CloudFabric Solution Optimized for High-Availability/Hyperscale/HPC Environments

Internet

VPC | Industry cloud | DCI leased line

Finance

Mobile marketing | Online banking | Telephone banking

HPC

Artificial intelligence

FusionSphere Enabled | vmware

Microsoft | openstack

Agile CONTROLLER | Fabric Insight

Simplified deployment

Automation, enabling service deployment in minutes

Simplified Operations

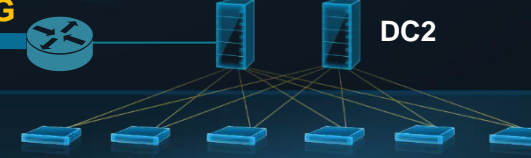Intelligence, enabling fault locating in minutes

DC1 — 400G — 400G — DC2
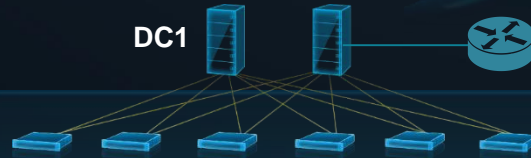
- **Hyperscale**
- **High-Availability**
- **HPC**

Scale

Server scale: 0.5k   5k   50k …

Access bandwidth: GE   10/25 GE   100 GE

Simplified design

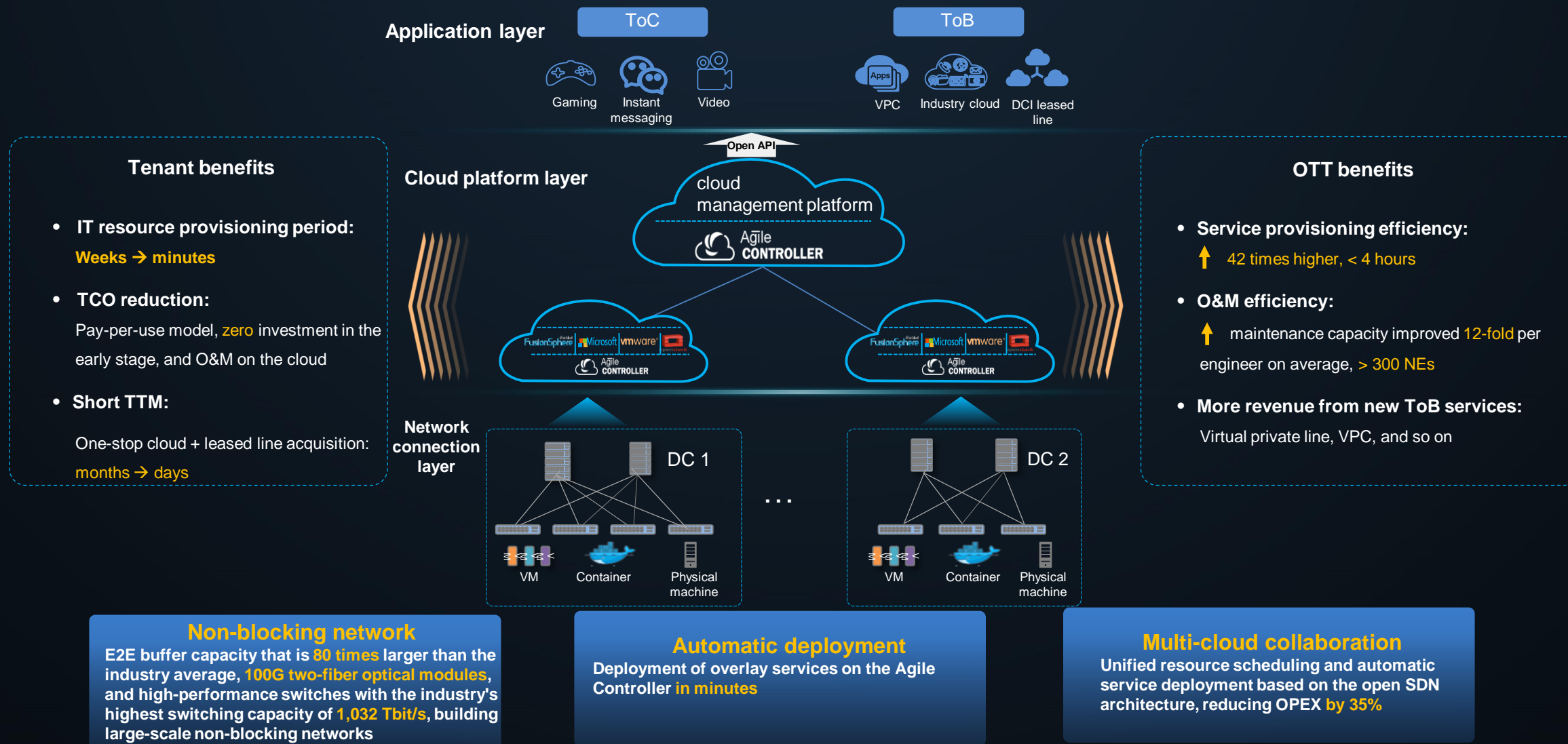Modular design, enabling flexible self-service on-demand customization

Feature

- Zero packet loss
- Low latency
- High specifications
- High reliability
- High security
- Non-blocking

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CloudFabric for Hyperscale Benefits
Automatic Deployment of Multi-Cloud Networks, Quick Development of Internet Services

Application layer

ToC
- Gaming
- Instant messaging
- Video

ToB
- VPC
- Industry cloud
- DCI leased line

Tenant benefits

- **IT resource provisioning period:**
  Weeks → minutes

- **TCO reduction:**
  Pay-per-use model, zero investment in the early stage, and O&M on the cloud

- **Short TTM:**
  One-stop cloud + leased line acquisition:
  months → days

Cloud platform layer

Open API

cloud management platform

Agile CONTROLLER

FusionSphere | Microsoft | vmware | openstack
Agile CONTROLLER

FusionSphere | Microsoft | vmware | openstack
Agile CONTROLLER

Network connection layer

DC 1
- VM
- Container
- Physical machine

. . .

