filtering function
root guard configured	Setting and current status of the root guard function
Configured Link Type	Setting and current status of the interface's link type. Either point-to-point or shared
auto-edge configured	Auto-edge setting and current status

[Example]

Show the spanning tree status for LAN port #1.

```
SWX232x>show spanning-tree interface port1.1
% Default: Bridge up - Spanning Tree Enabled  - topology change detected
% Default: CIST Root Path Cost 0 - CIST Root Port 0 -  CIST Bridge Priority 32768
% Default: Forward Delay 15 - Hello Time 2 - Max Age 20 - Transmit Hold Count 6 -
Max-hops 20
% Default: CIST Root Id 8000ac44f2300110
% Default: CIST Reg Root Id 8000ac44f2300110
% Default: CIST Bridge Id 8000ac44f2300110
% Default: 6 topology change(s)  - last topology change Tue Feb 27 19:52:52 2018

%   port1.1: Port Number 905 - Ifindex 5001 - Port Id 0x8389 - Role Designated -
State Forwarding
%   port1.1: Designated External Path Cost 0 -Internal Path Cost 0
%   port1.1: Configured Path Cost 20000  - Add type Explicit ref count 1
%   port1.1: Designated Port Id 0x8389 - CIST Priority 128  -
%   port1.1: CIST Root 8000ac44f2300110
%   port1.1: Regional Root 8000ac44f2300110
%   port1.1: Designated Bridge 8000ac44f2300110
%   port1.1: Message Age 0 - Max Age 20
%   port1.1: CIST Hello Time 2 - Forward Delay 15
%   port1.1: CIST Forward Timer 0 - Msg Age Timer 0 - Hello Timer 1 - topo change
timer 0
%   port1.1: forward-transitions 1
%   port1.1: Version Multiple Spanning Tree Protocol - Received MSTP - Send MSTP
```

```
%   port1.1: No portfast configured - Current  portfast off
%   port1.1: bpdu-guard  disabled  - Current bpdu-guard off
%   port1.1: bpdu-filter disabled  - Current bpdu-filter off
%   port1.1: no root guard configured     - Current root guard off
%   port1.1: Configured Link Type point-to-point - Current point-to-point
%   port1.1: No auto-edge configured - Current port Auto Edge off
```

6.3.13 Show spanning tree BPDU statistics

[Syntax]

show spanning-tree statistics [interface *ifname*]

[Keyword]

interface	:	Specifies the interface to show

[Parameter]

ifname	:	Name of LAN/SFP port or logical interface Interface to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows spanning tree BPDU statistics.

If "interface" is omitted, the status of all interfaces is shown.

[Example]

Show the BPDU statistics for LAN port #1.

```
SWX232x>show spanning-tree statistics interface port1.1
                 Port number = 905 Interface = port1.1
                 ================================
% BPDU Related Parameters
% ----------------------
% Port Spanning Tree                : Enable
% Spanning Tree Type                : Multiple Spanning Tree Protocol
% Current Port State                : Forwarding
% Port ID                           : 8389
% Port Number                       : 389
% Path Cost                         : 20000
% Message Age                       : 0
% Designated Root                   : ac:44:f2:30:01:10
% Designated Cost                   : 0
% Designated Bridge                 : ac:44:f2:30:01:10
% Designated Port Id                : 0x8389
% Top Change Ack                    : FALSE
% Config Pending                    : FALSE

% PORT Based Information & Statistics
% ----------------------------------
% Config Bpdu's xmitted             : 3
% Config Bpdu's received            : 0
% TCN Bpdu's xmitted                : 2
% TCN Bpdu's received               : 3
% Forward Trans Count               : 1

% STATUS of Port Timers
% --------------------
% Hello Time Configured             : 2
% Hello timer                       : ACTIVE
% Hello Time Value                  : 0
% Forward Delay Timer               : INACTIVE
% Forward Delay Timer Value         : 0
% Message Age Timer                 : INACTIVE
% Message Age Timer Value           : 0
% Topology Change Timer             : INACTIVE
% Topology Change Timer Value       : 0
% Hold Timer                        : INACTIVE
% Hold Timer Value                  : 0
```

```
% Other Port-Specific Info
  ------------------------
% Max Age Transitions               : 1
% Msg Age Expiry                    : 0
% Similar BPDUS Rcvd                : 0
% Src Mac Count                     : 0
% Total Src Mac Rcvd                : 3
% Next State                        : Discard/Blocking
% Topology Change Time              : 0

% Other Bridge information & Statistics
  ------------------------------------
% STP Multicast Address             : 01:80:c2:00:00:00
% Bridge Priority                   : 32768
% Bridge Mac Address                : ac:44:f2:30:01:10
% Bridge Hello Time                 : 2
% Bridge Forward Delay              : 15
% Topology Change Initiator         : 5001
% Last Topology Change Occured      : Tue Feb 27 19:52:52 2018
% Topology Change                   : FALSE
% Topology Change Detected          : TRUE
% Topology Change Count             : 6
% Topology Change Last Recvd from   : 00:a0:de:ae:b8:79
```

6.3.14 Clear protocol compatibility mode

[Syntax]

clear spanning-tree detected protocols [interface *ifname*]

[Keyword]

interface	:	Specifies the interface to clear

[Parameter]

ifname	:	Name of LAN/SFP port or logical interface Interface to clear

[Input mode]

privileged EXEC mode

[Description]

Returns an interface that had been operating in STP compatibility mode to normal mode.

If "interface" is omitted, the status of all interfaces is cleared.

[Note]

If a STP BPDU is received, the interface that received it will operate in STP compatibility mode. However even if STP BPDU is no longer received subsequently, the corresponding interface continues to operate in STP compatibility mode. In such cases, you can execute this command to make the interface return from STP compatibility mode to normal mode.

[Example]

Return LAN port #1 from STP compatibility to normal mode.

```
SWX232x#clear spanning-tree detected protocols interface port1.1
```

6.3.15 Move to MST mode

[Syntax]

spanning-tree mst configuration

[Input mode]

global configuration mode

[Description]

Moves to MST mode in order to make MST instance and MST region settings.

[Note]

To return from MST mode to global configuration mode, use the **exit** command. To return to privileged EXEC mode, use the **end** command.

[Example]

Move to MST mode.

```
SWX232x(config)#spanning-tree mst configuration
SWX232x(config-mst)#
```

6.3.16 Generate MST instance

[Syntax]

instance *instance-id*
no instance

[Parameter]

instance-id : <1-15>
Instance ID

[Initial value]

none

[Input mode]

MST mode

[Description]

Generates an MST instance.

If this command is executed with the "no" syntax, the MST instance is deleted.

[Note]

MST instance generation and association with a VLAN is specified by the **instance vlan** command.

[Example]

Generate MST instance #1.

```
SWX232x(config)#spanning-tree mst configuration
SWX232x(config-mst)#instance 1
```

6.3.17 Set VLAN for MST instance

[Syntax]

instance *instance-id* **vlan** *vlan-id*
no instance *instance-id* **vlan** *vlan-id*

[Parameter]

instance-id : <1-15>
Instance ID

vlan-id : <2-4094>
VLAN ID set by the **vlan** command

[Initial value]

none

[Input mode]

MST mode

[Description]

Associates a VLAN with an MST instance.

If this command is executed with the "no" syntax, the VLAN association for the MST instance is deleted. If as a result of this deletion, not even one VLAN is associated with the MST instance, the MST instance is deleted.

If you specify an MST instance that has not been generated, the MST instance will also be generated.

[Note]

You cannot specify a VLAN ID that is associated with another MST instance.

[Example]

Associate VLAN #2 with MST instance #1.

```
SWX232x(config)#spanning-tree mst configuration
SWX232x(config-mst)#instance 1 vlan 2
```

6.3.18 Set priority of MST instance

[Syntax]

instance *instance-id* **priority** *priority*
no instance *instance-id* **priority**

[Parameter]

instance-id : <1-15>
Instance ID

priority : <0-61440> (multiple of 4096)
Priority value

[Initial value]

instance *instance-id* priority 32768

[Input mode]

MST mode

[Description]

Sets the priority of the MST instance.

Lower numeric values indicate a higher priority, increasing the probability that this MST instance will become the root bridge.

If this command is executed with the "no" syntax, the setting returns to the default.

[Example]

Set MST instance #2 to a priority of 4096.

```
SWX232x(config)#spanning-tree mst configuration
SWX232x(config-mst)#instance 2
SWX232x(config-mst)#instance 2 priority 4096
```

6.3.19 Set MST region name

[Syntax]

region *region-name*
no region

[Parameter]

region-name : Single-byte alphanumeric characters and single-byte symbols(32characters or less)
Region name

[Initial value]

region Default

[Input mode]

MST mode

[Description]

Sets the MST region name.

If this command is executed with the "no" syntax, the setting returns to the default.

[Example]

Set the MST region name to "Test1".

```
SWX232x(config)#spanning-tree mst configuration
SWX232x(config-mst)#region Test1
```

6.3.20 Set revision number of MST region

[Syntax]

revision *revision*

[Parameter]

revision : <0-65535>

Revision number

[Initial value]

revision 0

[Input mode]

MST mode

[Description]

Sets the revision number of the MST region.

If this command is executed with the "no" syntax, the setting returns to the default.

[Example]

Set the revision number as 2 for the MST region.

```
SWX232x(config)#spanning-tree mst configuration
SWX232x(config-mst)#revision 2
```

6.3.21 Set MST instance for interface

[Syntax]

spanning-tree instance *instance-id*
no spanning-tree instance

[Parameter]

instance-id : <1-15>

ID of generated MST interface

[Initial value]

none

[Input mode]

interface mode

[Description]

Sets MST instance for the applicable interface.

If this command is executed with the "no" syntax, the MST instance setting is deleted.

[Note]

This command can be specified only for LAN/SFP port and logical interface.

It is not possible to specify this command for a LAN/SFP port that is associated to a logical interface.

If a LAN/SFP port is associated with a logical interface, the setting of this command for the corresponding LAN/SFP port returns to the default.

[Example]

Set MST instance #2 for LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#spanning-tree instance 2
```

6.3.22 Set interface priority for MST instance

[Syntax]

spanning-tree instance *instance-id* **priority** *priority*
no spanning-tree instance *instance-id* **priority**

[Parameter]

instance-id : <1-15>

ID of MST instance specified for the applicable interface

priority : <0-240> (multiple of 16)

Priority value

[Initial value]

spanning-tree instance *instance-id* priority 128

[Input mode]

interface mode

[Description]

Sets the priority for the applicable interface in the MST instance.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be specified only for LAN/SFP port and logical interface.

It is not possible to specify this command for a LAN/SFP port that is associated to a logical interface.

If a LAN/SFP port is associated with a logical interface, the setting of this command for the corresponding LAN/SFP port returns to the default.

[Example]

Set LAN port #1 MST instance #2 to a priority of 16.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#spanning-tree instance 2
SWX232x(config-if)#spanning-tree instance 2 priority 16
```

6.3.23 Set interface path cost for MST instance

[Syntax]

spanning-tree instance *instance-id* **path-cost** *path-cost*
no spanning-tree instance *instance-id* **path-cost**

[Parameter]

instance-id : <1-15>

ID of MST instance specified for the applicable interface

path-cost : <1-200000000>

Path cost value

[Initial value]

Use the following values according to the link speed of the interface.

Link speed	Path cost value
1000Mbps	20000
100Mbps	200000
10Mbps	2000000

For a logical interface, the path cost value is calculated based on totaling the link speed of each associated LAN/SFP port.

[Input mode]

interface mode

[Description]

Sets the path cost of the applicable interface on an MST instance.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be specified only for LAN/SFP port and logical interface.

It is not possible to specify this command for a LAN/SFP port that is associated to a logical interface.

If a LAN/SFP port is associated with a logical interface, the setting of this command for the corresponding LAN/SFP port returns to the default.

[Example]

Set LAN port #1 MST instance #2 to a path cost of 100000.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#spanning-tree instance 2
SWX232x(config-if)#spanning-tree instance 2 path-cost 100000
```

6.3.24 Show MST region information

[Syntax]

show spanning-tree mst config

[Input mode]

unprivileged EXEC mode, privileged EXEC mode, interface mode

[Description]

Shows distinguishing information for the MST region.

[Example]

Show distinguishing information for the MST region.

```
SWX232x>show spanning-tree mst config
%
%  MSTP Configuration Information for bridge Default :
%-------------------------------------------------------
%  Format Id      : 0
%  Name           : Default
%  Revision Level : 0
%  Digest         : 0xAC36177F50283CD4B83821D8AB26DE62
%-------------------------------------------------------
```

6.3.25 Show MSTP information

[Syntax]

show spanning-tree mst [detail] [interface *ifname*]

[Keyword]

detail	:	Shows detailed information
interface	:	Specifies the interface to show

[Parameter]

ifname	:	Name of LAN/SFP port or logical interface Interface to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode, interface mode

[Description]

Shows MSTP information.

Normally, this shows association information for the MST instance and VLAN and interface.

If "detail" is specified, this shows detailed information for the interface and MST instance.

If "interface" is omitted, information for all interfaces is shown.

[Note]

A LAN/SFP port that is associated with a logical interface cannot be specified as *ifname*.

[Example]

Show MSTP information.

```
SWX232x>show spanning-tree mst
% Default: Bridge up - Spanning Tree Enabled  - topology change detected
% Default: CIST Root Path Cost 0 - CIST Root Port 0 -  CIST Bridge Priority 32768
% Default: Forward Delay 15 - Hello Time 2 - Max Age 20 - Transmit Hold Count 6 -
Max-hops 20
% Default: CIST Root Id 8000ac44f2300110
% Default: CIST Reg Root Id 8000ac44f2300110
% Default: CIST Bridge Id 8000ac44f2300110
% Default: 9 topology change(s)  - last topology change Tue Feb 27 20:14:35 2018

%
%   Instance        VLAN
```

```
%   0:              1
%   1:              100 (port1.8)
```

Show detailed MSTP information for LAN port #8.

```
SWX232x>show spanning-tree mst detail interface port1.8
% Default: Bridge up - Spanning Tree Enabled  - topology change detected
% Default: CIST Root Path Cost 0 - CIST Root Port 0 -  CIST Bridge Priority 32768
% Default: Forward Delay 15 - Hello Time 2 - Max Age 20 - Transmit Hold Count 6 -
Max-hops 20
% Default: CIST Root Id 8000ac44f2300110
% Default: CIST Reg Root Id 8000ac44f2300110
% Default: CIST Bridge Id 8000ac44f2300110
% Default: 9 topology change(s)  - last topology change Tue Feb 27 20:14:35 2018

%   port1.8: Port Number 912 - Ifindex 5008 - Port Id 0x8390 - Role Designated -
State Forwarding
%   port1.8: Designated External Path Cost 0 -Internal Path Cost 0
%   port1.8: Configured Path Cost 20000  - Add type Explicit ref count 2
%   port1.8: Designated Port Id 0x8390 - CIST Priority 128  -
%   port1.8: CIST Root 8000ac44f2300110
%   port1.8: Regional Root 8000ac44f2300110
%   port1.8: Designated Bridge 8000ac44f2300110
%   port1.8: Message Age 0 - Max Age 20
%   port1.8: CIST Hello Time 2 - Forward Delay 15
%   port1.8: CIST Forward Timer 0 - Msg Age Timer 0 - Hello Timer 0 - topo change
timer 0
%   port1.8: forward-transitions 1
%   port1.8: Version Multiple Spanning Tree Protocol - Received MSTP - Send MSTP
%   port1.8: No portfast configured - Current  portfast off
%   port1.8: bpdu-guard  disabled  - Current bpdu-guard off
%   port1.8: bpdu-filter disabled  - Current bpdu-filter off
%   port1.8: no root guard configured     - Current root guard off
%   port1.8: Configured Link Type point-to-point - Current point-to-point
%   port1.8: No auto-edge configured - Current port Auto Edge off
%

% Instance  1:  Vlans: 100
% Default: MSTI Root Path Cost 0 -MSTI Root Port 0 - MSTI Bridge Priority 32768
% Default: MSTI Root Id 8001ac44f2300110
% Default: MSTI Bridge Id 8001ac44f2300110
%   port1.8: Port Number 912 - Ifindex 5008 - Port Id 0x8390 - Role Designated -
State Forwarding
%   port1.8: Designated Internal Path Cost 0  - Designated Port Id 0x8390
%   port1.8: Configured Internal Path Cost 20000
%   port1.8: Configured CST External Path cost 20000
%   port1.8: CST Priority 128  - MSTI Priority 128
%   port1.8: Designated Root 8001ac44f2300110
%   port1.8: Designated Bridge 8001ac44f2300110
%   port1.8: Message Age 0
%   port1.8: Hello Time 2 - Forward Delay 15
%   port1.8: Forward Timer 0 - Msg Age Timer 0 - Hello Timer 0
```

6.3.26 Show MST instance information

[Syntax]

show spanning-tree mst instance *instance-id* [interface *ifname*]

[Keyword]

interface	:	Specifies the interface to show

[Parameter]

instance-id	:	<1-15> ID of generated MST interface
ifname	:	Name of LAN/SFP port or logical interface Interface to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode, interface mode

[Description]

Shows information for the specified MST instance.

If "interface" is omitted, information is shown for all interfaces that are assigned the specified MST instance.

[Note]

A LAN/SFP port that is associated with a logical interface cannot be specified as *ifname*.

[Example]

Show information for MST instance #1.

```
SWX232x>show spanning-tree mst instance 1
% Default: MSTI Root Path Cost 0 - MSTI Root Port 0 - MSTI Bridge Priority 32768
% Default: MSTI Root Id 8001ac44f2300110
% Default: MSTI Bridge Id 8001ac44f2300110
%   port1.8: Port Number 912 - Ifindex 5008 - Port Id 0x8390 - Role Designated -
State Forwarding
%   port1.8: Designated Internal Path Cost 0  - Designated Port Id 0x8390
%   port1.8: Configured Internal Path Cost 20000
%   port1.8: Configured CST External Path cost 20000
%   port1.8: CST Priority 128  - MSTI Priority 128
%   port1.8: Designated Root 8001ac44f2300110
%   port1.8: Designated Bridge 8001ac44f2300110
%   port1.8: Message Age 0
%   port1.8: Hello Time 2 - Forward Delay 15
%   port1.8: Forward Timer 0 - Msg Age Timer 0 - Hello Timer 0
%
```

6.4 Loop detection

6.4.1 Set loop detection function (system)

[Syntax]

loop-detect *switch*

no loop-detect

[Parameter]

switch : Set system-wide loop detection function

Setting value	Description
enable	Enables system-wide loop detection function
disable	Disables system-wide loop detection function

[Initial value]

loop-detect disable

[Input mode]

global configuration mode

[Description]

Enables or disables the system-wide loop detection function.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

The spanning tree function and the loop detection function can be used together on the entire system.

In order to enable the loop detection function, the loop detection function must be enabled on the interface in addition to this command.

Even if the loop detection function is enabled, the loop detection function does not operate on the following interfaces.

- LAN/SFP port on which the spanning tree function is operating. However, because a Forwarding port transmits and receives LDF, the loop detection will operate if misconnection or another issue causes a loop to occur.
- LAN/SFP port that is operating as a mirror port for the mirroring function
- LAN/SFP port that is inside a logical interface

[Example]

Enable the loop detection function for the entire system.

```
SWX232x(config)#loop-detect enable
```

Disable the loop detection function for the entire system.

```
SWX232x(config)#loop-detect disable
```

6.4.2 Set loop detection function (interface)

[Syntax]

loop-detect *switch*

no loop-detect

[Parameter]

switch : Set loop detection function for the applicable interface

Setting value	Description
enable	Enables loop detection function for the applicable interface
disable	Disables loop detection function for the applicable interface

[Initial value]

loop-detect enable

[Input mode]

interface mode

[Description]

Enables or disables loop detection function for the applicable interface.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be specified only for LAN/SFP port.

In order to enable the loop detection function, the loop detection function must be enabled on the entire system in addition to this command.

Even if the loop detection function is enabled, the loop detection function does not operate on the following interfaces.

- LAN/SFP port on which the spanning tree function is operating. However, because a Forwarding port transmits and receives LDF, the loop detection will operate if misconnection or another issue causes a loop to occur.
- LAN/SFP port that is operating as a trunk port for which native VLAN is not specified
- LAN/SFP port that is inside a logical interface

The following table shows which function is enabled depending on the settings of the spanning tree function (STP) and the loop detection function (LPD).

			Interface			
			LPD disabled		LPD enabled	
			STP disabled	STP enabled	STP disabled	STP enaabled
System	LPD disabled	STP disabled	-	-	-	-
		STP enabled	-	STP	-	STP
	LPD enabled	STP disabled	-	-	LPD	LPD
		STP enabled	-	STP	LPD	STP

[Example]

Enable the loop detection function of LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#loop-detect enable
```

Disable the loop detection function of LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#loop-detect disable
```

6.4.3 Set port blocking for loop detection

[Syntax]

loop-detect blocking *switch*

no loop-detect blocking

[Parameter]

switch : Set port blocking for the applicable interface

Setting value	Description
enable	Enables port blocking for the applicable interface
disable	Disables port blocking for the applicable interface

[Initial value]

loop-detect blocking enable

[Input mode]

interface mode

[Description]

Enables or disables blocking when a loop is detected for the applicable interface.

If this is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be specified only for LAN/SFP port.

[Example]

Block if a loop is detected on LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#loop-detect blocking enable
```

Do not block if a loop is detected on LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#loop-detect blocking disable
```

6.4.4 Reset loop detection status

[Syntax]

loop-detect reset

[Input mode]

privileged EXEC mode

[Description]

Resets the loop detection status of all interfaces.

[Note]

This command can be executed only if the system-wide loop detection function is enabled.

[Example]

Reset the loop detection status.

```
SWX232x#loop-detect reset
```

6.4.5 Show loop detection function status

[Syntax]

show loop-detect

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the settings and status of the loop detection function.

The following items are shown.

- Setting of the system-wide loop detection function
- Loop detection status for each LAN/SFP port
  - Interface name (port)
  - Setting of the loop detection function (loop-detect) for LAN/SFP port. If the loop detection function is operating, (*) is added
  - Status of the Port Blocking setting (port-blocking)
  - Loop detection status (status)

[Example]

Show the loop detection status.

```
SWX232x>show loop-detect
loop-detect: Enable

port      loop-detect    port-blocking           status
-------------------------------------------------------
port1.1        enable(*)        enable         Detected
port1.2        enable(*)        enable         Blocking
port1.3        enable(*)        enable           Normal
port1.4        enable(*)       disable           Normal
port1.5        enable(*)        enable           Normal
port1.6        enable(*)        enable         Shutdown
port1.7       disable           enable           ------
   :             :                :                :
-------------------------------------------------------
(*): Indicates that the feature is enabled.
```

Chapter 7

Layer 3 functions

7.1 IPv4 address management

7.1.1 Set IPv4 address

[Syntax]

ip address *ip_address/mask* [secondary] [label *textline*]
ip address *ip_address netmask* [secondary] [label *textline*]
no ip address *ip_address/mask* [secondary]
no ip address *ip_address netmask* [secondary]
no ip address

[Keyword]

label	:	Set label as IPv4 address
secondary	:	Set as the secondary address

[Parameter]

ip_address	:	A.B.C.D
		IPv4 address
mask	:	<1-31>
		Number of mask bits
netmask	:	A.B.C.D
		Netmask in IPv4 address format
textline	:	Label (maximum 64 characters)

[Initial value]

None

[Input mode]

interface mode

[Description]

Specifies the IPv4 address and net mask for the VLAN interface.

For IPv4 addresses, one primary address and four secondary addresses can be set in one VLAN interface.

Up to 8 IPv4 addresses can be configured for the system overall.

A primary address must be set before configuring a secondary address.

If this command is executed with the "no" syntax, the specified IPv4 address is deleted. If no IPv4 address is specified, all IPv4 addresses are deleted.

You cannot delete a primary address while a secondary address is set.

If a label is specified, it is shown in the "IPv4 address" field by the **show interface** command.

[Note]

It is not possible to assign an IPv4 address of the same subnet to multiple interfaces.

[Example]

Specify 192.168.1.100 as the IP address for VLAN #1.

