

Empowering Your Software-Defined Transformation

# 軟體定義新時代 轉型優化無縫升級

## Bigtera VirtualStor™ Software Defined Storage(SDS)

January, 2018

# Agenda

- Bigtera 公司簡介
- Industry Overview 產業概況 : The Business Problem , Market Opportunity
- Bigtera VirtualStor™ SDS 解決方案和特色
  - SDS is Perfect, But How to Switch?
- Bigtera uniqueness & benefits to Customer
- Successful Stories

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# Bigtera 公司簡介

# Bigtera 公司簡介

- Bigtera is a member of the [Intel® Storage Builders](https://storagebuilders.intel.com/membership/bigtera) (like EMC, NetApp) and an important member of Intel HCI (Hyper Converged Infrastructure) Alliance. our microsite: <https://storagebuilders.intel.com/membership/bigtera>
- Established in year 2012, Bigtera is a disruptive innovator of industry-leading enterprise software-defined storage (**SDS**) solutions. We are a wholly-owned subsidiary of Silicon Motion Technology Corporation (**Nasdaq: SIMO**)
- Our mission at Bigtera is empowering enterprises with software-defined freedom.
- Mainly active in Greater China, we've helped our partners in their cloud businesses with our **SDS** products in the production environment for more than 3 years, especially in Telecom, Media and Broadcasting, Manufacturer sectors
- Headquartered in Taipei with businesses offices in Beijing and Shanghai, **RD center in Taipei** and Nanjing, Bigtera is credited for our innovative approaches in solving data storage problems in large scale data center as well as our strong customer/partner support and services.

# Silicon Motion at a Glance

*Fabless Semiconductor Leader in NAND Flash Controllers and Mobile RF ICs*

- Est. 1995 in San Jose, CA; now corporate offices in HK, Taiwan & US
- NASDAQ: "SIMO" (2005 IPO)
- 2016 revenue = \$556m (2010-16 CAGR = 27%)
- 1200+ employees (2017 Q3) & 82% are engineers
- 1,650+ patents issued/pending (2016 year-end)
- #1 market share leader in merchant SSD/eMMC/SD/UFD controllers with over 5 Billion NAND controllers shipped in the past 10 years
- Design centers and sales offices in Taiwan, China, Japan, Korea and U.S.A.
- Named "2016 Best Financially Managed Company (<\$1 Billion Revenue) Award" by the Global Semiconductor Alliance (GSA)
- Named one of 100 Fastest-Growing Companies by Fortune magazine 2017



## SOLUTION BRIEF

Bigtera VirtualStor™ Converger  
Intel® Xeon® Processor and  
Intel® Solid State Drive Data Center Family  
Topic: Software Defined Storage



Information

# Software Defined Storage for Media and Broadcasting Industry in China

China Media and Broadcasting industry leverages Bigtera VirtualStor™  
for Simplicity and Streamlining Business Processes



### Overview

The media and broadcasting industry in China has grown significantly at an average rate of 15% between 2009 and 2013.<sup>1</sup> This is having a substantial impact on IT requirements in the industry, as stations have outgrown their traditional infrastructures due to the following challenges:

- **Business complexity.** The many different media processes in the industry, such as collection, editing, broadcasting, archiving, and content management, have had an impact on IT. Different processes demand different characteristics for storage, such as protocols, performance, availability, etc. Thus, customers have purchased different storage technologies across their workflows, creating "storage islands," where these systems have required high implementation costs, but have low utilization.
- **Rapid data growth.** The demand for high definition and 4K video continues to rise, placing pressure on storage capacity and scalability. A 90-minute standard definition TV program can consume 540 GB of space, while a high-quality 90-minute TV show's raw materials might consume TBs of storage. Because the traditional storage systems are unable to seamlessly scale-out, storage islands continue to grow, further increasing the complexity of managing infrastructure, data, and content.
- **The silo effect.** In a TV station or a media company, content data should migrate with the workflow. With multiple storage islands, data must be manually copied between heterogeneous environments, increasing workflow complexity, duplicating data, and wasting time and resources.
- **High cost of entry.** For smaller TV stations, buying, deploying, managing, and scaling the entire infrastructure is expensive and time consuming.

"Today's IT requirements in  
Media and Broadcasting  
industry also have  
outgrown the traditional  
infrastructure."



# Member of Intel Storage Builder Program

Bigtera/Intel white paper for success  
story in China Media and Broadcasting  
industry

Download:  
<https://goo.gl/Cf6Sde>

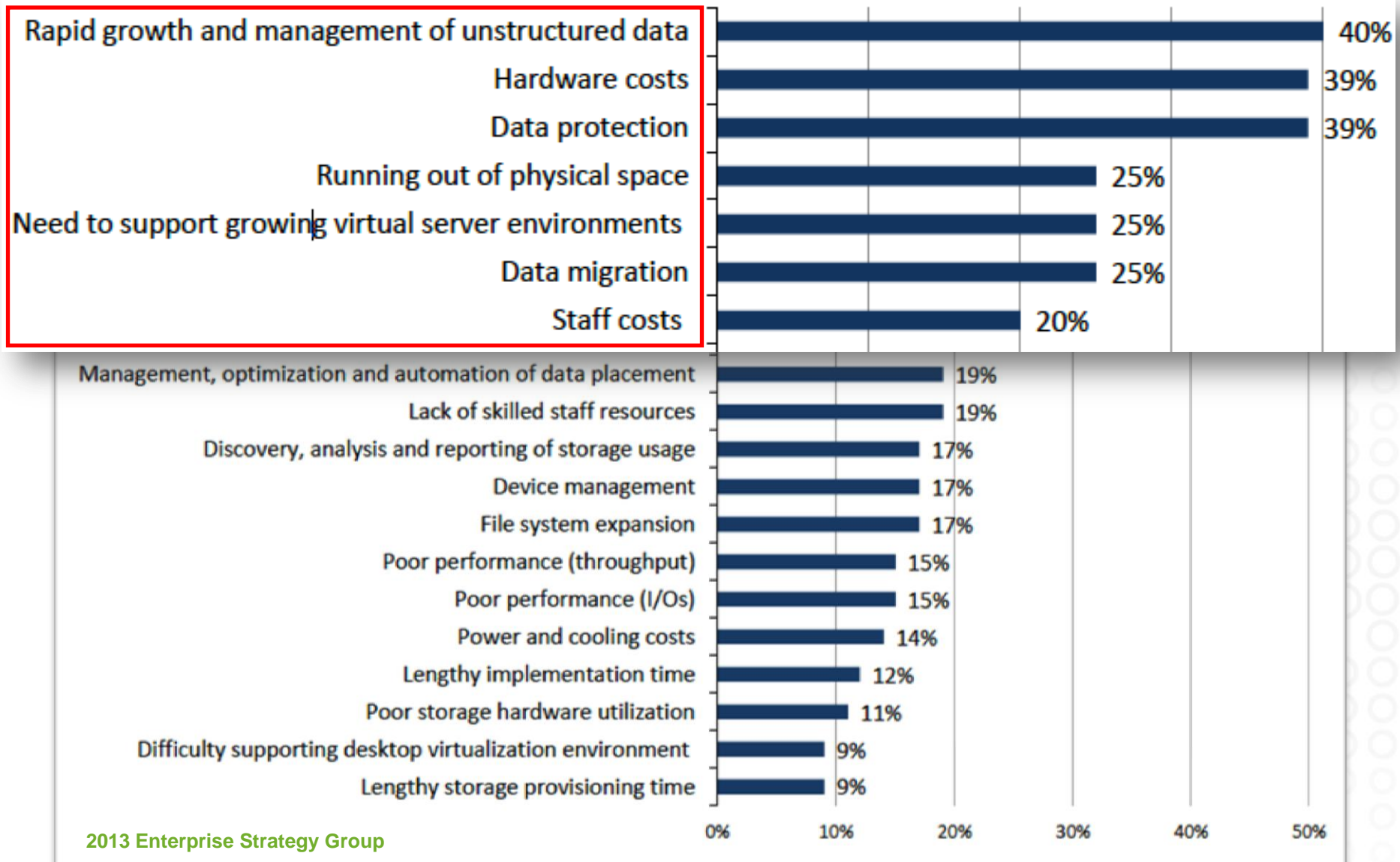


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# Industry Overview 產業概況

## The Business Problem

# Top Enterprise Storage Concerns



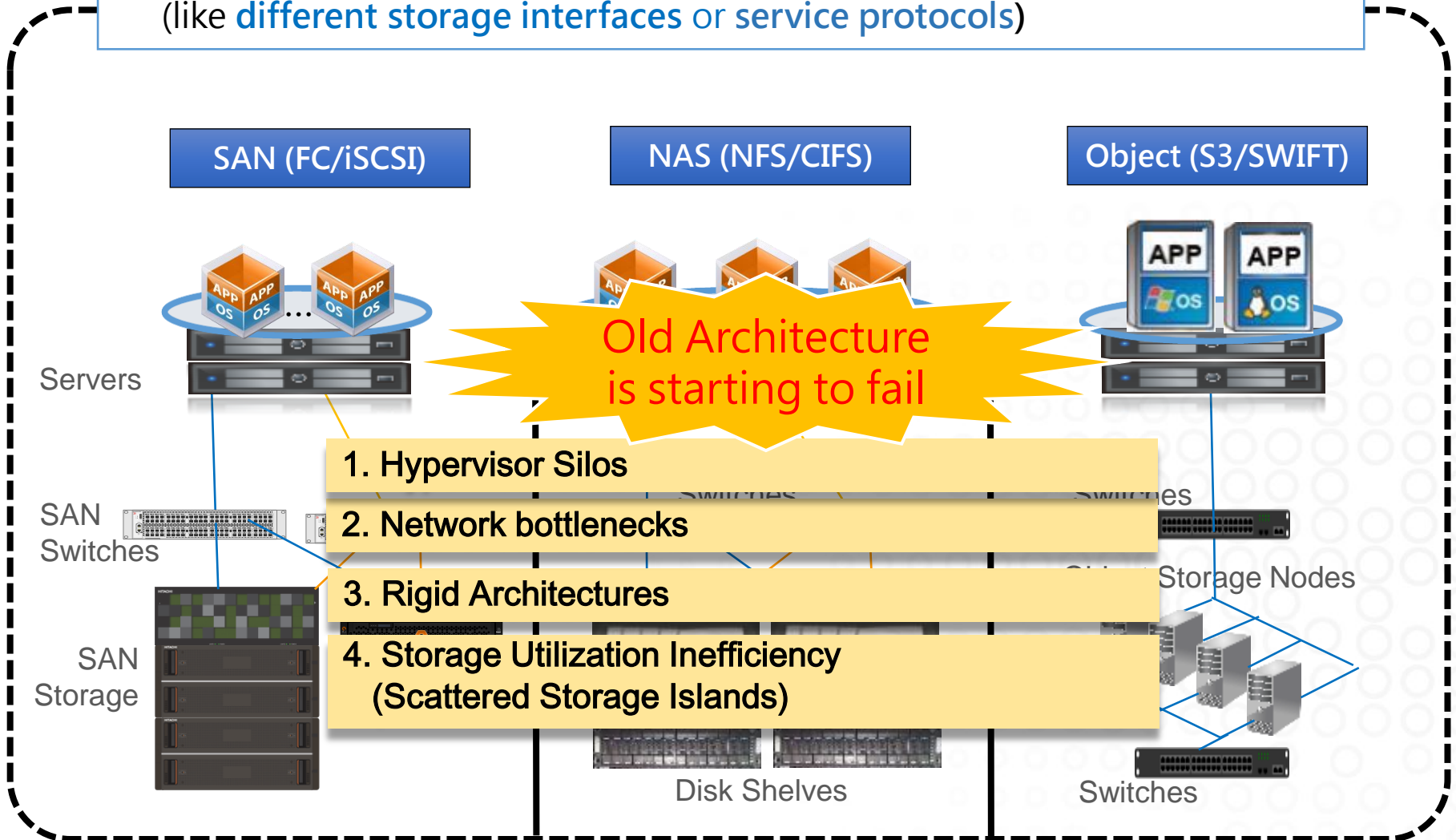


# The Rapid Growth of Global Data – Statistics

- 4300% increase in annual data generation by 2020
- The estimate is 35 zettabytes by 2020 (1 Zettabyte = 1024 Exabytes or 1024\*1024\*1024 Terabytes)
- More than 70% of the digital universe is generated by individuals. But enterprises have responsibility for the storage, protection and management of 80% of it.
- **The dramatic rise of unstructured data** (photos, video, social media and etc.) requires non-relational databases and it consumes massive storage
- **Server virtualization growth** outpaces other software
- Data Analytics is revealing **new level of insight** to customers and business, and it requires **new level of compute and storage**

# All this New data is supported by a 10-15 year Old Architecture

- Different storage appliances for different user application workloads (like different storage interfaces or service protocols)

