



## White Paper

# Active-Active Data Centers Help Enterprises to Safeguard Business Continuity in the Era of Digital Transformation

Sponsored by: Huawei

William Zhang  
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## IDC OPINION

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Digital technologies represented by cloud computing, Big Data, mobility and the Internet of Things are the main forces driving the development of the new economy. Driven by these emerging digital technologies, each enterprise is expanding business across traditional industrial boundaries. The digital business model is breaking the existing rules of the game, getting closer to users and creating new experiences for them.

Business and technology are vital for achieving digital transformation. Enterprises need to base their business design and development on digital technology. This implies that enterprises must develop new information technologies of the third platform represented by cloud, Big Data, social and mobility technologies.

The application of digital transformation and third platform technologies has made enterprise data centers become increasingly important. More technological capabilities have shifted from the client end to cloud computing data centers. As cloud computing and data centers concentrate, data center reliability has become more and more closely related to enterprises' business development. Active-active data centers, as a solution loosely related to enterprises' business continuity, are drawing growing attention from users.

An IDC research conducted in 2016 shows:

For CIOs, the key to selecting BCDRs (Business Continuity and Disaster Recovery System Solutions) is to firstly understand enterprises' business needs, policies and priorities. Then, they will need to design IT services that can meet such requirements and find a solution that can best satisfy them. There is no doubt that cloud represents the future trend, and there are now all kinds of cloud service solutions relating to BCDR. However, most enterprises today deploy their various businesses on different platforms, resulting in complex IT architecture.

An IDC survey of more than 1,300 enterprises in the Asia/Pacific Region indicates that enterprises that select public cloud-based BCDR solutions are mostly small- and medium-sized enterprises, and these solutions are mainly about secondary critical businesses. For enterprise-level critical businesses, more companies have opted for private cloud-based active-active data center solutions to ensure business continuity and delivery of critical business services.

The active-active data center involves various levels, including application, computing, network and storage. Among them, the storage system is the primary component and also the most important part of the active-active data center. Storage active-active solutions include 2 types: array-based Active-Active and Active-Passive. In addition, there are also independent gateway-based active-active solutions. CIOs need to select a suitable solution based on their business needs. Array-based Active-Active solutions can ensure zero RPO (recovery point objective), zero RTO (recovery time objective) and business load balance between 2 active-active data centers, maximizing performance advantages while saving TCO. On the whole, such solutions are more suitable for meeting enterprises' need for critical business delivery and continuity, helping enterprises take the first opportunity in digital transformation.

In addition, the open source cloud computing program, OpenStack has become the most widely accepted cloud platform standard, currently with more than 300 companies worldwide in participation. The practice of OpenStack has deepened from the Internet to finance, telecom, manufacturing, retail, energy and other traditional industries, with growing deployment in the production environment. In cloud data center building, it has become regular practice for traditional solutions to integrate

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### Enterprise Users Are Facing Digital Transformation

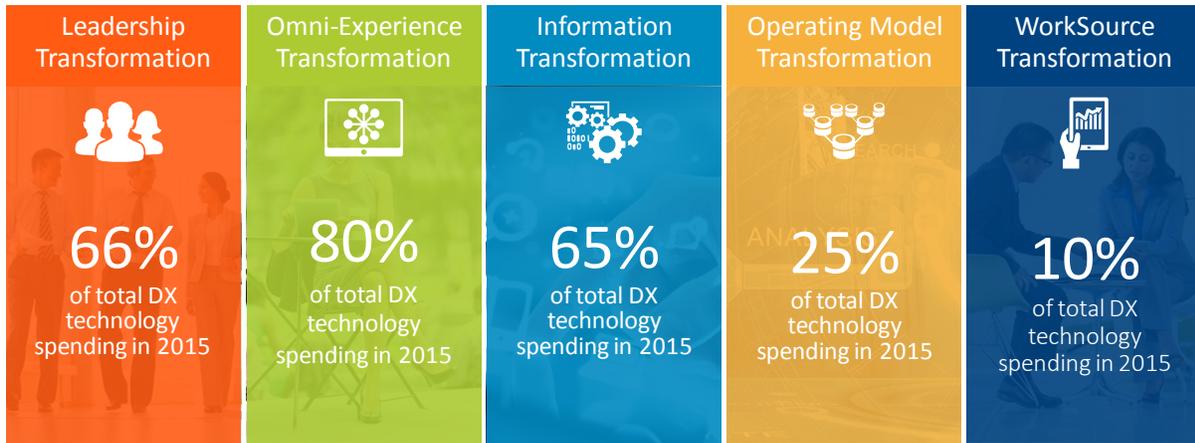
Like air and water, the Internet and digital technologies are becoming an indispensable part of people's work and lives. The Internet of Things, social media and mobility technology are changing the way people interact among themselves and with enterprises and government institutions. Global connection makes traditional enterprises gradually evolve into digital organizations. Digitalization has brought not only convenience to individuals and enterprises; it has also paved the way for the demand for swift, flexible, secure and outstanding user experience. As a result, government departments, financial companies, Internet and traditional manufacturing enterprises are all considering how to transform digitally in order to target market segmentation intelligence, strengthen interaction with users, achieve product and service differentiation and further tap into potential business opportunities.

Today, businesses worldwide are focused on prioritizing user-centric preferences, much of it being on a digital platform. At the beginning, governments, enterprises and individuals were cautious of digitization, however, they have now grown to accept and embrace this new era. Cloud computing, Big Data, mobility and the Internet of Things, these digital technologies are emerging in prominence, breaking and recreating the value chain. All enterprises are expanding their businesses beyond traditional industrial boundaries. The digital business model is breaking out of the existing mold and creating new experiences for users, such as real time online interaction and product on demand, etc.