```
SWX232x(config)#interface vlan1
SWX232x(config-if)#ip address 192.168.1.100/24
```

7.1.2 Show IPv4 address

[Syntax]

show ip interface [*interface*] **brief**

[Parameter]

interface	:	VLAN interface name

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the IPv4 address for each interface.

The following content is shown.

- IPv4 address
  - For secondary addresses, “(secondary)” is appended to the end of IPv4 addresses.
  - If an IPv4 address has been specified by the **ip address dhcp** command, an "*" is shown added before the displayed IPv4 address.
  - If the IPv4 address is not specified after setting the **ip address dhcp** command (such as while searching for the server), then "searching" is shown.
  - If the **ip address** command has not been set, the indication "unassigned" is shown.
- Physical layer status
- Data link layer status

If an interface is specified, information for that interface is shown. If the interface is omitted, information is shown for all interfaces for which an IPv4 address can be specified.

[Note]

An error occurs if the specified interface is one to which an IP address cannot be assigned.

[Example]

Show the IP address of every VLAN interface.

```
SWX232x>show ip interface brief
Interface      IP-Address                      Admin-Status          Link-Status
vlan1          192.168.1.100/24
               192.168.101.100/24 (secondary)  up                    up
vlan2          192.168.2.100/24                up                    down
vlan3          unassigned                      up                    down
```

7.1.3 Automatically set IPv4 address by DHCP client

[Syntax]

ip address dhcp [hostname *hostname*]
no ip address

[Keyword]

hostname	:	Set host name of DHCP server

[Parameter]

hostname	:	Host name or IPv4 address (A.B.C.D)

[Initial value]

none

[Input mode]

interface mode

[Description]

Using the DHCP client, assigns the IPv4 address granted by the DHCP server to the VLAN interface.

If the DHCP server is specified, the HostName option (option code 12) can be added to the Discover/Request message.

If an IPv4 address has been obtained, you can execute the **no ip address** command to send a release message for the obtained IP address to the DHCP server.

A secondary address cannot be set for interfaces that are set as DHCP clients.

If this command is executed with the "no" syntax, the DHCP client setting is deleted.

[Note]

The lease time requested from the DHCP server is fixed at 72 hours. However, the actual lease time will depend on the setting of the DHCP server.

Even if this command is used to obtain the default gateway, DNS server, and default domain name from the DHCP server, the settings of the **ip route, ip name-server, ip domain-name** commands take priority.

If an IPv4 address cannot be obtained from the DHCP server even by using this command, then an IPv4 link local address (169.254.xxx.xxx/16) is automatically assigned only to VLAN interfaces for which the Auto IP function is enabled.

This command cannot be used if the stack function is enabled and the stack port is using the Auto IP function.

[Example]

Use the DHCP client to assign an IPv4 address to VLAN #100.

```
SWX232x(config)#interface vlan100
SWX232x(config-if)#ip address dhcp
```

7.1.4 Show DHCP client status

[Syntax]

show dhcp lease

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the DHCP client status. The following items are shown.

- Interface that is operating as a DHCP client
- Assigned IPv4 address
- Lease expiration time
- Lease renewal request time
- Lease rebinding time
- DHCP server name
- Information obtained as DHCP options
  - Net mask
  - Default gateway
  - Lease time
  - DNS server
  - DHCP server ID
  - Domain name

[Note]

This command cannot be used if the stack function is enabled.

[Example]

Show the current DHCP client status.

```
SWX232x>show dhcp lease
Interface vlan1
------------------------------------------------------------------------------
IP Address:                    192.168.100.2
Expires:                       2018/01/01 00:00:00
Renew:                         2018/01/01 00:00:00
Rebind:                        2018/01/01 00:00:00
Server:
Options:
  subnet-mask                  255.255.255.0
  default-gateway              192.168.100.1
  dhcp-lease-time              259200
  domain-name-servers          192.168.100.1
  dhcp-server-identifier       192.168.100.1
  domain-name                  example.com
```

7.1.5 Set auto IP function

[Syntax]

auto-ip *switch*

no auto-ip

[Parameter]

switch : Behavior of the auto IP function

Setting value	Description
enable	Enable the auto IP function
disable	Disable the auto IP function

[Initial value]

auto-ip disable

[Input mode]

interface mode

[Description]

For the VLAN interface, enables the Auto IP function which automatically generates the IPv4 link local address (169.254.xxx.xxx/16).

The Auto IP function works only if an IPv4 address cannot be obtained from the DHCP server after the **ip address dhcp** command is specified.

The Auto IP function can be enabled for only one VLAN interface.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

If an IPv4 address could be obtained from the DHCP server after the IPv4 link local address was determined, the IPv4 link local address is discarded, and the IPv4 address obtained from the DHCP server is used.

This command cannot be used if the stack function is enabled and the stack port is using the Auto IP function.

[Example]

Enable the Auto IP function for VLAN #2.

```
SWX232x(config)#interface vlan2
SWX232x(config-if)#auto-ip enable
```

7.2 IPv4 route control

7.2.1 Set static IPv4 route

[Syntax]

ip route *ip_address/mask gateway* [*number*]
ip route *ip_address/mask* null [*number*]
ip route *ip_address netmask gateway* [*number*]
ip route *ip_address netmask* null [*number*]
no ip route *ip_address/mask* [*gateway* [*number*]]
no ip route *ip_address/mask* [null [*number*]]
no ip route *ip_address netmask* [*gateway* [*number*]]
no ip route *ip_address netmask* [null [*number*]]

[Keyword]

null : Discard packet without forwarding it

[Parameter]

ip_address : A.B.C.D

IPv4 address

Set this to 0.0.0.0 if specifying the default gateway

mask : <1-31>

Number of mask bits

Set this to 0 if specifying the default gateway

netmask : A.B.C.D

Netmask in address format

Set this to 0.0.0.0 if specifying the default gateway

gateway : A.B.C.D

IPv4 address of gateway

number : <1-255>

Administrative distance (priority order when selecting route) (if omitted: 1)

Lower numbers have higher priority.

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Adds a static route for IPv4.

If this command is executed with the "no" syntax, the specified route is deleted.

[Example]

Set the default gateway to 192.168.1.1.

```
SWX232x(config)#ip route 0.0.0.0/0 192.168.1.1
```

For the destination 172.16.0.0/16, set the gateway to 192.168.2.1.

```
SWX232x(config)#ip route 172.16.0.0 255.255.0.0 192.168.2.1
```

7.2.2 Show IPv4 Forwarding Information Base

[Syntax]

show ip route [*ip_address*[/*mask*]]

[Parameter]

ip_address : A.B.C.D

IPv4 address

mask : <0-32>

Number of mask bits (if omitted: 32)

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the IPv4 Forwarding Information Base (FIB).

If the IPv4 address is omitted, the entire content of the FIB is shown.

If the IPv4 address or network address is specified, detailed information for the routing entry that matches the destination is shown.

[Example]

Show the entire IPv4 forwarding information base.

```
SWX232x>show ip route
Codes: C - connected, S - static
       * - candidate default

Gateway of last resort is 192.168.100.1 to network 0.0.0.0

S*      0.0.0.0/0 [1/0] via 192.168.100.1, vlan1
S       172.16.0.0/16 [1/0] via 192.168.200.240, vlan100
S       192.168.1.1/32 [1/0] is directly connected, vlan100
C       192.168.100.0/24 is directly connected, vlan1
C       192.168.200.0/24 is directly connected, vlan100
```

Show the route used for sending packets that are addressed to 192.168.100.10.

```
SWX232x>show ip route 192.168.100.10
Routing entry for 192.168.100.0/24
```

```
  Known via "connected", distance 0, metric 0, best
  * is directly connected, vlan1
```

7.2.3 Show IPv4 Routing Information Base

[Syntax]

show ip route database

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the IPv4 Routing Information Base (RIB).

[Example]

Show the IPv4 routing information base.

```
SWX232x>show ip route database
Codes: C - connected, S - static
       > - selected route, * - FIB route

S    *> 0.0.0.0/0 [1/0] via 192.168.100.1, vlan1
S    *> 172.16.0.0/16 [1/0] via 192.168.200.240, vlan100
S    *> 192.168.1.1/32 [1/0] is directly connected, vlan100
C    *> 192.168.100.0/24 is directly connected, vlan1
C    *> 192.168.200.0/24 is directly connected, vlan100

Gateway of last resort is not set
```

7.2.4 Show summary of the route entries registered in the IPv4 Routing Information Base

[Syntax]

show ip route summary

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows a summary of the route entries that are registered in the IPv4 Routing Information Base (RIB).

[Example]

Show a summary of the route entries that are registered in the IPv4 Routing Information Base.

```
SWX232x>show ip route summary
IP routing table name is Default-IP-Routing-Table(0)
IP routing table maximum-paths is 1
Route Source    Networks
connected       2
static          3
Total           5
```

7.3 ARP

7.3.1 Show ARP table

[Syntax]

show arp

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the ARP cache.

[Example]

Show the ARP cache.

```
SWX232x>show arp
 IP Address      MAC Address   Interface  Type
192.168.100.10  00a0.de00.0000 vlan1    dynamic
192.168.100.100 00a0.de00.0001 vlan1    static
```

7.3.2 Clear ARP table

[Syntax]

clear arp-cache

[Input mode]

privileged EXEC mode

[Description]

Clears the ARP cache.

[Example]

Clear the ARP cache.

```
SWX232x#clear arp-cache
```

7.3.3 Set static ARP entry

[Syntax]

arp *ip_address mac_address interface*
no arp *ip_address*

[Parameter]

ip_address	:	A.B.C.D
		IP address
mac_address	:	HHHH.HHHH.HHHH
		MAC address
interface	:	portN.M
		Physical interface name

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Creates a static group ARP entry.

If this command is executed with the "no" syntax, the specified entry is deleted.

[Example]

Create a static ARP entry of IP address 192.168.100.100 and MAC address 00a0.de00.0000 connected to port1.1.

```
SWX232x(config)#arp 192.168.100.100 00a0.de00.0000 port1.1
```

7.3.4 Set ARP timeout

[Syntax]

arp-ageing-timeout *time*
no arp-ageing-timeout [*time*]

[Parameter]

time	:	<1-3000>
		ARP entry ageing timeout (seconds)

[Initial value]

arp-ageing-timeout 1200

[Input mode]

interface mode

[Description]

Changes the length of time that ARP entries are maintained in the applicable VLAN interface. ARP entries that are not received within this length of time are deleted.

If this command is executed with the "no" syntax, the ARP entry timeout is set to 1200 seconds.

[Example]

Change the ARP entry ageing timeout for VLAN #1 to five minutes.

```
SWX232x(config)#interface vlan1
SWX232x(config)#arp-aging-timeout 300
```

7.4 IPv4 forwarding control

7.4.1 IPv4 forwarding settings

[Syntax]

ip forwarding *switch*
no ip forwarding [*switch*]

[Parameter]

switch : IPv4 packet forwarding settings

Setting value	Description
enable	Enable forwarding of IPv4 packets
disable	Disable forwarding of IPv4 packets

[Initial value]

ip forwarding disable

[Input mode]

global configuration mode

[Description]

Enables or disables forwarding of IPv4 packets.

If this is executed with the "no" syntax, the setting returns to the default.

7.4.2 Show IPv4 forwarding settings

[Syntax]

show ip forwarding

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the IPv4 packet forwarding settings.

[Example]

Shows the IPv4 packet forwarding settings.

```
SWX232x>show ip forwarding
IP forwarding is on
```

7.5 IPv4 ping

7.5.1 IPv4 ping

[Syntax]

ping *host* [repeat *count*] [size *datalen*] [timeout *timeout*] [source *ip_address*]

[Keyword]

repeat : Specifies the number of times to execute

size : Specifies the length of the ICMP payload (byte units)

timeout : Specifies the time to wait for a reply after transmitting the specified number of Echo requests

source : Sets the source address for ICMP packets

[Parameter]

host : Target to which ICMP Echo is sent

Host name, or target IP address (A.B.C.D)

count : Number of times to execute (if omitted: 5)

Setting value	Description
<1-2147483647>	Execute the specified number of times
continuous	Execute repeatedly until Ctrl+C is entered

datalen : <36-18024>

Length of the ICMP payload (if omitted: 56)

timeout : <1-65535>

Time to wait for a reply (if omitted: 2)

This is ignored if the number of times to execute is specified as "continuous"

ip_address : A.B.C.D

IPv4 address

[Input mode]

privileged EXEC mode

[Description]

Send ICMP Echo to the specified host, and wait for ICMP Echo Reply.

If there is a reply, show it. Show statistical information when the command ends.

[Example]

Ping the IP address 192.168.100.254 three times with a data size of 120 bytes.

```
SWX232x#ping 192.168.100.254 repeat 3 size 120
PING 192.168.100.254 (192.168.100.254): 120 data bytes
128 bytes from 192.168.100.254: seq=0 ttl=255 time=8.368 ms
128 bytes from 192.168.100.254: seq=1 ttl=255 time=9.946 ms
128 bytes from 192.168.100.254: seq=2 ttl=255 time=10.069 ms

--- 192.168.100.254 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 8.368/9.461/10.069 ms
```

7.5.2 Check IPv4 route

[Syntax]

traceroute *host*

[Parameter]

host : Destination for which to check the route

Host name, or target IP address (A.B.C.D)

[Input mode]

privileged EXEC mode

[Description]

Shows information for the route to the specified host.

[Example]

Check the route to 192.168.100.1.

```
SWX232x#traceroute 192.168.100.1
traceroute to 192.168.100.1 (192.168.100.1), 30 hops max
 1  192.168.10.1 (192.168.10.1)  0.563 ms  0.412 ms  0.428 ms
 2  192.168.20.1 (192.168.20.1)  0.561 ms  0.485 ms  0.476 ms
 3  192.168.30.1 (192.168.30.1)  0.864 ms  0.693 ms  21.104 ms
 4  192.168.40.1 (192.168.40.1)  0.751 ms  0.783 ms  0.673 ms
```

```
5  192.168.50.1 (192.168.50.1)  7.689 ms  7.527 ms  7.168 ms
6  192.168.100.1 (192.168.100.1)  33.948 ms  10.413 ms  7.681 ms
```

7.6 IPv6 address management

7.6.1 Set IPv6

[Syntax]

ipv6 *switch*
no ipv6

[Parameter]

switch : Behavior of the IPv6

Setting value	Description
enable	Enable the IPv6
disable	Disable the IPv6

[Initial value]

ipv6 disable

[Input mode]

interface mode

[Description]

Enables IPv6 for the VLAN interface and automatically sets the link local address.

IPv6 addresses can be assigned to a maximum of 8 VLAN interfaces.

If IPv6 is disabled, related settings are also simultaneously deleted.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

The automatically-specified link local address can be viewed by using the **show ipv6 interface brief** command.

This command cannot be used if the stack function is enabled.

[Example]

Enable IPv6 for VLAN #1.

```
SWX232x(config)#interface vlan1
SWX232x(config-if)#ipv6 enable
```

7.6.2 Set IPv6 address

[Syntax]

ipv6 address *ipv6_address/prefix_len*
no ipv6 address *ipv6_address/prefix_len*
no ipv6 address

[Parameter]

ipv6_address : X:X::X:X

IPv6 address

prefix_len : <1-127>

IPv6 prefix length

[Input mode]

interface mode

[Description]

Specifies the IPv6 address and prefix length for the VLAN interface.

An IPv6 address can be set for a VLAN interface for which the **ipv6 enable** command has been set.

This command can be used with the **ipv6 address autoconfig** command.

For IPv6 addresses, up to five global addresses (including RA settings) and one link local address can be set in one VLAN interface.

Up to 8 IPv6 addresses can be configured for the system overall (excepting link local addresses that are automatically assigned).

If this command is executed with the "no" syntax, the specified IPv6 address is deleted. If no IPv6 address is specified, all IPv6 addresses (including RA settings) are deleted.

[Note]

It is not possible to assign an IPv6 address of the same subnet to multiple interfaces.

This command cannot be used if the stack function is enabled.

[Example]

Specify 2001:db8:1::2 as the IPv6 address for VLAN #1.

```
SWX232x(config)#interface vlan1
SWX232x(config-if)#ipv6 address 2001:db8:1::2/64
```

7.6.3 Set RA for IPv6 address

[Syntax]

ipv6 address autoconfig
no ipv6 address autoconfig

[Initial value]

none

[Input mode]

interface mode

[Description]

Uses RA to specify an IPv6 address for the VLAN interface.

RA can be specified only for the VLAN interface for which the **ipv6 enable** command has been specified.

This command can be used with the **ipv6 address ipv6_address/prefix_len** command.

If this command is executed with the "no" syntax, the RA setting is deleted.

[Note]

This command cannot be used if the stack function is enabled.

[Example]

Use RA to set the IPv6 address for VLAN #1.

```
SWX232x(config)#interface vlan1
SWX232x(config-if)#ipv6 address autoconfig
```

7.6.4 Show IPv6 address

[Syntax]

show ipv6 interface [*interface*] **brief**

[Parameter]

interface	:	VLAN interface name Interface to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the IPv6 address for each interface.

- IPv6 address
  - If an IPv6 address has not been set, this will be "unassigned."
- Physical layer status
- Data link layer status

If an interface is specified, information for that interface is shown. If the interface is omitted, information is shown for all interfaces for which an IPv6 address is specified.

[Note]

An error occurs if the specified interface is one to which an IPv6 address cannot be assigned.

This command cannot be used if the stack function is enabled.

[Example]

Show the IPv6 address for all VLAN interface.

```
SWX232x>show ipv6 interface brief
Interface        IPv6-Address                                Admin-Status
Link-Status
vlan1            2001:db8:1::2/64
                 2001:db8:2::2/64
                 fe80::2a0:deff:fe:2/64                      up                    up
vlan2            2001:db8:2::2/64
                 fe80::2a0:deff:fe:2/64                      up
down
vlan3            unassigned                                  up
down
```

7.7 IPv6 route control

7.7.1 Set IPv6 static route

[Syntax]

ipv6 route *ipv6_address/prefix_len gateway* [*number*]
ipv6 route *ipv6_address/prefix_len* null [*number*]
no ipv6 route *ipv6_address/prefix_len* [*gateway* [*number*]]
no ipv6 route *ipv6_address/prefix_len* [null [*number*]]

[Keyword]

null	:	Discard packet without forwarding it

[Parameter]

ipv6_address	:	X:X::X:X IPv6 address Set this to :: (abbreviated 0:0:0:0:0:0:0:0) if specifying the default gateway
prefix_len	:	<1-127> IPv6 prefix Set this to 0 if specifying the default gateway
gateway	:	X:X::X:X IPv6 address of gateway If you specify an IPv6 link local address, you must also specify the output interface (fe80::X%vlanN format)
number	:	<1-255> Management route (priority order when selecting route) (if omitted: 1) Lower numbers have higher priority.

[Input mode]

global configuration mode

[Description]

Adds a static route for IPv6.

If this command is executed with the "no" syntax, the specified route is deleted.

[Note]

For the default gateway setting, the static route setting takes priority over the RA setting.

This command cannot be used if the stack function is enabled.

[Example]

For the destination 2001:db8:2::/64, set the gateway to 2001:db8:1::1.

```
SWX232x(config)#ipv6 route 2001:db8:2::/64 2001:db8:1::1
```

Set the default gateway to fe80::2a0:deff:fe:1 on VLAN #1.

```
SWX232x(config)#ipv6 route ::/0 fe80::2a0:deff:fe:1%vlan1
```

7.7.2 Show IPv6 Forwarding Information Base

[Syntax]

show ipv6 route [*ipv6_address*[/*prefix_len*]]

[Parameter]

ipv6_address	:	X:X::X:X IPv6 address
mask	:	<0-128> IPv6 prefix length (if omitted: 128)

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the IPv6 Forwarding Information Base (FIB).

If the IPv6 address is omitted, the entire content of the FIB is shown.

If the IPv6 address or network address is specified, detailed information for the routing entry that matches the destination is shown.

[Note]

This command cannot be used if the stack function is enabled.

[Example]

Show the entire IPv6 forwarding information base.

```
SWX232x>show ipv6 route
Codes: C - connected, S - static
Timers: Uptime

S      ::/0 [1/0] via fe80::2a0:deff:fe:1, vlan1, 00:03:08
C      2001:db8:1::/64 via ::, vlan1, 00:01:10
S      2001:db8:2::/64 [1/0] via 2001:db8:1::1, vlan1, 00:01:52
C      fe80::/64 via ::, vlan1, 00:03:08
```

Show the route used for sending packets that are addressed to 2001:db8:1::2.

```
SWX232x>show ipv6 route 2001:db8:1::2
Routing entry for 2001:db8:1::/64
  Known via "connected", distance 0, metric 0, best
  Last update 00:18:27 ago
  * directly connected, vlan1
```

7.7.3 Show IPv6 Routing Information Base

[Syntax]

show ipv6 route database

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the IPv6 Routing Information Base (RIB).

[Note]

This command cannot be used if the stack function is enabled.

[Example]

Show the IPv6 routing information base.

```
SWX232x>show ipv6 route database
Codes: C - connected, S - static
       > - selected route, * - FIB route
Timers: Uptime

S   *> ::/0 [1/0] via fe80::2a0:deff:fe:1, vlan1, 00:21:39
C   *> 2001:db8:1::/64 via ::, vlan1, 00:19:41
```

```
S    *> 2001:db8:2::/64 [1/0] via 2001:db8:1::1, vlan1, 00:20:23
C    *> fe80::/64 via ::, vlan1, 00:21:39
```

7.7.4 Show summary of the route entries registered in the IPv6 Routing Information Base

[Syntax]

show ipv6 route summary

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows a summary of the route entries that are registered in the IPv6 Routing Information Base (RIB).

[Note]

This command cannot be used if the stack function is enabled.

[Example]

Show a summary of the IPv6 Routing Information Base.

```
SWX232x>show ipv6 route summary
IPv6 routing table name is Default-IPv6-Routing-Table(0)
IPv6 routing table maximum-paths is 1
Route Source    Networks
connected       2
static          2
Total           4
```

7.8 Neighbor cache

7.8.1 Set static neighbor cache entry

[Syntax]

ipv6 neighbor *ipv6_address interface mac_address interface*
no ipv6 neighbor *ipv6_address interface*

[Parameter]

ipv6_address	:	X:X::X:X
		IPv6 address
interface	:	vlanN
		VLAN interface name
mac_address	:	HHHH.HHHH.HHHH
		MAC address
interface	:	portN.M
		Physical interface name

[Input mode]

global configuration mode

[Description]

Adds a static entry to the neighbor cache.

If this command is executed with the "no" syntax, the specified static entry is deleted.

[Note]

This command cannot be used if the stack function is enabled.

[Example]

Set the MAC address of IPv6 2001:db8:cafe::1 located at port1.1 of VLAN #1, in the Neighbor cache.

```
SWX232x(config)#ipv6 neighbor 2001:db8:cafe::1 vlan1 00a0.de80.cafe port1.1
```

7.8.2 Show neighbor cache table

[Syntax]

show ipv6 neighbors

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the neighbor cache table.

[Note]

This command cannot be used if the stack function is enabled.

[Example]

Show the neighbor cache table.

```
SWX232x>show ipv neighbors
 IPv6 Address                              MAC Address     Interface  Type
2001:db8:1:0:3538:5dc7:6bc4:1a23          0011.2233.4455   vlan1      dynamic
2001:db8:cafe::1                          00a0.de80.cafe   vlan1      static
fe80::0211:22ff:fe33:4455                 0011.2233.4455   vlan1      dynamic
fe80::6477:88ff:fe99:aabb                 6677.8899.aabb   vlan1      dynamic
```

7.8.3 Clear neighbor cache table

[Syntax]

clear ipv6 neighbors

[Input mode]

privileged EXEC mode

[Description]

Clears the neighbor cache.

[Note]

This command cannot be used if the stack function is enabled.

[Example]

Clear the neighbor cache.