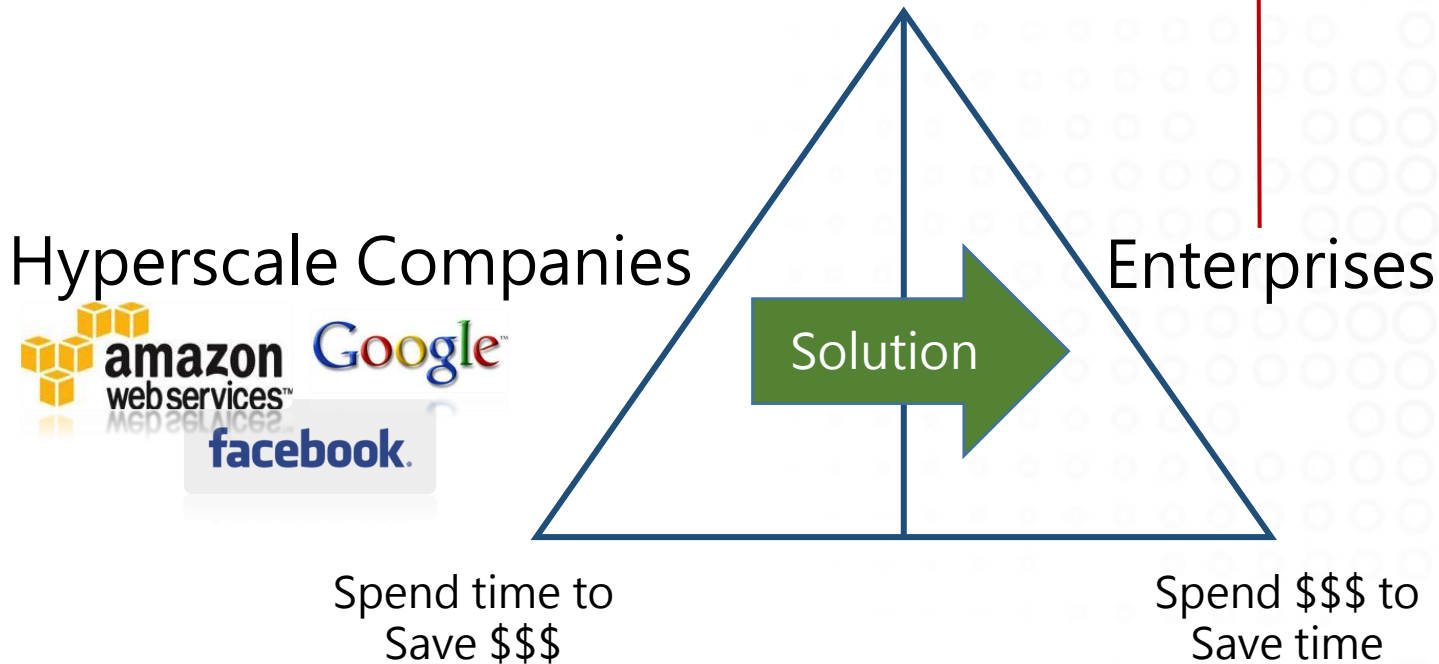


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# Industry Overview Market Opportunity

# What Enterprise Customers Wants

An **agile, scalable** and **cost-effective** storage infrastructure like what Amazon or Google has, allowing enterprises to meet their unpredictable storage requirements



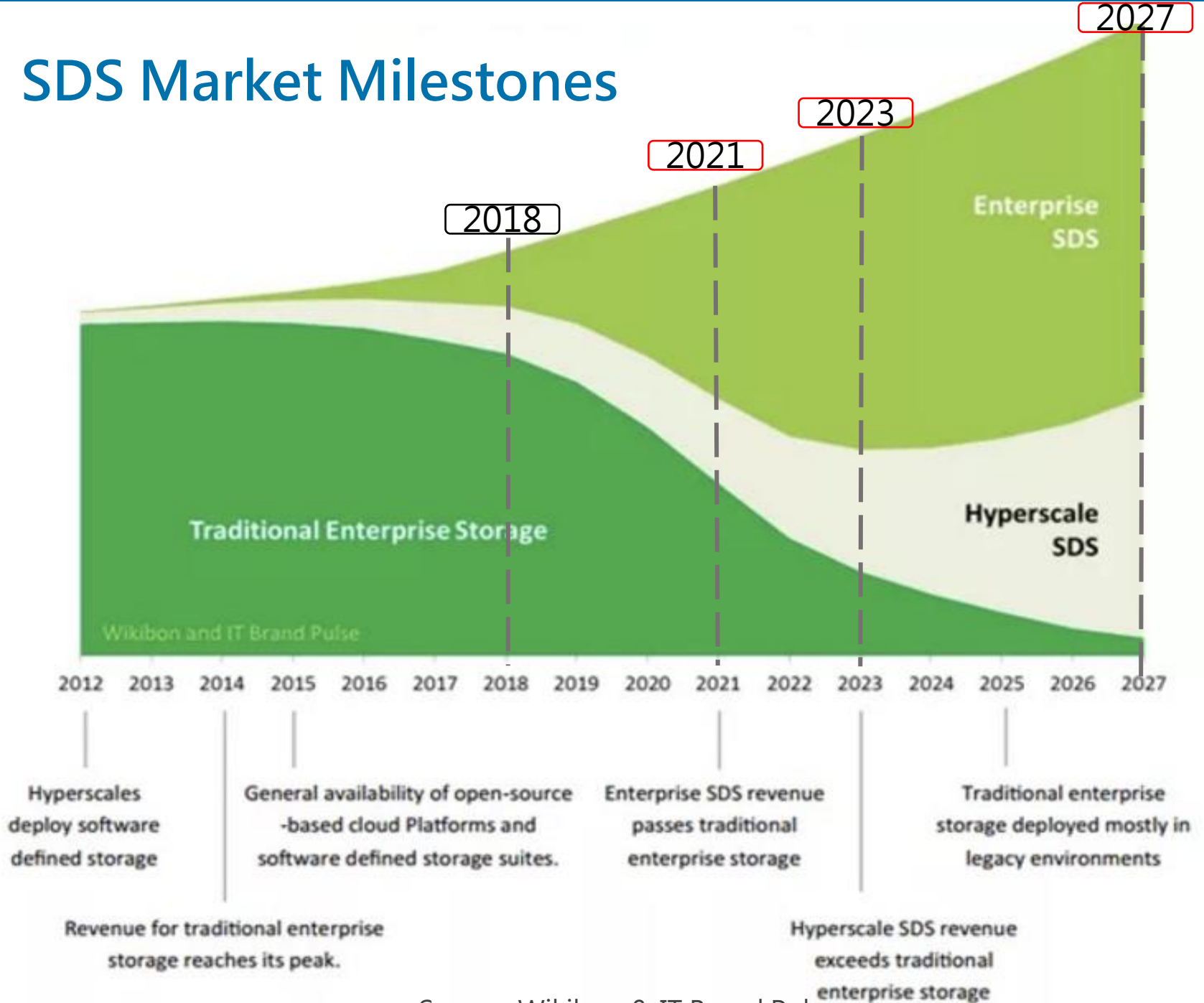
# Software-defined Storage (SDS)

- SNIA ([www.snia.org](http://www.snia.org)) defines SDS as:

Software-defined storage separates storage hardware from the software that manages the storage infrastructure. It provides functions such as de-duplication, replication, snapshots, and backup and restore capabilities. Enterprises can design their own application and leverage multiple storage hardware without worrying about interoperability and under or over utilization of servers

- SDS is a radical new way to deploy storage services that promise to **lower both acquisition and operational costs** while simultaneously increasing storage infrastructure **flexibility and performance**

# SDS Market Milestones



Source: Wikibon & IT Brand Pulse

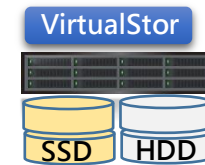
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# Bigtera VirtualStor™ SDS 解決方案和特色

# Bigtera VirtualStor™ SDS Products

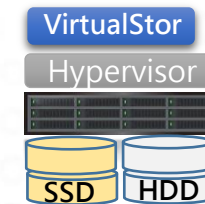
- Scale-out unified storage: VirtualStor™ Scaler

- ✓ High-performance scale-out unified storage



- Hyper-converged storage: VirtualStor™ Converger

- ✓ Cross-platform unified hyper-converged (compute, storage) solution for server virtualization/VDI with scale-out architecture,
- ✓ Heterogeneous Hypervisor Platform (VMware/VAAI, KVM, Hyper-V)



- Storage consolidation: VirtualStor™ SDS Controller

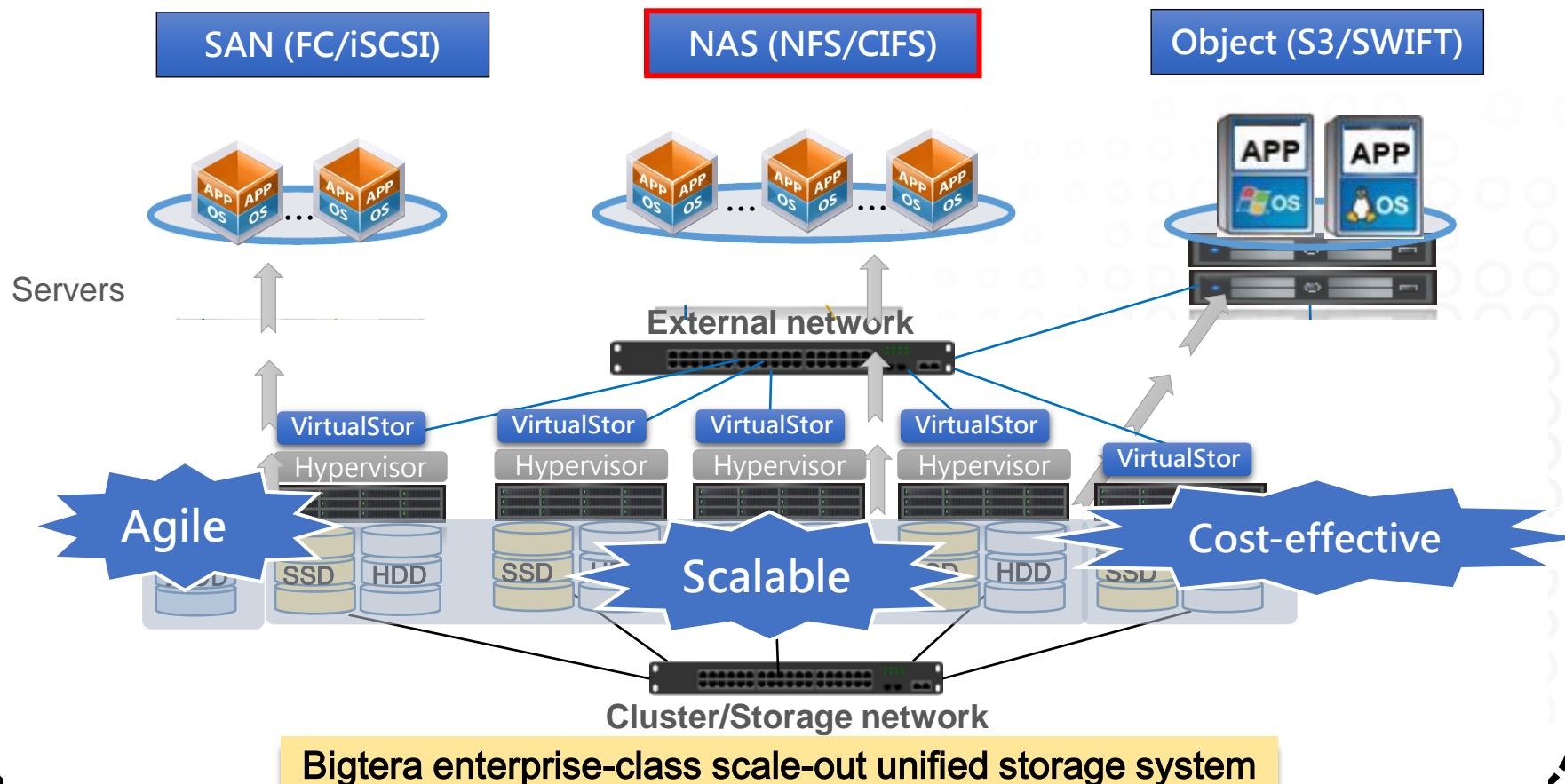
- ✓ Consolidate and empower the existing storages (SAN, NAS, DAS) with scale-out architecture