Enterprises with a strong focus on digital innovation are exerting a growing influence on the market and users. Companies that implement a digital strategy are likely to become a market leader. Early adopters are already seeing the benefits such as growing operating revenues, profitability and market valuation. However, most enterprises still have a limited understanding of the meaning of digitization. In IDC's view, digital transformation maturity can be measured in 5 dimensions, including leadership, omni-experience, information, operating model and work source.

FIGURE 1

IDC Enterprise Digital Transformation Survey, 2015



Source: IDC, 2016

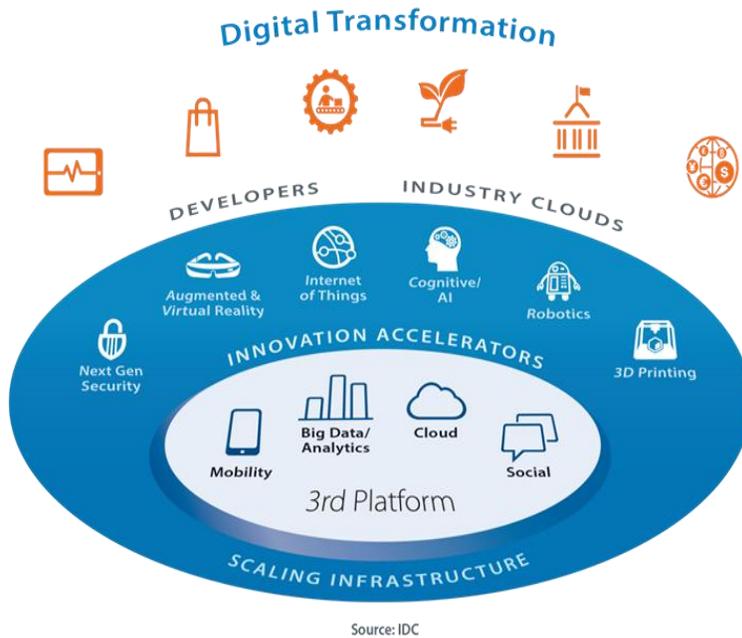
Third Platform Technologies (Cloud, Big Data, Mobility and Social) Support Enterprises' Digital Transformation

The digital transformation which drives the new economy is happening here and now, where business and technology are crucial for achieving digital transformation. Enterprises need to base their business design and development on digital technology. As the market is undergoing a revolutionary change, how will emerging digital technologies affect the industry and users? What technologies will lay the foundation for future success? IDC believes that new IT is vital for achieving digital transformation in the new economy. New IT will push forward changes in production, management and marketing models, recreate the industry, supply and value chains. Furthermore, it will reconstruct and improve traditional momentums, generate new vitality and eventually speed up the development of the new economy.

Third platform technologies represented by cloud, Big Data, social and mobility technologies will promote platform-based virtual resource sharing among users. There will also be more frequent and effective interaction among people and that with the equipment. Data will flow much faster between different channels and carriers and come in more diversified formats, adding more value. Driven by these technologies, products, services and interaction modes will be increasingly digitalized. Users' custom needs will be optimized. The fulfillment of demand is the primary driving force for social and economic development. It is inevitable that the third platform and related technologies, especially cloud computing, smart connection and Big Data technologies will dominate digital change in the next few years.

FIGURE 2

## Relationship between Digital Transformation and Third Platform Technologies



Source: IDC, 2016

## Data Center Reliability Is the Foundation for Digital Transformation

Not long ago, IDC divided enterprise IT functions into 2 types: supporting business development, and pushing forward business innovation. Today, it becomes increasingly difficult to distinguish between the two. IT is a critical element for enterprises to deliver new products and services, interact with customers and differentiate from others in the market. It is more fitting than ever before to describe that data centers are the cornerstone of businesses.

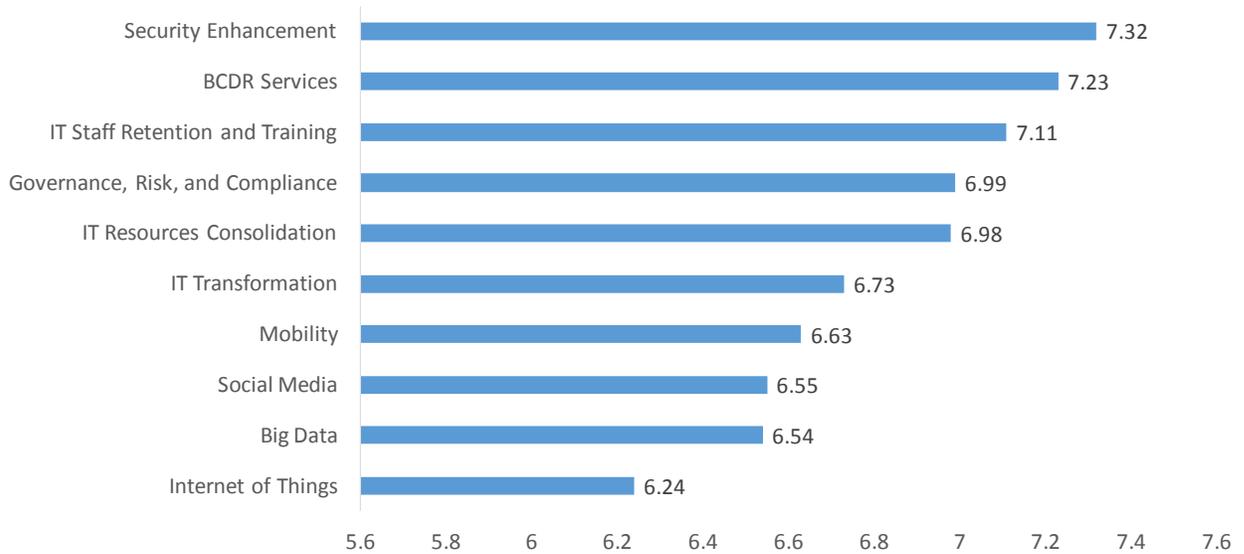
In the era of digital transformation and cloud computing, enterprises' rapid business iteration and innovation have presented many challenges to data centers, such as providing continuous business services while managing more and more applications (most are online). Previous experience shows that system downtime and business interruption not only incur operating revenue losses, but also greatly damage enterprise reputation. The latter can often cause serious damage to organizations on the social network platform. As a result, CIOs all attach great importance to data center reliability, which in turn, is the foundation for enterprises' digital transformation.