```
SWX232x#clear ipv6 neighbors
```

7.9 IPv6 forwarding control

7.9.1 IPv6 forwarding settings

[Syntax]

ipv6 forwarding *switch*
no ipv6 forwarding [*switch*]

[Parameter]

switch : IPv6 packet forwarding settings

Setting value	Description
enable	Enable forwarding of IPv6 packets
disable	Disable forwarding of IPv6 packets

[Initial value]

ipv6 forwarding disable

[Input mode]

global configuration mode

[Description]

Enables or disables forwarding of IPv6 packets.

If this is executed with the "no" syntax, the setting returns to the default.

7.9.2 Show IPv6 forwarding settings

[Syntax]

show ipv6 forwarding

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the IPv6 packet forwarding settings.

[Example]

Shows the IPv6 packet forwarding settings.

```
SWX232x>show ipv6 forwarding
IPv6 forwarding is on
```

7.10 IPv6 ping

7.10.1 IPv6 ping

[Syntax]

ping6 *host* [repeat *count*] [size *datalen*] [timeout *timeout*] [source *ipv6_address*]

[Keyword]

repeat	:	Specifies the number of times to execute
size	:	Specifies the length of the ICMPv6 payload (byte units)
timeout	:	Specifies the time to wait for a reply after transmitting the specified number of Echo requests
source	:	Sets the source address for ICMPv6 packets

[Parameter]

host : Host name, or target IPv6 address (X:X::X:X)

Target to which ICMPv6 Echo is sent

If you specify an IPv6 link local address, you must also specify the output interface (fe80::X%vlanN format)

count : Number of times to execute (if omitted: 5)

Setting value	Description
<1-2147483647>	Execute the specified number of times
continuous	Execute repeatedly until Ctrl+C is entered

datalen : <36-18024>

Length of ICMP payload (if omitted: 56)

timeout : <1-65535>

Time to wait for a reply (if omitted: 2)

Ignored if count is specified as "continuous"

ipv6_address : X:X::X:X

IPv6 address

[Input mode]

privileged EXEC mode

[Description]

Send ICMPv6 Echo to the specified host, and wait for ICMPv6 Echo Reply.

When it is received, indicate this. Show simple statistical information when the command ends.

[Note]

This command cannot be used if the stack function is enabled.

[Example]

Ping fe80::2a0:deff:fe11:2233.

```
SWX232x#ping6 fe80::2a0:deff:fe11:2233%vlan1
PING fe80::2a0:deff:fe11:2233%vlan1 (fe80::2a0:deff:fe11:2233%vlan1): 56 data bytes
```

```
64 bytes from fe80::2a0:deff:fe11:2233: seq=0 ttl=64 time=2.681 ms
64 bytes from fe80::2a0:deff:fe11:2233: seq=1 ttl=64 time=4.760 ms
64 bytes from fe80::2a0:deff:fe11:2233: seq=2 ttl=64 time=10.045 ms
64 bytes from fe80::2a0:deff:fe11:2233: seq=3 ttl=64 time=10.078 ms
64 bytes from fe80::2a0:deff:fe11:2233: seq=4 ttl=64 time=10.210 ms

--- fe80::2a0:deff:fe11:2233%vlan1 ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 2.681/7.554/10.210 ms
```

7.10.2 Check IPv6 route

[Syntax]

traceroute6 *host*

[Parameter]

host : Destination for which to check the route

Host name, or target IPv6 address (X:X::X:X)

[Input mode]

privileged EXEC mode

[Description]

Shows information for the route to the specified host.

[Note]

This command cannot be used if the stack function is enabled.

[Example]

Check the route to 2001:db8:1::2.

```
SWX232x#traceroute6 2001:db8:1::2
traceroute to 2001:db8:1::2 (2001:db8:1::2), 30 hops max
 1  2001:db8:10::1 (2001:db8:10::1)  0.563 ms  0.412 ms  0.428 ms
 2  2001:db8:20::1 (2001:db8:20::1)  0.561 ms  0.485 ms  0.476 ms
 3  2001:db8:30::1 (2001:db8:30::1)  0.864 ms  0.693 ms  21.104 ms
 4  2001:db8:40::1 (2001:db8:40::1)  0.751 ms  0.783 ms  0.673 ms
 5  2001:db8:50::1 (2001:db8:50::1)  7.689 ms  7.527 ms  7.168 ms
 6  2001:db8:1::2 (2001:db8:1::2)  33.948 ms  10.413 ms  7.681 ms
```

7.11 DNS client

7.11.1 Set DNS lookup function

[Syntax]

dns-client *switch*

no dns-client

[Parameter]

switch : Behavior of the DNS client

Setting value	Description
enable	Enable the DNS client
disable	Disable the DNS client

[Initial value]

dns-client enable

[Input mode]

global configuration mode

[Description]

Enables or disables the DNS lookup function.

If this command is executed with the "no" syntax, the function is disabled.

[Example]

Enable the DNS lookup function.

```
SWX232x(config)#dns-client enable
```

7.11.2 Set DNS server list

[Syntax]

dns-client name-server *server*

no dns-client name-server *server*

[Parameter]

server : A.B.C.D

IPv4 addtess of the DNS server

: X:X::X:X

IPv6 address of the DNS server

If you specify an IPv6 link local address, you must also specify the output interface (fe80::X%vlanN format)

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Adds a server to the DNS server list.

Up to three servers can be specified.

If this command is executed with the "no" syntax, the specified server is deleted from the DNS server list.

[Note]

If the **ip address dhcp** command was used to obtain the DNS server list from the DHCP server, the setting of this command takes priority.

However if fewer than three items were registered to the DNS server list by this command, up to a total of three items of the DNS server list obtained from the DHCP server are added to the end of this list.

[Example]

Add the IP addresses 192.168.100.1, 2001:db8::1234, and fe80::2a0:deff:fe11:2233 to the DNS server list.

```
SWX232x(config)#dns-client name-server 192.168.100.1
SWX232x(config)#dns-client name-server 2001:db8::1234
SWX232x(config)#dns-client name-server fe80::2a0:deff:fe11:2233%vlan1
```

7.11.3 Set default domain name

[Syntax]

dns-client domain-name *name*

no dns-client domain-name *name*

[Parameter]

name : Domain name (maximum 255 characters)

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Specifies the default domain name used for DNS queries.

If this command is executed with the "no" syntax, the default domain name is deleted.

[Note]

The setting of this command takes priority if the default domain name (option code 15) was obtained from the DHCP server by the **ip address dhcp** command.

If a search domain list is specified by the **dns-client domain-list** command, the default domain name specified by this command and the default domain name automatically specified by the **ip address dhcp** command are not used.

[Example]

Set the default domain name to "example.com".

```
SWX232x(config)#dns-client domain-name example.com
```

7.11.4 Set search domain list

[Syntax]

dns-client domain-list *name*
no dns-client domain-list *name*

[Parameter]

name : Domain name (maximum 255 characters)

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Adds a domain name to the list of domain names used for DNS queries.

Up to six domains can be registered in the search domain list.

If this command is executed with the "no" syntax, the specified domain name is deleted from the search domain list.

[Note]

If a search domain list is specified by this command, the default domain name specified by the **dns-client domain-name** command and the default domain name automatically specified by the **ip address dhcp** command are not used.

[Example]

Add the domain names "example1.com" and "example2.com" to the search domain list.

```
SWX232x(config)#dns-client domain-list example1.com
SWX232x(config)#dns-client domain-list example2.com
```

7.11.5 Show DNS client information

[Syntax]

show dns-client

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the DNS client information.

The following content is shown.

Item	Description
DNS Client is enabled	Enable the DNS client
DNS Client is disabled	Disable the DNS client
Default domain	Default domain name
Domain list	Search domain list
Name Servers	DNS server list (IP address)

[Example]

Show the DNS client information.

```
SWX232x>show dns-client

DNS client is enabled
 Default domain  : example.com
 Domain list     : example1.com example2.com
 Name Servers    : 192.168.100.1 2001:db8::1234 fe80::2a0:deff:fe11:2233%vlan1

 * - Values assigned by DHCP Client.
```

Chapter 8

IP multicast control

8.1 IP multicast basic settings

8.1.1 Set processing method for unknown multicast frames

[Syntax]

l2-unknown-mcast *mode*

[Parameter]

mode : Sets the processing method for multicast frames

Setting value	Description
discard	Discard
flood	Flood

[Initial value]

l2-unknown-mcast flood

[Input mode]

global configuration mode

[Description]

Specifies the processing method for multicast frames that are not registered in the MAC address table.

[Example]

Discard unknown multicast.

```
SWX232x(config)#l2-unknown-mcast discard
```

8.2 IGMP snooping

8.2.1 Set enable/disable IGMP snooping

[Syntax]

ip igmp snooping *switch*
no ip igmp snooping

[Parameter]

switch : IGMP snooping operations

Setting value	Description
enable	Enable IGMP snooping
disable	Disable IGMP snooping

[Initial value]

ip igmp snooping enable

[Input mode]

interface mode

[Description]

Enables the IGMP snooping setting of the interface.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be specified only for VLAN interface.

[Example]

Enable IGMP snooping for VLAN #2.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#ip igmp snooping enable
```

Disable IGMP snooping for VLAN #2.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#ip igmp snooping disable
```

8.2.2 Set IGMP snooping fast-leave

[Syntax]

ip igmp snooping fast-leave
no ip igmp snooping fast-leave

[Initial value]

none

[Input mode]

interface mode

[Description]

Enables IGMP snooping fast-leave for the interface.

If this is executed with the "no" syntax, IGMP snooping fast-leave is disabled.

[Note]

This command can be specified only for VLAN interface. Also, this can be specified only if IGMP snooping is enabled.

Do not enable this command on a VLAN interface for which multiple hosts are connected to the LAN/SFP port.

[Example]

Enable IGMP snooping fast-leave for VLAN #2.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#ip igmp snooping fast-leave
```

Disable IGMP snooping fast-leave for VLAN #2.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#no ip igmp snooping fast-leave
```

8.2.3 Set multicast router connection destination

[Syntax]

ip igmp snooping mrouter interface *ifname*
no ip igmp snooping mrouter interface *ifname*

[Parameter]

ifname	:	LAN/SFP port interface name Interface to set

[Initial value]

none

[Input mode]

interface mode

[Description]

Statically sets the LAN/SFP port to which the multicast router is connected.

If this command is executed with the "no" syntax, the setting is discarded.

[Note]

This command can be specified only for VLAN interface. Also, this can be specified only if IGMP snooping is enabled.

The multicast router must be connected to the specified LAN/SFP port. If an IGMP report is received from the receiver, it is forwarded to the specified LAN/SFP port.

[Example]

Specify LAN port #8 as a connection destination of the multicast router.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#ip igmp snooping mrouter interface port1.8
```

Remove LAN port #8 as a connection destination of the multicast router.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#no ip igmp snooping mrouter interface port1.8
```

8.2.4 Set query transmission function

[Syntax]

ip igmp snooping querier
no ip igmp snooping querier

[Initial value]

none

[Input mode]

interface mode

[Description]

Enables the IGMP query transmission function.

If this is executed with the "no" syntax, the IGMP query transmission function is disabled.

[Note]

This command can be specified only for VLAN interface. Also, this can be specified only if IGMP snooping is enabled.

Note that if you change the IP address while leaving this command enabled, queries will no longer be sent with the correct IP address following the change.

[Example]

Enable the transmission function for VLAN #2.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#ip igmp snooping querier
```

Disable the transmission function for VLAN #2.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#no ip igmp snooping querier
```

8.2.5 Set IGMP query transmission interval

[Syntax]

ip igmp snooping query-interval *interval*
no ip igmp snooping query-interval

[Parameter]

interval : <20-18000>
Query transmission interval (seconds)

[Initial value]

ip igmp snooping query-interval 125

[Input mode]

interface mode

[Description]

Sets the transmission interval for IGMP queries.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be specified only for VLAN interface. Also, this can be specified only if IGMP snooping is enabled.

[Example]

Set the VLAN #2 query transmission interval to 30 seconds.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#ip igmp snooping query-interval 30
```

Return the VLAN #2 query transmission interval to the default setting.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#no ip igmp snooping query-interval
```

8.2.6 Set TTL value verification function for IGMP packets

[Syntax]

ip igmp snooping check ttl *switch*
no ip igmp snooping check ttl

[Parameter]

switch : TTL value verification function for IGMP packets

Setting value	Description
enable	Enable
disable	Disable

[Initial value]

ip igmp snooping check ttl enable

[Input mode]

interface mode

[Description]

Sets the TTL value verification function for IGMP packets.

If this command is executed with the "no" syntax, the setting returns to the default.

When this is enabled, IGMP packets with illegal TTL values in the IP header (besides 1) will be discarded.

When disabled, the relevant packet will be discarded, and the TTL value will be corrected to 1 and forwarded.

[Note]

This command can be specified only for VLAN interface. Also, this can be specified only if IGMP snooping is enabled.

[Example]

Enable the TTL value verification function of IGMP packets for VLAN #2.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#ip igmp snooping check ttl enable
```

Disnable the TTL value verification function of IGMP packets for VLAN #2.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#ip igmp snooping check ttl disable
```

8.2.7 Set IGMP version

[Syntax]

ip igmp snooping version *version*
no ip igmp snooping version

[Parameter]

version : <2-3>

IGMP version

[Initial value]

ip igmp snooping version 3

[Input mode]

interface mode

[Description]

Sets the IGMP version.

If this command is executed with the "no" syntax, the IGMP version returns to the default setting (V3).

[Note]

This command can be specified only for VLAN interface. Also, this can be specified only if IGMP snooping is enabled.

If an IGMP packet of a different version than this setting is received, the following action occurs.

- When set to V2
  - If a V3 query is received, it is forwarded as a V2 query
  - If a V3 report is received, it is discarded
- When set to V3
  - If a V2 query is received, it is forwarded as a V2 query
  - If a V2 report is received, it is forwarded as a V3 report

[Example]

On VLAN #2, set the IGMP version to 2.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#ip igmp snooping version 2
```

On VLAN #2, return the IGMP version to the default setting.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#no ip igmp snooping version
```

8.2.8 Show multicast router connection port information

[Syntax]

show ip igmp snooping mrouter *ifname*

[Parameter]

ifname : VLAN interface name

Interface to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the multicast router connection port information that was dynamically learned or statically set.

[Example]

Show multicast router connection port information for VLAN #2.

```
SWX232x#show ip igmp snooping mrouter vlan2
VLAN    Interface             IP-address    Expires
2       port1.8(dynamic)          192.168.100.216        00:00:49
```

8.2.9 Show IGMP group membership information

[Syntax]

show ip igmp snooping groups [detail]

show ip igmp snooping groups *A.B.C.D* [detail]

show ip igmp snooping groups *ifname* [detail]

[Keyword]

detail : Detailed information

[Parameter]

A.B.C.D	:	Multicast group address
ifname	:	VLAN interface name Interface to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows IGMP group membership information.

[Example]

Show IGMP group membership information.

```
SWX232x#show ip igmp snooping groups
IGMP Snooping Group Membership
Group source list: (R - Remote, S - Static)
Vlan   Group/Source Address    Interface      Flags   Uptime     Expires  Last
Reporter   Version
1      239.255.255.250          port1.5        R      01:06:02   00:03:45
192.168.100.11    V3
```

Show detailed IGMP group membership information.

```
SWX232x#show ip igmp snooping groups detail
IGMP Snooping Group Membership Details
Flags: (R - Remote, S - Static)

Interface:      port1.5
Group:          239.255.255.250
Flags:          R
Uptime:         01:07:10
Group mode:     Exclude (Expires: 00:04:13)
Last reporter:  192.168.100.11
Source list is empty
```

8.2.10 Show an interface's IGMP-related information

[Syntax]

show ip igmp snooping interface *ifname*

[Parameter]

ifname	:	VLAN interface name Interface to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows IGMP-related information for a VLAN interface.

[Example]

Show IGMP-related information for VLAN #1.

```
SWX232x#show ip igmp snooping interface vlan1

IGMP Snooping information for vlan1
 IGMP Snooping enabled
 Snooping Querier none
 IGMP Snooping other querier timeout is 255 seconds
 Group Membership interval is 260 seconds
 IGMPv2 fast-leave is disabled
 IGMPv1/v2 Report suppression enabled
 IGMPv3 Report suppression enabled
 Router port detection using IGMP Queries
 Number of router-ports: 1
 Number of Groups: 1
 Number of v1-reports: 0
 Number of v2-reports: 6
```

```
Number of v2-leaves: 0
Number of v3-reports: 127
Active Ports:
 port1.5
 port1.8
```

8.2.11 Clear IGMP group membership entries

[Syntax]

clear ip igmp snooping
clear ip igmp snooping group *A.B.C.D*
clear ip igmp snooping interface *ifname*

[Keyword]

group	:	Specifies the multicast group address to be cleared
interface	:	Specifies the VLAN interface to be cleared

[Parameter]

A.B.C.D	:	Multicast group address "*" indicates all entries
ifname	:	VLAN interface name Interface to clear

[Input mode]

privileged EXEC mode

[Description]

Clears IGMP group membership entries.

[Example]

Clear IGMP group membership entries for VLAN #1.

```
SWX232x#clear ip igmp snooping interface vlan1
```

8.3 MLD snooping

8.3.1 Enable/disable MLD snooping

[Syntax]

ipv6 mld snooping *switch*
no ipv6 mld snooping

[Parameter]

switch : MLD snooping operations

Setting value	Description
enable	Enable MLD snooping
disable	Disable MLD snooping

[Initial value]

ipv6 mld snooping enable

[Input mode]

interface mode

[Description]

Configures the operations of the MLD snooping setting of the interface.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

This command can be specified only for VLAN interfaces.

[Example]

Enable MLD snooping for VLAN #2.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#ipv6 mld snooping enable
```

Disnable MLD snooping for VLAN #2.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#ipv6 mld snooping disable
```

8.3.2 Set MLD snooping fast-leave

[Syntax]

ipv6 mld snooping fast-leave
no ipv6 mld snooping fast-leave

[Initial value]

none

[Input mode]

interface mode

[Description]

Enables MLD snooping fast-leave for the interface.

If this is executed with the "no" syntax, MLD snooping fast-leave is disabled.

[Note]

This command can be specified only for VLAN interfaces. Also, this can be specified only if MLD snooping is enabled.

Do not enable this command on a VLAN interface for which multiple hosts are connected to the LAN/SFP port.

[Example]

Enable MLD snooping fast-leave for VLAN #2.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#ipv6 mld snooping fast-leave
```

Disable MLD snooping fast-leave for VLAN #2.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#no ipv6 mld snooping fast-leave
```

8.3.3 Set multicast router connection destination

[Syntax]

ipv6 mld snooping mrouter interface *ifname*
no ipv6 mld snooping mrouter interface *ifname*

[Parameter]

ifname	:	Interface name of LAN/SFP port Interface to set

[Initial value]

none

[Input mode]

interface mode

[Description]

Statically sets the LAN/SFP port to which the multicast router is connected.

If this command is executed with the "no" syntax, the setting is discarded.

[Note]

This command can be specified only for VLAN interfaces. Also, this can be specified only if MLD snooping is enabled.

The multicast router must be connected to the specified LAN/SFP port. If an MLD report is received from the receiver, it is forwarded to the specified LAN/SFP port.

[Example]

Specify LAN port #8 as a connection destination of the multicast router.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#ipv6 mld snooping mrouter interface port1.8
```

Remove LAN port #8 as a connection destination of the multicast router.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#no ipv6 mld snooping mrouter interface port1.8
```

8.3.4 Set query transmission function

[Syntax]

ipv6 mld snooping querier
no ipv6 mld snooping querier

[Initial value]

none

[Input mode]

interface mode

[Description]

Enables the MLD query transmission function.

If this command is executed with the "no" syntax, the MLD query transmission function is disabled.

[Note]

This command can be specified only forVLAN interfaces. Also, this can be specified only if MLD snooping is enabled.

When using this command, you must specify the **ipv6 enable** command for one of the VLAN interfaces. Note that if the **ipv6 enable** command has not been specified, MLD query is not transmitted.

[Example]

Enable the MLD query transmission function for VLAN #2.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#ipv6 mld snooping querier
```

Disable the MLD query transmission function for VLAN #2.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#no ipv6 mld snooping querier
```

8.3.5 Set MLD query transmission interval

[Syntax]

ipv6 mld snooping query-interval *interval*
no ipv6 mld snooping query-interval

[Parameter]

interval : <20-18000>
Query transmission interval (seconds)

[Initial value]

ipv6 mld snooping query-interval 125

[Input mode]

interface mode

[Description]

Sets the transmission interval for MLD queries.

If this command is executed with the "no" syntax, the MLD query transmission interval is returned to the default setting.

[Note]

This command can be specified only for VLAN interfaces. Also, this can be specified only if MLD snooping is enabled.

[Example]

Set the VLAN #2 query transmission interval to 30 seconds.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#ipv6 mld snooping query-interval 30
```

Return the VLAN #2 query transmission interval to the default setting.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#no ipv6 mld snooping query-interval
```

8.3.6 Set MLD version

[Syntax]

ipv6 mld snooping version *version*
no ipv6 mld snooping version

[Parameter]

version : <1-2>
MLD version

[Initial value]

ipv6 mld snooping version 2

[Input mode]

interface mode

[Description]

Sets the MLD version.

If this command is executed with the "no" syntax, the MLD version returns to the default setting (V2).

[Note]

This command can be specified only for VLAN interfaces. Also, this can be specified only if MLD snooping is enabled.

If an MLD packet of a different version than this setting is received, the following action occurs.

- If V1 is specified
  - If a V2 query is received, it is forwarded as a V1 query
  - If a V2 report is received, it is discarded
- If V2 is specified
  - If a V1 query is received, it is forwarded as a V1 query
  - If a V1 report is received, it is forwarded as a V2 report

[Example]

On VLAN #2, set the MLD version to 1.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#ipv6 mld snooping version 1
```

On VLAN #2, return the MLD version to the default setting.

```
SWX232x#configure terminal
SWX232x(config)#interface vlan2
SWX232x(config-if)#no ipv6 mld snooping version
```

8.3.7 Show multicast router connection port information

[Syntax]

show ipv6 mld snooping mrouter *ifname*

[Parameter]

ifname : VLAN interface name

Interface to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the multicast router connection port information that was dynamically learned or statically set.

[Example]

Show multicast router connection port information for VLAN #2.

```
SWX232x#show ipv6 mld snooping mrouter vlan2
VLAN    Interface             IP-address    Expires
2       port1.11(dynamic)         fe80::ae44:f2ff:fe30:291        00:01:04
```

8.3.8 Show MLD group membership information

[Syntax]

show ipv6 mld snooping groups [detail]
show ipv6 mld snooping groups *X*:*X*::*X*:*X* [detail]
show ipv6 mld snooping groups *ifname* [detail]

[Keyword]

detail	:	Detailed information

[Parameter]

X:X::X:X	:	Multicast group address
ifname	:	VLAN interface name Interface to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows MLD group membership information.

[Example]

Show MLD group membership information.

```
SWX232x#show ipv6 mld snooping groups
MLD Connected Group Membership
Group Address                           Interface            Uptime   Expires  Last
Reporter
ff15::1                                 port1.3              00:00:44 00:01:07
fe80::a00:27ff:fe8b:87e3
```

Show detailed MLD group membership information.

```
SWX232x#show ipv6 mld snooping groups detail
MLD Snooping Group Membership Details
Flags: (R - Remote, S - Static)

Interface:      port1.3
Group:          ff15::1
Uptime:         00:00:03
Group mode:     Include ()
Last reporter:  fe80::a00:27ff:fe8b:87e3
Group source list: (R - Remote, M - SSM Mapping, S - Static )
    Source Address                          Uptime    v2 Exp    Fwd  Flags
    fe80::221:70ff:fef9:8a39              00:00:03  00:01:06  Yes  R
```

8.3.9 Show an interface's MLD-related information

[Syntax]

show ipv6 mld snooping interface *ifname*

[Parameter]

ifname	:	VLAN interface name Interface to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Show a VLAN interface's MLD-related information.