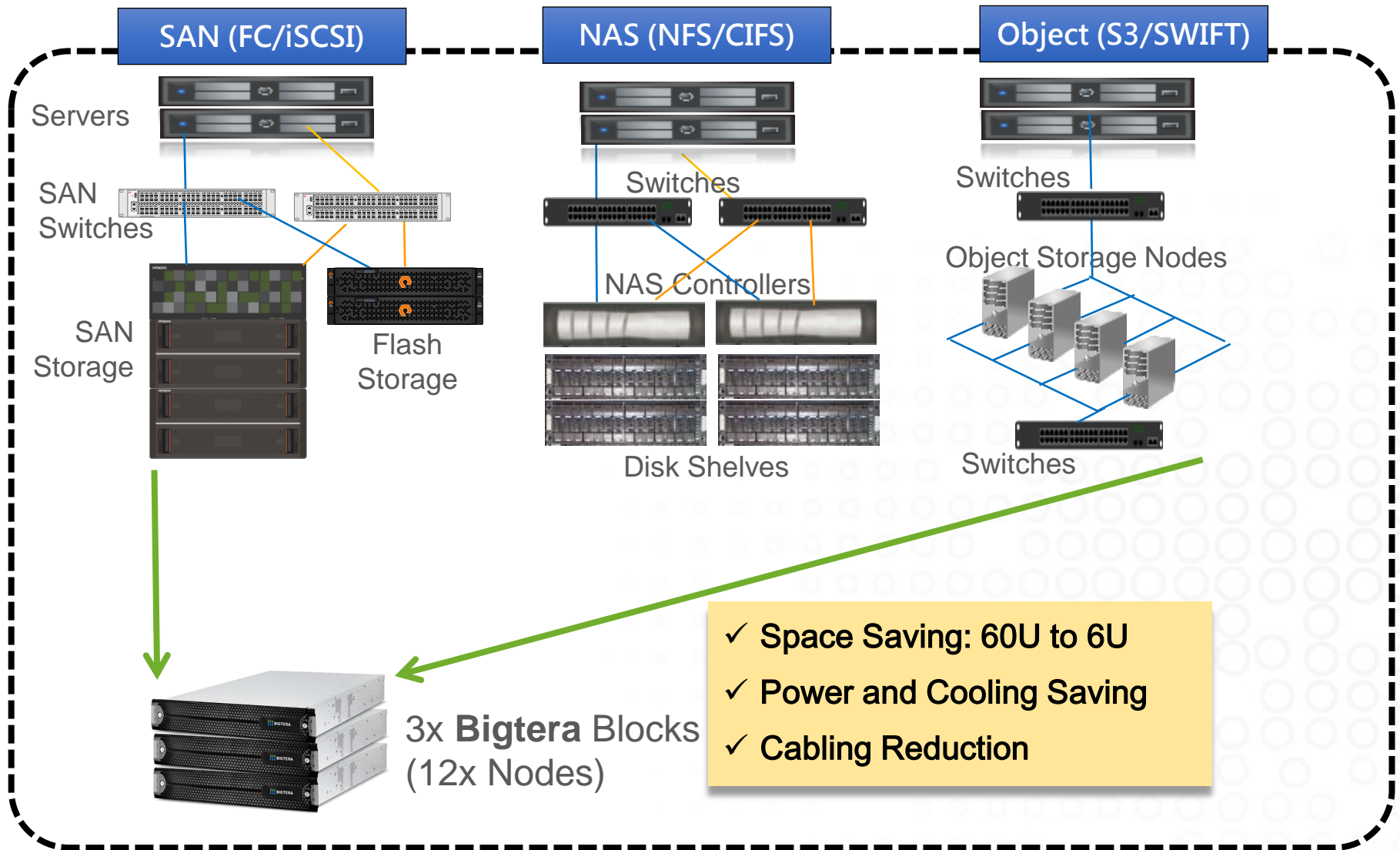


# All in One Platform – Enterprise-class scale-out unified storage

- ✓ Bigtera VirtualStor™ SDS platform is able to provide various storage types (**NAS**, **SAN** and **Object**) **simultaneously** and **served** in mission critical production env. > **3 years**
- ✓ **Network segmentation** – It supports for the demand of different subnet users



# All in One Platform - Infrastructure Saving



# SDS is Perfect, But How to Switch?

# SDS is Perfect, But How to Switch?

## Bigtera' s Unique Approach

### ✓ Live(seamless) Data Migration

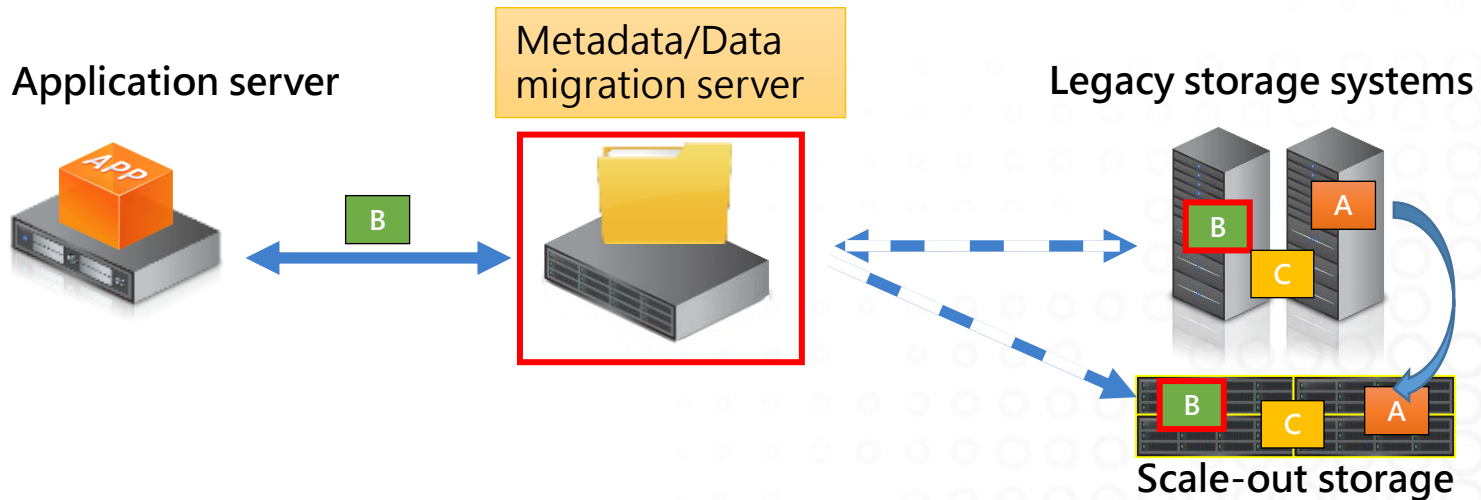
Bigtera' s **Smart Data Migration (SDM) engine** allows administrators to migrate data automatically or on demand almost **WITHOUT** service downtime

### ✓ Consolidate legacy investments to increase ROI

Bigtera VirtualStor™ is able to consolidate the existing storages (SAN, NAS, Disk Array, JBOD) into a single storage pool and empower it with **new SDS features**.

# Traditional Data Migration

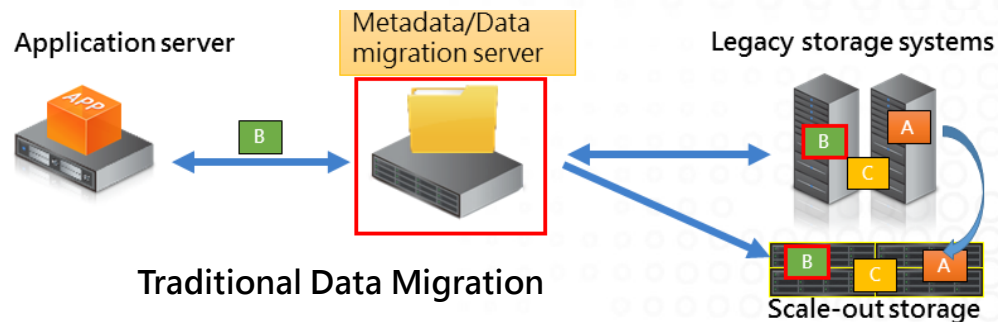
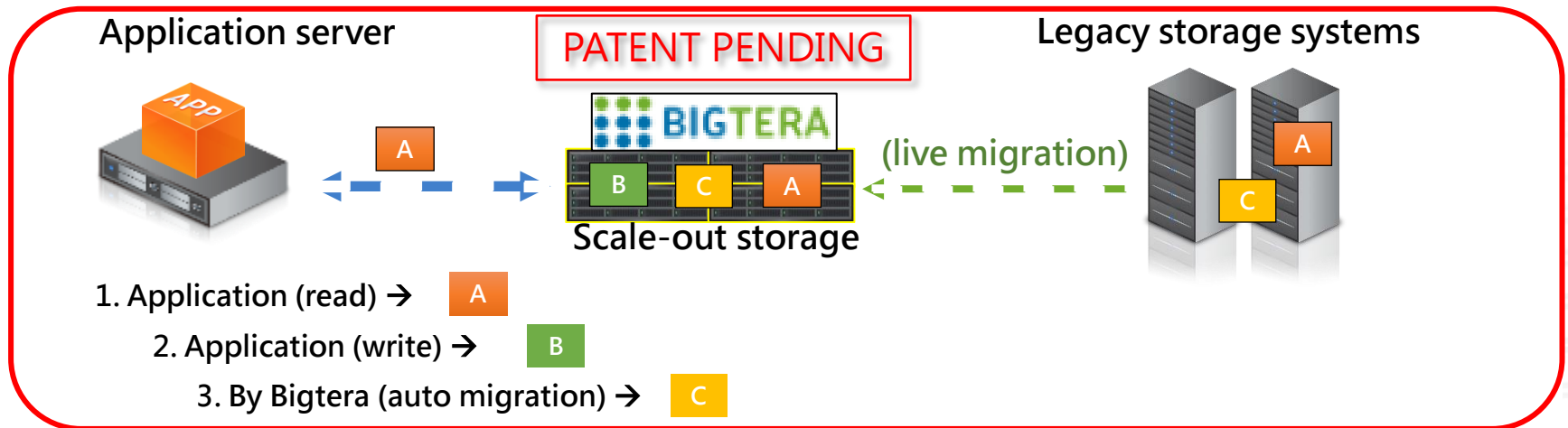
- **Impact SLA** – Service interrupt (long service downtime), duplicate data
- **Costly migration** – require the migration server/tool, performance bottleneck, time consumption and complexity.



# Bigtera - Live(seamless) data migration

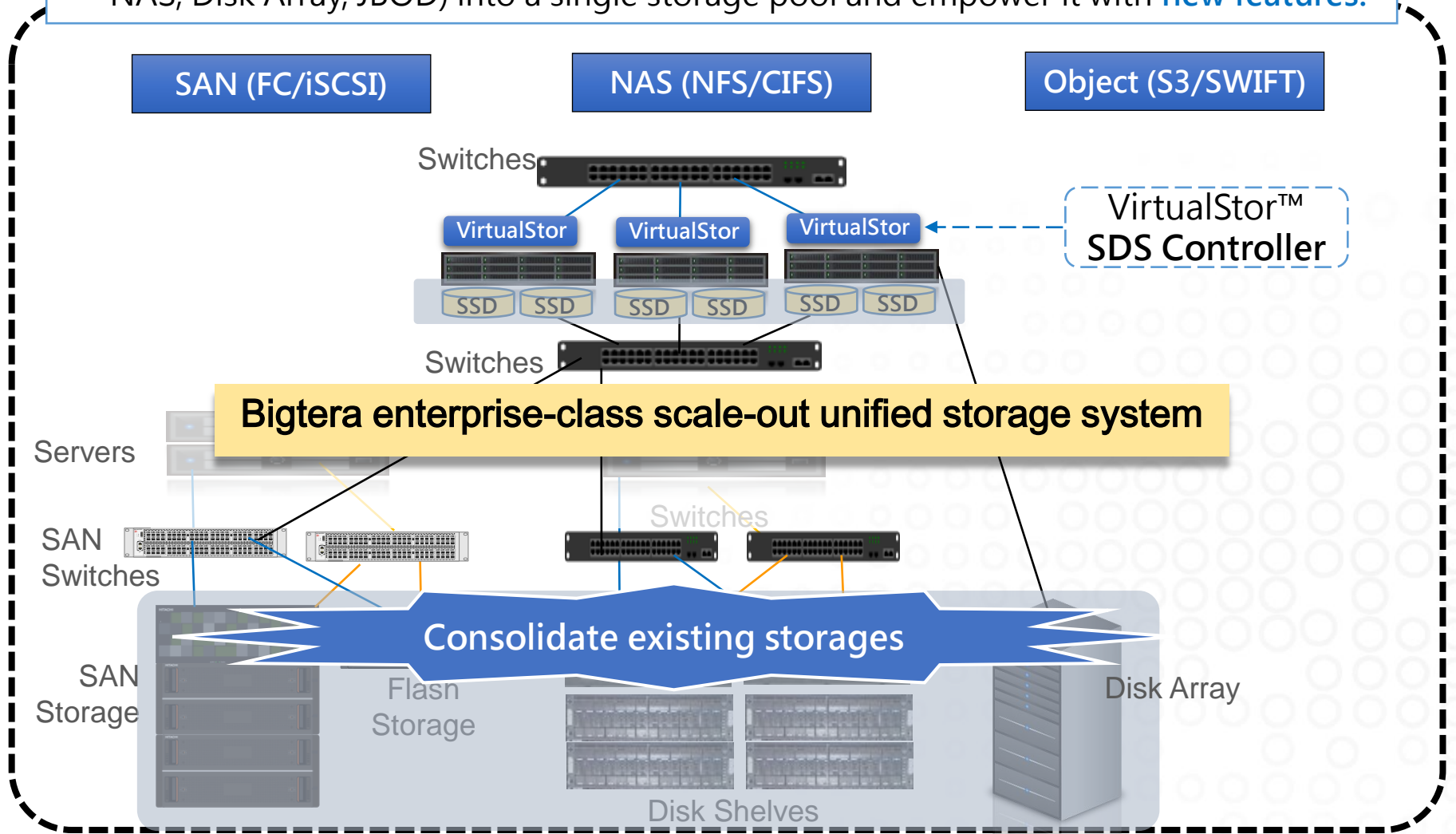
✓ Bigtera's **Smart Data Migration (SDM) engine** allows administrators to migrate data automatically or on demand almost **WITHOUT** service downtime

- Seamlessly moves data from legacy to a self-healing SDS infrastructure
- Automates the migration process
- Data availability and durability are configurable (replication, erasure coding)
- No require special tool or services (metadata/data migration server)



# Bigtera - Consolidate legacy investments to increase ROI

- ✓ Bigtera VirtualStor™ SDS Controller is able to consolidate the existing storages (SAN, NAS, Disk Array, JBOD) into a single storage pool and empower it with **new features**.