IDC's survey of nearly 1,300 enterprise-level customers in the Asia/Pacific Region shows that strengthening security protection and BCDR are the two items of greatest concern to customers.

**FIGURE 3**

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**Top 10 Data Center Matters of Greatest Concern to Enterprises**



Source: Asia/Pacific Enterprise End-user IT Service Survey, 2015-2016

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**BCDR IS THE CORNERSTONE SUPPORTING ENTERPRISES' DATA CENTERS**

**Global BCDR Development Trend**

**Private Cloud BCDR (Business Continuity & Disaster Recovery System Solution):** private cloud BCDR is suitable for enterprises with 2 or more geographically separated addresses. It can ensure that all functions including business continuity and disaster recovery can be managed by the IT teams within organizations. This will allow enterprises to evenly distribute production load between several data centers and data recovery addresses in different regions, maximizing the utilization of the IT set-up. This will also create a dynamic, flexible environment for enterprises so that their IT department can readily allocate resources according to demand. Usually, big companies will choose to deploy such solutions for their critical businesses. What is worth noting is that when enterprises want to safeguard business continuity and disaster recovery on their private cloud, they also face new challenges, such as lack of multiple tenants and centralized management. When choosing a private cloud disaster recovery system, these questions must therefore be taken into account.

**Public Cloud BCDR (Business Continuity & Disaster Recovery System Solution):** Public cloud-based BCDR means that the production and replication environments of applications are migrated to the public cloud platform hosted and protected by the cloud service provider. In BCDR, data is moved to another geographical location of cloud service provider. What is worth noting is that cloud service providers will face grave challenges when protecting task-critical application programs hosted in the public cloud. This is because different customers have different IT environments and network situations, and therefore the challenge is to ensure business continuity and undergoing a smooth transition.

**Disaster Recovery as a Service (DRaaS):** Adopting DRaaS will allow enterprises to deploy their own data centers within their systems. However, the cloud service provider has to be their data recovery address and replication target. Enterprises can host their replication site within the cloud service provider's infrastructure which transcends several geographical regions to gain certain cost benefits and reduce complexity. However, DRaaS also has its limitations and is not suitable for some enterprises. For example, for cost and/or size reasons, it is not feasible to provide DRaaS cloud for applications at Layer 1 or 2. For array-based replications, the cloud service provider needs to create a separate and identical environment for each customer under its protection to meet the requirements of the basic equipment under replication. Due to equipment and management expenses, this will greatly increase cost, making it impossible to offer such services. In addition, DRaaS also has other defects in terms of multiple tenants and centralized management. In some cases, lack of two-way replication to support multiple addresses is also a problem.

Disaster Recovery is not Business Continuity

With the development of digital business and the intensification of competition, safeguarding data security and achieving business continuity are of great significance for every enterprise. It is also an issue which CIOs cannot avoid. For banking transaction settlement, telecom billing and other core businesses, it is far from enough to enable the disaster recovery center and ensure the absolute reliability of critical data in the event of a system breakdown. Business continuity operations have become a general requirement. For enterprises, business continuity is a key priority. After a disaster or when there is minor destruction, enterprises can recover their business operations through a business continuity program. This program is not merely about technology. All the people and processes involved must ensure smooth business operations. Under these circumstances, the recovery procedures include making backups in the recovery server or host which includes rebuilding a dedicated switch and deploying LAN.

For example, an enterprise's traditional disaster recovery solution usually will have a standby address for storing the backup data and system in the event of a disaster. By maintaining due attention to critical factors such as RPO and RTO, enterprises can to a great extent, avoid data loss or destruction to their IT system which supports their business functions when a disaster occurs. However, this is half of the process to establish a robust business. A business continuity solution includes an acute focus on task-critical services, communication policy and employee recovery. For example, it can respond rapidly by running the system after a disaster and minimizing any damage.

Disruptions to business services are not necessarily triggered by large-scale disasters. Minor destruction can also jeopardize business continuity. As shown in Fig.4, large-scale natural disasters only make up 21.3% of the causes of data center downtime for enterprises, while IT system downtime and man-made mis-operations account for over 60% of the causes. To give more examples, power interruption caused by excavators on the parking lot or a single fault in application program during IT equipment startup or running will also interrupt business continuity. In the cloud era, enterprises have higher operation requirements. Data backup and storage replication functions alone can no longer meet enterprises' requirement for RPO=0 and RTO=0. Enterprises need to consider more sound solutions to meet business continuity demand.