[Example]

Show MLD-related information for VLAN #1.

```
SWX232x#show ipv6 mld snooping interface vlan1

MLD Snooping information for vlan1
 MLD Snooping enabled
 Snooping Querier none
 MLD Snooping other querier timeout is 255 seconds
 Group Membership interval is 260 seconds
 MLDv1 fast-leave is disabled
 MLDv1 Report suppression enabled
 MLDv2 Report suppression enabled
 Router port detection using MLD Queries
 Number of router-ports: 0
 Number of Groups: 0
 Number of v1-reports: 0
 Number of v1-leaves: 0
 Number of v2-reports: 12
 Active Ports:
  port1.8
```

8.3.10 Clear MLD group membership entries

[Syntax]

clear ipv6 mld snooping
clear ipv6 mld snooping group *X*:*X*::*X*:*X*
clear ipv6 mld snooping interface *ifname*

[Keyword]

group	:	Specifies the multicast group address to be cleared
interface	:	Specifies the VLAN interface to clear

[Parameter]

X:X::X:X	:	Multicast group address "*" indicates all entries
ifname	:	VLAN interface name Interface to clear

[Input mode]

privileged EXEC mode

[Description]

Clears MLD group membership entries.

[Example]

Clear MLD group membership entries for VLAN #1.

```
SWX232x#clear ipv6 mld snooping interface vlan1
```

Chapter 9

Traffic control

9.1 ACL

9.1.1 Generate IPv4 access list

[Syntax]

access-list *ipv4-acl-id* [*seq_num*] *action protocol src-info* [*src-port*] *dst-info* [*dst-port*] [**ack**] [**fin**] [**psh**] [**rst**] [**syn**] [**urg**]

no access-list *ipv4-acl-id* [*seq_num*] [*action protocol src-info* [*src-port*] *dst-info* [*dst-port*] [**ack**] [**fin**] [**psh**] [**rst**] [**syn**] [**urg**]]

[Keyword]

ack	:	If tcp is specified as the protocol, the ACK flag of the TCP header is specified as a condition.
fin	:	If tcp is specified as the protocol, the FIN flag of the TCP header is specified as a condition.
psh	:	If tcp is specified as the protocol, the PSH flag of the TCP header is specified as a condition.
rst	:	If tcp is specified as the protocol, the RST flag of the TCP header is specified as a condition.
syn	:	If tcp is specified as the protocol, the SYN flag of the TCP header is specified as a condition.
urg	:	If tcp is specified as the protocol, the URG flag of the TCP header is specified as a condition.

[Parameter]

ipv4-acl-id : <1-2000>

ID of IPv4 access list

seq_num : <1-65535>

Sequence number. Specifies the position of the entry within the applicable access list.

If the sequence number is omitted, the entry is added to the end of the list. At this time, the new entry is automatically given a number that is 10 greater than the last existing entry. (If an entry is initially added without a sequence number, its entry number will be 10.)

action : Specifies the action for the access condition

Setting value	Description
deny	"Deny" the condition
permit	"Permit" the condition

protocol : Specifies the applicable protocol type

Setting value	Description
<0-255>	Protocol number of the IP header
any	All IPv4 packets
tcp	TCP packets
udp	UDP packets

src-info : Specifies the transmission-source IPv4 address that is the condition

Setting value	Description
A.B.C.D E.F.G.H	Specifies an IPv4 address (A.B.C.D) with wildcard bits (E.F.G.H)

Setting value	Description
A.B.C.D/M	Specifies an IPv4 address (A.B.C.D) with subnet mask length (Mbit)
host A.B.C.D	Specifies a single IPv4 address (A.B.C.D)
any	Applies to all IPv4 addresses

src-port : <0-65535>

If protocol is specified as tcp or udp, this specifies the transmission source port number <0-65535> that is the condition. This can also be omitted.

Method of specifying	Description
eq X	Specify port number (X)
range X Y	Specify port numbers (X) through (Y)

dst-info : Specifies the destination IPv4 address information that is the condition

Setting value	Description
A.B.C.D E.F.G.H	Specifies an IPv4 address (A.B.C.D) with wildcard bits (E.F.G.H)
A.B.C.D/M	Specifies an IPv4 address (A.B.C.D) with subnet mask length (Mbit)
host A.B.C.D	Specifies a single IPv4 address (A.B.C.D)
any	Applies to all IPv4 addresses

dst-port : <0-65535>

If protocol is specified as tcp or udp, this specifies the destination port number <0-65535> that is the condition. This can also be omitted.

Method of specifying	Description
eq X	Specify port number (X)
range X Y	Specify port numbers (X) through (Y)

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Generates an IPv4 access list.

Multiple conditions (maximum 768) can be specified for the generated access list.

To apply the generated access list, use the **access-group** command of interface mode.

If the "no" syntax is used to specify "action" and following, the IPv4 access list that matches all conditions is deleted.

If the "no" syntax is used without specifying "action" and following, the IPv4 access list of the matching ID of access list is deleted.

[Note]

An access list that is applied to LAN/SFP port and logical interface cannot be deleted using the "no" syntax. You must first cancel the application, and then delete the access list.

For both src-port and dst-port, you can use "range" to specify a range; however for the entire system, only one IPv4 access list that specifies a range in this way can be applied to the interface by using the **access-group** command.

[Example]

Create access list #1 that denies communication from the source segment 192.168.1.0/24 to the destination 172.16.1.1.

```
SWX232x(config)#access-list 1 deny any 192.168.1.0 0.0.0.255 host 172.16.1.1
```

Delete IPv4 access list #1.

```
SWX232x(config)#no access-list 1
```

9.1.2 Add comment to IPv4 access list

[Syntax]

access-list *ipv4-acl-id* **description** *line*
no access-list *ipv4-acl-id* **description**

[Parameter]

ipv4-acl-id : <1-2000>
ID of IPv4 access list to which a comment will be added

line : Comment to add. Up to 32 ASCII characters can be specified

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Adds a comment (remark) to the already-generated IPv4 access list.

If this command is executed with the "no" syntax, the comment is deleted from the IPv4 access list.

[Note]

You can use this command to add a comment even after the access list has been applied to LAN/SFP port and logical interface. (The last-written comment overwrites the previous one.)

[Example]

Create access list #1 that denies communication from source segment 192.168.1.0/24 to destination 172.16.1.1, and add the comment "Test."

```
SWX232x(config)#access-list 1 deny any 192.168.1.0 0.0.0.255 host 172.16.1.1
SWX232x(config)#access-list 1 description Test
```

9.1.3 Apply IPv4 access list

[Syntax]

access-group *ipv4-acl-id direction*
no access-group *ipv4-acl-id direction*

[Parameter]

ipv4-acl-id : <1-2000>
ID of IPv4 access list to apply

direction : Specifies the direction of applicable frames

Setting value	Description
in	Apply to received frames
out	Apply to transmitted frames

[Initial value]

none

[Input mode]

interface mode

[Description]

Applies an IPv4 access list to both LAN/SFP port and logical interface.

If the received/transmitted frame matches the conditions in the access list, the action in the access list will be the action (permit, deny) for the corresponding frame.

If this command is executed with the "no" syntax, the applied access list is deleted from both LAN/SFP port and logical interface.

[Note]

Only one access list for each direction can be registered for incoming frames (in) and for outgoing frames (out) on the same interface.

The access list for transmitted frames can only be applied to LAN/SFP port.

The following restrictions apply.

An IPv4 access list for which the port number range (range X Y) is specified cannot be applied to transmitted frames (out).

An LAN/SFP port for which an incoming frames access list is specified cannot be associated to an logical interface.

An incoming frames access list cannot be applied to an LAN/SFP port that is associated with an logical interface. However, if an access list setting for incoming frames is specified for an LAN/SFP port that is associated with an logical interface in the startup config, then the setting for the lowest-numbered port is applied to the logical interface.

[Example]

Apply extended IPv4 access list #1 to received frames of LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#access-group 1 in
```

9.1.4 Generate IPv6 access list

[Syntax]

access-list *ipv6-acl-id* [*seq_num*] *action src-info*

no access-list *ipv6-acl-id* [*seq_num*] [*action src-info*]

[Parameter]

ipv6-acl-id : <3001-4000>

ID of IPv6 access list

seq_num : <1-65535>

Sequence number. Specifies the position of the entry within the applicable access list.

If the sequence number is omitted, the entry is added to the end of the list. At this time, the new entry is automatically given a number that is 10 greater than the last existing entry. (If an entry is initially added without a sequence number, its entry number will be 10.)

action : Specifies the action for the access condition

Setting value	Description
deny	"Deny" the condition
permit	"Permit" the condition

src-info : Specifies the transmission-source IPv6 address that is the condition

Setting value	Description
X:X::X:X/M	Specifies an IPv6 address (X:X::X:X) with subnet mask length (Mbit)
any	Applies to all IPv6 addresses

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Generates an IPv6 access list.

Multiple conditions (maximum 768) can be specified for the generated access list.

To apply the generated access list, use the **access-group** command of interface mode.

If the "no" syntax is used to specify "action" and following, the IPv6 access list that matches all conditions is deleted.

If the "no" syntax is used without specifying "action" and following, the IPv6 access list of the matching ID of access list is deleted.

[Note]

An access list that is applied to LAN/SFP port and logical interface cannot be deleted using the "no" syntax. Before you can delete the access list, you must rescind the application of that list.

This command cannot be used if the stack function is enabled.

[Example]

Create IPv6 access list #3002 which will deny frames from 3ffe:506::/32.

```
SWX232x(config)#access-list 3002 deny 3ffe:506::/32
```

Delete IPv6 access list #3002.

```
SWX232x(config)#no access-list 3002
```

9.1.5 Add comment to IPv6 access list

[Syntax]

access-list *ipv6-acl-id* **description** *line*
no access-list *ipv6-acl-id* **description**

[Parameter]

ipv6-acl-id	:	<3001-4000>
		ID of IPv6 access list to which comment is added
line	:	Comment to add. Up to 32 ASCII characters can be specified

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Adds a comment (remark) to the already-generated IPv6 access list.

If this is executed with the "no" syntax, the comment is deleted from the IPv6 access list.

[Note]

You can use this command to add a comment even after the access list has been applied to LAN/SFP port and logical interface. (The last-written comment overwrites the previous one.)

This command cannot be used if the stack function is enabled.

[Example]

Create IPv6 access list #3002 which denies frames from 3ffe:506::/32, and add the comment "Test."

```
SWX232x(config)#access-list 3002 deny 3ffe:506::/32
SWX232x(config)#access-list 3002 description Test
```

9.1.6 Apply IPv6 access list

[Syntax]

access-group *ipv6-acl-id direction*
no access-group *ipv6-acl-id direction*

[Parameter]

ipv6-acl-id	:	<3001-4000>
		ID of IPv6 access list to apply
direction	:	Specifies the direction of applicable frames

Setting value	Description
in	Apply to received frames
out	Apply to transmitted frames

[Initial value]

none

[Input mode]

interface mode

[Description]

Applies an IPv6 access list to both LAN/SFP port and logical interface.

If the received/transmitted frame matches the conditions in the access list, the action in the access list will be the action (permit, deny) for the corresponding frame.

If this command is executed with the "no" syntax, the applied access list is deleted from both LAN/SFP port and logical interface.

[Note]

Only one access list for each direction can be registered for incoming frames (in) and for outgoing frames (out) on the same interface.

The access list for transmitted frames can only be applied to LAN/SFP port.

The following restrictions apply.

An LAN/SFP port for which an incoming frames access list is specified cannot be associated to an logical interface.

An incoming frames access list cannot be applied to an LAN/SFP port that is associated with an logical interface. However, if an access list setting for incoming frames is specified for an LAN/SFP port that is associated with an logical interface in the startup config, then the setting for the lowest-numbered port is applied to the logical interface.

This command cannot be used if the stack function is enabled.

[Example]

Apply IPv6 access list #3002 to received frames of LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#access-group 3002 in
```

9.1.7 Generate MAC access list

[Syntax]

access-list *mac-acl-id* [*seq_num*] *action src-info dst-info*

no access-list *mac-acl-id* [*seq_num*] [*action src-info dst-info*]

[Parameter]

mac-acl-id : <2001-3000>

ID of MAC access list

seq_num : <1-65535>

Sequence number. Specifies the position of the entry within the applicable access list.

If the sequence number is omitted, the entry is added to the end of the list. At this time, the new entry is automatically given a number that is 10 greater than the last existing entry. (If an entry is initially added without a sequence number, its entry number will be 10.)

action : Specifies the action for the access condition

Setting value	Description
deny	"Deny" the condition
permit	"Permit" the condition

src-info : Specifies the transmission-source MAC address information that is the condition

Setting value	Description
HHHH.HHHH.HHHH WWWW.WWWW.WWWW	Specifies the MAC address (HHHH.HHHH.HHHH) with wildcard bits (WWWW.WWWW.WWWW)
host HHHH.HHHH.HHHH	Specifies an individual MAC address (HHHH.HHHH.HHHH)
any	Applies to all MAC addresses

dst-info : Specifies the destination MAC address information that is the condition

Setting value	Description
HHHH.HHHH.HHHH WWWW.WWWW.WWWW	Specifies the MAC address (HHHH.HHHH.HHHH) with wildcard bits (WWWW.WWWW.WWWW)
host HHHH.HHHH.HHHH	Specifies an individual MAC address (HHHH.HHHH.HHHH)
any	Applies to all MAC addresses

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Generates a MAC access list.

Multiple conditions (maximum 768) can be specified for the generated access list.

To apply the generated access list, execute the **access-group** command in interface mode.

If the "no" syntax is used to specify "action" and following, the MAC access list that matches all conditions is deleted.

If the "no" syntax is used without specifying "action" and following, the MAC access list of the matching ID of access list is deleted.

[Note]

An access list that is applied to LAN/SFP port and logical interface cannot be deleted using the "no" syntax. You must first cancel the application, and then delete the access list.

"W" and "H" represent a single character from the range 0-9, a-f, and A-F.

[Example]

Create MAC access list #2001 which denies frames from MAC address 00-A0-DE-12-34-56.

```
SWX232x(config)#access-list 2001 deny mac 00A0.DE12.3456 0000.0000.0000 any
```

Delete MAC access list #2001.

```
SWX232x(config)#no access-list 2001
```

9.1.8 Add comment to MAC access list

[Syntax]

access-list *mac-acl-id* **description** *line*

no access-list *mac-acl-id* **description**

[Parameter]

mac-acl-id : <2001-3000>

ID of MAC access list to which a comment will be added

line : Comment to add. Up to 32 ASCII characters can be specified

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Adds a comment (remark) to the already-generated MAC access list.

If this is executed with the "no" syntax, the comment is deleted from the MAC access list.

[Note]

You can use this command to add a comment even after the access list has been applied to LAN/SFP port and logical interface. (The last-written comment overwrites the previous one.)

[Example]

Create MAC access list #2000 which denies frames from MAC address 00-A0-DE-12-34-56, and add the comment "Test."

```
SWX232x(config)#access-list 2001 deny mac 00A0.DE12.3456 0000.0000.0000 any
SWX232x(config)#access-list 2001 description Test
```

9.1.9 Apply MAC access list

[Syntax]

access-group *mac-acl-id direction*

no access-group *mac-acl-id direction*

[Parameter]

mac-acl-id : <2001-3000>

ID of MAC access list to apply

direction : Specifies the direction of applicable frames

Setting value	Description
in	Apply to received frames

[Initial value]

none

[Input mode]

interface mode

[Description]

Applies a MAC access list to both LAN/SFP port and logical interface.

If the received frame matches the conditions in the access list, the action in the access list will be the action (permit, deny) for the corresponding frame.

If this is executed with the "no" syntax, the applied access list is deleted from both LAN/SFP port and logical interface.

[Note]

It is not possible to register multiple access lists for a single interface.

The following restrictions apply.

An LAN/SFP port for which an incoming frames access list is specified cannot be associated to an logical interface.

An incoming frames access list cannot be applied to an LAN/SFP port that is associated with an logical interface. However, if an access list setting for incoming frames is specified for an LAN/SFP port that is associated with an logical interface in the startup config, then the setting for the lowest-numbered port is applied to the logical interface.

[Example]

Apply access list #2001 to received frames of LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#access-group 2001 in
```

9.1.10 Show generated access list

[Syntax]

show access-list [*acl_id*]

[Parameter]

acl-id : <1-2000>, <2001-3000>, <3001-4000>
ID of access list

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the registered access list.

If acl-id is omitted, all access lists are shown.

If an access list is applied to an interface, and one or more frames that match the conditions are received or forwarded, the total number (match) of those frames is also shown.

[Note]

The total number (match) of frames that match the traffic category (QoS) conditions is also incremented.

[Example]

Show all lists.

```
SWX232x>show access-list
IPv4 access list 1
    10 deny any 192.168.1.0/24 host 172.16.1.1 [match= 62]
MAC access list 2001
    10 deny host 00A0.DE12.3456 any [match= 123]
IPv6 access list 3002
    10 deny 3ffe:506::/32
```

9.1.11 Clear counters

[Syntax]

clear access-list counters [*acl_id*]

[Parameter]

acl-id : <1-2000>, <2001-3000>, <3001-4000>
ID of access list

[Input mode]

privileged EXEC mode

[Description]

Clears the counters (match) that are shown by the "show access-list" command.

[Example]

Clear counters.

```
SWX232x>clear access-list counters
```

9.1.12 Show access list applied to interface

[Syntax]

show access-group

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

For each interface, shows the ID of all access lists that are applied.

[Example]

Show a list.

```
SWX232x>show access-group
Interface port1.1 : IPv4 access group 1 in
Interface port1.7 : IPv6 access group 3002 in
Interface port1.8 : MAC access group 2001 in
```

9.1.13 Set VLAN access map and move to VLAN access map mode

[Syntax]

vlan access-map *access-map-name*
no vlan access-map *access-map-name*

[Parameter]

access-map-name : Single-byte alphanumeric characters and single-byte symbols(256 characters or less)
Access map name

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Create a VLAN access map with the name specified by *access-map-name*, and then move to VLAN access map mode in order to make VLAN access map settings.

If this command is executed with the "no" syntax, the specified VLAN access map is deleted.

[Note]

To return from VLAN access map mode mode to global configuration mode, use the **exit** command. To return to privileged EXEC mode, use the **end** command.

[Example]

Create a VLAN access map named "VAM001", and move to VLAN access map mode.

```
SWX232x(config)#vlan access-map VAM001
SWX232x(config-vlan-access-map)#
```

9.1.14 Set access list for VLAN access map

[Syntax]

match access-list *list-id*
no match access-list *list-id*

[Parameter]

list-id : <1-2000>, <2001-3000>, <3001-4000>
Access list number specified by the access-list command

[Initial value]

none

[Input mode]

VLAN access map mode

[Description]

Sets the access list that is applied to the corresponding VLAN access map.

If this command is executed with the "no" syntax, the specified access list is deleted from the corresponding VLAN access map.

[Note]

Only one access list can be specified for one VLAN access map.

You can use the **show vlan access-map** command to view the setting.

[Example]

Create a VLAN access map named "VAM001", and specify an access list that denies packets from 192.168.0.1.

```
SWX232x(config)#access-list 2 deny any 192.168.0.1/32 any
SWX232x(config)#vlan access-map VAM001
SWX232x(config-vlan-access-map)#match access-list 2
```

9.1.15 Set VLAN access map filter

[Syntax]

vlan filter *access-map-name vlan-id* [*direction*]

no vlan filter *access-map-name vlan-id* [*direction*]

[Parameter]

access-map-name : Single-byte alphanumeric characters and single-byte symbols(256 characters or less)

Access map name specified by the vlan access-map command

vlan-id : <1-4094>

VLAN ID set to the "enable" status by the vlan command

direction : Specifies the direction of applicable frames. Applied to incoming frames when omitted

Setting value	Description
in	Apply to received frames
out	Apply to transmitted frames

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Sets the VLAN access map filter for the specified VLAN.

If this command is executed with the "no" syntax, the VLAN access map filter for the specified VLAN is deleted.

[Note]

It is not possible to specify this command for a VLAN ID that is set to the "disable" state.

Only one VLAN access map for each direction can be registered for incoming frames (in) and for outgoing frames (out) on the same interface.

Note that VLAN access maps for which the following access list is set cannot be applied to outgoing frames (out).

- MAC access list
- As a restriction, an IPv4 access list for which the port number range (range X Y) is specified cannot be applied to transmitted frames (out).

[Example]

Creates a VLAN access map named VAM001, specifies an access list that denies packets beginning from 192.168.0.1, and then applies VAM001 to incoming frames of VLAN #1000.

```
SWX232x(config)#vlan database
SWX232x(config-vlan)#vlan 1000
SWX232x(config-vlan)#exit
SWX232x(config)#access-list 2 deny any 192.168.0.1/32 any
SWX232x(config)#vlan access-map VAM001
SWX232x(config-vlan-access-map)#match access-list 2
SWX232x(config-vlan-access-map)#exit
SWX232x(config)#vlan filter VAM001 1000 in
```

9.1.16 Show VLAN access map

[Syntax]

show vlan access-map

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the registered VLAN access map.

The following items are shown.

- Name of the VLAN access map
- Access list applied to VLAN access map

[Example]

Show VLAN access map information.

```
SWX232x>show vlan access-map
Vlan access-map VAM001
    match ipv4 access-list 2
```

9.1.17 Show VLAN access map filter

[Syntax]

show vlan filter

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Show VLAN access map filter application information.

The following items are shown.

- Name of the VLAN access map
- VLAN ID applied to VLAN access map
- Frame direction (in/out) for which a VLAN access map is applied

[Example]

Show VLAN access map filter information.

```
SWX232x>show vlan filter
Vlan Filter VAM001 is applied to vlan 1000 in
Vlan Filter VAM001 is applied to vlan 1001 out
Vlan Filter VAM002 is applied to vlan 2000-2001 in
```

9.2 QoS (Quality of Service)

9.2.1 Enable/disable QoS

[Syntax]

qos *action*

qos_disable

[Parameter]

action : Operation for Qos

Setting value	Description
enable	Qos is enabled
disable	Qos is disabled

[Initial value]

no qos

[Input mode]

global configuration mode

[Description]

Enables QoS.

If this is executed with the "no" syntax, QoS is disabled. At this time, the related QoS settings are also deleted.

[Note]

If the flow control system setting is enabled, it is not possible to enable QoS.

Many of the commands related to QoS cannot be executed unless QoS is left enabled.

[Example]

Enable QoS.

```
SWX232x(config)#qos enable
```

Disable QoS.

```
SWX232x(config)#qos disable
```

9.2.2 Set default CoS

[Syntax]

qos cos *value*

no qos cos

[Parameter]

value : <0-7>

Default CoS value

[Initial value]

qos cos 0

[Input mode]

interface mode

[Description]

Sets the default CoS of LAN/SFP port and logical interface.

If this is executed with the "no" syntax, the default value (CoS=0) is specified.

The default CoS is used if untagged frames are received when the interface's trust mode is set to CoS. (Since CoS is not specified for the frame)

[Note]

In order to execute this command, QoS must be enabled.

If this is executed for an interface whose trust mode is CoS, the command results in an execution error.

An LAN/SFP port whose default CoS differs cannot be aggregated as an logical interface.

If the interface for which this is executed is an LAN/SFP port that is associated with an logical interface, then this command produces an execution error. However, in the case of settings for an LAN/SFP port that is associated with an logical interface in the startup config, the setting for the lowest-numbered port is applied to the logical interface.

[Example]

Set the default CoS value to 2.

```
SWX232x(config-if)#qos cos 2
```

Return the default CoS value to the default value.