DC 2
- VM
- Container
- Physical machine

OTT benefits

- **Service provisioning efficiency:**
  ↑ 42 times higher, < 4 hours

- **O&M efficiency:**
  ↑ maintenance capacity improved 12-fold per engineer on average, > 300 NEs

- **More revenue from new ToB services:**
  Virtual private line, VPC, and so on

Non-blocking network
E2E buffer capacity that is 80 times larger than the industry average, 100G two-fiber optical modules, and high-performance switches with the industry's highest switching capacity of 1,032 Tbit/s, building large-scale non-blocking networks

Automatic deployment
Deployment of overlay services on the Agile Controller in minutes

Multi-cloud collaboration
Unified resource scheduling and automatic service deployment based on the open SDN architecture, reducing OPEX by 35%

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CloudFabric for Hyperscale
Large-Scale Automation and Multi-Cloud Collaboration — 1st Choice for the Internet Industry

Currently

Four pairs of optical fibers are required for 100GE interfaces.

Future

One pair of optical fibers is required for 100GE interfaces.

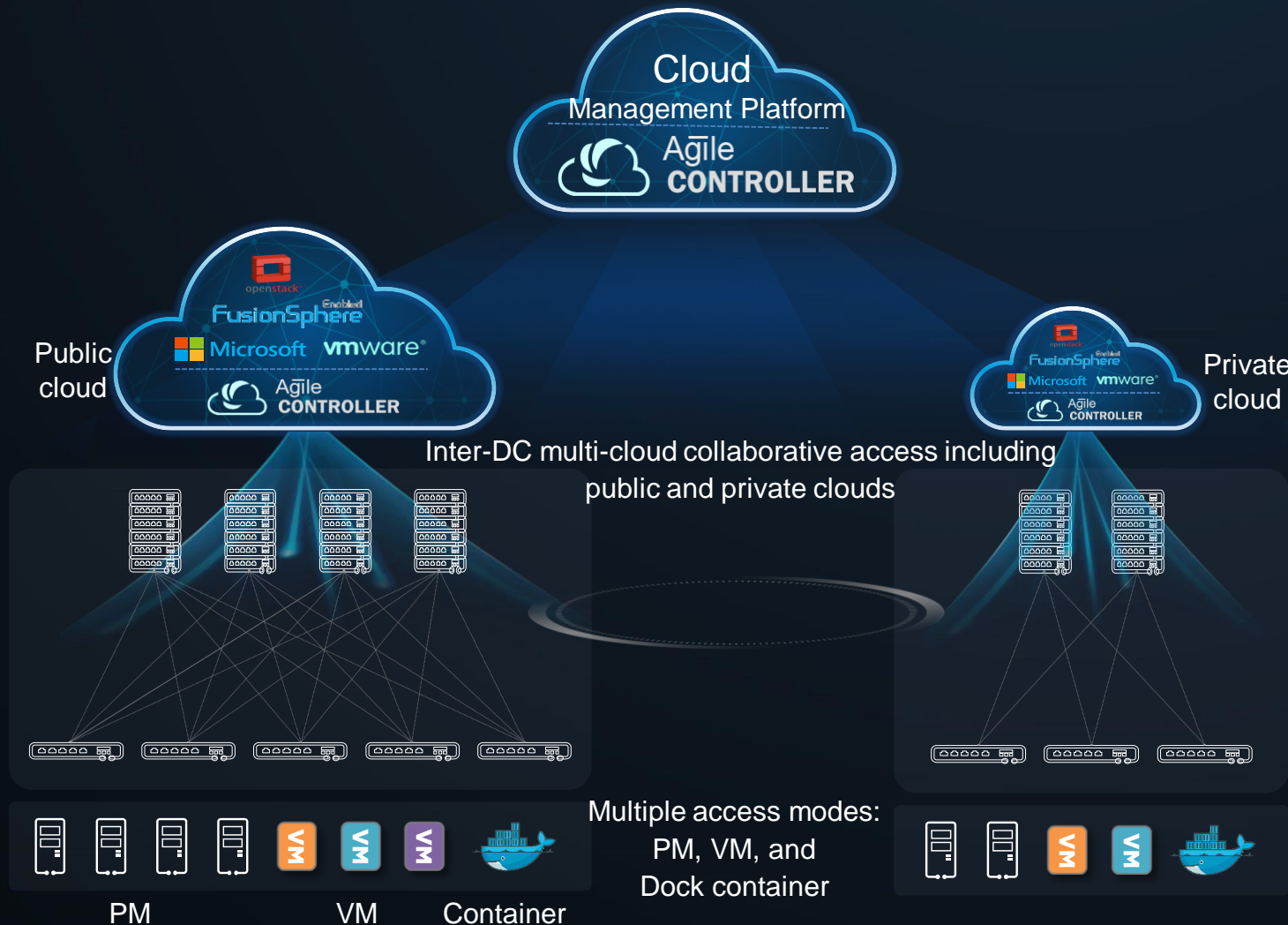The industry's **first** 100GE two-fiber interconnection, **75%** fewer fibers.

Clos architecture, cell switching
1152*100GE interfaces

1:1 convergence ratio, non-blocking
48*10GE/25GE access interfaces

The industry's highest-performing switch provides ultra-large-scale non-blocking access for **50,000+** servers.