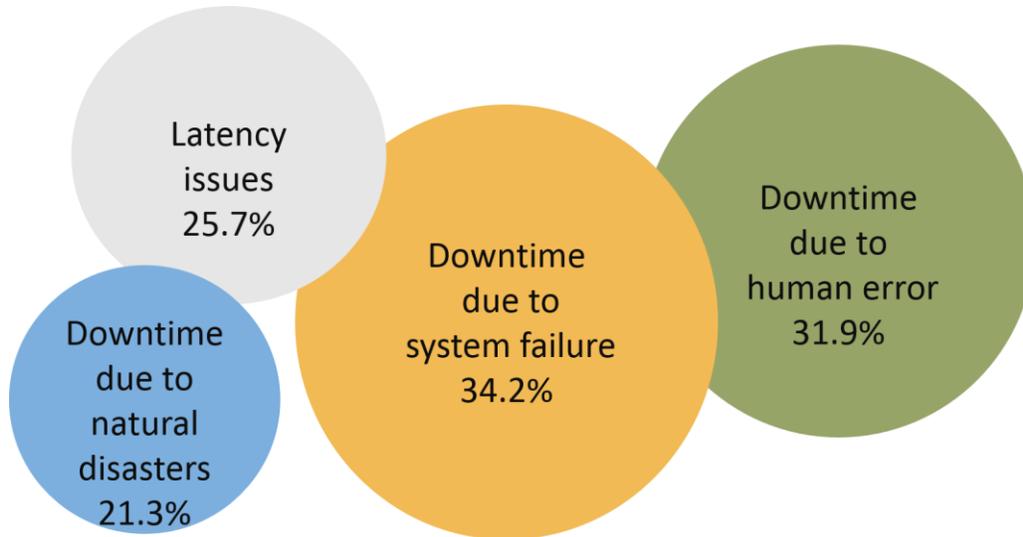
From the above description, it can be seen that compared with active-active solutions that can ensure business continuity, traditional "Active-Passive" disaster recovery solutions have the following shortcomings. This is also the reason why the former are more attractive to CIOs:

- 1) In traditional disaster recovery solutions, the disaster recovery center cannot provide external services and is idle throughout the year, resulting in resource waste and low utilization. The active-active center emphasizes more on synergetic work between the dual centers, doubling IT resource use efficiency and return on investment.
- 2) When a production center encounters business system failure, power supply fault or even fire, the traditional disaster recovery solution requires specialists to manually switch business to the disaster recovery center. During this period, professional recovery policy and certain adjustment and verification will be needed. Because the duration of business interruption is unforeseen, it is difficult to ensure continuous business operation for enterprises.
- 3) In traditional disaster recovery solutions, enterprises organize their IT departments to make regular disaster recovery drills to protect and maintain the operations of its data centers.



**FIGURE 4**

**Causes of Data Center Downtime in Enterprises**



Source: IDC, 2016

**Active-Active Solutions Ensure Enterprise Business Continuity**

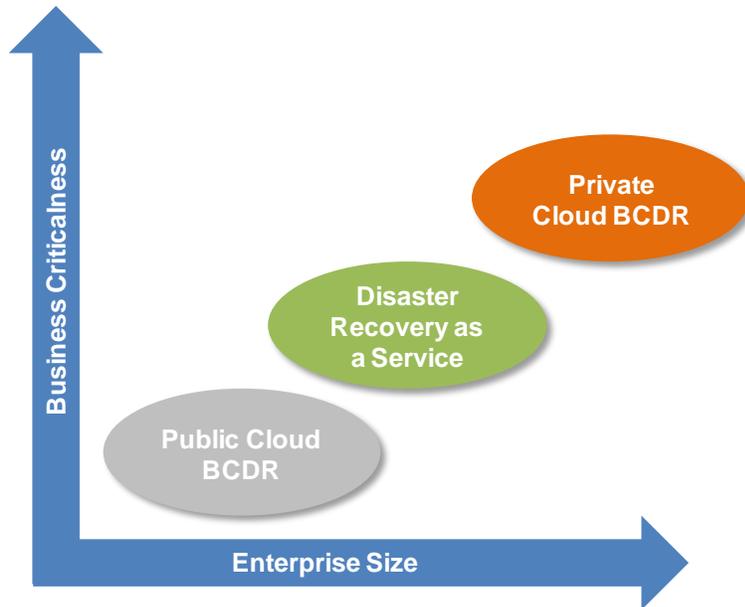
For CIOs, the key to selecting BCDR is to firstly understand enterprises' business needs, policies and priorities. Then, they will need to design IT services that can meet such needs and find a solution that can best satisfy these requirements.

There is no doubt that cloud represents the future trend, and there are now all kinds of cloud service solutions relating to BCDR. However, most enterprises today deploy their various businesses on different platforms, supported by complex and diversified applications and infrastructure. An IDC survey of more than 1,300 enterprises in the Asia/Pacific Region indicated that enterprises that select public cloud-based BCDR solutions are mostly small- and medium-sized enterprises, and these solutions are mainly about secondary critical businesses. For enterprise-level critical businesses, more companies have opted for private cloud-based active-active solutions to ensure their business continuity. For example, enterprises in finance, taxation and telecom industries mostly adopt an active-active & 3-centers-in-2-places solution to make large-scale critical business data protection and provide the highest level of business continuity guarantee. For the protection of small- and medium-scale enterprise-level data, non-critical business data or projects with a limited initial investment, enterprises will adopt efficient, economic and applicable backup and disaster recovery solutions, starting with small-scale deployment and gradually improving their data protection capacity.

**FIGURE 5**

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**The Active-Active System Is the Best BCDR Solution to Enterprises' Critical Applications**



Source: IDC, 2016

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**ACTIVE-ACTIVE SOLUTIONS' BUSINESS VALUE TO CUSTOMERS**

**IDC's Definition & Classification of Active-Active Solutions**

"Active-active" data centers refer to a model whereby two data centers of the same business system can deliver services on a concurrent basis, serving as mutual backup to each other as a contingency measure. This dual model enables businesses to complete transitions or switchovers automatically and seamlessly.