```
SWX232x(config-if)#no qos cos
```

9.2.3 Set trust mode

[Syntax]

qos trust *mode*

no qos trust

[Parameter]

mode : Trust mode

Setting value	Description
cos	Determines the egress queue based on the CoS value
dscp	Determines the egress queue based on the DSCP value
port-priority	Applies the specified priority to the receiving port

[Initial value]

qos trust cos

[Input mode]

interface mode

[Description]

Specifies the trust mode of LAN/SFP port and logical interface.

If this is executed with the "no" syntax, the default value (CoS trust mode) is specified.

In the case of "CoS" trust mode, the CoS value of incoming frames is used to determine the egress queue. In the case of "DSCP," the DSCP value of incoming frames is used to determine the egress queue. In the case of "port priority," the priority specified for the receiving interface is used to determine the egress queue.

The CoS value and DSCP value, and the egress queue that is associated with the receiving port, can be changed by using the following commands.

Trust mode	Setting value used for egress queue determination	Corresponding command
CoS	CoS - egress queue ID conversion table	**qos cos-queue**
DSCP	DSCP - egress queue ID conversion table	**qos dscp-queue**
Port Priority	Priority specified for each receiving port	**qos port-priority-queue**

Within the various QoS processes, there are four types of timing that determine (change) the egress queue.

1. When assigning the egress queue
2. Specifying the egress queue by class map
3. Specifying pre-marking by class map
4. Specifying remarking by class map

Types 2, 3, and 4 can be specified whether the trust mode is "CoS" or "DSCP"; in either case, the egress queue is assigned by referencing the "egress queue ID conversion table" that corresponds to its own trust mode.

[Note]

In order to execute this command, QoS must be enabled.

If a policy map is applied to LAN/SFP port and logical interface, the trust mode cannot be changed.

An LAN/SFP port whose trust mode differs cannot be aggregated as an logical interface.

The trust mode cannot be changed for an LAN/SFP port that is associated with an logical interface. However, in the case of settings for an LAN/SFP port that is associated with an logical interface in the startup config, the setting for the lowest-numbered port is applied to the logical interface.

Some QoS functions have limitations on execution depending on the trust mode, or may show different results.

[Example]

Set the trust mode of LAN/SFP port and logical interface to DSCP.

```
SWX232x(config-if)#qos trust dscp
```

Set the trust mode of LAN/SFP port and logical interface to the default setting (CoS).

```
SWX232x(config-if)#no qos trust
```

9.2.4 Show status of QoS function setting

[Syntax]

show qos

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the enabled (Enable) or disabled (Disable) status of the QoS function.

[Example]

Show the status of the system's QoS setting.

```
SWX232x#show qos
  Enable
```

9.2.5 Show QoS information for interface

[Syntax]

show qos interface [*ifname*]

[Parameter]

ifname : Name of the LAN/SFP port or logical interface. If this is omitted, the command applies to all ports.
Interface to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows QoS settings for the specified interface. The following content is shown.

Item	Description
Port Trust Mode	Trust mode of interface (CoS/DSCP/Port-Priority)
Input Policy-Map Name	Name of policy map already applied to the interface class map information (note 1)
Port Default CoS Priority	Default CoS value (note 2)
Port-Priority-Queue	Port priority order (note 3)
Egress Traffic Shaping	Traffic shaping (individual port)
Egress Traffic Queue Shaping	Traffic shaping (individual queue)
Queue Scheduling	Egress queue scheduling format and weight
CoS (Queue)	CoS - egress queue ID conversion table (note 2)
DSCP (Queue)	DSCP - egress queue ID conversion table (note 4)
Special Queue Assignment: Sent From CPU	Specify the egress queue of the frames transmitted from the CPU

Note 1) Not shown if no policy map is applied. For details on class map information, refer to the **show class-map** command.

Note 2) Shown only for CoS trust mode.

Note 3) Shown only if the trust mode is "port priority."

Note 4) Shown only for DSCP trust mode.

[Note]

In order to execute this command, QoS must be enabled.

[Example]

Show the QoS settings of LAN port #1. (trust mode CoS)

```
SWX232x#show qos interface port1.1

  Port Trust Mode: CoS

  Port Default CoS Priority: 0

  Egress Traffic Shaping: Rate 30016 Kbps, Burst 1876 KByte

  Queue Scheduling:
  Queue0 : Weight  1 ( 5.3%)
  Queue1 : Weight  1 ( 5.3%)
  Queue2 : Weight  2 (10.5%)
  Queue3 : Weight  5 (26.3%)
  Queue4 : Weight  5 (26.3%)
  Queue5 : Weight  5 (26.3%)
  Queue6 : SP
  Queue7 : SP

  Cos (Queue): 0(2), 1(0), 2(1), 3(3), 4(4), 5(5), 6(6), 7(7)

  Special Queue Assignment:
    Sent From CPU: Queue7
```

Show the QoS settings of LAN port #1. (trust mode DSCP)

```
SWX232x#show qos interface port1.1
```

```
  Port Trust Mode: DSCP

  Egress Traffic Shaping: Not Configured

  Queue Scheduling:
  Queue0 : SP
  Queue1 : SP
  Queue2 : SP
  Queue3 : SP
  Queue4 : SP
  Queue5 : SP
  Queue6 : SP
  Queue7 : SP

  DSCP (Queue):  0(2),  1(2),  2(2),  3(2),  4(2),  5(2),  6(2),  7(2)
                 8(0),  9(0), 10(0), 11(0), 12(0), 13(0), 14(0), 15(0)
                16(1), 17(1), 18(1), 19(1), 20(1), 21(1), 22(1), 23(1)
                24(3), 25(3), 26(3), 27(3), 28(3), 29(3), 30(3), 31(3)
                32(4), 33(4), 34(4), 35(4), 36(4), 37(4), 38(4), 39(4)
                40(5), 41(5), 42(5), 43(5), 44(5), 45(5), 46(5), 47(5)
                48(6), 49(6), 50(6), 51(6), 52(6), 53(6), 54(6), 55(6)
                56(7), 57(7), 58(7), 59(7), 60(7), 61(7), 62(7), 63(7)

  Special Queue Assignment:
    Sent From CPU: Queue7
```

9.2.6 Show egress queue usage ratio

[Syntax]

show qos queue-counters [*ifname*]

[Parameter]

ifname : Name of the LAN/SFP port. If this is omitted, the command applies to all ports.
Interface to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the usage ratio for each egress queue of the specified LAN/SFP port. The queue usage ratio is calculated as follows.

(queue usage ratio) = (number of buffers held in the queue) / (maximum length of the queue)

[Note]

This command can be used regardless of the QoS status (enabled/disabled).

[Example]

Show the queue usage ratio of LAN port #1.

```
SWX232x#show qos queue-counters port1.1
QoS: Enable
Interface port1.1 Queue Counters:
  Queue 0          59.4 %
  Queue 1          15.0 %
  Queue 2           0.0 %
  Queue 3           0.0 %
  Queue 4           0.0 %
  Queue 5           3.6 %
  Queue 6           0.0 %
  Queue 7           0.1 %
```

9.2.7 Set CoS - egress queue ID conversion table

[Syntax]

qos cos-queue *cos-value queue-id*
no qos cos-queue

[Parameter]

cos-value : <0-7>

CoS value of conversion source

queue-id : <0-7>

Egress queue ID corresponding to CoS value

[Initial value]

See [Note]

[Input mode]

global configuration mode

[Description]

Specifies the values of the CoS - egress queue ID conversion table that is used to determine the egress queue.

If this is executed with the "no" syntax, the egress queue ID for the specified CoS value is returned to the default setting.

The CoS - egress queue ID conversion table is used when the trust mode is set to CoS.

[Note]

In order to execute this command, QoS must be enabled.

The following table shows the default settings of the CoS - egress queue ID conversion table.

CoS value	Egress queue
0	2
1	0
2	1
3	3
4	4
5	5
6	6
7	7

[Example]

Assign egress queue #4 to CoS value "0".

```
SWX232x(config)#qos cos-queue 0 4
```

Return the egress queue ID of CoS value "0" to the default value.

```
SWX232x(config)#no qos cos-queue 0
```

9.2.8 Set DSCP - egress queue ID conversion tabl

[Syntax]

qos dscp-queue *dscp-value queue-id*

no qos dscp-queue *dscp-value*

[Parameter]

dscp-value : <0-63>

DSCP value of the conversion source

queue-id : <0-7>

Egress queue ID corresponding to DSCP value

[Initial value]

See [Note]

[Input mode]

global configuration mode

[Description]

Specifies the values of the DSCP - egress queue ID conversion table that is used to determine the egress queue.

If this is executed with the "no" syntax, the egress queue ID for the specified DSCP value is returned to the default setting.

The DSCP - egress queue ID conversion table is used when the trust mode is set to DSCP.

[Note]

In order to execute this command, QoS must be enabled.

The following table shows the default settings of the DSCP - egress queue ID conversion table.

DSCP value	Egress queue
0-7	2
8-15	0
16-23	1
24-31	3
32-39	4
40-47	5
48-55	6
56-63	7

[Example]

Assign egress queue #4 to DSCP value "0."

```
SWX232x(config)#qos dscp-queue 0 4
```

Return the egress queue ID of DSCP value "23" to the default value.

```
SWX232x(config)#no qos dscp-queue 23
```

9.2.9 Set port priority order

[Syntax]

qos port-priority-queue *queue-id*
no qos port-priority-queue

[Parameter]

queue-id : <0-7>
Egress queue ID assigned to LAN/SFP port

[Initial value]

qos port-priority-queue 2

[Input mode]

interface mode

[Description]

Specifies the priority (egress queue ID) for the receiving interface to LAN/SFP port and logical interface.

If this is executed with the "no" syntax, the egress queue ID for the specified interface is returned to the default setting (2).

The port priority is used to determine the egress queue when the trust mode is set to "port priority."

[Note]

In order to execute this command, QoS must be enabled.

If this is executed for an interface whose trust mode is not "port priority," the command results in an execution error.

An LAN/SFP port whose port priority differs cannot be aggregated as an logical interface.

If the interface for which this is executed is an LAN/SFP port that is associated with an logical interface, then this command produces an execution error. However, in the case of settings for an LAN/SFP port that is associated with an logical interface in the startup config, the setting for the lowest-numbered port is applied to the logical interface.

[Example]

Assign egress queue ID #4 as the port priority for LAN port #1.

```
SWX232x#interface port1.1
SWX232x(config-if)#qos port-priority-queue 4
```

9.2.10 Specify egress queue of frames transmitted from the switch itself

[Syntax]

qos queue sent-from-cpu *queue-id*
no qos queue sent-from-cpu

[Parameter]

queue-id : <0-7>
Egress queue ID

[Initial value]

qos queue sent-from-cpu 7

[Input mode]

global configuration mode

[Description]

Specifies the egress queue for the storage destination of frames sent to each LAN/SFP port from the switch itself (CPU).

If this is executed with the "no" syntax, the default value is specified.

[Note]

In order to execute this command, QoS must be enabled.

If the priority order of frames sent from the CPU is lowered, transmission from a higher-priority queue takes priority; this means that under conditions of high load, functions such as L2MS or loop detection might stop working. For this reason, we recommend that you set this setting to as high a value (priority) as possible.

When the stack function is enabled, the storage-destination transmission queue ID for frames sent from the CPU is "6" by default.

[Example]

Specify #5 as the storage destination egress queue for frames sent from the CPU.

```
SWX232x(config)#qos queue sent-from-cpu 5
```

9.2.11 Generate class map (traffic category conditions)

[Syntax]

class-map *name*
no class-map *name*

[Parameter]

name : Name of class map (maximum 20 characters; uppercase and lowercase are distinguished)

[Input mode]

global configuration mode

[Description]

Generates a class map.

A class map defines the conditions used to classify received frames into traffic classes, and consists of conditions defined by the **match** command and the corresponding action (permit/deny).Class map actions are handled as follows. Class map actions are handled as follows.

- If an access list (ACL) is specified (execute the **match access-group** command)
  The class map action will be the action for the ACL.
- If other than an access list (ACL) is specified
  Permit.

After generating the class map, move to class map mode to specify its content.

If this command is executed with the "no" syntax, the specified class map is deleted.

[Note]

In order to execute this command, QoS must be enabled.

If the specified class map has already been generated, the change is applied to the previous settings. However, if a policy map has been applied to LAN/SFP port and logical interface, then the class map that is associated with the policy map cannot be edited or deleted.

[Example]

Create class map "class1."

```
SWX232x(config)#class-map class1
SWX232x(config-cmap)#
```

9.2.12 Associate class map

[Syntax]

class *name*

no class *name*

[Parameter]

name : Class map name

[Input mode]

policy map mode

[Description]

Associates a class map to a policy map.

When the class map association succeeds, move to policy map class mode. In policy map class mode, you can make the following settings for each traffic class.

- Pre-marking or specifying the egress queue
- Metering
- Policing
- Remarking

If this command is executed with the "no" syntax, the association of the class map to the policy map is canceled.

For LAN/SFP port and logical interface to which a policy map is applied, received frames are classified into traffic classes according to the conditions of the associated class map. If the action in the class map is "permit," the QoS processing specified by the user for that traffic class is performed.

Up to eight class maps can be associated to one policy map.

[Note]

In order to execute this command, QoS must be enabled.

It is meaningless to specify QoS processing settings for a traffic class for which the action is "deny."

[Example]

Make the following settings for received frames to LAN port #1.

- Permit traffic from the 10.1.0.0 network
- Categorize bandwidth classes as CIR:48kbps, CBS:12kbyte, and EBS:12kbyte
- Green: forward, Yellow: rewrite DSCP value to 10, Red: discard

[Traffic class definition]

```
SWX232x(config)#access-list 1 permit any 10.1.0.0 0.0.255.255 any
SWX232x(config)#class-map class1
SWX232x(config-cmap)#match access-list 1
SWX232x(config-cmap)#exit
```

[Policy settings]

```
SWX232x(config)#policy-map policy1
SWX232x(config-pmap)#class class1
SWX232x(config-pmap-c)#police 48 12 12 yellow-action remark red-action drop
SWX232x(config-pmap-c)#remark-map yellow ip-dscp 10
SWX232x(config-pmap-c)#exit
SWX232x(config-pmap)#exit
SWX232x(config)#interface port1.1
SWX232x(config-if)#service-policy input policy1
```

9.2.13 Set traffic classification conditions (access-list)

[Syntax]

match access-list *acl-id*

no match access-list *acl-id*

[Parameter]

acl-id : <1 - 2000>
IPv4 access list ID
: <2001 - 3000>
MAC access list ID
: <3001 - 4000>
IPv6 access list ID

[Input mode]

class map mode

[Description]

Uses the access list as the conditions to classify the traffic class.

If the received frame matches the conditions in the access list, the action in the access list will be the action (permit, deny) for the traffic class.

If this is executed with the "no" syntax, the condition settings of the access list are deleted.

[Note]

In order to execute this command, QoS must be enabled.

A maximum of 39 conditions can be specified for traffic categorization in an access list.

[Example]

Specify access list #1 as the classification conditions for class map "class1."

```
SWX232x(config)#class-map class1
SWX232x(config-cmap)#match access-list 1
```

9.2.14 Set traffic classification conditions (CoS)

[Syntax]

match cos *cos-list*
no match cos

[Parameter]

cos-list : <0 - 7>
CoS value used as classification condition. Up to eight can be registered.

[Input mode]

class map mode

[Description]

Uses the CoS value of the VLAN tag header as the condition to classify the traffic class.

If this is executed with the "no" syntax, the CoS condition setting is deleted.

The setting can be repeated up to the maximum number (eight) of registrations.

[Note]

In order to execute this command, QoS must be enabled.

[Example]

Specify CoS values "1" and "2" as the classification conditions for class map "class1."

```
SWX232x(config)#class-map class1
SWX232x(config-cmap)#match cos 1 2
```

9.2.15 Set traffic classification conditions (TOS precedence)

[Syntax]

match ip-precedence *tos-list*
no match ip-precedence

[Parameter]

tos-list : <0 - 7>

Value of the IP header's TOS precedence field used as a classification condition. Up to eight can be registered.

[Input mode]

class map mode

[Description]

Uses the value of the IP header's TOS precedence field as a condition to classify the traffic class.

If this is executed with the "no" syntax, the classification conditions using TOS precedence are deleted.

The setting can be repeated up to the maximum number (eight) of registrations.

[Note]

In order to execute this command, QoS must be enabled.

[Example]

Specify TOS precedence values "3" and "4" as the classification conditions for class map "class1".

```
SWX232x(config)#class-map class1
SWX232x(config-cmap)#match ip-precedence 3 4
```

9.2.16 Set traffic classification conditions (DSCP)

[Syntax]

match ip-dscp *dscp-list*

no match ip-dscp

[Parameter]

dscp-list : <0 - 63>

Value of the IP header's DSCP (DiffServ Code Point) field used as a classification condition. Up to eight can be registered.

[Input mode]

class map mode

[Description]

Uses the value of the IP header's DSCP (DiffServ Code Point) field as a condition to classify the traffic class.

If this is executed with the "no" syntax, the classification conditions using DSCP precedence are deleted.

The setting can be repeated up to the maximum number (eight) of registrations.

[Note]

In order to execute this command, QoS must be enabled.

[Example]

Specify DSCP values "48" and "56" as the classification conditions for class map "class1."

```
SWX232x(config)#class-map class1
SWX232x(config-cmap)#match ip-dscp 48 56
```

9.2.17 Set traffic classification conditions (Ethernet Type)

[Syntax]

match ethertype *type*

match ethertype *type* tagged

match ethertype *type* untagged

no match ethertype

[Keyword]

tagged : Set conditional VLAN tagging

untagged : Set conditional VLAN untagging

[Parameter]

type :

Specifies the type of the Ethernet frame.

Setting value	Description
0xXXXX	Hexadecimal expression of type value
any	All frame

[Input mode]

class map mode

[Description]

Uses the Ethernet frame's type value and the presence of a VLAN tag as the conditions to classify the traffic class.

If this command is executed with the "no" syntax, deletes conditional settings based on the Ethernet frame's type value and the presence of a VLAN tag.

If this setting has already been made by the **match ethertype** command, the content of the setting is changed.

[Note]

In order to execute this command, QoS must be enabled.

If applied to an access port, the "tagged" specification is invalid (because tagged frames are not handled by an access port).

[Example]

Set Ethernet frame type value "0x0800" as the classification condition for class map "class1."

```
SWX232x(config)#class-map class1
SWX232x(config-cmap)#match ethertype 0x0800
```

9.2.18 13.2.22 Set traffic classification conditions (VLAN ID)

[Syntax]

match vlan *id*

no match vlan

[Parameter]

id : <1 - 4094>

VLAN ID used as classification condition

[Input mode]

class map mode

[Description]

Uses the VLAN ID as the condition to classify the traffic class.

If this is executed with the "no" syntax, the classification conditions using VLAN ID are deleted.

The setting can be repeated up to the maximum number (30) of registrations.

[Note]

In order to execute this command, QoS must be enabled.

[Example]

Specify VLAN #20 as the classification conditions for class map "class1".

```
SWX232x(config)#class-map class1
SWX232x(config-cmap)#match vlan 20
```

9.2.19 Set traffic classification conditions (VLAN ID range)

[Syntax]

match vlan-range *id-start* **to** *id-end*

[Parameter]

id-start : <1 - 4094>

Starting VLAN ID value used as classification condition.

id-end : <1 - 4094>

Ending VLAN ID value used as classification condition. The range from the specified starting value to the ending value can be a maximum of 30.

[Input mode]

class map mode

[Description]

Uses the VLAN ID as the condition to classify the traffic class.

To delete the classification condition, use the **no match vlan** command.

This can be used in conjunction with the setting of the **match vlan** command.

The **match vlan** command or **match vlan-range** command settings can be repeated up to the maximum number that can be registered (30).

[Note]

In order to execute this command, QoS must be enabled.

[Example]

Specify VLAN #20 through #30 as the classification conditions for class map "class1".

```
SWX232x(config)#class-map class1
SWX232x(config-cmap)#match vlan-range 20 to 30
```

9.2.20 Show class map information

[Syntax]

show class-map [*name*]

[Parameter]

name : Class map name. If this is omitted, all class map information is shown.

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows information for the specified class map. The following information is shown for each class map.

Section	Item	Description
Classification conditions (match)	Match Access-List	Access list ID
	Match ethertype	Ethernet Type
	Match vlan	VLAN ID
	Match vlan-range	
	Match CoS	CoS value
	Match IP precedence	TOS precedence
	Match IP DSCP	DSCP value

- The classification condition is shown only once for each type that is specified.
- A classification condition for which a corresponding command (match) is not set will not be shown.

[Note]

In order to execute this command, QoS must be enabled.

[Example]

Show information for class map "class1".

```
SWX232x#show class-map class1

    Class-Map Name: class1
      Match vlan 10
```

9.2.21 Generate policy map for received frames

[Syntax]

policy-map *name*
no policy-map *name*

[Parameter]

name : Name of policy map (maximum 32 characters; uppercase and lowercase are distinguished)

[Input mode]

global configuration mode

[Description]

Generates a policy map. The policy map combines the following processing for received frames, for each traffic class.

- Traffic classification
- Pre-marking
- Metering
- Policing
- Remarking

The policy map generated by this command can be applied to LAN/SFP port and logical interface by the **service-policy input** command. This classifies received frames into traffic classes according to each class map in the policy map, and applies the QoS process specified by the user to each class of traffic.

After generating the policy map, move to policy map mode to specify its content.

If this is executed with the "no" syntax, the specified policy map is deleted.

[Note]

In order to execute this command, QoS must be enabled.

If the specified policy map has already been generated, the change is applied to the previous settings. However, if the policy map is already applied to LAN/SFP port and logical interface, it cannot be edited or deleted.

[Example]

Make the following settings for received frames to LAN port #1.

- Permit traffic from the 10.1.0.0 network
- Categorize bandwidth classes as CIR:48kbps, CBS:12kbyte, and EBS:12kbyte
- Green: forward, Yellow: rewrite DSCP value to 10, Red: discard

[Traffic class definition]

```
SWX232x(config)#access-list 1 permit any 10.1.0.0 0.0.255.255 any
SWX232x(config)#class-map class1
SWX232x(config-cmap)#match access-list 1
SWX232x(config-cmap)#exit
```

[Policy settings]

```
SWX232x(config)#policy-map policy1
SWX232x(config-pmap)#class class1
SWX232x(config-pmap-c)#police 48 12 12 yellow-action remark red-action drop
SWX232x(config-pmap-c)#remark-map yellow ip-dscp 10
SWX232x(config-pmap-c)#exit
SWX232x(config-pmap)#exit
SWX232x(config)#interface port1.1
SWX232x(config-if)#service-policy input policy1
```

9.2.22 Apply policy map for received frames

[Syntax]

service-policy input *name*
no service-policy *name*

[Parameter]

name : Name of policy map to apply

[Input mode]

interface mode

[Description]

Applies the policy map to the corresponding LAN/SFP port and logical interface.

If this is executed with the "no" syntax, the policy map is deleted from the LAN/SFP port and logical interface.

[Note]

In order to execute this command, QoS must be enabled.

If a policy map has already been applied to the LAN/SFP port and logical interface, an error occurs.

For a class map that is associated with a policy map, an error occurs if there is not even one setting that corresponds to the trust mode of the LAN/SFP port and logical interface. Of the class map settings, the following commands are limited in their applicability by the trust mode.

Trust mode	Command	Restrictions
CoS	**set ip-dscp-queue**	Cannot be used
DSCP	**set cos-queue**	Cannot be used
Port Priority	**set cos**	Cannot be used
	set ip-precedence	
	set ip-dscp	
	set cos-queue	
	set ip-dscp-queue	
	police, remark-map	Cannot use a combination for which remarking is enabled (*1)

*1) A combination for which remarking is enabled refers to when the yellow-action or red-action of the **police** command is set to "remark" and the **remark-map** of the corresponding color is specified.

An LAN/SFP port to which a policy map is applied cannot be associated with an logical interface.

A policy map cannot be applied to an LAN/SFP port that is associated with an logical interface. However, in the case of settings for an LAN/SFP port that is associated with an logical interface in the startup config, the setting for the lowest-numbered port is applied to the logical interface.

Metering cannot be performed on the following logical interfaces. A policy map that includes metering (policer) settings (police-type commands) must not be applied.

- Logical interfaces that are grouped across member switches constituting a stack

[Example]

Apply policy map "policy1" to LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#service-policy input policy1
```

Remove policy map "policy1" from LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#no service-policy input policy1
```

9.2.23 Set pre-marking (CoS)

[Syntax]

set cos *value*
no set cos

[Parameter]

value : <0 - 7>
CoS value set by pre-marking

[Input mode]

policy map class mode

[Description]

Changes the CoS value of the classified traffic class to the specified CoS value. In addition, reassign the egress queue according to the egress queue ID table that corresponds to the trust mode.

If this is executed with the "no" syntax, pre-marking processing of the CoS value corresponding to the traffic class is removed.

[Note]

In order to execute this command, QoS must be enabled.

Pre-marking cannot be used in conjunction with the set egress queue function.

[Example]

Make the following settings for received frames of LAN port #1

- Permit traffic from the 10.1.0.0 network
- Change the classified traffic class to the CoS value "2"

[Traffic class definition]