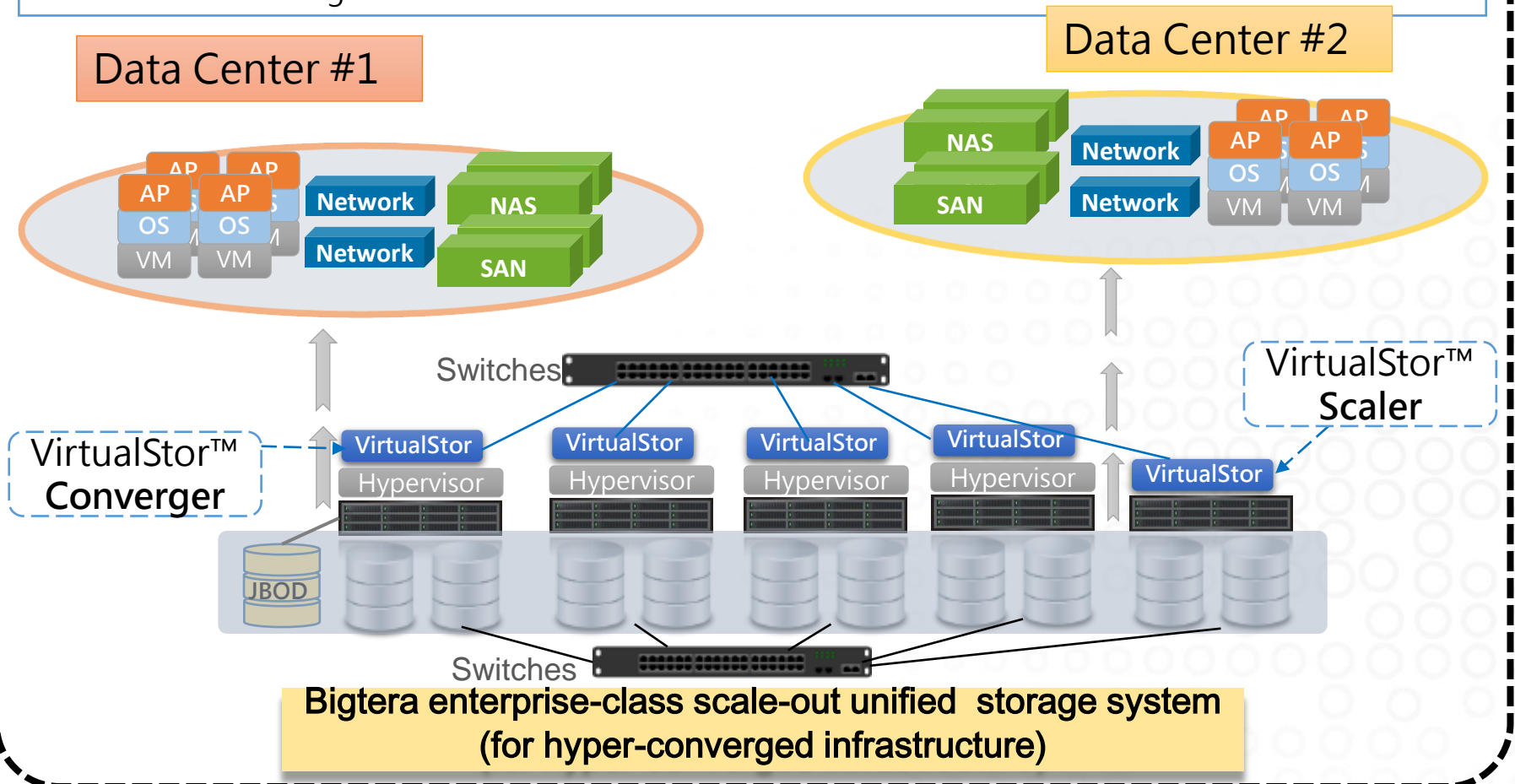
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Bigtera VirtualStor™ SDS 還有哪些特色..?



# Support Multitenancy

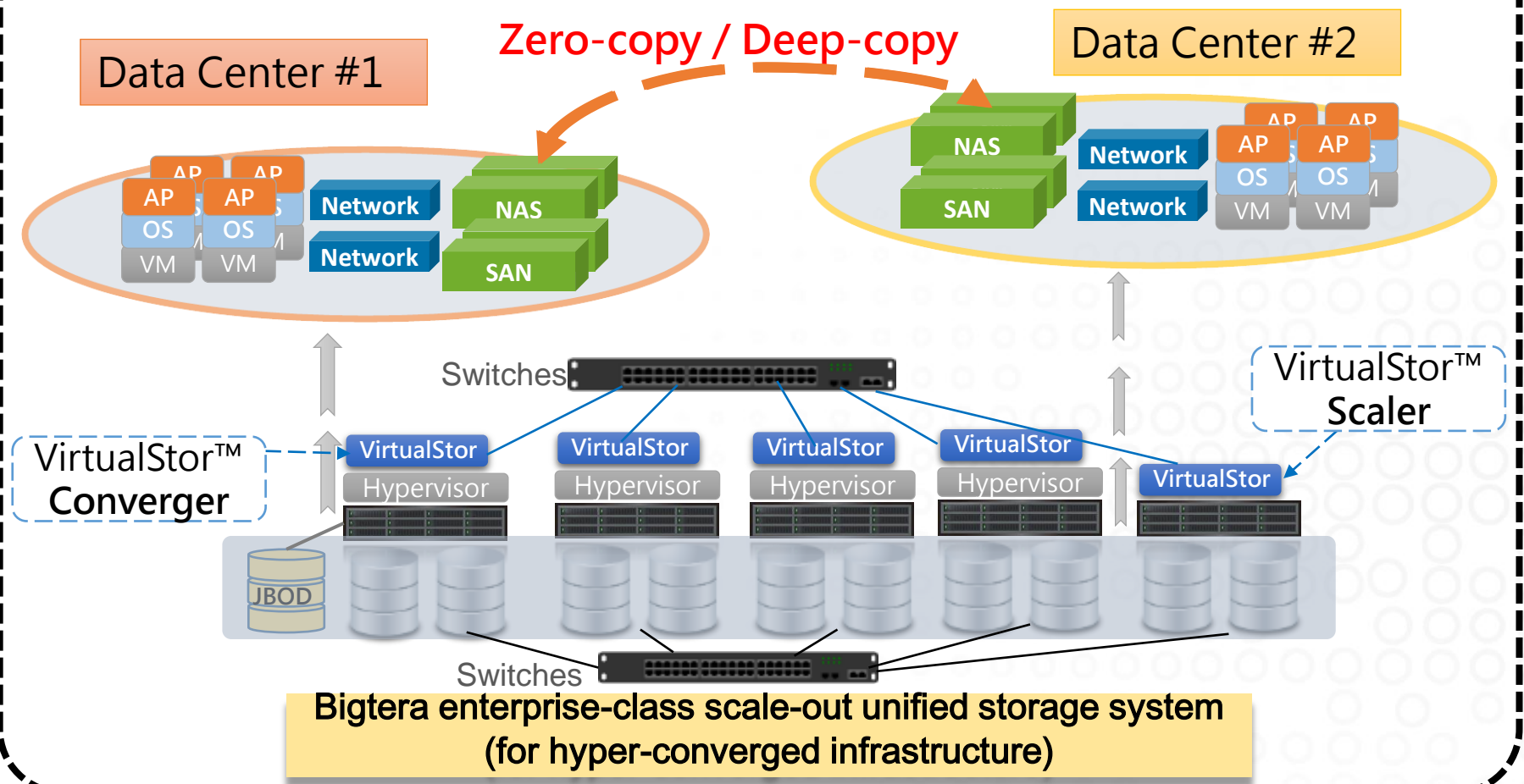
- ✓ Bigtera unique multitenant technology “**Virtual Storage (VS)**” supports true Software-Defined Data Center to enable the cloud service with **multitenancy capability**.
- ✓ **Dedicated, isolated data storage areas** removes the risk of leakage
- ✓ **Different SLA of storage pool** for different application needs
- ✓ Each Virtual Storage has its **own ACL control**



PATENT PENDING

# Share Data Between Tenant

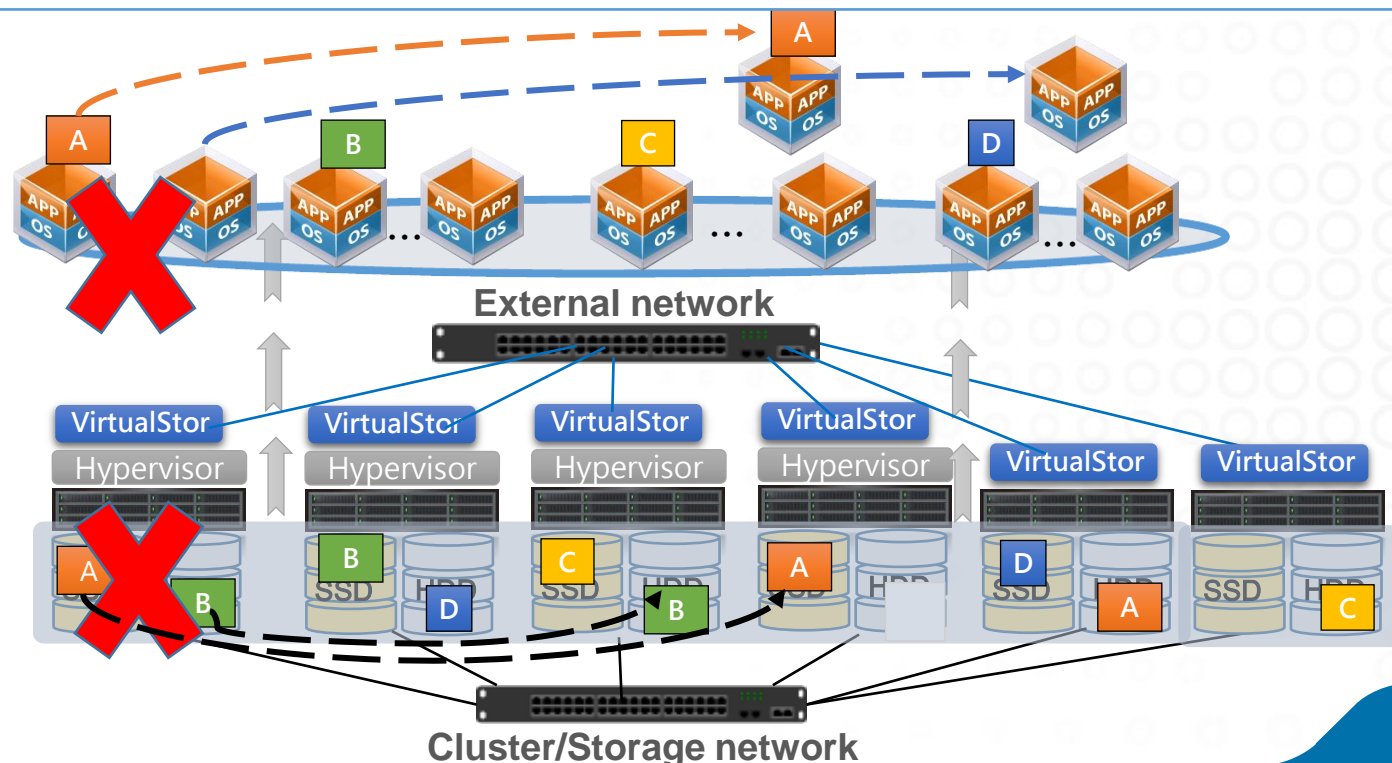
- ✓ **Bigtera zero copy technology** – it is able to transfer data rapidly between multiple storage tenant (reduce data movement time)