CloudFabric for Hyperscale
Large-Scale Automation and Multi-Cloud Collaboration — 1st Choice for the Internet Industry

Cloud
Management Platform
Agile
CONTROLLER

Public cloud

openstack Enabled
FusionSphere
Microsoft vmware®
Agile
CONTROLLER

openstack Enabled
FusionSphere
Microsoft vmware®
Agile
CONTROLLER

Private cloud

Inter-DC multi-cloud collaborative access including public and private clouds

PM   VM   Container

Multiple access modes: PM, VM, and Dock container

The open SDN architecture achieves unified resource scheduling and automatic service deployment, reducing OPEX by **35%.**

The SDN controller implements service deployment **within minutes.**

The industry's **first** 100GE two-fiber interconnection, **75%** fewer fibers.

The industry's highest-performing switch provides ultra-large-scale non-blocking access for **50,000+** servers.

CloudFabric for High-Availability Benefits
Zero Service Interruptions, Enabling Service Provisioning Anytime and Anywhere

Application layer

- Mobile banking
- Online banking
- Operation management
- Risk control

Cloud platform layer

Open API

VPC/DNS/EIP/NAT

FusionSphere Enabled | Microsoft | vmware | openstack

Open interface

Agile CONTROLLER | FarbricInsight

User experience

- **Self service**
  Mobile payment and real-time money transfer

- **Uninterrupted services**
  24/7 services

- **Data protection**
  E2E data security, ensuring zero information leakage
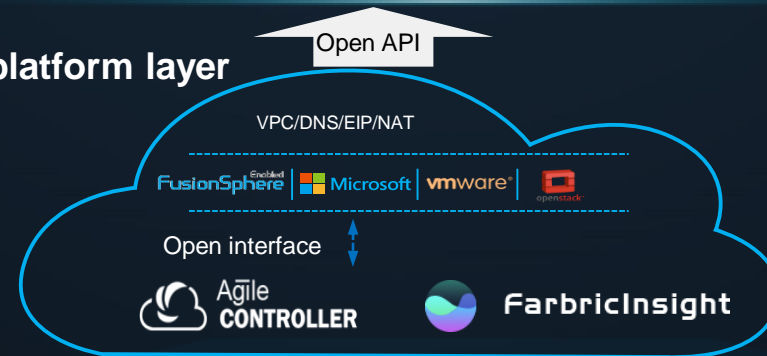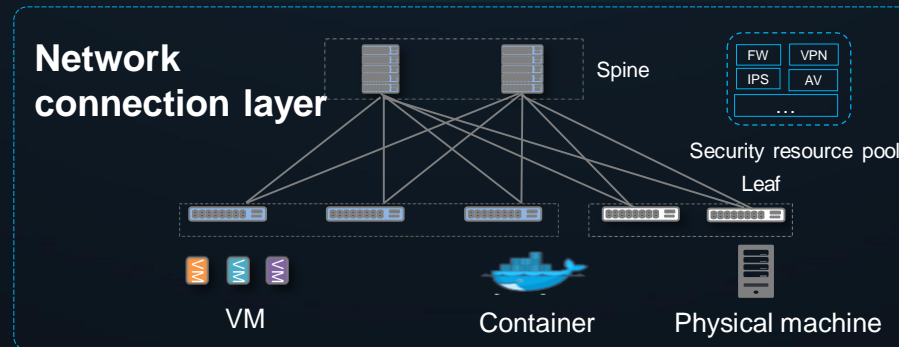
Enterprise benefits

- **Quick provisioning of innovative services**
  Small and micro loan service provisioning time cut from weeks to days

- **Internal security isolation**
  Security policy delivery mode optimized from manual to automatic

- **Intelligent O&M**
  Fault locating time cut from hours to minutes

Network connection layer

Spine

FW | VPN
IPS | AV
...

Security resource pool

Leaf

VM | Container | Physical machine

High reliability
Achieving reliability at the link and device levels based on **hardware BFD** and **M-LAG**, ensuring zero service interruptions

High security
Implementing security isolation from the network segment level to the **VM level** based on the service chain and **microsegmentation**, enabling flexible deployment

Intelligent O&M
Understanding network situations from the application perspective using **FabricInsight**, helping locate faults within minutes

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CloudFabric for High-Availability
High-Reliability and High-Security Intelligent O&M Solution – Ideal for the Financial Industry