```
SWX232x(config)#access-list 1 permit any 10.1.0.0 0.0.255.255 any
SWX232x(config)#class-map class1
SWX232x(config-cmap)#match access-list 1
SWX232x(config-cmap)#exit
```

[Policy settings]

```
SWX232x(config)#policy-map policy1
SWX232x(config-pmap)#class class1
SWX232x(config-pmap-c)#set cos 2
SWX232x(config-pmap-c)#exit
SWX232x(config-pmap)#exit
SWX232x(config)#interface port1.1
SWX232x(config-if)#service-policy input policy1
```

9.2.24 Set pre-marking (TOS precedence)

[Syntax]

set ip-precedence *value*

no set ip-precedence

[Parameter]

value : <0 - 7>

TOS precedence to specify by pre-marking

[Input mode]

policy map class mode

[Description]

Changes the value of the IP header's TOS precedence field of the classified traffic class to the specified TOS value. In addition, reassign the egress queue according to the egress queue ID table that corresponds to the trust mode.

If this is executed with the "no" syntax, pre-marking processing of the TOS precedence corresponding to the traffic class is removed.

[Note]

In order to execute this command, QoS must be enabled.

Pre-marking cannot be used in conjunction with the set egress queue function.

[Example]

Make the following settings for received frames of LAN port #1

- Permit traffic from the 10.1.0.0 network
- Change the classified traffic class to TOS precedence "5".

[Traffic class definition]

```
SWX232x(config)#access-list 1 permit any 10.1.0.0 0.0.255.255 any
SWX232x(config)#class-map class1
SWX232x(config-cmap)#match access-list 1
SWX232x(config-cmap)#exit
```

[Policy settings]

```
SWX232x(config)#policy-map policy1
SWX232x(config-pmap)#class class1
SWX232x(config-pmap-c)#set ip-precedence 5
SWX232x(config-pmap-c)#exit
SWX232x(config-pmap)#exit
SWX232x(config)#interface port1.1
SWX232x(config-if)#service-policy input policy1
```

9.2.25 Set pre-marking (DSCP)

[Syntax]

set ip-dscp *value*

no set dscp

[Parameter]

value : <0 - 63>

DSCP value specified by pre-marking

[Input mode]

policy map class mode

[Description]

Changes the DSCP value of the classified traffic class to the specified DSCP value. In addition, reassign the egress queue according to the egress queue ID table that corresponds to the trust mode.

If this is executed with the "no" syntax, pre-marking processing of the DSCP value corresponding to the traffic class is removed.

[Note]

In order to execute this command, QoS must be enabled.

Pre-marking cannot be used in conjunction with the set egress queue function.

Up to four values may be used for pre-marking/remarking to a DSCP value not recommended in the RFC. The following table shows the DSCP values that are recommended in the RFC.

PHB	DSCP value	RFC
default	0	2474
Class Selector	0, 8, 16, 24, 32, 40, 48, 56	2474
Assured Forwarding	10, 12, 14, 18, 20, 22, 26, 28, 30, 34, 36, 38	2597
Expedited Forwarding(EF)	46	2598

[Example]

Make the following settings for received frames of LAN port #1

- Permit traffic from the 10.1.0.0 network
- Change the classified traffic class to the DSCP value "10."

[Traffic class definition]

```
SWX232x(config)#access-list 1 permit any 10.1.0.0 0.0.255.255 any
SWX232x(config)#class-map class1
SWX232x(config-cmap)#match access-list 1
SWX232x(config-cmap)#exit
```

[Policy settings]

```
SWX232x(config)#policy-map policy1
SWX232x(config-pmap)#class class1
SWX232x(config-pmap-c)#set ip-dscp 10
SWX232x(config-pmap-c)#exit
SWX232x(config-pmap)#exit
SWX232x(config)#interface port1.1
SWX232x(config-if)#service-policy input policy1
```

9.2.26 Set individual policers (single rate)

[Syntax]

police [single-rate] *CIR CBS EBS* **yellow-action** *action* **red-action** *action*

no police

[Keyword]

single-rate : Use single-rate policer

[Parameter]

CIR : <1 - 102300000>

Traffic rate (kbps)

CBS : <11 - 2097120>

Burst size of conformant token bucket (kbyte)

EBS : <11 - 2097120>

Burst size of excess token bucket (kbyte)

action : Operation for packets categorized by bandwidth class

Setting value	Operation
transmit	Forward
drop	Discard
remark	Remarking (CoS/TOS/DSCP)

[Input mode]

policy map class mode

[Description]

Specifies individual policers (single rate) for the categorized traffic classes.

If the setting was already made by the **police** command, its content is changed.

Metering on the SWX232x is implemented as a single-rate three-color marker (RFC2697), and the following processing can be specified for the categorized bandwidth classes.

- Green : Only forward (cannot be specified)
- Yellow : Choose forward, discard, or remark
- Red : Choose discard or remark

  However, remarking can be specified for either Yellow or Red, not both.

Detailed remarking settings are made using the **remark-map** command (policy map class mode). Regardless of whether *action* is set to "remark," remarking is disabled if there are no detailed remarking settings for that bandwidth class. In this case, the default settings (Yellow: forward, Red: discard) are applied.

If this is executed with the "no" syntax, metering/policing/remarking processing is deleted.

This cannot be used in conjunction with the aggregate policer (**police-aggregate** command).

[Note]

In order to execute this command, QoS must be enabled.

Metering cannot be performed on the following logical interfaces. A policy map that includes metering (policer) settings (police-type commands) must not be applied.

- Logical interfaces that are grouped across member switches constituting a stack

[Example]

Make the following settings for received frames of LAN port #1

- Permit traffic from the 10.1.0.0 network
- Categorize bandwidth classes as CIR:48kbps, CBS:12kbyte, and EBS:12kbyte
- Green: forward, Yellow: rewrite DSCP value to 10, Red: discard

[Traffic class definition]

```
SWX232x(config)#access-list 1 permit any 10.1.0.0 0.0.255.255 any
SWX232x(config)#class-map class1
SWX232x(config-cmap)#match access-list 1
SWX232x(config-cmap)#exit
```

[Policy settings]

```
SWX232x(config)#policy-map policy1
SWX232x(config-pmap)#class class1
SWX232x(config-pmap-c)#police 48 12 12 yellow-action remark red-action drop
SWX232x(config-pmap-c)#remark-map yellow ip-dscp 10
SWX232x(config-pmap-c)#exit
SWX232x(config-pmap)#exit
```

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#service-policy input policy1
```

9.2.27 Set individual policers (twin rate)

[Syntax]

police twin-rate *CIR PIR CBS PBS* **yellow-action** *action* **red-action** *action*
no police

[Keyword]

twin-rate	:	Use twin rate policers

[Parameter]

CIR	:	<1 - 102300000> Traffic rate (kbps)
PIR	:	<1 - 102300000> Peak traffic rate (kbps). A value less than CIR cannot be specified.
CBS	:	<11 - 2097120> Burst size of conformant token bucket (kbyte)
PBS	:	<11 - 2097120> Burst size of peak token bucket (kbyte)
action	:	Operation for packets categorized by bandwidth class

Setting value	Operation
transmit	Forward
drop	Discard
remark	Remarking (CoS/TOS/DSCP)

[Input mode]

policy map class mode

[Description]

Specifies individual policers (twin rate) for the categorized traffic classes.

If the setting was already made by the **police** command, its content is changed.

Metering on the SWX232x is implemented as a single-rate three-color marker (RFC2697), and the following processing can be specified for the categorized bandwidth classes.

- Green : Only forward (cannot be specified)
- Yellow : Choose forward, discard, or remark
- Red : Choose discard or remark

  However, remarking can be specified for either Yellow or Red, not both.

Detailed remarking settings are made using the **remark-map** command (policy map class mode). Regardless of whether *action* is set to "remark," remarking is disabled if there are no detailed remarking settings for that bandwidth class. In this case, the default settings (Yellow: forward, Red: discard) are applied.

If this is executed with the "no" syntax, metering/policing/remarking processing is deleted.

This cannot be used in conjunction with the aggregate policer (**police-aggregate** command).

[Note]

In order to execute this command, QoS must be enabled.

Metering cannot be performed on the following logical interfaces. A policy map that includes metering (policer) settings (police-type commands) must not be applied.

- Logical interfaces that are grouped across member switches constituting a stack

[Example]

Make the following settings for received frames of LAN port #1

- Permit traffic from the 10.1.0.0 network
- Categorize bandwidth classes as CIR:48kbps, PIR:96kbps, CBS:12kbyte, and PBS:12kbyte

- Green: forward, Yellow: rewrite DSCP value to 10, Red: discard

[Traffic class definition]

```
SWX232x(config)#ip-access-list 1 permit 10.1.0.0 0.0.255.255
SWX232x(config)#class-map class1
SWX232x(config-cmap)#match access-group 1
SWX232x(config-cmap)#exit
```

[Policy settings]

```
SWX232x(config)#policy-map policy1
SWX232x(config-pmap)#class class1
SWX232x(config-pmap-c)#police twin-rate 48 96 12 12 yellow-action remark red-action
drop
SWX232x(config-pmap-c)#remark-map yellow ip-dscp 10
SWX232x(config-pmap-c)#exit
SWX232x(config-pmap)#exit
SWX232x(config)#interface port1.1
SWX232x(config-if)#service-policy input policy1
```

9.2.28 Set remarking of individual policers

[Syntax]

remark-map *color type value*
no remark-map

[Parameter]

color : Bandwidth class to remark

Setting value	Description
yellow	Make remarking settings for bandwidth class Yellow
red	Make remarking settings for bandwidth class Red

type : Type of remarking

Setting value	Description
cos	CoS remarking
ip-precedence	TOS precedence remarking
ip-dscp	DSCP remarking

value : <0 - 7>

CoS or TOS precedence remarking value

: <0 - 63>

DSCP remarking value

[Input mode]

policy map class mode

[Description]

Specifies remarking operations for bandwidth classes Yellow and Red that were classified by individual policers. In addition, reassign the egress queue according to the egress queue ID table that corresponds to the trust mode.

For remarking, you can select either CoS value, TOS precedence, or DSCP value.

If this is executed with the "no" syntax, the remarking setting is deleted.

In order to perform remarking, you must specify this command and additionally use the **police** command (policy map class mode)) to specify "remark" as the action for the corresponding bandwidth class.

[Note]

In order to execute this command, QoS must be enabled.

Remarking can be used in conjunction with pre-marking and specifying the egress queue.

Up to four user-defined values may be used for pre-marking/remarking to a DSCP value not recommended in the RFC. The following table shows the DSCP values that are recommended in the RFC.

PHB	DSCP value	RFC
default	0	2474
Class Selector	0, 8, 16, 24, 32, 40, 48, 56	2474
Assured Forwarding	10, 12, 14, 18, 20, 22, 26, 28, 30, 34, 36, 38	2597
Expedited Forwarding(EF)	46	2598

[Example]

Make the following settings for received frames of LAN port #1@

- Permit traffic from the 10.1.0.0 network
- Categorize bandwidth classes as CIR:48kbps, CBS:12kbyte, and EBS:12kbyte
- Green: forward, Yellow: rewrite DSCP value to 10, Red: discard

[Traffic class definition]

```
SWX232x(config)#access-list 1 permit any 10.1.0.0 0.0.255.255 any
SWX232x(config)#class-map class1
SWX232x(config-cmap)#match access-list 1
SWX232x(config-cmap)#exit
```

[Policy settings]

```
SWX232x(config)#policy-map policy1
SWX232x(config-pmap)#class class1
SWX232x(config-pmap-c)#police 48 12 12 yellow-action remark red-action drop
SWX232x(config-pmap-c)#remark-map yellow ip-dscp 10
SWX232x(config-pmap-c)#exit
SWX232x(config-pmap)#exit
SWX232x(config)#interface port1.1
SWX232x(config-if)#service-policy input policy1
```

9.2.29 Generate aggregate policer

[Syntax]

aggregate-police *name*
no aggregate-police *name*

[Parameter]

name : Name of aggregate policer (maximum 20 characters; uppercase and lowercase are distinguished)

[Input mode]

global configuration mode

[Description]

Generates an aggregate policer. If the policer has already been generated, this command edits its content.

When the command succeeds, you transition to aggregate policer mode, where you can edit the content of the aggregate policer.

If this command is executed with the "no" syntax, the aggregate policer is deleted.

In the following case, the content of the aggregate policer cannot be changed (you will not transition to aggregate policer mode).

- A policy map that includes a class map specified by the aggregate policer is applied to LAN/SFP port and logical interface.

In the following case, the aggregate policer cannot be deleted.

- The **police-aggregate** command was used to set the aggregate policer to a traffic class

[Note]

In order to execute this command, QoS must be enabled.

Metering cannot be performed on the following logical interfaces. A policy map that includes metering (policer) settings (police-type commands) must not be applied.

- Logical interfaces that are grouped across member switches constituting a stack

[Example]

Generate aggregate policer "AGP-01".

```
SWX232x(config)#aggregate-police AGP-01
SWX232x(config-agg-policer)#
```

9.2.30 Set aggregate policer (single rate)

[Syntax]

police [single-rate] *CIR CBS EBS* **yellow-action** *action* **red-action** *action*

no police

[Keyword]

single-rate	:	Use single-rate policer

[Parameter]

CIR	:	<1 - 102300000> Traffic rate (kbps)
CBS	:	<11 - 2097120> Burst size of conformant token bucket (kbyte)
EBS	:	<11 - 2097120> Burst size of excess token bucket (kbyte)
action	:	Operation for packets categorized by bandwidth class

Setting value	Operation
transmit	Forward
drop	Discard
remark	Remarking (CoS/TOS/DSCP)

[Input mode]

aggregate policer mode

[Description]

Specifies a single rate policer as an aggregate policer.

If this is executed with the "no" syntax, metering/policing/remarking processing is deleted.

Metering on the SWX232x is implemented as a single-rate three-color marker (RFC2697), and the following processing can be specified for the categorized bandwidth classes.

- Green : Only forward (cannot be specified)
- Yellow : Choose forward, discard, or remark
- Red : : Choose discard or remark

  However, remarking can be specified for either Yellow or Red, not both.

Detailed remarking settings are made using the **remark-map** command (aggregate policer mode). Regardless of whether *action* is set to "remark," remarking is disabled if there are no detailed remarking settings for that bandwidth class. In this case, the default settings (Yellow: forward, Red: discard) are applied.

[Note]

In order to execute this command, QoS must be enabled.

Metering cannot be performed on the following logical interfaces. A policy map that includes metering (policer) settings (police-type commands) must not be applied.

- Logical interfaces that are grouped across member switches constituting a stack

[Example]

Create an aggregate policer "AGP-01".

- Executing metering by SrTCM with CIR:48kbps, CBS:12kbyte, and EBS:12kbyte
- Yellow: rewrite DSCP value to 10, Red: discard

[Aggregate policer creating]

```
SWX232x(config)#aggregate-police AGP-01
SWX232x(config-agg-policer)#police single-rate 48 12 12 yellow-action remark red-
action drop
```

```
SWX232x(config-agg-policer)#remark-map yellow ip-dscp 10
SWX232x(config-agg-policer)#exit
```

9.2.31 Set aggregate policer (twin rate)

[Syntax]

police twin-rate *CIR PIR CBS PBS* **yellow-action** *action* **red-action** *action*
no police

[Keyword]

twin-rate : Use twin rate policers

[Parameter]

CIR : <1 - 102300000>

Traffic rate (kbps)

PIR : <1 - 102300000>

Peak traffic rate (kbps). A value less than CIR cannot be specified.

CBS : <11 - 2097120>

Burst size of conformant token bucket (kbyte)

PBS : <11 - 2097120>

Burst size of peak token bucket (kbyte)

action : Operation for packets categorized by bandwidth class

Setting value	Operation
transmit	Forward
drop	Discard
remark	Remarking (CoS/TOS/DSCP)

[Input mode]

aggregate policer mode

[Description]

Specifies a twin rate policer as an aggregate policer.

If this is executed with the "no" syntax, metering/policing/remarking processing is deleted.

Metering on the SWX232x is implemented as a single-rate three-color marker (RFC2697), and the following processing can be specified for the categorized bandwidth classes.

- Green : Only forward (cannot be specified)
- Yellow : Choose forward, discard, or remark
- Red : Choose discard or remark

  However, remarking can be specified for either Yellow or Red, not both.

Detailed remarking settings are made using the **remark-map** command (aggregate policer mode). Regardless of whether *action* is set to "remark," remarking is disabled if there are no detailed remarking settings for that bandwidth class. In this case, the default settings (Yellow: forward, Red: discard) are applied.

[Note]

In order to execute this command, QoS must be enabled.

Metering cannot be performed on the following logical interfaces. A policy map that includes metering (policer) settings (police-type commands) must not be applied.

- Logical interfaces that are grouped across member switches constituting a stack

[Example]

Create an aggregate policer "AGP-01".

- Executing metering by TrTCM with CIR:48kbps, PIR:96kbps, CBS:12kbyte, and EBS:12kbyte
- Yellow: rewrite DSCP value to 10, Red: discard

[Aggregate policer creating]

```
SWX232x(config)#aggregate-police AGP-01
SWX232x(config-agg-policer)#police twin-rate 48 96 12 12 yellow-action remark red-
```

```
action drop
SWX232x(config-agg-policer)#remark-map yellow ip-dscp 10
SWX232x(config-agg-policer)#exit
```

9.2.32 Set remarking of aggregate policers

[Syntax]

remark-map *color type value*

no remark-map

[Parameter]

color : Bandwidth class to remark

Setting value	Description
yellow	Make remarking settings for bandwidth class Yellow
red	Make remarking settings for bandwidth class Red

type : Type of remarking

Setting value	Description
cos	CoS remarking
ip-precedence	TOS precedence remarking
ip-dscp	DSCP remarking

value : <0 - 7>

CoS or TOS precedence remarking value

: <0 - 63>

DSCP remarking value

[Input mode]

aggregate policer mode

[Description]

Specifies remarking operations for bandwidth classes Yellow and Red that were classified by aggregate policers. In addition, reassign the egress queue according to the egress queue ID table that corresponds to the trust mode.

For remarking, you can select either CoS value, TOS precedence, or DSCP value.

If this is executed with the "no" syntax, the remarking setting is deleted.

In order to perform remarking, you must specify this command and additionally use the **police** command (aggregate policer mode) to specify "remark" as the action for the corresponding bandwidth class.

[Note]

In order to execute this command, QoS must be enabled.

Remarking can be used in conjunction with pre-marking and specifying the egress queue.

Up to four user-defined values may be used for pre-marking/remarking to a DSCP value not recommended in the RFC. The following table shows the DSCP values that are recommended in the RFC.

PHB	DSCP value	RFC
default	0	2474
Class Selector	0, 8, 16, 24, 32, 40, 48, 56	2474
Assured Forwarding	10, 12, 14, 18, 20, 22, 26, 28, 30, 34, 36, 38	2597
Expedited Forwarding(EF)	46	2598

[Example]

Make the following settings for aggregate policer "AGP-01".

- Executing metering by TrTCM with CIR:48kbps, PIR:96kbps, CBS:12kbyte, and PBS:12kbyte
- Yellow: rewrite DSCP value to 10, Red: discard

[Aggregate policer creating]

```
SWX232x(config)#aggregate-police AGP-01
SWX232x(config-agg-policer)#police twin-rate 48 96 12 12 yellow-action remark red-
action drop
SWX232x(config-agg-policer)#remark-map yellow ip-dscp 10
SWX232x(config-agg-policer)#exit
```

9.2.33 Show aggregate policers

[Syntax]

show aggregate-police [*name*]

[Parameter]

name : Aggregate policer name. If this is omitted, the command applies to all aggregate policers.

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the contents of an aggregate policer. The contents shown are the same as in the police section shown by the **show class-map** command.

[Note]

In order to execute this command, QoS must be enabled.

[Example]

Show the contents of aggregate policer "AGP-01".

```
SWX232x#show aggregate-police AGP-01

     Aggregator-Police Name: AGP-01
         Mode: TrTCM
         average rate (48 Kbits/sec)
         peak rate (96 Kbits/sec)
         burst size (12 KBytes)
         peak burst size (16 KBytes)
         yellow-action (Transmit)
         red-action (Drop)
```

9.2.34 Apply aggregate policer

[Syntax]

police-aggregate *name*

no police-aggregate *name*

[Parameter]

name : Aggregate policer to apply

[Input mode]

policy map class mode

[Description]

Specifies an aggregate policer for a traffic class.

If this is executed with the "no" syntax, the aggregate policer settings for the traffic class are removed.

This cannot be used in conjunction with an individual policer (the **police single-rate and police twin-rate** commands of policy map class mode).

[Note]

In order to execute this command, QoS must be enabled.

Metering cannot be performed on the following logical interfaces. A policy map that includes metering (policer) settings (police-type commands) must not be applied.

- Logical interfaces that are grouped across member switches constituting a stack

[Example]

Apply aggregate policer "AGP-01" to the two traffic classes "class1" and "class2" of policy map "policy1."

- Executing metering by SrTCM with CIR:48kbps, CBS:12kbyte, and EBS:12kbyte
- Yellow: rewrite DSCP value to 10, Red: discard

[Create an aggregate policer]

```
SWX232x(config)#aggregate-police AGP-01
SWX232x(config-agg-policer)#police single-rate 48 12 12 yellow-action remark red-
action drop
SWX232x(config-agg-policer)#remark-map yellow ip-dscp 10
SWX232x(config-agg-policer)#exit
```

[Set policy]

```
SWX232x(config)#policy-map policy1
SWX232x(config-pmap)#class class1
SWX232x(config-pmap-c)#police-aggregate AGP-01
SWX232x(config-pmap-c)#exit
SWX232x(config-pmap)#class class2
SWX232x(config-pmap-c)#police-aggregate AGP-01
SWX232x(config-pmap-c)#exit
SWX232x(config-pmap)#exit
SWX232x(config)#interface port1.1
SWX232x(config-if)#service-policy input policy1
```

9.2.35 Show metering counters

[Syntax]

show qos metering-counters [*ifname*]

[Parameter]

ifname : LAN/SFP port name or logical interface name. If this is omitted, the command applies to all ports.

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the metering totals for all policers (individual policers / aggregate policers) on the specified LAN/SFP port or logical interface.

The following totals are shown.

Item	Description
Green Bytes	Number of bytes categorized as bandwidth class Green
Yellow Bytes	Number of bytes categorized as bandwidth class Yellow
Red Bytes	Number of bytes categorized as bandwidth class Red

The count starts when the policy map is applied to the LAN/SFP port or logical interface.

[Note]

In order to execute this command, QoS must be enabled.

[Example]

Show the metering totals for LAN port #1.

```
SWX232x#show qos metering-counters port1.1
Interface: port1.1(policy1)

  ****** Individual ******
  Class-map        : class1
      Green Bytes  : 178345
      Yellow Bytes : 0
      Red Bytes    : 0

  ****** Aggregate *******
  Aggregate-policer: AGP-01
  Class-map        : class2
                     class3
      Green Bytes  : 28672
```

```
      Yellow Bytes : 2048
      Red Bytes    : 51552
```

9.2.36 Clear metering counters

[Syntax]

clear qos metering-counters [*ifname*]

[Parameter]

ifname : LAN/SFP port name or logical interface name. If this is omitted, the command applies to all ports.

[Input mode]

privileged EXEC mode

[Description]

Clears the metering totals for all policers (individual policers / aggregate policers) on the specified LAN/SFP port or logical interface.

[Note]

In order to execute this command, QoS must be enabled.

[Example]

Clear the metering totals for LAN port #1.

```
SWX232x#clear qos metering-counter port1.1
```

9.2.37 Set egress queue (CoS-Queue)

[Syntax]

set cos-queue *value*

no set cos-queue

[Parameter]

value : <0 - 7>

CoS value corresponding to egress queue

[Input mode]

policy map class mode

[Description]

Assigns an egress queue to the classified traffic class.

Use the CoS value to specify the egress queue; the egress queue that is assigned is based on the "CoS-egress queue ID conversion table."

If this is executed with the "no" syntax, the specification of egress queue based on traffic class is removed.

[Note]

In order to execute this command, QoS must be enabled.