PATENT PENDING

# Data Protection & Service Availability

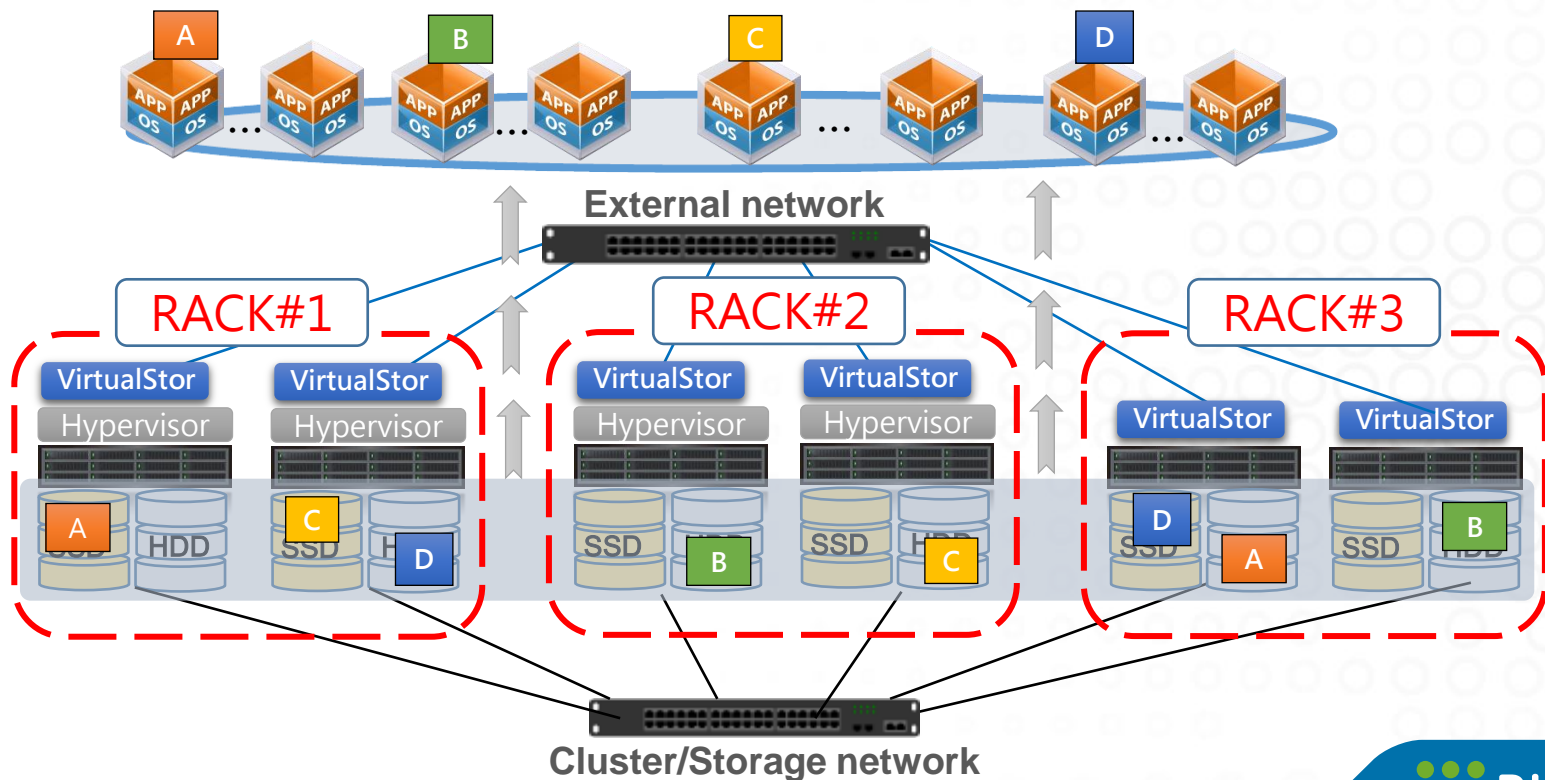
- ✓ **Tunable Resiliency Factor** - Different levels of fault tolerance for different applications in the same cluster dynamically
  - RF2 offers protection against one simultaneous disk, node and NIC failures
  - RF3 offers protection against two simultaneous disk, node and NIC failures
- ✓ **Data Availability** - System auto-recovery/auto-rebalance, Self-repairing (with data replication or parity files), Erasure code, Continuous data protection(CDP), Replicate data to public clouds (S3-compatible, Amazon S3 SSE)
- ✓ **Data Integrity** - Real-time data replication
- ✓ **Data Security** - Support of Intel® AES-NI encryption
- ✓ **Service Availability** - IP takeover and DNS load-balancing, Full mesh storage backend



# Data Protection & Service Availability (Rack Awareness)

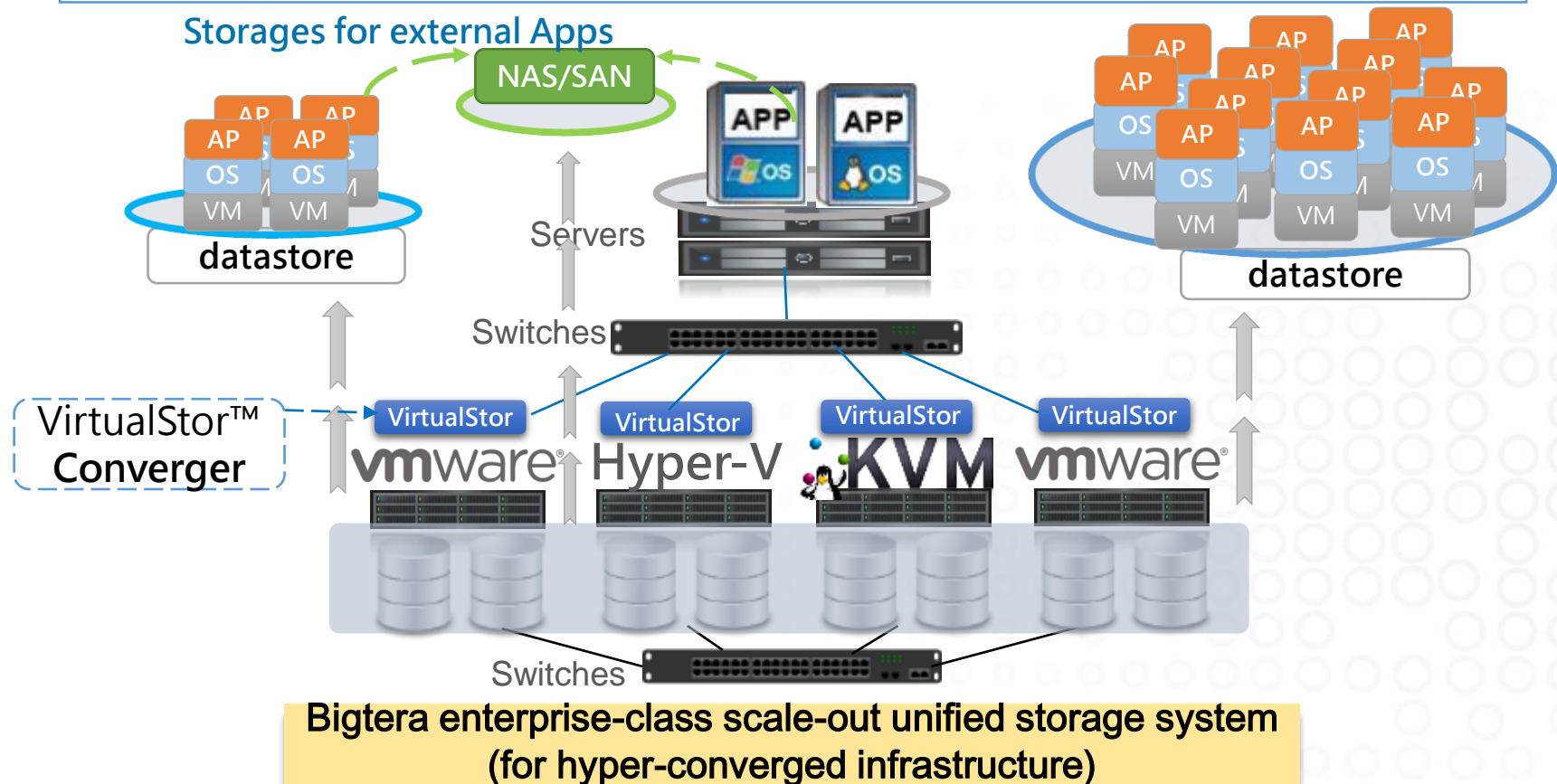
## ✓ Support Rack Awareness

- Offers the protection & distribution of data in real scene by physical hardware configuration (ex. Rack, Building)



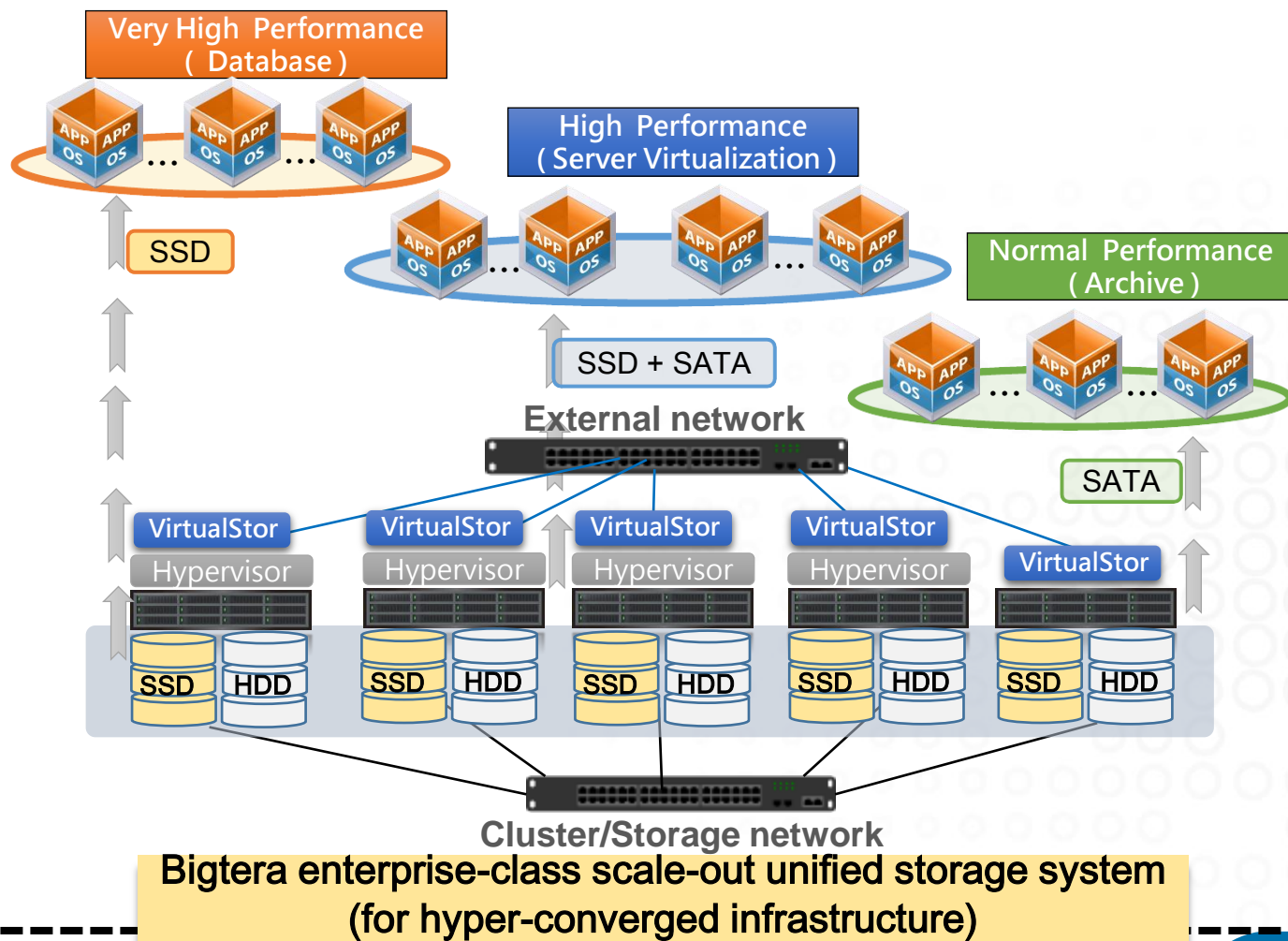
# Hyper-converged Cloud Platform Save TCO

- ✓ Hyper-converged cloud platform(compute + storage) – **less latency**, saving network layer, **cost-effective**.
- ✓ **Application close to the data** – Saving network bandwidth, better performance
- ✓ Heterogeneous Hypervisor support (VMware/VAAI, KVM, Hyper-V) and able to provide various storage type (SAN/NAS/Object) to **external applications** simultaneously