Agile CONTROLLER

Micro-segmentation

M-LAG

Being upgraded

Master   Peer Link   Slave

Eth-Trunk

VM 1	VM 2	VM 3
1.1.1.1	1.1.1.2	1.1.1.3

VM 4	VM 5	VM 6
2.2.2.1	2.2.2.2	2.2.2.3

AS IS: subnet-level communication and isolation

TO-BE: VM-level communication and isolation based on microsegmentation
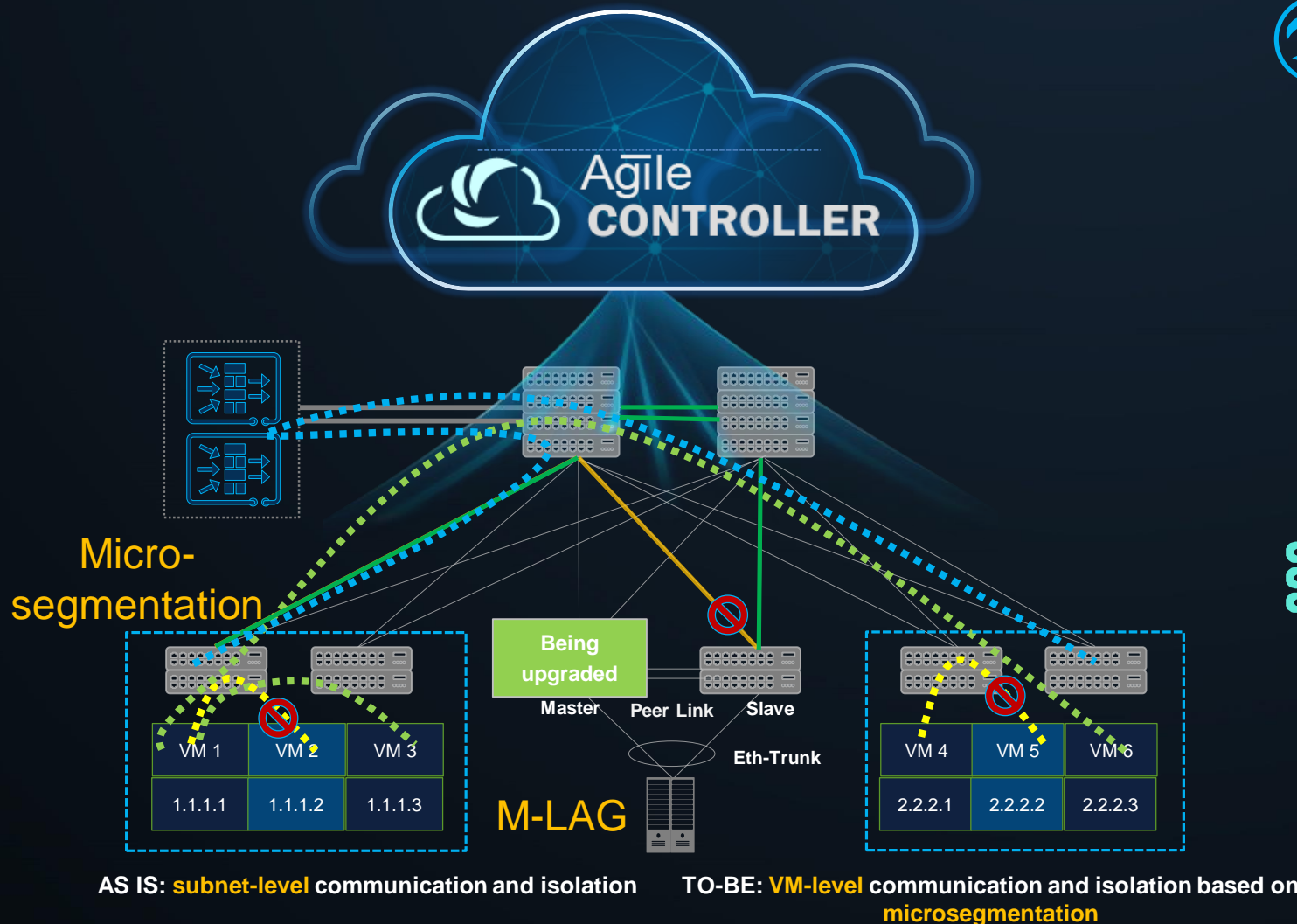
Network-level high reliability

- Duration for detecting a link fault through Hardware BFD reduced from 50 ms to 3.3 ms, ensuring zero service interruptions upon link switchover

- Independent M-LAG control planes that work in active-active backup mode, ensuring zero service interruptions upon device upgrade

Application-level high security

- Secure application isolation from the network segment level to the VM level based on the microsegmentation feature of network devices, enabling precise on-demand security control

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CloudFabric for High-Availability
Application Relevant Visibility, Fast Fault Isolation, & Predictive Prevention with FabricInsight

PC iPAD
Service presentation layer

Collector → Analyzer

Data analysis layer FabricInsight

web ! app app db

Data center network
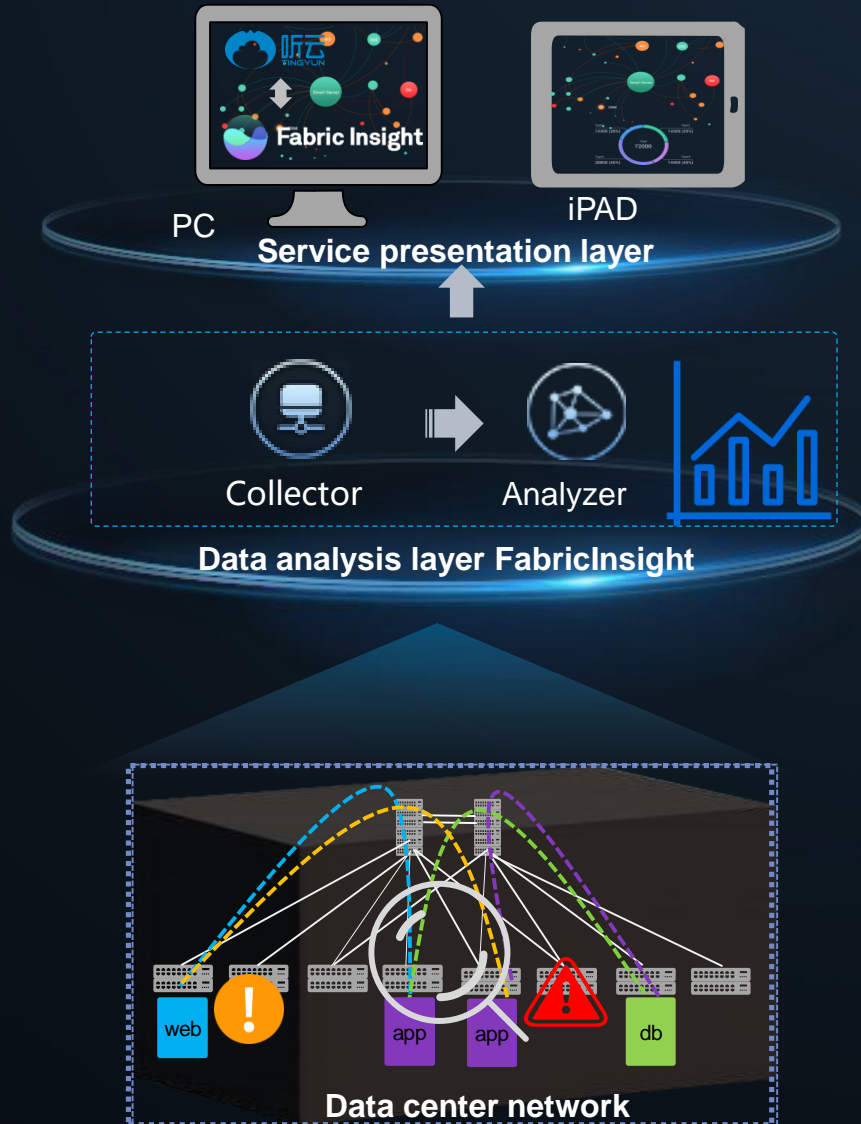
Mutual visibility between applications and networks, facilitating minute-level fault locating