Egress queue specification cannot be used in conjunction with pre-marking.

Egress queue specification based on CoS is only for CoS trust mode. If a policy map contains even one class map that includes this command, that policy map cannot be applied to a port that uses DSCP trust mode.

[Example]

Make the following settings for received frames of LAN port #1

- Permit traffic from the 10.1.0.0 network
- Change the classified traffic class to egress queue 3 (CoS:3)

[Traffic class definition]

```
SWX232x(config)#access-list 1 permit any 10.1.0.0 0.0.255.255 any
SWX232x(config)#class-map class1
SWX232x(config-cmap)#match access-list 1
SWX232x(config-cmap)#exit
```

[Policy settings]

```
SWX232x(config)#policy-map policy1
SWX232x(config-pmap)#class class1
```

```
SWX232x(config-pmap-c)#set cos-queue 3
SWX232x(config-pmap-c)#exit
SWX232x(config-pmap)#exit
SWX232x(config)#interface port1.1
SWX232x(config-if)#service-policy input policy1
```

9.2.38 Set egress queue (DSCP-Queue)

[Syntax]

set ip-dscp-queue *value*
no set ip-dscp-queue

[Parameter]

value : <0 - 63>
DSCP value corresponding to egress queue

[Input mode]

policy map class mode

[Description]

Assigns an egress queue to the classified traffic class.

Use the DSCP value to specify the egress queue; the egress queue that is assigned is based on the "DSCP-egress queue ID conversion table."

If this is executed with the "no" syntax, the specification of egress queue based on traffic class is removed.

[Note]

In order to execute this command, QoS must be enabled.

Egress queue specification cannot be used in conjunction with pre-marking.

Egress queue specification based on DSCP is only for DSCP trust mode. If a policy map contains even one class map that includes this command, that policy map cannot be applied to a port that uses DSCP trust mode.

[Example]

Make the following settings for received frames of LAN port #1

- Permit traffic from the 10.1.0.0 network
- Change the classified traffic class to egress queue 3 (DSCP:24)

[Traffic class definition]

```
SWX232x(config)#access-list 1 permit any 10.1.0.0 0.0.255.255 any
SWX232x(config)#class-map class1
SWX232x(config-cmap)#match access-list 1
SWX232x(config-cmap)#exit
```

[Policy settings]

```
SWX232x(config)#policy-map policy1
SWX232x(config-pmap)#class class1
SWX232x(config-pmap-c)#set ip-dscp-queue 24
SWX232x(config-pmap-c)#exit
SWX232x(config-pmap)#exit
SWX232x(config)#interface port1.1
SWX232x(config-if)#service-policy input policy1
```

9.2.39 Show policy map information

[Syntax]

show policy-map [*name*]

[Parameter]

name : Policy map name. If this is omitted, all policy map information is shown.

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows information for the specified policy map. The following content is shown.

Item	Description
Policy-Map Name	Policy map name
State	Application status of the policy map (attached/detached)
Class-Map Name	Class map information. For details, refer to the **show class-map** command.
Match	Classification conditions - Match Access-List (Access list ID) - Match ethertype (Ethernet Type) - Match vlan (VLAN ID) - Match vlan-range (VLAN ID) - Match CoS (CoS value) - Match IP precedence (TOS precedence) - Match IP DSCP (DSCP value)
Set	Pre-marking setting, egress queue setting - Set CoS (Pre-marking setting : CoS value) - Set IP precedence (Pre-marking setting : TOS precedence) - Set IP DSCP (Pre-marking setting : DSCP value) - Set CoS-Queue (Specify egress queue : CoS - Set IP-DSCP-Queue (Specify egress queue : DSCP)
Police	Metering/policing/remarking setting * For details, refer to the following

Details of metering, policing, and remarking settings are as follows.

Item		Description
Aggregator-Police Name		Name of aggregate policer (only if specified)
Mode		Metering algorithm (SrTCM/TrTCM)
Shown only for SrTCM	average rate	Traffic rate (kbits/sec)
	burst size	Burst size of conformant token bucket (kBytes)
	excess burst size	Burst size of excess token bucket (kBytes)
Shown only for TrTCM	average rate	Traffic rate (kbits/sec)
	peak rate	Peak traffic rate (kbits/sec)
	burst size	Burst size of conformant token bucket (kBytes)
	peak burst size	Burst size of peak token bucket (kBytes)
yellow-action		Action for bandwidth class Yellow (transmit/drop/remark)
red-action		Action for bandwidth class Red (drop/remark)

- Of the various items in the "Match" and the "Set", only the single item that has been specified is shown.
- The "Match", the "Set", and the "Police" are not shown if the corresponding command (match, set, police) has not been specified.

[Note]

In order to execute this command, QoS must be enabled.

[Example]

Show information for policy map "policy1".

```
SWX232x#show policy-map policy1

  Policy-Map Name: policy1
    State: attached

    Class-Map Name: class1
      Qos-Access-List Name: 1
      Police: Mode: SrTCM
              average rate (48 Kbits/sec)
              burst size (12 KBytes)
              excess burst size (12 KBytes)
              yellow-action (Remark [DSCP:10])
              red-action (Drop)
```

9.2.40 Show map status

[Syntax]

show qos map-status *type* [*name*]

[Parameter]

type : Type of map to show

Setting value	Description
policy	Show policy map status information
class	Show class map status information

name : The name of the policy map (or class map) to show. If this is omitted, all policy maps (or class maps)

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows policy map or class map status information.

By using this command, you can obtain information about the combination of policy maps or class maps, such as the LAN/SFP ports and logical interfaces to which a policy map is applied, or the policy maps to which a class map is registered.

The following content is displayed.

policy-map

Item	Display information
input port	List of LAN/SFP ports and logical interfaces to which the policy map is applied
edit/erase	Whether **policy-map/no policy-map** can be executed
attach limitation	Whether attachment is possible for each trust mode

class-map

Item	Display information
policy-map association	List of policy maps to which the class map is associated
edit/erase	Whether **class-map/no class-map** can be executed
attach limitation	Whether attachment is possible for each trust mode

Use the **show policy-map** and **show class-map** commands to check the settings of the policy map or class map.

[Note]

In order to execute this command, QoS must be enabled.

[Example]

Show the status of policy map "policy1".

```
SWX232x#show qos map-status policy policy1
policy1 status
  input port            : port1.3
```

```
  edit/erase            : Disable

  attach limitation
    CoS trust mode           : Enable
    DSCP trust mode          : Enable
    Port-Priority trust mode : Disable
```

Show the status of class map "class1".

```
SWX232x#show qos map-status class class1
class1 status
  policy-map association : policy1 (Detached)

  edit/erase             : Disable

  attach limitation
    CoS trust mode           : Enable
    DSCP trust mode          : Enable
    Port-Priority trust mode : Disable
```

9.2.41 Set egress queue scheduling

[Syntax]

qos wrr-weight *queue-id weight*
no qos wrr-weight *queue-id*

[Parameter]

queue-id : <0-7>
Egress queue ID

weight : <1-32>
Weight of WRR

[Initial value]

no qos wrr-weight 0
no qos wrr-weight 1
no qos wrr-weight 2
no qos wrr-weight 3
no qos wrr-weight 4
no qos wrr-weight 5
no qos wrr-weight 6
no qos wrr-weight 7

[Input mode]

global configuration mode

[Description]

Specifies the WRR (weighted round robin) weight for the egress queue.

The scheduling method setting is common to all LAN/SFP ports and logical interfaces.

If this is executed with the "no" syntax, the egress queue uses the strict priority (SP) method.

[Note]

In order to execute this command, QoS must be enabled.

[Example]

Set egress queues #7 and #6 to the SP method (7 has priority), and set #5, #4, #3, #2, #1, and #0 to the WRR method (5:5:5:2:1:1).

```
SWX232x(config)#no qos wrr-weight 7
SWX232x(config)#no qos wrr-weight 6
SWX232x(config)#qos wrr-weight 5 5
SWX232x(config)#qos wrr-weight 4 5
SWX232x(config)#qos wrr-weight 3 5
SWX232x(config)#qos wrr-weight 2 2
SWX232x(config)#qos wrr-weight 1 1
SWX232x(config)#qos wrr-weight 0 1
```

9.2.42 Set traffic shaping (individual port)

[Syntax]

traffic-shape rate kbps *CIR* **burst** *BC*
no traffic-shape rate

[Parameter]

CIR : <18-10000000>
Traffic rate (kbps). Since rounding occurs, the value actually applied to the input value might be less

BC : <16-16000>
Burst size (kbyte). Specified in 4 kbyte units. (See [Note])

[Initial value]

no traffic-shape rate

[Input mode]

interface mode

[Description]

Specifies shaping for the port.

If this command is executed with the "no" syntax, the port shaping setting is disabled.

[Note]

In order to execute this command, QoS must be enabled.

Since rounding occurs on the traffic rate, the value actually applied to the input value might be less.

Set the burst size to 10 times or greater of the “maximum value of MRU (the largest value of the MRU for each interface).”

If the burst size is not set properly, frames will not be transmitted from ports that are configured for shaping.

[Example]

Reduce transmission from LAN port #1 down to CIR:30016 kbps, Bc:1876000 bytes.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#traffic-shape rate kbps 30016 burst 1876
```

9.2.43 Sets traffic shaping (per queue)

[Syntax]

traffic-shape queue *queue-id* **rate kbps** *CIR* **burst** *BC*
no traffic-shape queue *queue-id* **rate**

[Parameter]

queue-id : <0-7>
Egress queue ID

CIR : <18-10000000>
Traffic rate (kbps). Since rounding occurs, the value actually applied to the input value might be less

BC : <16-16000>
Burst size (kbyte). Specified in 4 kbyte units. (See [Note])

[Initial value]

no traffic-shpe queue 0 rate
no traffic-shpe queue 1 rate
no traffic-shpe queue 2 rate
no traffic-shpe queue 3 rate
no traffic-shpe queue 4 rate
no traffic-shpe queue 5 rate
no traffic-shpe queue 6 rate
no traffic-shpe queue 7 rate

[Input mode]

interface mode

[Description]

Specifies shaping for the transmission queue of the port.

If this command is executed with the "no" syntax, the egress queue shaping setting is disabled.

[Note]

In order to execute this command, QoS must be enabled.

Since rounding occurs on the traffic rate, the value actually applied to the input value might be less.

Set the burst size to 10 times or greater of the “maximum value of MRU (the largest value of the MRU for each interface).”

If the burst size is not set properly, frames will not be transmitted from ports that are configured for shaping.

[Example]

This filters the transmission from LAN port # 1 queue #0 down to CIR: 10 Mbps, Bc: 64000 bytes.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#traffic-shape queue 0 rate kbps 10000 burst 64
```

9.3 Flow control

9.3.1 Set flow control (IEEE 802.3x PAUSE send/receive) (system)

[Syntax]

flowcontrol *type*

no flowcontrol

[Parameter]

type : Flow control operation

Setting value	Description
enable	Enables flow control
disable	Disables flow control

[Initial value]

flowcontrol disable

[Input mode]

global configuration mode

[Description]

Enables flow control for the entire system (IEEE 802.3x PAUSE frames send/receive).

If this is executed with the "no" syntax, flow control is disabled.

[Note]

If the QoS function is enabled, it is not possible to enable flow control for the system.

If flow control is enabled, the tail drop function is automatically disabled. However, this limitation does not apply if the stack function is enabled.

Flow control for each interface operates only if the flow control settings of the system and of the interface are each enabled.

[Example]

Enable flow control for system.

```
SWX232x(config)#flowcontrol enable
```

9.3.2 Set flow control (IEEE 802.3x PAUSE send/receive) (interface)

[Syntax]

flowcontrol *type*

no flowcontrol

[Parameter]

type : Flow control operation

Setting value	Description
auto	Enable flow control auto negotiation
both	Enable transmission/reception of Pause frames
disable	Disable flow control

[Initial value]

flowcontrol disable

[Input mode]

interface mode

[Description]

Enables flow control for the LAN/SFP port (IEEE 802.3x PAUSE frames send/receive).

If this is executed with the "no" syntax, flow control is disabled.

[Note]

This command can be specified only for LAN/SFP port.

This will not operate if flow control is disabled for the system.

Sending and receiving of PAUSE frames are enabled or disabled as a set.

The period of pause time requested when the SWX232x transmits a PAUSE frame is 0xFFFF (65535).

The following limitations apply.

- When using an SPF+ module, auto negotiation of flow control is unsupported.
- If the following conditions apply, auto negotiation and Pause frame transmission are unsupported. (Pause frame reception only is supported)
  - If the stack function is enabled and flow control is enabled

[Example]

Enable flow control for LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#flowcontrol both
```

Disable flow control for LAN port #1.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#no flowcontrol
```

9.3.3 Show flow control operating status

[Syntax]

show flowcontrol [inteface *ifname*]

[Keyword]

interface : Specifies the interface to show

[Parameter]

ifname : Name of LAN/SFP port. If this is omitted, the command applies to all interfaces.

Interface to show

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows information related to flow control (enabled/disabled, number of PAUSE frames sent/received).

[Note]

The number of PAUSE frames sent and received are shown only if flow control is enabled on the corresponding port.

The number of PAUSE frames sent and received is cleared when you execute the **clear frame-counters** command.

[Example]

Show flow control information for LAN port #1.

```
SWX232x#show flowcontrol port1.1
Port        FlowControl       RxPause TxPause
---------   -----------       ------- -------
port1.1     Both                 4337       0
```

Show flow control information for all ports.

```
SWX232x#show flowcontrol
System flow-control: Enable
Port        FlowControl       RxPause TxPause
---------   -----------       ------- -------
port1.1     Both                 4337       0
port1.2     Disable                 -       -
port1.3     Both                    0    1732
port1.4     Disable                 -       -
port1.5     Disable                 -       -
port1.6     Disable                 -       -
port1.7     Disable                 -       -
port1.8     Disable                 -       -
```

9.4 Storm control

9.4.1 Set storm control

[Syntax]

storm-control *type* [*type..*] **level** *level*

no storm-control

[Parameter]

type : Storm control type

Storm control type	Description
broadcast	Enables broadcast storm control
multicast	Enables multicast storm control
unicast	Enables control for unicast frames with unknown address

level : <0.00-100.00>

Specifies the threshold value as a percentage of the bandwidth
The threshold value can be specified to the second decimal place

[Initial value]

no storm-control

[Input mode]

interface mode

[Description]

Applies reception restrictions to a LAN/SFP port, enabling broadcast storm control, multicast storm control, and control of unicast frames with unknown address.

Incoming frames that exceed the threshold value are discarded. However, no reception restrictions are applied if the threshold value is 100%. The threshold value is common to all frames, and cannot be specified individually.

[Example]

Enable broadcast storm control and multicast storm control for LAN port #1, and set the threshold value to 30%.

```
SWX232x(config)#interface port1.1
SWX232x(config-if)#storm-control broadcast multicast level 30
```

9.4.2 Show storm control reception upper limit

[Syntax]

show storm-control [*ifname*]

[Parameter]

ifname	:	LAN/SFP port interface name Interface to show

[Initial value]

none

[Input mode]

unprivileged EXEC mode, privileged EXEC mode

[Description]

Shows the upper limit value for frame reception.

If the interface name is omitted, all interfaces are shown.

[Example]

Show the setting status of all interfaces.

```
SWX232x#show storm-control
Port     BcastLevel    McastLevel    UcastLevel
port1.1    30.00%        30.00%       100.00%
port1.2    20.00%        20.00%        20.00%
port1.3   100.00%       100.00%       100.00%
port1.4   100.00%       100.00%       100.00%
port1.5    50.00%        50.00%       100.00%
port1.6   100.00%       100.00%       100.00%
port1.7   100.00%       100.00%        30.00%
port1.8   100.00%       100.00%        30.00%
```

Chapter 10

Application

10.1 Local RADIUS server

10.1.1 Local RADIUS server function settings

[Syntax]

radius-server local enable [*port*]
radius-server local disable
no radius-server local

[Parameter]

port : <1024-65535>
UDP port number used for authentication (the default value of 1812 is used when this is omitted)

[Initial value]

radius-server local disable

[Input mode]

global configuration mode

[Description]

Enables/disables the settings for the local RADIUS server function.

You can also change the authentication UDP port number.

If this command is executed with the "no" syntax, the setting returns to the default.

[Note]

To use the local RADIUS server functions, you must first use the **crypto pki generate ca** command to generate a route certificate authority.

[Example]

Enables the local RADIUS server function.

```
SWX232x(config)#radius-server local enable
```

10.1.2 Set access interface

[Syntax]

radius-server local interface *interface*
no radius-server local interface

[Parameter]

interface : VLAN interface name

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Sets the VLAN interface that allows access to the local RADIUS server.

Up to seven access interfaces can be specified.

If the command is executed with the "no" syntax, the specified interface is deleted.

[Example]

Allows access to the RADIUS client (NAS) connected to VLAN #1 and VLAN #100.

```
SWX232x(config)#radius-server local interface vlan1
SWX232x(config)#radius-server local interface vlan100
```

10.1.3 Generate a route certificate authority

[Syntax]

crypto pki generate ca [*ca-name*]
no crypto pki generate ca

[Parameter]

ca-name : Certificate authority name

Characters that can be inputted for the certificate authority name
- Within 3–32 characters
- Single-byte alphanumeric characters and symbols other than the characters \ [ ] " ? and spaces
- Cannot specify “DEFAULT”

[Initial value]

none

[Input mode]

global configuration mode

[Description]

Generates a route certificate authority to issue a client certificate.

“YAMAHA_SWITCH” will be used when the certificate authority is omitted.

If this command is executed with the "no" syntax, the specified route certificate authority is deleted.

[Note]

If a route certificate authority has not been generated, the functions of the local RADIUS server cannot be used.

When setting a different route certificate authority name when a route certificate authority has already been generated, the route certificate authority will be overwritten.

When the route certificate authority is deleted or overwritten, all client certificates already issued will become invalid.

Even if a route certificate authority exists, it cannot be used as such unless the **crypto pki generate ca** settings have not been made.

[Example]

This generates a route certificate authority with the name “MY RADIUS”.

```
SWX232x(config)#crypto pki generate ca MYRADIUS
```

10.1.4 RADIUS configuration mode

[Syntax]

radius-server local-profile

[Input mode]

global configuration mode

[Description]

Switches to the RADIUS configuration mode.

This mode is used to configure the operating specifications for the local RADIUS server function.

[Example]

Switches to the RADIUS configuration mode.

```
SWX232x(config)#radius-server local-profile
SWX232x(config-radius)#
```

10.1.5 Authentication method settings

[Syntax]

authentication *mode* [*mode...*]
no authentication

[Parameter]

mode : Authentication method

Setting value	Description
pap	PAP authentication method
peap	PEAP authentication method
eap-md5	EAP-MD5 authentication method
eap-tls	EAP-TLS authentication method
eap-ttls	EAP-TTLS authentication method

[Initial value]

authentication pap peap eap-md5 eap-tls eap-ttls

[Input mode]

RADIUS configuration mode

[Description]

Specifies the authentication method used for the local RADIUS server.

If this command is executed with the "no" syntax, the setting is returned to its default, and all authentication methods will be enabled.

[Note]

As an internal authentication method for PEAP and EAP-TTLS, this supports MSCHAPv2 and MD5.

The authentication method must be set to “eap-md5” when using MD5.

[Example]

This restricts the authentication method to PEAP and EAP-MD5.

```
SWX232x(config)#radius-server local-profile
SWX232x(config-radius)#authentication peap eap-md5
```

10.1.6 RADIUS client (NAS) settings

[Syntax]

nas *host* key *secret*

no nas *host*

[Keyword]

key : Sets the password used for communicating with the RADIUS client (NAS)

[Parameter]

host : IP address, or IP network address

Setting value	Description
IPv4 address (A.B.C.D)	Range from 0.0.0.1 to 223.255.255.255, except for 127.0.0.1
IPv4 network address (A.B.C.D/M)	The network mask range is from 8 to 32, and the IP address host part will be “0”
IPv6 address (A:B:C::D)	Out of all unicast addresses, the exceptions are unspecified addresses (::/128), default root addresses (::/0) and loopback addresses (::1/128)
IPv6 network address (A:B:C::D/M)	The prefix length is 1–128

secret : Shared password

(128 characters or less, single-byte alphanumeric characters and symbols other than the characters \ [ ] " ? and spaces)

[Initial value]

nas 127.0.0.1 key secret_local

[Input mode]

RADIUS configuration mode

[Description]

Adds a RADIUS client (NAS) to the RADIUS client list.

The maximum number of registered entries is 100.

If this command is executed with the "no" syntax, the specified RADIUS client setting is deleted.

[Note]

RADIUS client (NAS) information configured using this command will not display in running-config or startup-config.

Also, this is different from the regular settings command, in that it will be saved as setting data when this command is executed.

Information for the RADIUS client (NAS) that was set can be checked using the **show radius-server local nas** command.

The following settings must be made when specifying a local RADIUS server using the port authentication function of this device.

```
SWX232x(config)#radius-server host 127.0.0.1 key secret_local
```

[Example]

Add the RADIUS client (NAS) at IP address 192.168.100.101, with a shared password of "abcde".

```
SWX232x(config)#radius-server local-profile
SWX232x(config-radius)#nas 192.168.100.101 key abcde
```

10.1.7 Authenticated user settings

[Syntax]

user *userid password* [vlan *vlan-id*] [mac *mac-address*] [ssid *ssid*] [name *name*] [mail *mail-address*] [auth *type*] [expire *date*]

no user *userid*

[Keyword]

vlan	:	Set the VLAN for dynamic VLAN
mac	:	Specify the terminal's MAC address when you want to specify an authentication terminal
ssid	:	Specify the SSID when you want to specify a connected SSID
name	:	Specify the user name
mail	:	Set the e-mail addresses to which client certificates will be distributed
auth	:	Set the authentication method type
expire	:	Set the term of validity for the client certificate (this is enabled only when the authentication method is EAP-TLS)

[Parameter]

userid : User ID

(within 3–32 characters; cannot specify "DEFAULT")

Authentication method	Characters that can be inputted
EAP-MD5, EAP-TTLS, PEAP, PAP	Single-byte alphanumeric characters and symbols other than the characters \ [ ] " ? and spaces
EAP-TLS	Single-byte alphanumeric characters and symbols other than the characters \ [ ] " ? and spaces

password : Password

(32 characters or less, single-byte alphanumeric characters and symbols other than the characters \ [ ] " ? and spaces)

vlan-id : <1-4094>

VLAN number for dynamic VLAN

mac-address : hhhh.hhhh.hhhh (h is hexadecimal)

MAC address for terminal (user) to authenticate

ssid : SSID connection point

(32 characters or less, single-byte alphanumeric characters and symbols other than the characters \ [ ] " ? and spaces)

name : User name

(32 characters or less, single-byte alphanumeric characters and symbols other than the characters " ? and spaces

mail-address : Mail address

(256 characters or less, single-byte alphanumeric characters and _ - . @)

type : Type of authentication method

Setting value	Description
pap	PAP authentication method (this type uses the user ID and password)
peap	PEAP, EAP-MD5, EAP-TTLS authentication method (this type uses the user ID and password)
eap-tls	EAP-TLS authentication method (this type uses the user ID and password)

When abbreviating, use “eap-tls”

date : Date (“2037/12/31” is used when omitted)

(YYYY/MM/DD from current date to 2037/12/31)

[Initial value]

none

[Input mode]

RADIUS configuration mode

[Description]

This registers the user to be authenticated with the RADIUS server.

The maximum number of registered entries is 2000.

If this command is executed with the "no" syntax, the specified user is deleted.

When the authentication method is EAP-TLS, client certificates need to be issued by executing the **certificate user** command.

Client certificates must be reissued for users for whom the term of validity has been changed on their password or client certificate.

When deleting a user whose client certificate has already been issued, the client certificate will automatically be processed for revocation.

[Note]

Information configured using this command will not display in running-config or startup-config.

Also, this is different from the regular settings command, in that it will be saved as setting data when this command is executed.

User information that was set can be checked using the **show radius-server local user** command.

MAC addresses specified using the “mac” keyword are used when the RADIUS client (NAS) notifies its Calling-Station-Id.

SSID specified using the “ssid” keyword are used when the RADIUS client (NAS) notifies its Calling-Station-Id.