Active-active data centers involve various layers, including application, computing, network and storage. Among them, the storage system is the primary and also the most important part of the data center. The storage layer active-active solution model enables two independent storage devices to function in real time, hold consistent data copies that can be concurrently read, written and accessed by the same business host. Therefore, continuous business operations at upper layers are ensured even when there is a fault.

Current mainstream storage-layer active-active solutions are mainly divided into the following 3 types:

- **Active-Passive array-based solutions:** Only the primary site array bears the business load, while the secondary site array is not in a mode of real time business provision (divided into 2 modes: inaccessible and business forwarding). An arbitration mechanism is provided so that service operation is maintained even when one site is faulty. In this mode, link faults between the primary site server and the primary array may cause service interruptions.
- **Active-Active array-based solutions:** The primary and secondary sites both adopt an active-active architecture, and all the I/O paths of the same active-active LUN can be concurrently accessed while both the primary and secondary arrays can process the same business I/O. There is no need for forwarding between systems. Business load balance can be achieved, and a sound arbitration mechanism is provided. In the event of a fault, a seamless transition can be made.
- **Active-Active gateway-based solutions:** This type involves using dedicated equipment to make virtual takeovers of the disk array. It enables load balance and provides an arbitration mechanism. When one site is faulty, service operation is maintained. What is worth noting is that adding gateway equipment implies increased networking complexity, and purchase and management costs will also rise. The introduction of external gateways also increases nodes of the IT system. A longer I/O path will result in increased system delays and have a certain impact on overall system reliability and performance. Especially in an era of widespread application of full flash memories, gateway devices can easily become an obstacle for the whole system in terms of securing maximum performance and minimum delays.

Array active-active solutions refer to Active-Active array solutions. In IDC's view, the latter should meet the following conditions:

- **Active-active is achieved between independent storage systems with independent hardware/software.** (If active-active is achieved between different engines of a single storage system, it will not be able to handle any related issues and other abnormal scenarios. It is thus very likely to result in business interruptions.)
- The two storage systems should be able to concurrently provide upper layer applications with the read/write authorization of the same LUN. The two active-active copies are both in active mode (non-active/standby mode) and provide the outside with real time, consistent mirror data volumes (RPO=0, RTO=0).
- **Provide an independent arbitration mechanism.** (When there is a link fault between the two storage systems that provide active-active LUN, the arrays can no longer achieve real time mirror synchronization. At this time, one array has to continue to deliver service. To ensure data consistency, there must be independent third-party arbitration to decide which array will continue to provide service. Otherwise, service disruption may occur.)
- Active-active replication links between the two storage systems support high-performance FC networking. (This is to ensure performance after critical business becomes active-active.)

## Active-Active Solutions' Value to Users

The frequent occurrence of natural disasters in recent years has raised alarms for all sectors. Ensuring business service continuity has become a priority for many CIOs, since system downtime can result in immeasurable business and reputation losses to enterprises.

IDC's survey of enterprises in the Fortune Global 1000 shows:

- Average annual losses from unscheduled application downtime varied from \$1.25 billion to \$2.5 billion.
- Average losses per hour resulting from infrastructure downtime reached \$100,000.
- Hourly losses due to critical application downtime were as high as between \$500,000 and \$1 million.

When selecting a business continuity solution, CIOs must be clear about the technical differences between the traditional active/standby model and active-active solutions. Active-active and disaster recovery centers are consistent in their aim to align customers' business continuity requirements and IT infrastructure's supporting capacity. Traditional disaster recovery dual or multiple centers all adopt the active/standby model and require manual switchover. When a disaster occurs, it usually takes several hours for a manual recovery to take effect. However, active-active centers emphasize more on the collaborative work and automatic switchover abilities of two data centers, doubling IT resource use efficiency and return on investment.

It can be therefore seen that traditional data backup and active/standby disaster recovery solutions are far from meeting enterprises' zero critical business interruption and zero data loss requirements. In the data center construction planning stage, active-active data center solutions have already become an essential requirement for critical business systems. According to an IDC survey conducted in 2015, nearly half of the surveyed enterprises specifically said that they had a plan to use active-active data center solutions to improve their business continuity and such enterprises were mainly concentrated in government, finance, telecom, manufacturing and other traditional sectors with the highest requirement for data security. Active-active data center solutions will help them reduce issues such as disproportionate high cost, complications in construction and management, long switchover time and numerous complex technical solutions. In effect, markedly boosting enterprise trust in data center disaster recovery.

IDC has observed that Huawei has implemented numerous active-active solutions in telecom operators, finance, government and other sectors. Below, an introduction will be made to Huawei's active-active array solutions.

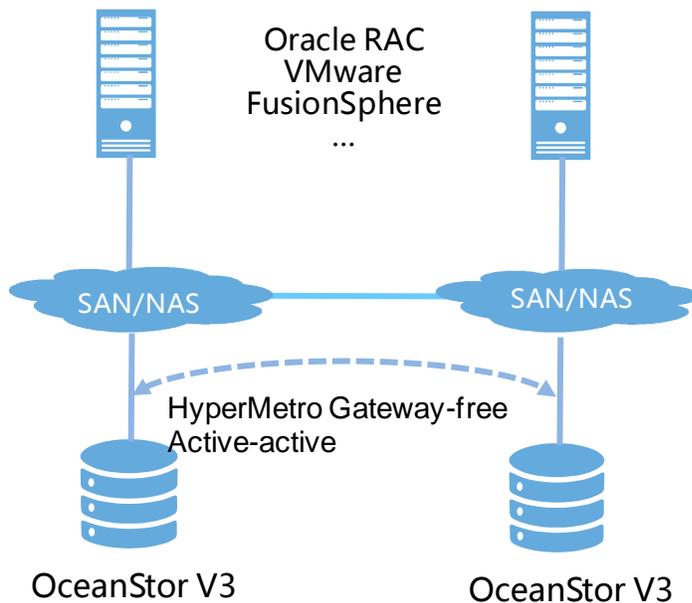
## Overview of the Huawei HyperMetro Gateway-Free Active-Active Array-based Solution

The Huawei HyperMetro Gateway-Free Active-Active Array Solution is based on Huawei OceanStor V3's storage-integrated HyperMetro features. In combination with the database cluster, transmission equipment, network and other components, it provides customers with an end-to-end active-active data center solution over a distance of up to 300 km and ensures automatic business switchover and no perception by upper layer applications and achieves RPO=0 and RTO=0 when the business system encounters an equipment fault or single data center fault.