•Intelligent drawing of the application map and real-time network policy assessment.

•Automatic association of the faulty link upon application exceptions, enabling fault locating within minutes.

Precise playback of historical faults and retrieval of ten billion data records within seconds

•Retrieval of ten billion flow data records within seconds and capability of processing 1 million packets per second.

•Multi-dimensional network visibility.

Actual network quality assessment and proactive risk prediction

•Inband telemetry, assessing network SLA based on real service flows on the entire network.

•Support for identification and analysis of abnormal flows on the network.

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CloudFabric for HPC Benefits
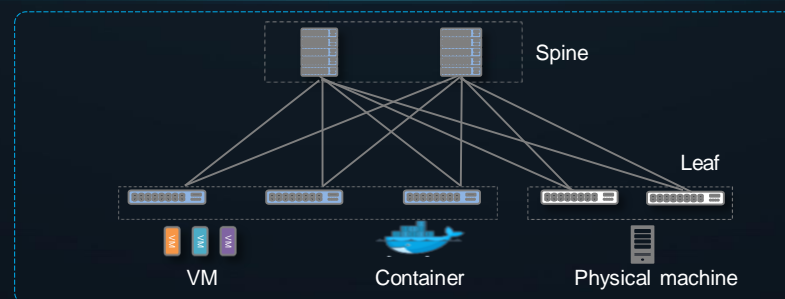## Bringing the Benefits of Cloud and Replacing Siloed Dedicated Networks

Application layer

Autonomous driving | Satellite mapping | Meteorological science | Energy exploration | Speech recognition
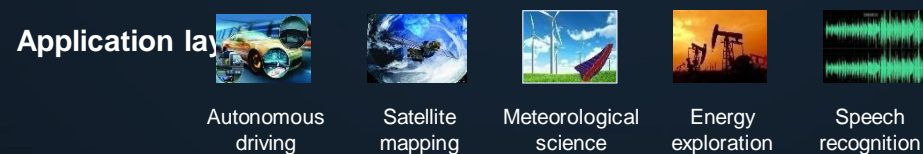
Open API

Cloud platform layer

Big Data + Artificial intelligence

Self-owned cloud platform

Agile CONTROLLER

Tenant benefits

- **TCO reduction**
  Pay-per-use model, zero investment in the early stage, and elastic capacity expansion

- **IB quality at Ethernet price**
  40% shorter job completion time, reducing the cost by 30%

Benefits to cloud service providers

- **Converged and unified network management**
  Three networks converged into one, reducing OPEX by 40%

- **More revenue from new ToB services:**
  New cloud services provided by HPC servers, implementing **HPC** network automation deployment

Network connection layer

Spine

Leaf

VM | Container | Physical machine

HPC Network automation
On-demand resource sharing based on Ethernet's outstanding openness, migrating HPC services to the cloud

Large-scale network
Building of a large-scale network consisting of 5,000 servers for HPC

Low-latency network
Zero packet loss and 40% shorter computing duration for HPC services using Huawei-developed scheduling algorithms