[Example]

This registers the authenticated user.

```
SWX232x(config)#radius-server local-profile
SWX232x(config-radius)#user yamaha secretpassword mac 00a0.de00.0001 auth peap name
YamahaTaro
```

10.1.8 Reauthentication interval setting

[Syntax]

reauth interval *time*

no reauth interval

[Parameter]

time : <3600,43200,86400,604800>

Reauthentication interval (no. of seconds)

[Initial value]

reauth interval 3600

[Input mode]

RADIUS configuration mode

[Description]

Sets the reauthentication interval that is notified to the RADIUS client (NAS).

The RADIUS client (NAS) determines whether the reauthentication interval will be used.

If this command is executed with the "no" syntax, the setting returns to the default.

[Example]

This sets the reauthentication interval to 604800 seconds.

```
SWX232x(config)#radius-server local-profile
SWX232x(config-radius)#reauth interval 604800
```

10.1.9 Apply setting data to local RADIUS server

[Syntax]

radius-server local refresh

[Input mode]

privileged EXEC mode

[Description]

This applies the current settings to the local RADIUS server.

If the RADIUS-related settings have been modified, this command must be executed to update the data of the local RADIUS server.

[Note]

When this command is executed, operations will be temporarily halted and restarted afterwards, so that the data can be applied to the local RADIUS server.

[Example]

Applies the current settings to the local RADIUS server.

```
SWX232x#radius-server local refresh
```

10.1.10 Issuing a client certificate

[Syntax]

certificate [mail] **user** [*userid*]

[Keyword]

mail : This issues a client certificate and sends the certificate to the user via e-mail attachment.

[Parameter]

userid : User ID

(within 3–32 characters; cannot specify “DEFAULT”)

Authentication method	Characters that can be inputted
EAP-MD5, EAP-TTLS, PEAP, PAP	Single-byte alphanumeric characters and symbols other than the characters \ [ ] " ? and spaces
EAP-TLS	Single-byte alphanumeric characters and symbols other than the characters \ [ ] / : * | < > " ? and spaces

[Input mode]

privileged EXEC mode

[Description]

This issues client certificates to users for which the EAP-TLS certification method is specified.

If the user ID is omitted, client certificates will be sent for all users who meet the following conditions.

- Users to whom a client certificate has never been issued
- Users whose passwords or client certificate's term of validity has been changed
- Users whose authentication method has been changed to EAP-TLS

This automatically revokes the client certificates for users whose authentication methods have been changed from EAP-TLS to a method other than EAP-TLS.

When the "mail" keyword is specified, this sends a client certificate to the e-mail address set using the **user** command.

The e-mail subject and body text follow the e-mail settings template (**mail send certificate** command) used when the certificate was sent.

E-mails cannot be sent if an e-mail address has not been set.

[Note]

Up to two client certificates may be issued per user. If two or more client certificates are issued, the older ones will be revoked.

As bulk issuance of client certificates takes time, this is performed in the background, and other commands may be executed while the certificates are being issued.

However, note that the following commands may not be executed due to restrictions.

- crypto pki generate ca
- no crypto pki generate ca
- nas
- user
- certificate user
- certificate mail user
- certificate revoke
- certificate export sd
- copy radius-server local

[Example]

Bulk issuance of client certificates.

```
SWX232x#certificate user
```

10.1.11 Aborting the issue of a client certificate

[Syntax]

certificate abort

[Input mode]

privileged EXEC mode

[Description]

This aborts the bulk issuance of client certificates.

The issuance of client certificates can be restarted by executing the **certificate user** command once more.

[Example]

Aborts the bulk issuance of client certificates.

```
SWX232x#certificate abort
```

10.1.12 Revoking client certificates

[Syntax]

certificate revoke user *userid*
certificate revoke id *certificate-id*

[Keyword]

user	:	Revoking client certificates for specified users
id	:	Revoking client certificates for specified client certificate IDs

[Parameter]

userid : User ID

(within 3–32 characters; cannot specify “DEFAULT”)

Authentication method	Characters that can be inputted
EAP-MD5, EAP-TTLS, PEAP, PAP	Single-byte alphanumeric characters and symbols other than the characters \ [ ] " ? and spaces
EAP-TLS	Single-byte alphanumeric characters and symbols other than the characters \ [ ] / : * | < > " ? and spaces

certificate-id : Client certificate ID

Combination of “user ID” and “serial number”

[Input mode]

privileged EXEC mode

[Description]

This revokes client certificates for specified users or client certificate IDs.

In the event that a client certificate is revoked, the authorization using that certificate will fail.

[Note]

Client certificate IDs (certificate-id) can be checked using the **show radius-server local certificate list** command.

[Example]

This revokes the client certificate for user ID “Taro”.

```
SWX232x#certificate revoke user Taro
```

This revokes the client certificate for client certificate ID “Taro-DF598EE9B44D22CC”.

```
SWX232x#certificate revoke id Taro-DF598EE9B44D22CC
```

10.1.13 Exporting client certificates (copying to SD card)

[Syntax]

certificate export sd all [**compress**]
certificate export sd user *userid* [**compress**]

[Keyword]

all	:	Exporting client certificates for all users
user	:	Exporting client certificates for specified users
compress	:	Compress into a ZIP file

[Parameter]

userid : User ID

(within 3–32 characters; cannot specify “DEFAULT”)

Authentication method	Characters that can be inputted
EAP-MD5, EAP-TTLS, PEAP, PAP	Single-byte alphanumeric characters and symbols other than the characters \ [ ] " ? and spaces
EAP-TLS	Single-byte alphanumeric characters and symbols other than the characters \ [ ] / : * | < > " ? and spaces

[Input mode]

privileged EXEC mode

[Description]

This exports the client certificates to an SD card.

The certificates will be exported to the /swx2320/certification/ or /swx2322p/certification/ folder on the SD card.

If specified using “compress,” the client certificates will be compressed to a ZIP file and then exported.

Export target	Contents
all	Compress all client certificates as “certificate_all.zip”
user	Compress client certificates for specified users as “certificate_<specified ID>.zip”

[Note]

Only the newest client certificate (1) can be exported.

[Example]

This exports the client certificate for the user ID “Yamaha” to an SD card.

```
SWX232x#certificate export sd user Yamaha
```

10.1.14 Exporting of client certificates (sending via e-mail)

[Syntax]

certificate export mail all compress

certificate export mail user *userid* **compress**

[Keyword]

all	:	Send client certificates for all users via e-mail
user	:	Send client certificates for specified users via e-mail
compress	:	Compress into a ZIP file

[Parameter]

userid	:	User ID (within 3–32 characters; cannot specify “DEFAULT”)

Authentication method	Characters that can be inputted:
EAP-MD5, EAP-TTLS, PEAP, PAP	Single-byte alphanumeric characters and symbols other than the characters \ [ ] " ? and spaces
EAP-TLS	Single-byte alphanumeric characters and symbols other than the characters \ [ ] / : * | < > " ? and spaces

[Input mode]

privileged EXEC mode

[Description]

Sends client certificates to each user via e-mail attachment.

Client certificates to be sent are ZIP files, compressed using the passwords for each user.

E-mail cannot be sent to users whose e-mail addresses have not been set.

To send e-mail, the e-mail destination server and e-mail recipient name must be configured in the e-mail template, and an e-mail template ID for use when sending the e-mail must be set using the **mail send certificate** command.

[Note]

Only the newest client certificate (1) can be sent via e-mail.

[Example]

This sends a client certificate via e-mail to the user with the “Yamaha” user ID.

```
SWX232x#certificate export mail user Yamaha
```

10.1.15 Copying RADIUS data

[Syntax]

copy radius-server local *src_config_num dst_config_num*

[Parameter]

src_config_num : Copy source configuration number

Setting value	Description
<0-1>	Configuration #0-#1
sd	Configuration on the SD card

dst_config_num : Copy destination configuration number

Setting value	Description
<0-1>	Configuration #0-#1
sd	Configuration on the SD card

[Input mode]

privileged EXEC mode

[Description]

This copies the entire set of data in connection with the local RADIUS server.

- Route certificate authority
- Client certificates issued
- User data
- Management file

When you need to copy all settings including the command settings, you can use the **copy startup-config** command to copy.

[Note]

If an SD card that is not mounted is specified, an error will occur.

[Example]

This copies the config #0 RADIUS data to the SD card.

```
SWX232x#copy radius-server local 0 sd
Succeeded to copy Radius configuration
```

10.1.16 Show RADIUS client (NAS) status

[Syntax]

show radius-server local nas *host*

[Parameter]

host : IP address or IP network address

Setting value	Description
IPv4 address (A.B.C.D)	Range from 0.0.0.1 to 223.255.255.255, except for 127.0.0.1
IPv4 network address (A.B.C.D/M)	The network mask range is from 8 to 32, and the IP address host part will be “0”
IPv6 address (A:B:C::D)	Out of all unicast addresses, the exceptions are unspecified addresses (::/128), default root addresses (::/0) and loopback addresses (::1/128)
IPv6 network address (A:B:C::D/M)	The prefix length is 1–128

[Input mode]

privileged EXEC mode

[Description]

Shows a list of RADIUS clients (NAS).

[Example]

Shows the RADIUS clients (NAS) with an IP address of “192.168.100.0/24”.

```
SWX232x#show radius-server local nas 192.168.100.0/24
host                                    key
------------------------------------------------------------------------------
--------------------
192.168.100.0/24                        abcde
```

10.1.17 Show authenticated user information

[Syntax]

show radius-server local user [detail *userid*]

[Keyword]

detail : Show detailed information for the specified user

[Parameter]

userid : User ID

(within 3–32 characters; cannot specify “DEFAULT”)

Authentication method	Characters that can be inputted
EAP-MD5, EAP-TTLS, PEAP, PAP	Single-byte alphanumeric characters and symbols other than the characters \ [ ] " ? and spaces
EAP-TLS	Single-byte alphanumeric characters and symbols other than the characters \ [ ] / : * | < > " ? and spaces

[Input mode]

privileged EXEC mode

[Description]

This shows the user information.

[Example]

Shows the user information list.

```
SWX232x#show radius-server local user
Total     1

userid                          name                              vlan mode
------------------------------------------------------------------------------
00a0de001080                    YamahaTaro                           1 eap-md5
```

Shows user information for user ID “00a0de000001”.

```
SWX232x#show radius-server local user detail 00a0de000001
Total     1

userid      : 00a0de000001
password    : secretpassword
mode        : eap-tls
vlan        : 10
MAC         : 00a0.de00.0001
SSID        :
name        : YamahaTaro
mail-address: test.com
expire date : 2037/12/31
certificated: Not
```

10.1.18 Client certificate issuance status display

[Syntax]

show radius-server local certificate status

[Input mode]

privileged EXEC mode

[Description]

Shows the issuance status for client certificates.

Issuance status	Contents
done	Client certificate issuance completed, or not issued
processing	Now issuing client certificate
aborted	Issuance of client certificate aborted by executing “certificate abort” or other command

[Example]

Shows the issuance status for client certificates.

```
SWX232x#show radius-server local certificate status
certificate process: done.
```

10.1.19 Client certificate list display

[Syntax]

show radius-server local certificate list [**detail** *userid*]

[Keyword]

detail : Output the list of details

[Parameter]

userid : User ID

(within 3–32 characters; cannot specify “DEFAULT”)

Authentication method	Characters that can be inputted
EAP-MD5, EAP-TTLS, PEAP, PAP	Single-byte alphanumeric characters and symbols other than the characters \ [ ] " ? and spaces
EAP-TLS	Single-byte alphanumeric characters and symbols other than the characters \ [ ] / : * | < > " ? and spaces

[Input mode]

privileged EXEC mode

[Description]

This shows the list of client certificates that have been issued.

Specifying *userid* will show detailed information for that user.

[Example]

This displays client certificates that have been issued for specific users.

```
SWX232x#show radius-server local certificate list detail Yamaha

userid                          certificate number
enddate
-------------------------------------------------------------------------------
--------
Yamaha                          Yamaha-DF598EE9B44D22CC
2018/12/31
                                Yamaha-DF598EE9B44D22CD
2019/12/31
```

10.1.20 Revoked client certificate list display

[Syntax]

show radius-server local certificate revoke

[Input mode]

privileged EXEC mode

[Description]

This shows a list of client certificates that have been processed for revocation.

Reason for revocation	Contents
revoked	Manual revocation
expired	Revocation due to expired term of validity

[Example]

Displays the list of revoked client certificates.

```
SWX232x#show radius-server local certificate revoke

userid                          certificate number
reason
-------------------------------------------------------------------------------
--------
Yamaha                          Yamaha-DF598EE9B44D22CC
expired
                                Yamaha-DF598EE9B44D22CD
revoked
```

Index

A

aaa authentication auth-mac 163
aaa authentication auth-web 163
aaa authentication dot1x 163
access-group (IPv4) 260
access-group (IPv6) 262
access-group (MAC) 265
access-list (IPv4) 258
access-list (IPv6) 261
access-list (MAC) 263
access-list description (IPv4) 260
access-list description (IPv6) 262
access-list description (MAC) 264
action 131
aggregate-police 289
arp 232
arp-ageing-timeout 232
auth clear-state time (global configuration mode) 179
auth clear-state time (interface mode) 179
auth dynamic-vlan-creation 169
auth guest-vlan 169
auth host-mode 167
auth radius attribute nas-identifier 174
auth reauthentication 168
auth timeout quiet-period 170
auth timeout reauth-period 170
auth timeout server-timeout 171
auth timeout supp-timeout 171
auth-mac auth-user 166
auth-mac enable 166
auth-web enable 167
auth-web redirect-url 178
authentication 306
auto-ip 228

B

backup system 137
banner motd 32
baudrate select 54
boot prioritize sd 39

C

certificate abort 311
certificate export mail 313
certificate export sd 312
certificate revoke 312
certificate user 310
channel-group mode 154
class 277
class-map 276
clear access-list counters 266
clear arp-cache 232
clear auth state 178
clear auth statistics 177
clear boot list 39
clear counters 151
clear ip igmp snooping 252
clear ipv6 mld snooping 257
clear ipv6 neighbors 240
clear lacp counters 159
clear lldp counters 110
clear logging 58
clear mac-address-table dynamic 191
clear qos metering-counters 295
clear spanning-tree detected protocols 215
clear ssh host 91
clear ssh-server host key 87
cli-command 132
clock set 45
clock timezone 45
cold start 134
config-auto-set enable 120
copy auth-web custom-file 179
copy radius-server local 314
copy running-config startup-config 33
copy startup-config 36
copy tech-support sd 44
crypto pki generate ca 306

D

description 138
description (schedule) 131
dns-client 242
dns-client domain-list 244
dns-client domain-name 243
dns-client name-server 243
dot1x control-direction 164
dot1x max-auth-req 165
dot1x port-control 164

E

eee 142
enable password 28
erase auth-web custom-file 180
erase startup-config 36
errdisable auto-recovery 183
event-watch disable 119
event-watch interval 120
exec-timeout 53

F

firmware-update execute 123
firmware-update reload-method 125
firmware-update reload-time 125
firmware-update revision-down enable 124
firmware-update sd execute 124
firmware-update timeout 123
firmware-update url 122
flowcontrol (global configuration mode) 301
flowcontrol (interface mode) 301
force-password 29

H

hostname 133
http-proxy 83
http-proxy timeout 84
http-server 80
http-server access 82

http-server interface 81
http-server language 82
http-server login-timeout 83
http-server secure 80

I

instance 216
instance priority 217
instance vlan 216
interface reset 149
ip address 226
ip address dhcp 227
ip forwarding 233
ip igmp snooping 246
ip igmp snooping check ttl 249
ip igmp snooping fast-leave 247
ip igmp snooping mrouter interface 247
ip igmp snooping querier 248
ip igmp snooping query-interval 248
ip igmp snooping version 249
ip route 229
ipv6 235
ipv6 address 235
ipv6 address autoconfig 236
ipv6 forwarding 240
ipv6 mld snooping 252
ipv6 mld snooping fast-leave 253
ipv6 mld snooping mrouter interface 253
ipv6 mld snooping querier 254
ipv6 mld snooping query-interval 254
ipv6 mld snooping version 255
ipv6 neighbor 239
ipv6 route 237

L

l2-unknown-mcast 246
l2ms configuration 111
l2ms enable 111
l2ms filter enable 114
l2ms reset 115
l2ms role 111
lacp multi-speed 157
lacp port-priority 162
lacp system-priority 156
lacp timeout 158
led-mode default 135
line con 52
line vty 52
lldp auto-setting 99
lldp interface enable 106
lldp run 98
lldp system-description 98
lldp system-name 99
lldp-agent 99
logging backup sd 58
logging event 57
logging host 55
logging stdout info 57
logging trap debug 56
logging trap error 56
logging trap informational 56
loop-detect (global configuration mode) 222
loop-detect (interface mode) 223
loop-detect blocking 224
loop-detect reset 224

M

mac-address-table ageing-time 190
mac-address-table learning 190
mac-address-table static 191
mail certificate expire-notify 97
mail notify trigger 92
mail send certificate 96
mail send certificate-notify 96
mail server smtp host 91
mail server smtp name 92
mail template 93
management interface 55
match access-list (QoS) 277
match access-list (VLAN) 267
match cos 278
match ethertype 279
match ip-dscp 279
match ip-precedence 278
match vlan 280
match vlan-range 280
mdix auto 141
mirror interface 144
mount sd 135
mru 141
multiple-vlan group name 204

N

nas 307
negotiation 139
ntpdate interval 47
ntpdate oneshot 47
ntpdate server 46

P

pass-through eap 181
password 28
password-encryption 29
ping 233
ping6 241
police single-rate (aggregate policer mode) 290
police single-rate (policy map class mode) 285
police twin-rate (aggregate policer mode) 291
police twin-rate (policy map class mode) 287
police-aggregate 293
policy-map 282
port-channel load-balance 159
port-security enable 181
port-security mac-address 182
port-security violation 182
power-inline (global configuration mode) 184
power-inline (interface mode) 185
power-inline continuous 187
power-inline description 186
power-inline guardband 187
power-inline priority 186
private-vlan 194
private-vlan association 195
ptp (global configuration mode) 48
ptp (interface mode) 49
ptp mode 49
ptp transport protocol 50

Q

qos cos 270
qos cos-queue 273
qos dscp-queue 274
qos enable 269
qos port-priority-queue 275
qos queue sent-from-cpu 276
qos trust 270
qos wrr-weight 299

R

radius-server deadtime 174
radius-server host 172
radius-server key 173
radius-server local enable 305
radius-server local interface 305
radius-server local refresh 310
radius-server local-profile 306
radius-server retransmit 173
radius-server timeout 172
reauth interval 310
region 217
reload 134
remark-map (aggregate policer mode) 292
remark-map (policy map class mode) 288
remote-login 78
restart 134
restore system 137
revision 217
rmon 67
rmon alarm 70
rmon clear counters 74
rmon event 69
rmon history 68
rmon statistics 68

S

save 33
save logging 57
schedule 129
schedule template 131
script 133
send from 94
send notify wait-time 95
send server 94
send subject 95
send to 94
service terminal-length 54
service-policy 282
set cos 283
set cos-queue 295
set ip-dscp 285
set ip-dscp-queue 296
set ip-precedence 284
set lldp 100
set management-address-tlv 101
set msg-tx-hold 104
set timer msg-fast-tx 103
set timer msg-tx-interval 103
set timer reinit-delay 104
set too-many-neighbors limit 105
set tx-fast-init 105
sfp-monitor rx-power 152
show access-group 266
show access-list 266
show aggregate-police 293
show arp 231
show auth statistics 176
show auth status 175
show auth supplicant 176
show boot 38
show boot prioritize sd 39
show class-map 281
show clock 46
show config(show running-config) 34
show config(show startup-config) 35
show ddm status 151
show dhcp lease 228
show disk-usage 41
show dns-client 244
show eee capabilities interface 142
show eee status interface 143
show environment 40
show errdisable 184
show error port-led 136
show etherchannel 155
show etherchannel status 160
show fan history 45
show firmware-update 124
show flowcontrol 302
show frame-counter 149
show http-proxy 84
show http-server 81
show interface 145
show interface brief 147
show interface negotiation 140
show inventory 40
show ip forwarding 233
show ip igmp snooping groups 250
show ip igmp snooping interface 251
show ip igmp snooping mrouter 250
show ip interface 226
show ip route 230
show ip route database 231
show ip route summary 231
show ipv6 forwarding 240
show ipv6 interface 236
show ipv6 mld snooping groups 256
show ipv6 mld snooping interface 256
show ipv6 mld snooping mrouter 255
show ipv6 neighbors 239
show ipv6 route 238
show ipv6 route database 238
show ipv6 route summary 239
show l2ms 115
show l2ms slave-config 116
show lacp sys-id 157
show lacp-counter 159
show led-mode 136
show lldp interface 106
show lldp neighbors 109
show logging 59
show loop-detect 224
show mac-address-table 192
show mac-address-table count 193
show mail information 97
show memory 42
show mirror 144
show ntpdate 48

show policy-map 296
show port-security status 183
show power-inline 188
show process 41
show ptp 51
show ptp interface 51
show qos 271
show qos interface 271
show qos map-status 298
show qos metering-counters 294
show qos queue-counters 273
show radius-server 177
show radius-server local certificate list 316
show radius-server local certificate revoke 317
show radius-server local certificate status 316
show radius-server local nas 314
show radius-server local user 315
show rmon 72
show rmon alarm 74
show rmon event 73
show rmon history 73
show rmon statistics 73
show running-config 34
show snmp community 65
show snmp group 66
show snmp user 66
show snmp view 66
show spanning-tree 212
show spanning-tree mst 220
show spanning-tree mst config 220
show spanning-tree mst instance 221
show spanning-tree statistics 214
show ssh-server 85
show ssh-server host key 88
show stack 127
show startup-config 35
show static-channel-group 153
show storm-control 303
show tech-support 42
show telnet-server 75
show tftp-server 79
show users 31
show vlan 204
show vlan access-map 268
show vlan filter 269
show vlan multiple-vlan 205
show vlan private-vlan 205
shutdown 138
slave-watch down-count 113
slave-watch interval 112
snapshot delete 122
snapshot enable 121
snapshot save 122
snapshot trap terminal 121
snmp-server community 62
snmp-server contact 61
snmp-server enable trap 60
snmp-server group 64
snmp-server host 59
snmp-server location 62
snmp-server user 64
snmp-server view 63
spanning-tree 208
spanning-tree bpdu-filter 209
spanning-tree bpdu-guard 209
spanning-tree edgeport 211
spanning-tree forward-time 206
spanning-tree instance 218
spanning-tree instance path-cost 219
spanning-tree instance priority 218
spanning-tree link-type 208
spanning-tree max-age 207
spanning-tree mst configuration 215
spanning-tree path-cost 210
spanning-tree priority (global configuration mode) 207
spanning-tree priority (interface mode) 211
spanning-tree shutdown 206
speed-duplex 138
ssh 90
ssh-client 90
ssh-server 85
ssh-server access 86
ssh-server client alive 89
ssh-server host key generate 87
ssh-server interface 86
stack 126
stack renumber 127
stack subnet 128
startup-config description 37
startup-config select 37
static-channel-group 152
storm-control 303
switchport access vlan 196
switchport mode access 196
switchport mode private-vlan 199
switchport mode trunk 197
switchport multiple-vlan group 203
switchport private-vlan host-association 200
switchport private-vlan mapping 201
switchport trunk allowed vlan 198
switchport trunk native vlan 199
switchport voice cos 202
switchport voice dscp 203
switchport voice vlan 202

T

telnet 77
telnet-client 77
telnet-server 75
telnet-server access 76
telnet-server interface 76
terminal length 53
terminal-watch enable 113
terminal-watch interval 114
tftp-server 78
tftp-server interface 79
tlv-select basic-mgmt 101
tlv-select ieee-8021-org-specific 102
tlv-select ieee-8023-org-specific 102
tlv-select med 103
traceroute 234
traceroute6 242
traffic-shape queue rate 300
traffic-shape rate 300

U

unmount sd 135
user 308
username 30

V

vlan 193
vlan access-map 267
vlan database 193
vlan filter 268

W

wireless-terminal-watch interval 119
write 33