The Huawei HyperMetro Gateway-Free Active-Active Array Solution consists of two independent OceanStor V3 storage systems. It concurrently delivers two real-time, consistent data copies for the business host to read, write and access. Any fault with either copy will not affect continuous business operations.

FIGURE 6

### Schematic Diagram of the Huawei HyperMetro Gateway-Free Active-Active Array Solution



Source: Huawei, 2016

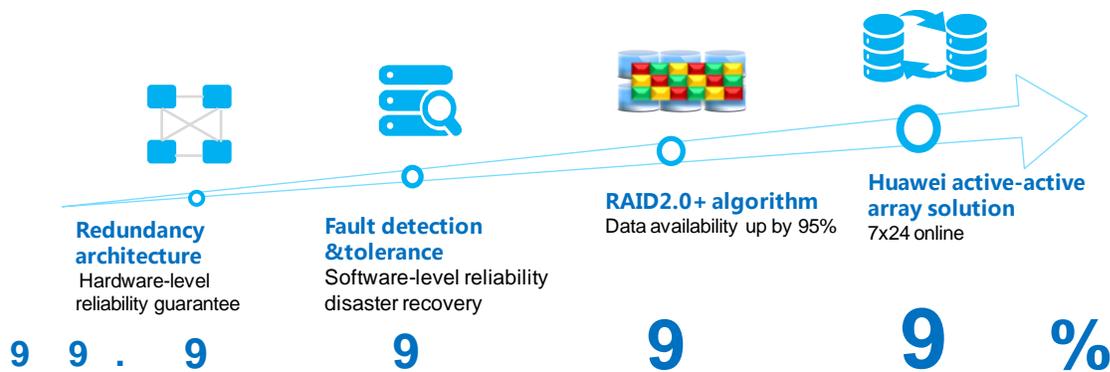
## Features of the Huawei HyperMetro Gateway-Free Active-Active Array Solution:

- **2 independent storage systems:** Active-active is achieved between 2 OceanStor V3 storage systems with independent hardware/software. This can effectively contain any single storage system faults and provide better reliability.
- **Integrated active-active of SAN and NAS:** No extra NAS gateway is needed on the SAN equipment. Active-active is concurrently achieved between the database and files at the business layer through array features. It lowers business deployment complexity, effectively reduces faulty points on the I/O path and improves system reliability.
- **Concurrent read/write A-A access mechanism:** The two data centers provide highly consistent data mirror copies, as well as identical business data to the upper layer applications, and achieve business load balance. When one data center is faulty, business can be automatically switched over to the other data centers, thus achieving zero data loss and zero business interruption.
- **Real time active-active copy synchronizations:** The two active-active copies maintain real time consistency, with RPO=0 and RTO=0. Even after a third-party arbitration fault occurs, the active-active LUN still possesses the capacity to provide read/write access ability at the same time to ensure real time data synchronization.
- **Performance-guaranteed FC replication link:** The SAN network and data mirror synchronization network between the active-active data centers support FC networking and can ensure performance after critical businesses become active-active. As is known to all, it is difficult for the IP network to meet the business requirement of maintaining high performance and low delay. It even has a stricter restriction on the data center deployment distance.
- **Independent third-party arbitration mechanism:** The Huawei HyperMetro Gateway-Free Active-Active Array Solution provides dual arbitration modes, namely supporting the two modes of third-party arbitration and booking priority, as well as automatic switchover between the two modes. Third-party arbitration may be achieved by adopting a physical or virtual server, and the production center and the arbitration server only require IP network accessibility. Unlike the solutions of some vendors in the industry which make arbitration through third-party arrays and must use FC networking, the Huawei HyperMetro Gateway-Free Active-Active Array Solution is more flexible and has a lower TCO. In addition, even if third-party arbitration has a fault, Huawei HyperMetro can automatically enter the booking priority mode. Compared with traditional active-active solutions, the Huawei solution offers a more sound arbitration mechanism and achieves higher business continuity.
- **High reliability:** Each active-active data center has redundant controllers of the OceanStor V3 storage. Even if a single controller is faulty, the remaining controllers can continue to provide business. There is no need to switch business over to the data center at the opposite end, thus ensuring higher performance and efficiency. In addition, in the most extreme situation when 3 of the 4 controllers making up the active-active system are damaged, business can still run without disruption.

- **Wide value-added feature compatibility:** Huawei HyperMetro's active-active feature can be combined with the heterogeneous virtualization feature to take over the storage equipment of different vendors and different brands. Users can fully leverage the resources of the existing storage equipment to achieve highly reliable storage resources integration, improve resources utilization and maximize user experience. It is also possible to combine snapshot, remote replication and other value-added features and make full use of the features of local or remote data protection to provide higher levels of business continuity protection.
- **Visualized & simplified disaster recovery management:** The disaster recovery management software of the Huawei HyperMetro Gateway-Free Active-Active Array Solution can provide simplified disaster recovery. It offers end-to-end monitoring functions to visually and clearly present the protection solution state and its changes, monitor relevant equipment components in real time, identify problems and faults before a business disaster happens, assist users to fix them, and prevent disaster recovery switchovers that affect business and increase cost.