CloudFabric for HPC
Elastic Lossless Fabric with Nanosecond Level Latency

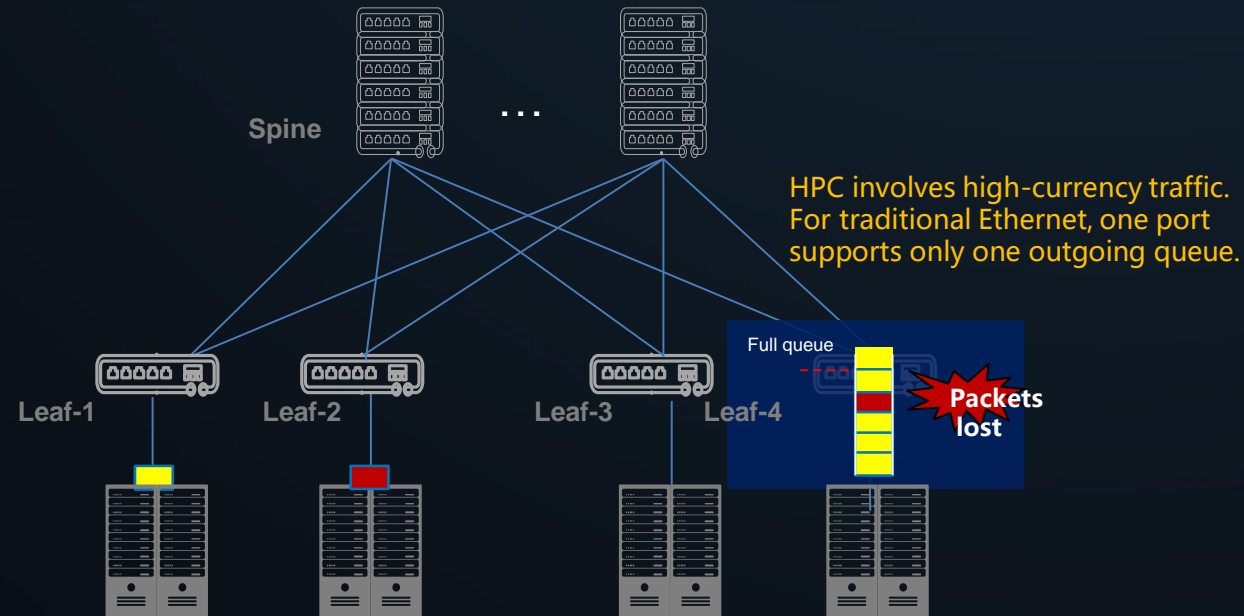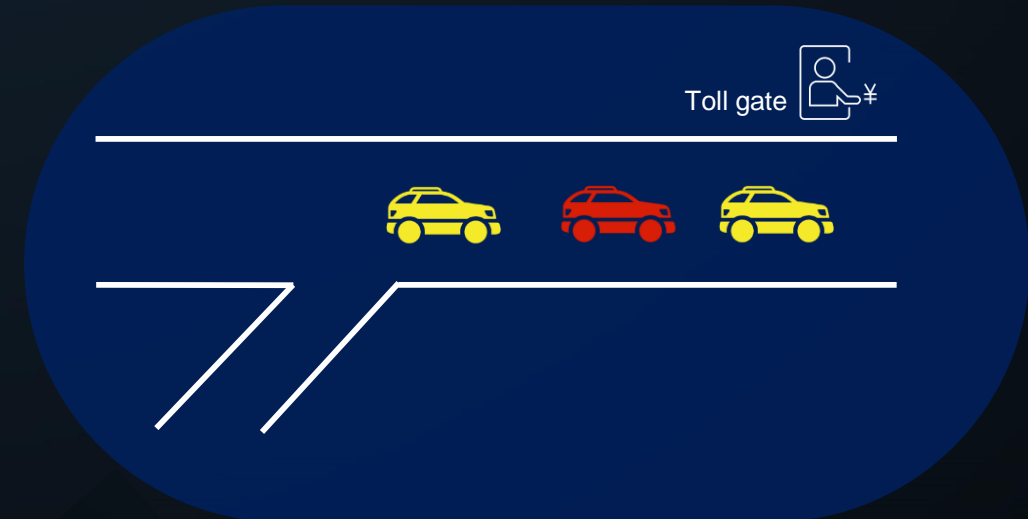