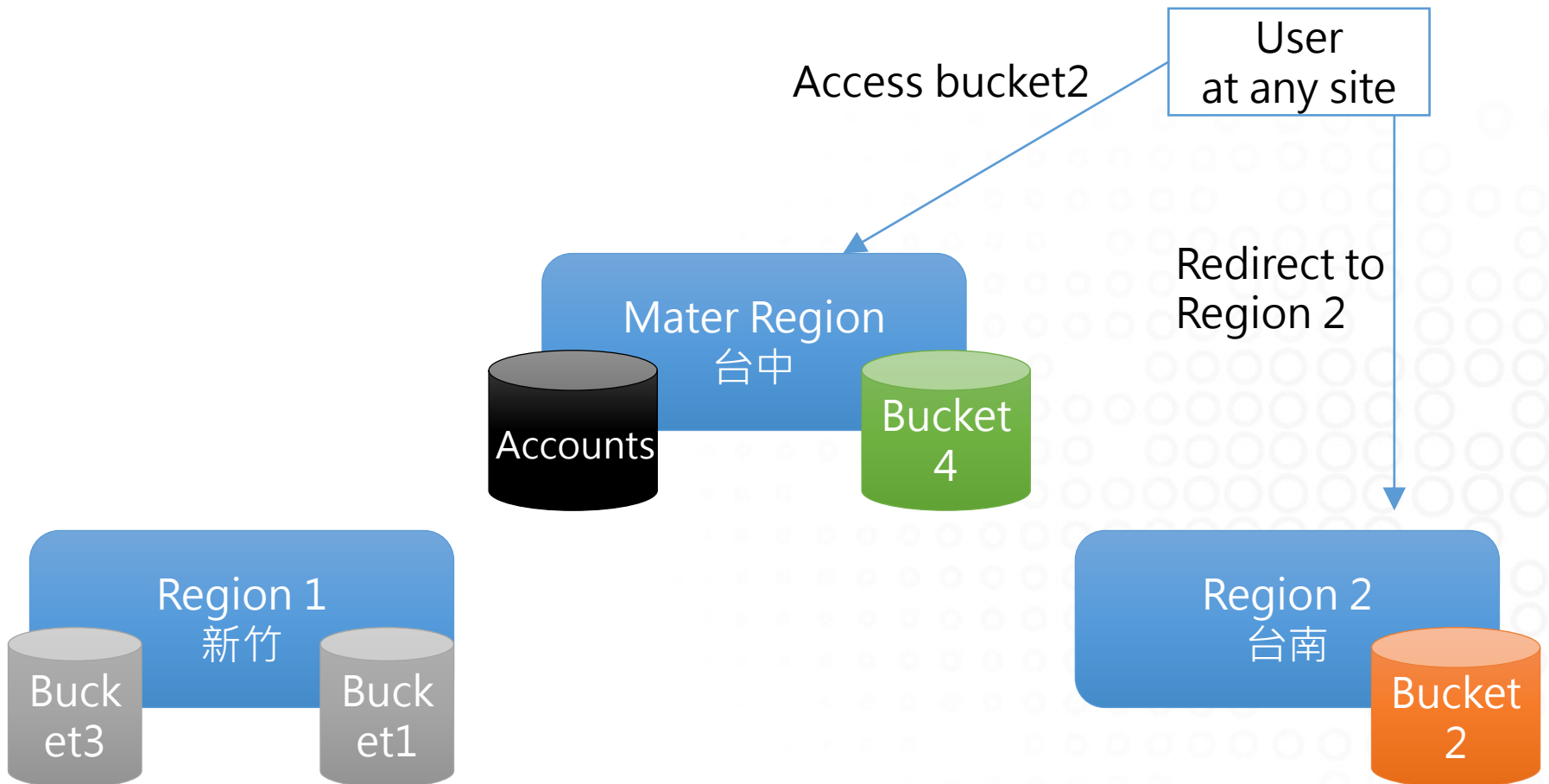
# Performance Tiering

- ✓ Different performance levels of storage pool for different applications' needs (database, virtualization, archive) in the same cluster.



# Object storage - Multiple Sites support

- ✓ **Single namespace** - Application running in any site can access the same object data



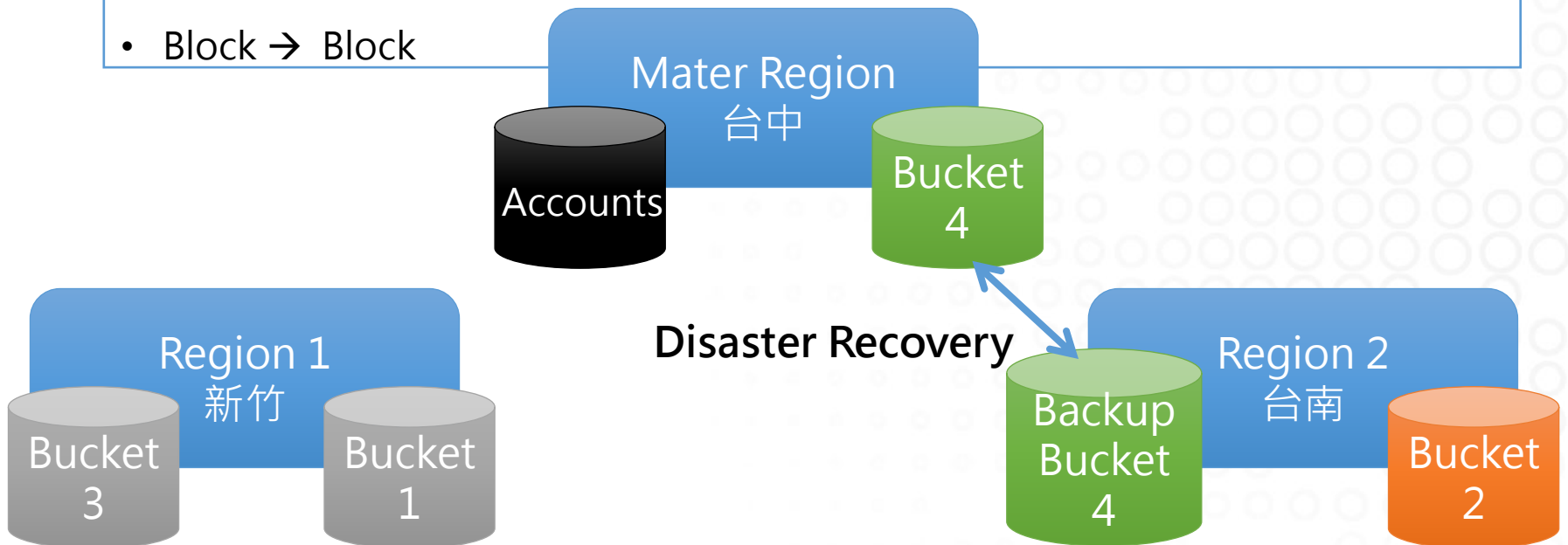
# Object storage – Disaster Recovery for Multiple Sites

✓ To provide **higher SLAs**, the object data can be replicated as disaster recovery across multiple data centers. Or consider this as another type of high-SLA storage service that uses **different pricing methods**.

✓ **Remote replication** between sites/clusters in following ways:

- Bucket → Bucket
- **Bucket → NAS folder / NAS folder → Bucket**
- **NAS folder → NAS folder**
- Block → Block

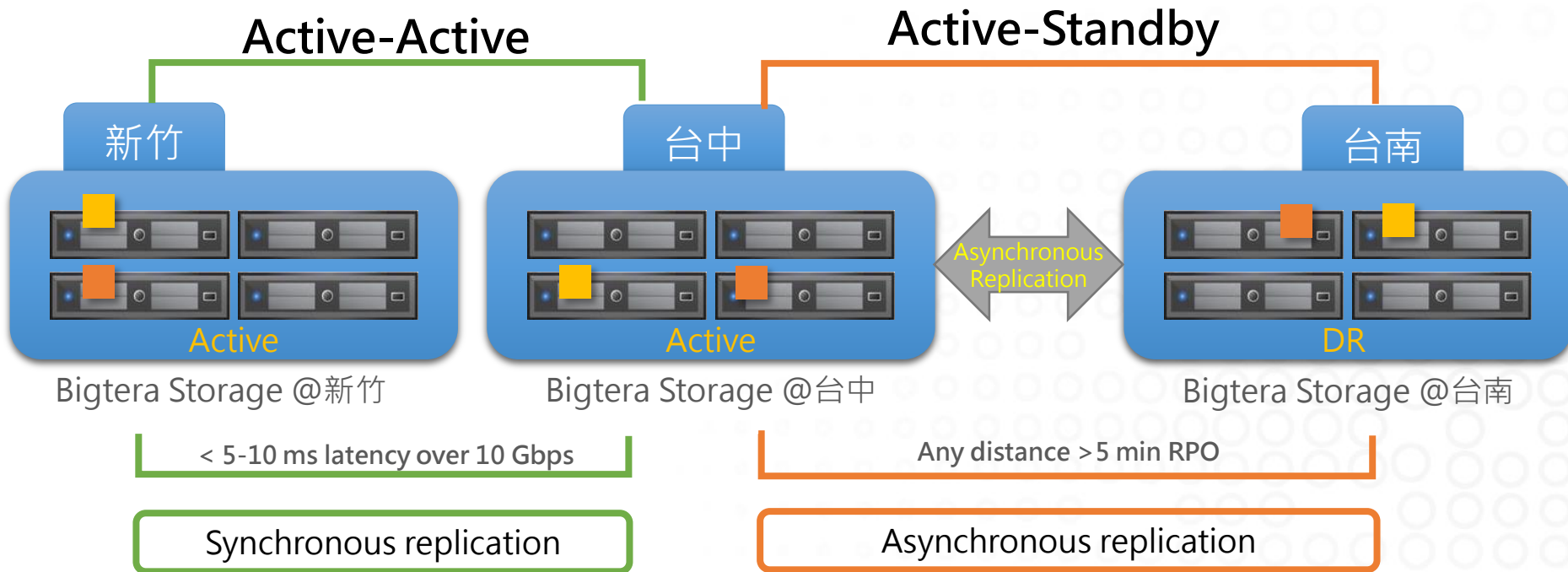
Also can be replicated to public cloud like AWS S3





# Multiple Sites - Active-Active /Active-Standby mode

- ✓ **Active-Active** mode for short distant sites (台中, 新竹)
- ✓ **Active-Standby** mode for long distant sites (台中,台南)

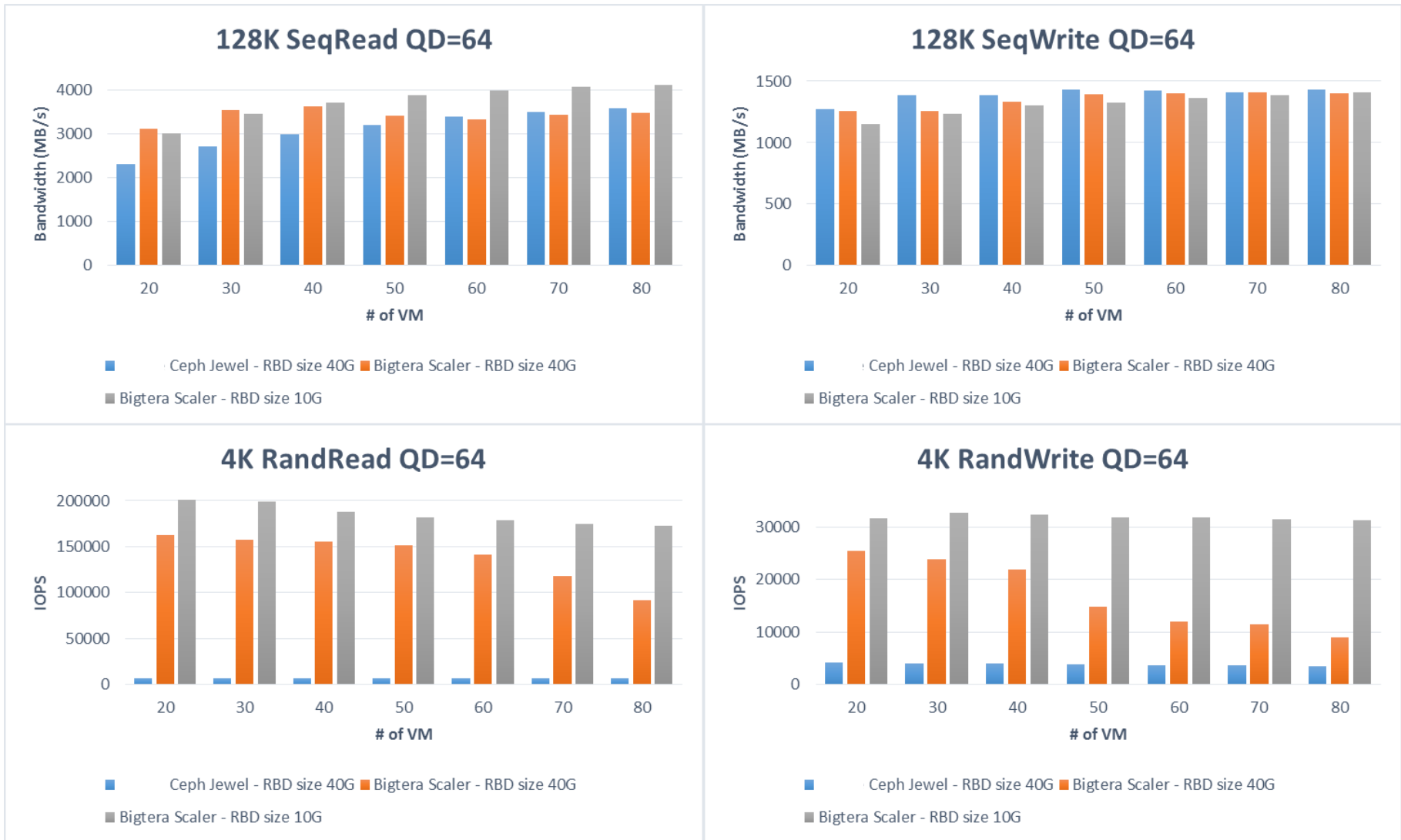


# Local R&D Support

- Local R&D support
  - More than 50 R&D in Taiwan providing professional support.
  - Professional testing labs located in Taiwan (台北 and 新竹)
- Cloud monitoring services
  - Our professional engineers help to monitor the entire system
  - Detect and predict the possible issue before it happens