FIGURE 7

### Huawei HyperMetro Gateway-Free Active-Active Array Solution Provides Users With 99.9999% Reliability



Source: Huawei, 2016

### Huawei HyperMetro's Value as Compared with Active-Passive Solutions

Compared with Active-Passive solutions, the Huawei HyperMetro Gateway-Free Active-Active Array Solution has the following advantages:

- High reliability & zero business interruption:
  - Two sites providing services on a concurrent basis. In combination with a powerful dual arbitration mechanism, the solution possesses a reinforced fault resistance ability and can effectively guarantee 7\*24 continuous business operations.

- Huawei's patented cross-site corrupt block repair technology provides both local and remote end data block repair solutions. The double protection ensures zero data loss and zero business interruption.
- High performance (20% improvement in performance)
  - Two data centers concurrently providing services and load balance, therefore preventing primary site performance bottlenecks.
  - The A-A architecture can fully leverage computing resources, effectively reduce inter-array communication, shorten the I/O path, therefore acquiring higher access performance and faster fault switchover.
  - Nearby business access shortens the I/O path and reduces overall system delay.
  - Huawei's patented FastWrite technology optimizes data synchronization, reduces the number of protocol interaction times between data centers and achieves shorter delays. This also makes 300KM ultra-distance active-active deployment possible and gives users more flexible site selections.

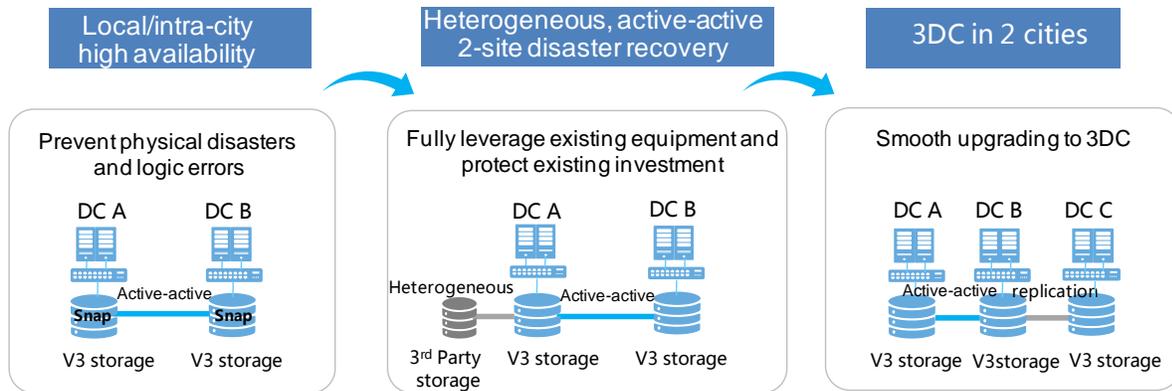
### *Huawei HyperMetro's Value as Compared with Active-Active Gateway-based Solutions*

In the Huawei HyperMetro Gateway-Free Active-Active Array Solution, users can adopt two independent OceanStor V3 converged storage products to provide active-active service, with no need of an extra gateway. Compared with gateway-based active-active solutions, Huawei HyperMetro has the following advantages:

- **Higher reliability:** No separate storage gateway needs to be deployed in the IT architecture, thus reducing the number of possible fault points in the IT system and improving overall solution reliability.
- **Improved performance:** In traditional active-active gateway solutions, the host must pass through the storage gateway to connect with the storage array. The gateway-free active-active solution has a shorter I/O path, thus greatly improving on system performance and 1.0-1.6 ms I/O response latency. Especially in active-active scenarios with high-end storage and all flash arrays, gateway equipment can easily become performance and availability bottlenecks on the whole I/O path.
- **Simpler networking & lower TCO:** The host is directly connected with the storage array, with no need to buy gateway equipment, thus reducing users' CAPEX. Meanwhile, it can greatly reduce networking complexity, shorten delivery time as well as the TTM for applications, and lower TCO by 44%.
- **Smooth expansion & more flexible solution:** When an upgrade into an active-active data center + off-site disaster recovery solution is needed, Huawei's active-active data centers require no change in existing networking or the introduction of gateway equipment. Huawei can complete the upgrade from active-active to a 3DC solution through the combination of OceanStor V3's HyperMetro functions and remote replication functions, thus helping users form higher-level multi-site disaster recovery solutions.

FIGURE 8

## Huawei HyperMetro Gateway-Free Active-Active Array Solution Supports Smooth Upgrade



Source: Huawei, 2016

### *Bottlenecks of Disaster Recovery Management & Overview of Huawei's Disaster Recovery Management Software*

As enterprises speed up their business digitalization process, traditional data centers' disaster recovery management work has met with the following difficulties:

- In enterprises' IT system, there are more and more business systems and applications (such as Oracle, DB2, SQL Server, etc.) which need disaster recovery protection as critical businesses. Meanwhile, there is a growing trend for IT systems to become cloud-based. Numerous virtual machines also need to provide protection, while these business systems lack a unified management platform.
- Different applications have different configuration modes and recovery processes, making management difficult. Meanwhile, business switchover and recovery lack automatic setup and deployment processes. Only specialists can operate them, which is time-consuming and error-prone.
- Traditional business switchover and drill processes are not visualized.

While activating disaster recovery data center resources and improving system resources utilization, the Huawei HyperMetro Gateway-Free Active-Active Array Solution can achieve agile visualized operations of active-active data centers via the OceanStor BCManager disaster recovery management software.