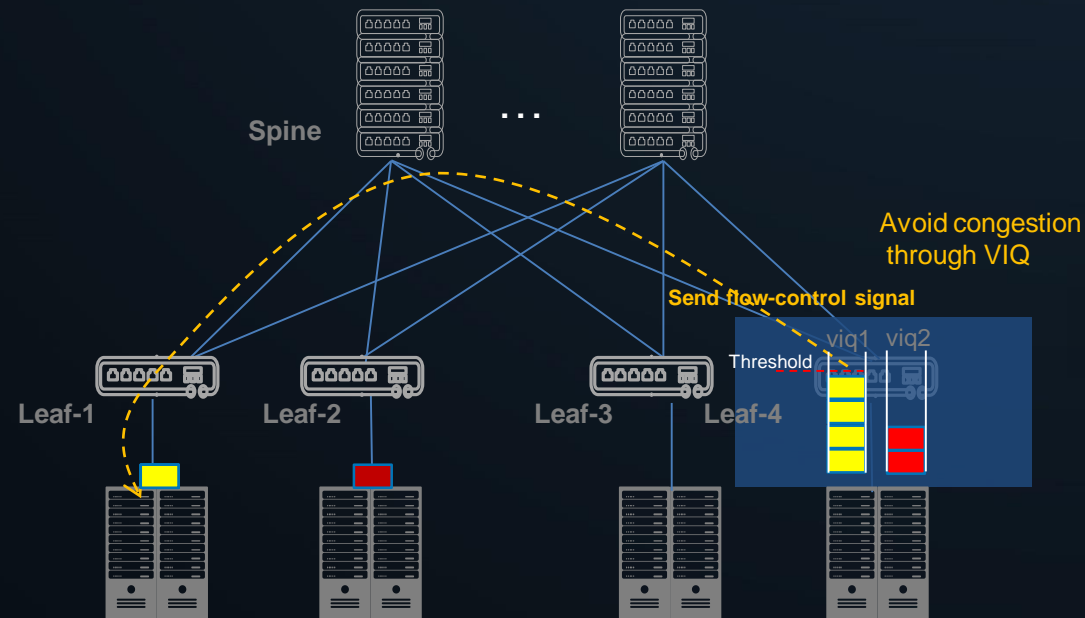Satellite surveying & mapping
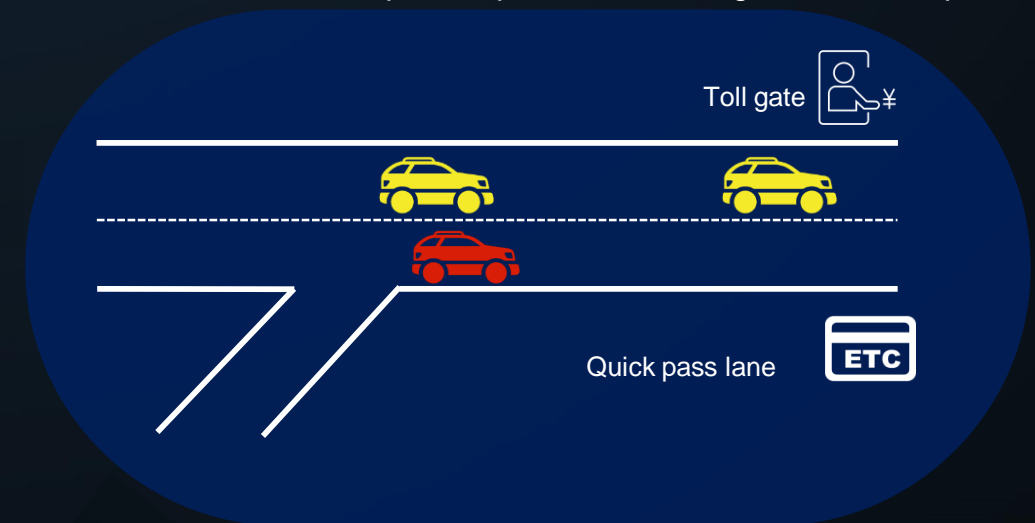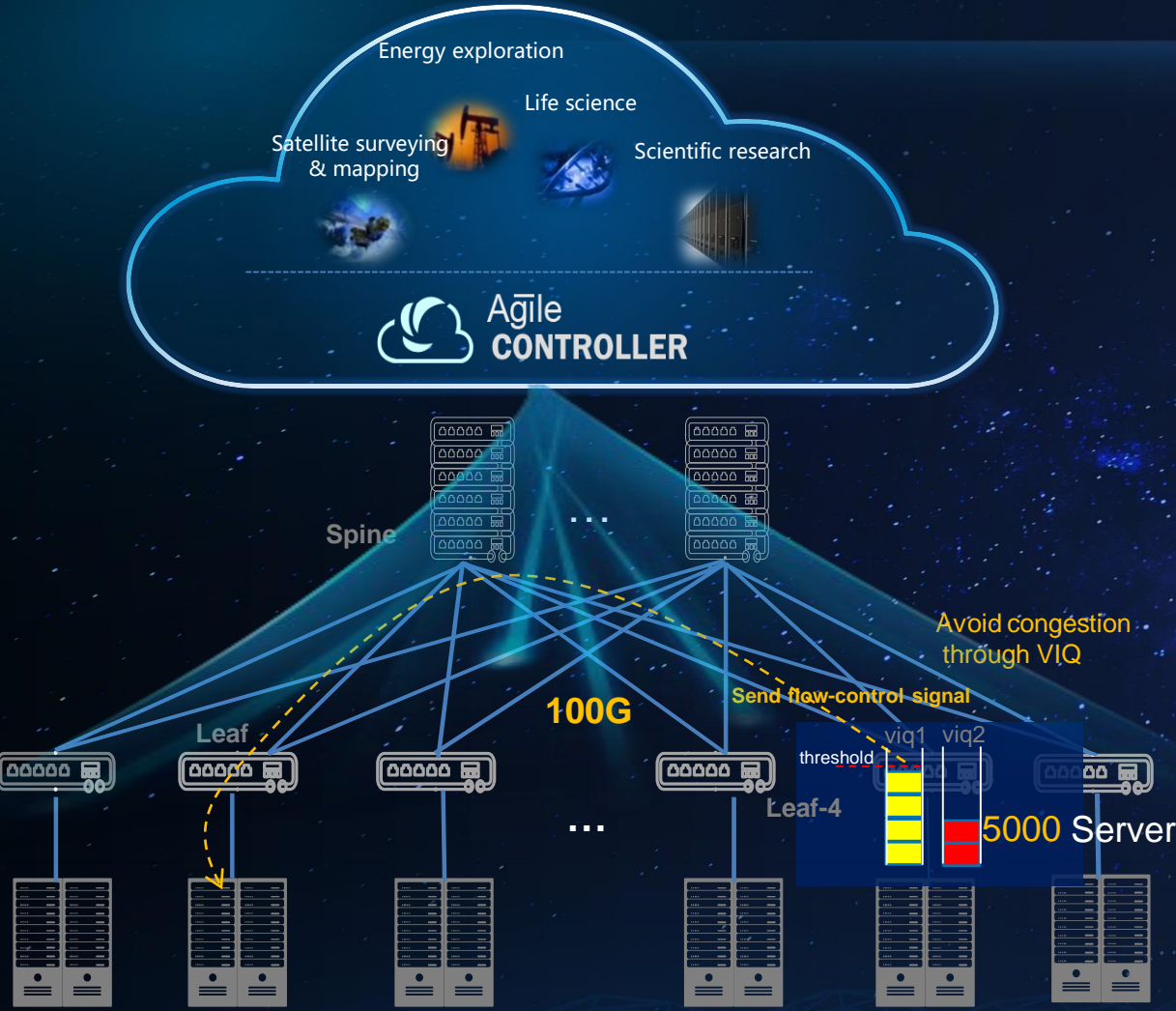
Energy exploration