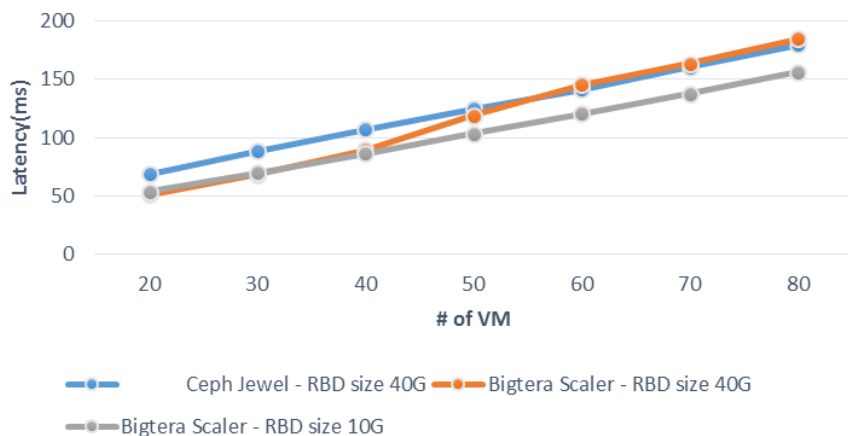


# Comparison – Performance (Bigtera vs Open Source Ceph)

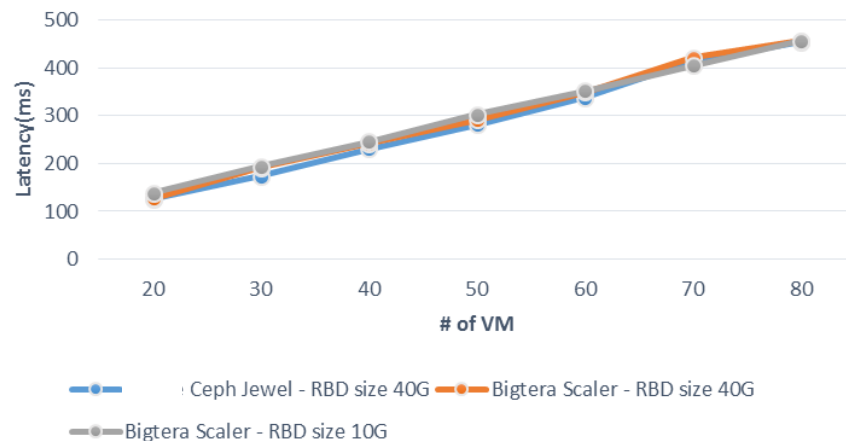


# Comparison – Latency (Bigtera vs Open Source Ceph)

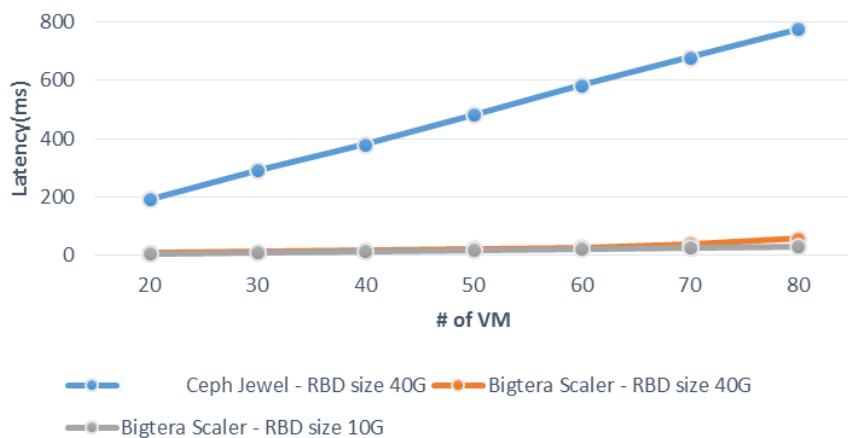
## 128K SeqRead QD=64



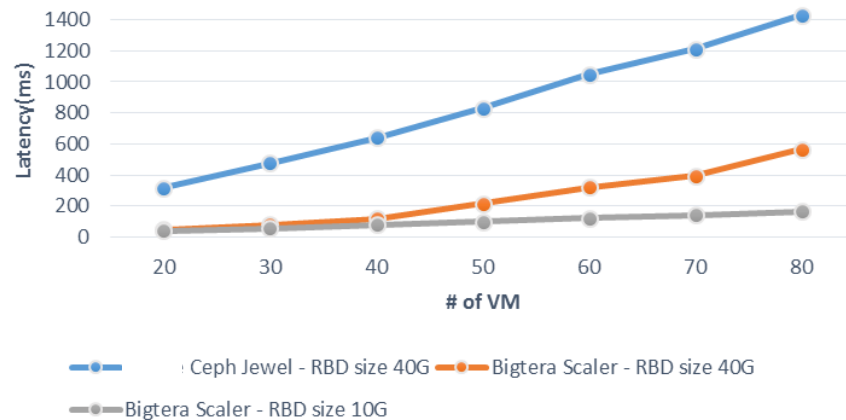
## 128K SeqWrite QD=64



## 4K RandRead QD=64



## 4K RandWrite QD=64





## WHITE PAPER

Bigtera VirtualStor™ Scaler  
Intel® Xeon® Processor D-1500 Product Family  
Intel® SSD Data Center Series  
Topic: Software Defined Storage

## Deploy Bigtera VirtualStor™ Scaler based on Intel® Xeon® Processor D-1500 Product Family Servers & Intel® SSDs

**Bigtera VirtualStor™ Scaler leverages the Intel® Xeon® processor D-1500 product family and Intel® Data Center SSDs, to build the high-performance and cost-effective storage solution.**



"Enterprise IT needs to deploy a scalable storage cluster optimized for performance and cost."

### Execution Summary

Enterprise IT need a scalable, high-performance and cost-effective storage solution that can handle the rapid data growth and satisfy different types of workload. To address the challenges of enterprise IT to deploy a scalable storage cluster optimized for performance and cost, Bigtera® and Intel performed extensive testing to characterize optimized configurations for deploying Bigtera VirtualStor™ Scaler on Intel® Xeon® processor D-1500 product family servers & Intel® SSD.

### Overview

Per IDC reports, the digital universe is doubling its size every two years, and by 2020, there will be more than 44 zettabytes, or 44 trillion gigabytes of data in the world<sup>1</sup>. This is having a substantial impact on enterprise IT requirements: enterprise IT will need storage solutions that are scalable, high performance, and cost effective. Unfortunately, these enterprises have outgrown their traditional infrastructures due to following challenges:

- **Business complexity.** As business processes get more sophisticated, different applications demand different characteristics for storage, such as protocols, performance, availability, etc. Thus, users must purchase different kind of storage systems across their workflows, creating "storage islands," where these systems have required high implementation costs, but have low utilization.

<sup>1</sup> IDC, The Digital Universe of Opportunities: Rich Data and the Increasing Value of the Internet of Things, April 2014.  
<https://www.emc.com/leadership/analyst-reports/IDC-Digital-Data-Report.aspx>

335433-001EN

# Bigtera VirtualStor™ on Intel Xeon D servers and Intel SSD

Bigtera/Intel white paper for performance benchmarking

Download:  
<https://goo.gl/uju4Fn>



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# Bigtera uniqueness & benefits to Customer

# Bigtera uniqueness & benefits to Customers

## High-lights

- ✓ Bigtera VirtualStor™ SDS platform is able to provide various storage types(NAS, SAN and Object) simultaneously and served in mission critical production env. > 3 years
- ✓ Live (seamless) data migration
- ✓ Consolidate legacy investments to increase ROI
- ✓ Taiwan local RD support for Taiwan customers as Bigtera RD center in Taiwan. Cloud monitoring services help to monitor the entire system
- ✓ Bigtera hyper-converged solution is with VMware Embedded OEM
- ✓ Bigtera has more successful stories in Very Large Enterprises
- ✓ Bigtera is a wholly-owned subsidiary of Silicon Motion Technology Corporation (Nasdaq: SIMO)
- ✓ Storage performance comparison: Bigtera storage > Open Source Ceph storage

# Bigtera VirtualStor™ SDS features at-a-glance

- All in one platform – Enterprise-class scale-out unified storage (SAN, NAS, Object)
- Live (seamless) Data Migration **PATENT PENDING**
- Consolidate legacy investments (SAN, NAS, DAS) to increase ROI
- Support Multitenancy (Virtual Storage) **PATENT PENDING**
- Share Data Between Tenant – Bigtera zero-copy technology
- Hyper-converged Cloud Platform Save TCO – serve both hypervisors (VMware/VAAI, KVM, Hyper-V) and VM guests/external applications with various storage types (SAN, NAS, Object) simultaneously
- Data Protection & Service Availability (Support Rack Awareness)
- Performance Tiering
- Decentralized management and storage management API (RESTful API) support lower management complexity
- Agnostic architecture means no vendor lock-in, commodity hardware
- Misc.: Amazon S3 SSE, QoS (for SAN, NAS), Remote Replication, Disaster Recovery, Snapshot, Active-Active/Multi-Active for Storage Service



# VirtualStor™ Management Console (Web)

**BIGTERA VirtualStor™ Scaler**

Cluster (HMCS049)