Huawei OceanStor BCManager is positioned as disaster recovery business management software for enterprises' data centers. With excellent application sensing capability and integration of Huawei's active-active storage, snapshot, remote replication and other data protection features, it provides application protection, visualized disaster recovery and management automation service abilities, to ensure consistency for application data in the disaster recovery process. It can complete simple and efficient disaster recovery business configurations, provide clear, visual information on the state of system disaster recovery business operations, and complete data recovery and test drills fast and conveniently.

Huawei OceanStor BCManager has the following main features:

- **Business integration:** Huawei OceanStor BCManager concurrently supports disaster recovery protection for traditional enterprise applications and virtualization platforms, which means it can fully adapt to the cloud-based development trend of enterprises' data centers.
- **Disaster recovery visualization:** Huawei OceanStor BCManager can make physical and logical topology presentation for disaster recovery-related business scenarios and let the IT administrator control the overall situation more easily. It can also visually show the disaster recovery protection switchover process and the disaster recovery drill process, provide statistics on the protection status of all applications, and provide information to help management personnel make better decisions.
- **Management automation:** Huawei OceanStor BCManager provides standard disaster recovery policy templates and customized recovery processes to meet different enterprises' personalized needs. All protected applications can achieve one-click disaster recovery business switchover and testing, ensuring automatic business operation, effectively shortening business switchover time and preventing man-made errors.

In addition to simple and convenient disaster recovery management tools, Huawei can also provide users with one-stop active-active data center construction service. Combining professional consultancy and delivery teams with 10+ years of work experience with its sound drill methodology, tools and templates, Huawei can provide users with disaster recovery consultancy, solution design, implementation, delivery, disaster recovery drill and other end-to-end disaster recovery services, Huawei's one-stop services make active-active data center construction simpler for users.

## OpenStack-Based Cloud Disaster Recovery Construction Enters the Fast Development Stage

Launched in 2010, OpenStack has become the most popular open source cloud computing program. More than 300 companies worldwide have taken part in it. Several world-leading IT companies including Huawei have played important roles in the program. OpenStack has now become the most widely accepted cloud platform standard. The adoption of OpenStack has extended from Internet to finance, telecom, manufacturing, retail, energy and other traditional industries, pushing forward industries to embrace "Internet + Connectivity" and transform to smart and cloud-based services, and making IT a driving force for business change and evolution. Cloud disaster recovery has started to be deployed in telecom carriers, finance and other industries, and OpenStack is also increasingly deployed in the production environment. Cloud disaster recovery provides disaster recovery capability for OpenStack-based cloud data centers. It can also provide tenant-oriented disaster recovery service and serve as an essential requirement for cloud data center construction.

Huawei's cloud disaster recovery solution is based on the OpenStack cloud data center architecture and has integrated Huawei's or third-party cloud management platforms, and data backup and replication technologies. It can provide data protection as a service and disaster recovery as a service to meet different business needs.

### ***Backup as a Service (BaaS)***

BaaS provides OpenStack-based cloud data centers with backup service directories. Through a unified backup management interface, it achieves multi-tenant and self-service virtual machine backup service. BaaS integrates Huawei DJ-DPS and BCManager, with DJ-DPS providing a BaaS entrance and scheduling, and BCManager achieving virtual machine mapping and volume backup. BCManager can support backup for FusionSphere and VMware virtualization platforms. In combination with the virtualization platform CBT (Change Block Tracing) technology and Huawei's patented backup data organization format, it can achieve permanent incremental full backup, remove duplicate data, shorten backup windows, lower impact on production and reduce storage capacity occupancy. BaaS provides different levels of recovery. Machine recovery can recover users' disk data and virtual machine configuration information, while disk recovery allows users to select the designated disk backup data for recovery into the designated virtual machine. Meanwhile, without recovering the whole disk, it can recover the files needed by users and achieve fine-grained recovery.

### ***Disaster Recovery as a Service (DRaaS)***

Huawei DRaaS provides OpenStack-based cloud data centers with a disaster recovery solution. Tenants can choose active-active or active/standby disaster recovery service for their virtual machines. Through a cloud management platform, tenants can achieve cross-VDC (Virtual Data Center) management and virtual switch, router and firewall management at the active/standby center. Through the scheduling of BCManager and interaction with OpenStack Nova, Huawei DRaaS can acquire tenants' virtual machine information, and create disaster recovery virtual machines. BCManager interacts with OpenStack Cinder to perform information acquisition, data active-active protection, data replication, replication switchover and other actions on tenants' virtual machine block equipment, thus achieving virtual machine disaster recovery configuration, switchover and testing.

## **CHALLENGES/OPPORTUNITIES**

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Because active-active solutions are mainly used in enterprise-level critical applications, to guarantee enterprises' business continuity, cooperate reputation and operating revenues, enterprises are particularly cautious about selecting active-active solutions and also conduct very strict POC tests. Active-active solution providers' success stories with enterprise-level customers are of great significance for market expansion. IDC has observed that Huawei has implemented numerous active-active solutions in telecom carriers, finance, government and other sectors and will make more efforts to further optimize user experience while ensuring meeting user demand.

## About IDC

International Data Corporation (IDC) is the premier global provider of market intelligence, advisory services, and events for the information technology, telecommunications and consumer technology markets. IDC helps IT professionals, business executives, and the investment community make fact-based decisions on technology purchases and business strategy. More than 1,100 IDC analysts provide global, regional, and local expertise on technology and industry opportunities and trends in over 110 countries worldwide. For 50 years, IDC has provided strategic insights to help our clients achieve their key business objectives. IDC is a subsidiary of IDG, the world's leading technology media, research, and events company.

## Global Headquarters

5 Speen Street  
Framingham, MA 01701  
USA  
508.872.8200  
Twitter: @IDC  
idc-community.com  
www.idc.com

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