Life science

Scientific research

Currently

Spine

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HPC involves high-currency traffic.
For traditional Ethernet, one port supports only one outgoing queue.

Leaf-1   Leaf-2   Leaf-3   Leaf-4

Full queue

Packets lost

Like on a single-lane road, congestion easily occurs

Toll gate

CloudFabric for HPC
Elastic Lossless Fabric with Nanosecond Level Latency

Satellite surveying & mapping

Energy exploration

Life science

Scientific research

Coming

Spine

. . .

Avoid congestion through VIQ

Send flow-control signal

Threshold

viq1   viq2

Leaf-1   Leaf-2   Leaf-3   Leaf-4

The innovative congestion scheduling algorithm achieves **0-loss** of packets and 40% shorter HPC service computing time

Like ETC lanes on highways, identify congestion flows and allocate them to a separate queue while letting normal flows pass

Toll gate

Quick pass lane

ETC

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CloudFabric for HPC
Elastic Lossless Fabric with Nanosecond Level Latency

Energy exploration

Life science

Satellite surveying & mapping

Scientific research

Agile **CONTROLLER**

Spine

...

Avoid congestion through VIQ

100G

Send flow-control signal

Leaf

threshold

viq1 viq2

Leaf-4

...

5000 Server

The innovative congestion scheduling algorithm achieves **0-loss** of packets and 40% shorter HPC service computing time

100G spine-leaf Ethernet increases the network size **5-fold** compared with an Infiniband private network.

Apps

SDN auto-provisioning, **HPCaaS** is possible.

400G DCI Solution : Leading Cloud and Digital Transformation

Tenant value

- **Fast provisioning**

  From weeks to **minutes**

- **High quality**

  Guarantee **SLA**

- **Improve experience**

  Self management & **visualization**

Network Capability Openness Platform

3rd APP

Agile **CONTROLLER**

3rd Controller

IP

DC **400GE**

400GE DC

Optical
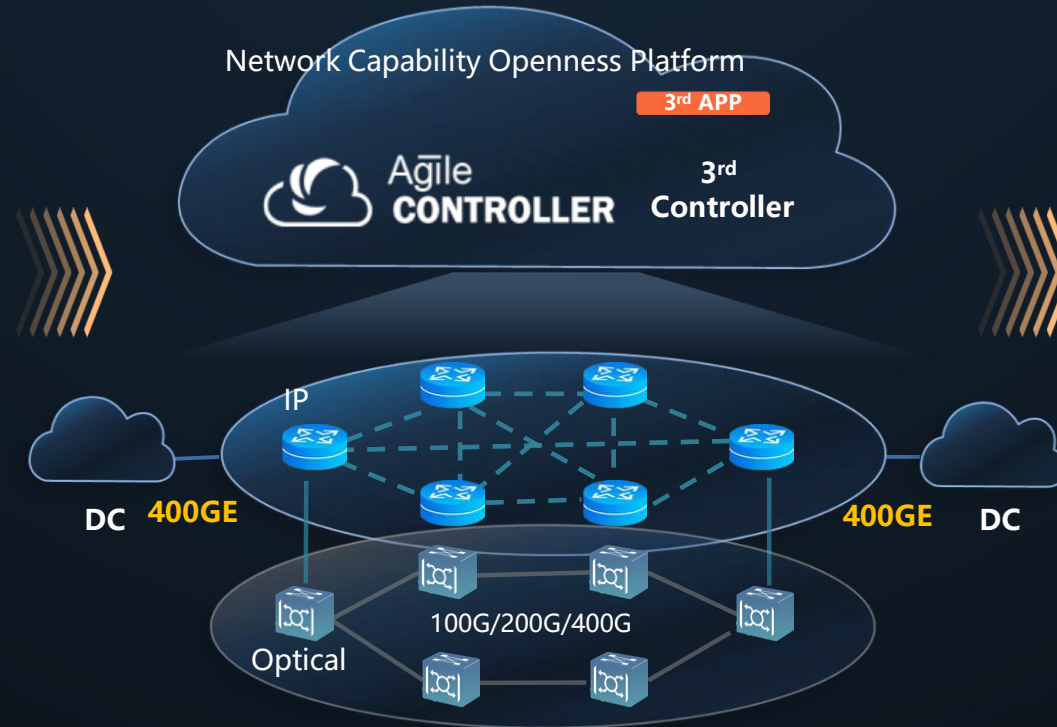
100G/200G/400G

OTT Values

- **Low TCO**

  Reduce TCO by **40%**

- **High BW utilization**

  Improve from **30% to 80%**

- **Green design**

  Energy consumption **40%↓**

Super

- **4T router and 400GE ports card**
- **Optical 100G/200G/400G**

Smart

- **The centralized Agile Controller**
- **IP+Optical Synergy**

Green

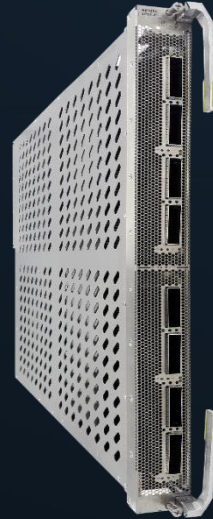- **Self-developed Solar 5.0 chipset**
- **First floating cooling technology**

NE9000-8 : Industry's Highest Capacity Backbone Router
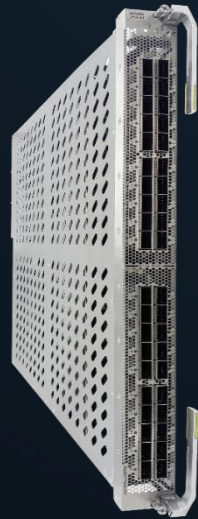
NE9000-8   **40*100GE**   **8*400GE**

4T/slot | 8 SLOT | 32T/chassis | Expandable to 8T/slot

Highest density Smart architecture

Real-time on-demand adjustment

Solar 5.0 chipset   **Energy Efficient**   **Compact Design**

Thank You.