Hosts

Virtual Storages

Statistics

Cluster

Virtual Storages

Host

Dashboard Accounts Hosts **2** Virtual Storages Remote DR Configuration Logs

**Cluster Health**

**100%**  
of cluster storage is healthy

**4 / 4**  
hosts are healthy

**Cluster IOPS**

ops/sec

reads/sec writes/sec

**Cluster Throughput**

bytes/sec

**Busy Virtual Storages**

By IOPS

By Throughput

**Cluster Disk Usage**

**3**

Disk Usage Summary

SAN Default: 0 I

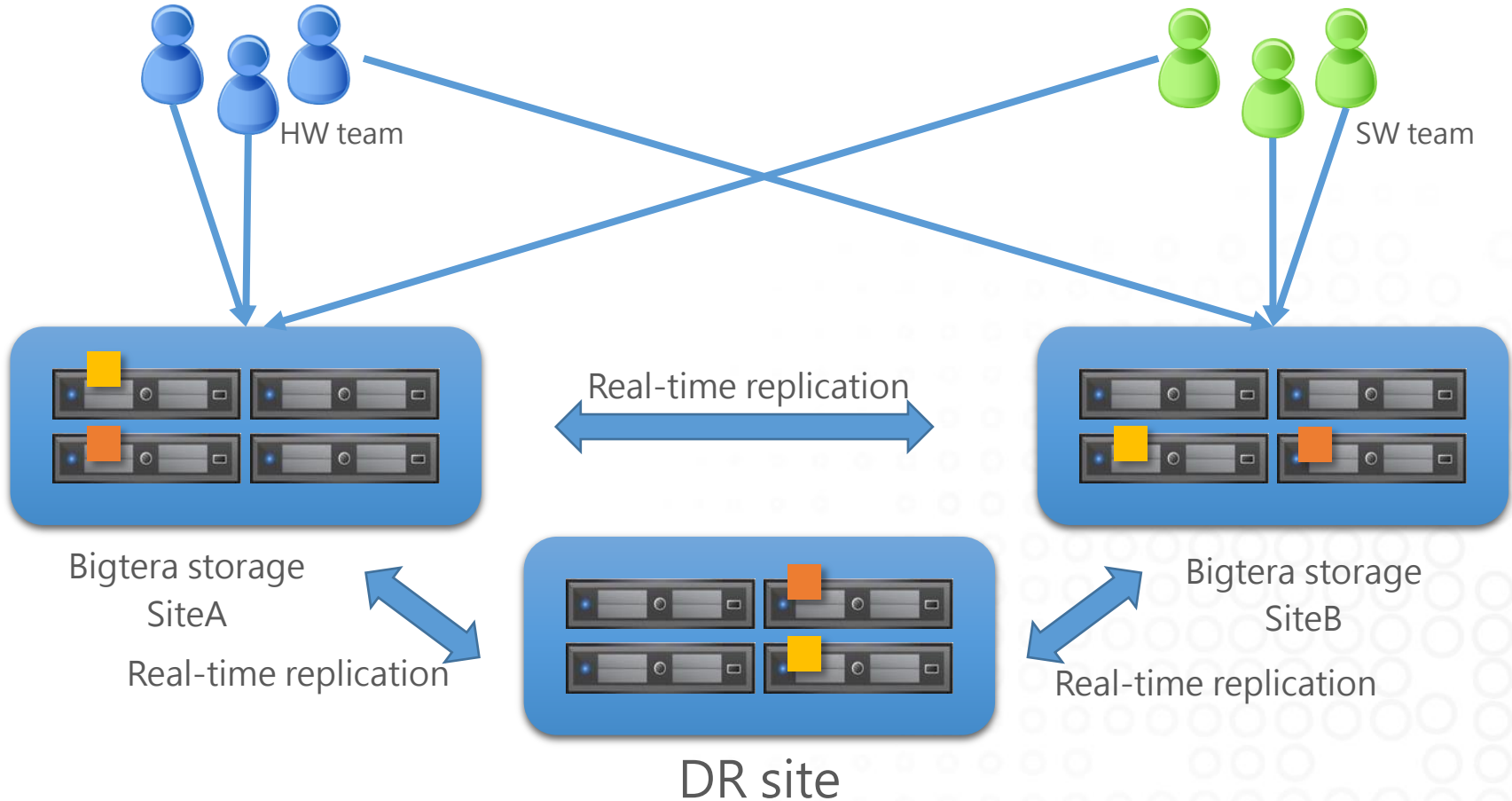
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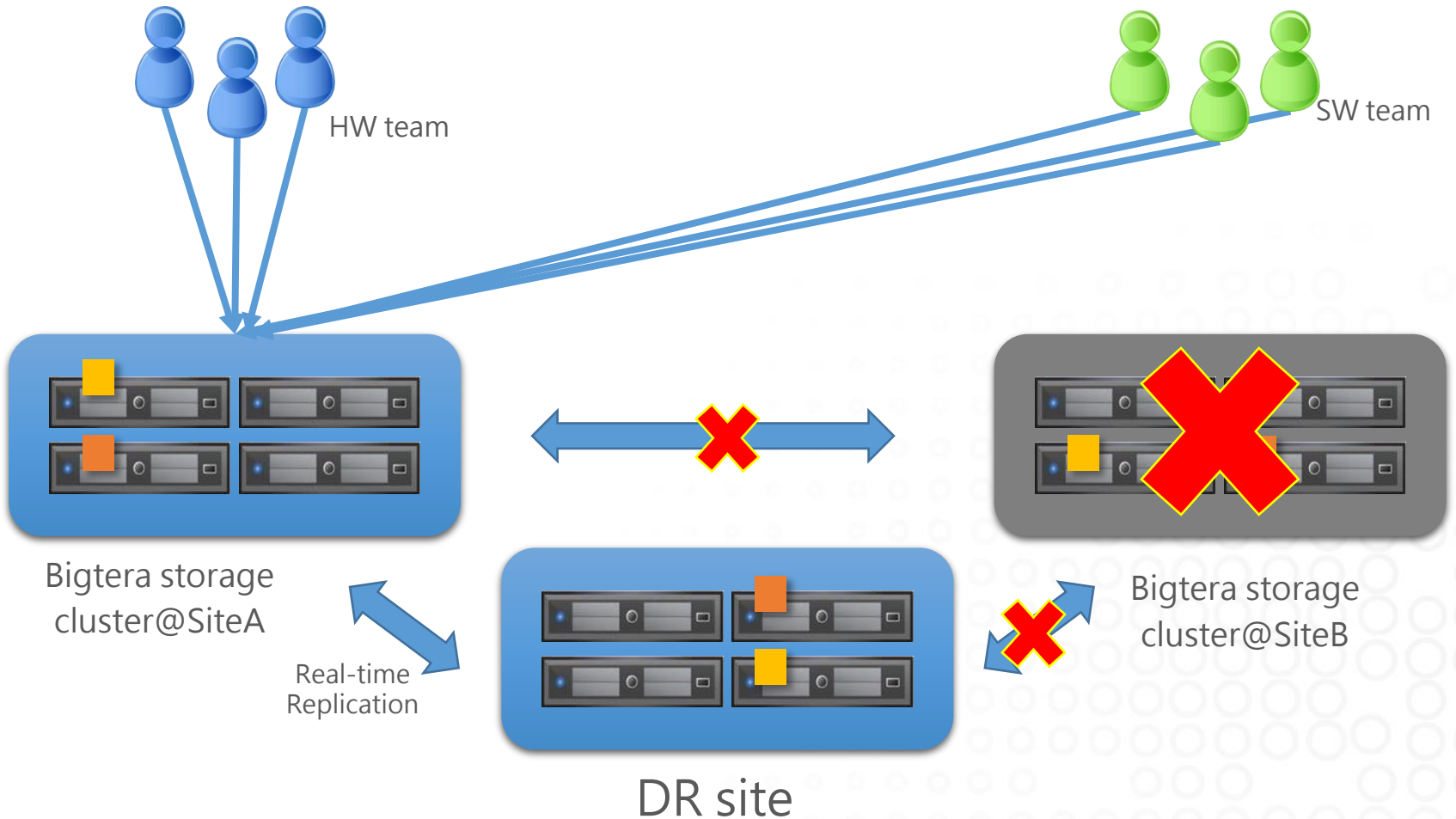
# Successful Stories

# Successful Story - Multiple Sites Deployment for IC Design Industry (1)



Multiple replicas across multiple sites  
Latency requirements: less than 10ms

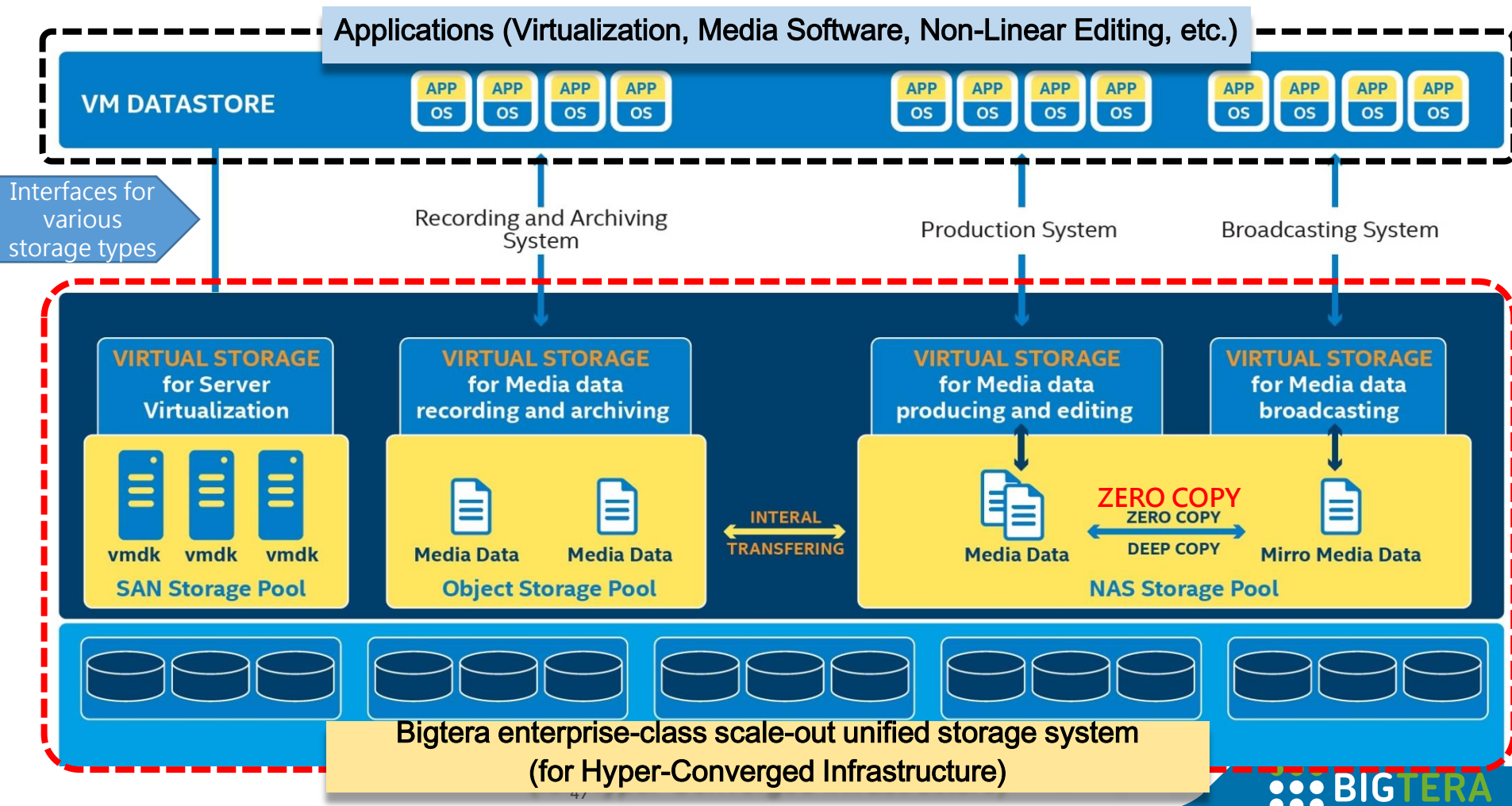
# Successful Story - Multiple Sites Deployment for IC Design Industry (2)



Multiple replicas across multiple sites  
Latency requirements: less than 10ms

# Successful Story - Simplicity and Streamlining Business Processes for Media & Broadcasting industry

- All in one platform for various storage types (SAN, NAS and Object)
- **Bigtera zero copy technology** – it is able to transfer data rapidly between multiple storage systems (**reduce data movement time**)
- Support Multitenant with Virtual Storage technology



# How Bigtera Works

VirtualStor™ Converger fulfills all demands from a small-scale of TV station.

- Based on Bigtera VirtualStor™ SDS and VMware ESXi, **Converger** offers a hyperscale cluster that kinds of TV and media applications, including the content creation and acquisition, non linear editing(NLE), transcoding, archiving systems, and so on.
- Bigtera VirtualStor™ SDS is **All in One Platform** to provide various storage types (**SAN**, **NAS** and **Object**) at the same time in one cluster:
  - **SAN storage**. It can support the database and VMDK for TV and media application systems
  - **NAS storage**. It can support the content production systems such as nonlinear editing (NLE), transcoding, packaging, online media, and so on.
  - **Object storage**. It can support the content service systems such as data archiving, recording, near-line media, and so on.
- With functions like **Bigtera zero copy technology**, data don't really need to be copied from storage to storage, and **reduce a lot of data movement time**. Therefore, the business process can be more agile and streamlined.
- With remote replication, multiple replica, and erasure code, Bigtera can ensure the highly degree of data security, and high performance for business applications

# Benefit at a glance

- 10x performance increase
- 75% reduction in space used
- 55% reduction in power consumption
- 40% reduction in storage cost
- TCO can be significantly saved in terms of CAPEX and OPEX:
  - CAPEX can be saved because:
    - Commodity hardware is used
    - Minimize the costly disk array replacement and data migration
  - OPEX can be saved because:
    - Reduce data movement time to publish new content faster
    - Improve SLA with easier and faster provisioning
    - Reduce downtime with self-healing infrastructure
    - Less space and power consumption

# FAQ – Media & Broadcasting industry

1. Does Bigtera SDS solution support "Non Linear Editing (NLE)" ?

Answer.: **Yes**, our customers of media & broadcasting has already adopted Bigtera SDS solution for their post-production process including "Non Linear Editing (NLE)" .

2. **The number of stream** can Bigtera SDS solution support for (a minimal set of Bigtera cluster with 3 nodes) ?

Answer: For **HD** bitrate = 100 Mbps, **read** ~ = 90, **write** ~ = 70

3. What innovation of Bigtera SDS solution to reduce the **data movement time** (pain point)?

Answer: Bigtera's the **zero-copy technology** (few seconds for a 3 TB file transmission) can effectively solve the media customer's the **data movement time issue** (pain point) that they were not able to transfer data rapidly between multiple storage systems.

( Please refer to Bigtera/Intel white paper for **successful story** in China Media and Broadcasting industry.  
Download: <https://goo.gl/Cf6Sde> )



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# Thank you

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