

## Cloud Transformation

### 1. Development Dilemma of the Telecom Industry

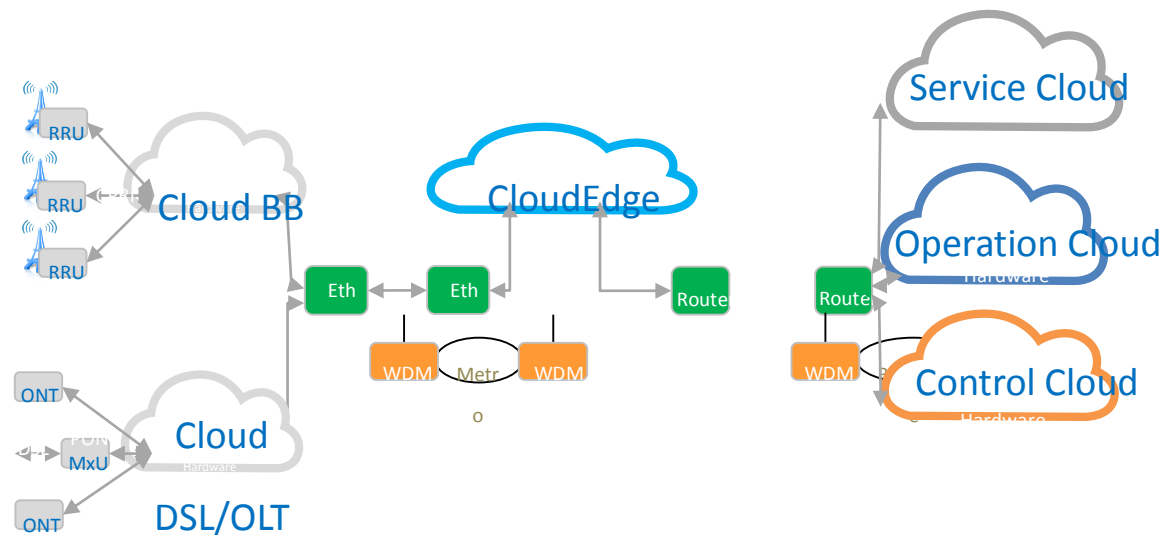
"About two decades ago, people who had a mobile phone were someone big. However, nowadays, those who do not have a phone are someone big." This joke briefly describes the two-decade development of the telecom industry. Mobile phones, which were symbols of social status, have become the commodities that everyone can have. According to the statistics (Oct 2014) of Re/code, a famous technology media in the United States, the number of mobile phone users all over the world is nearly the total population. In developed regions such as Europe and Middle East, the penetration rate of mobile phones has exceeded 100%. Traditional telecom services have become saturated.

At the same time, another industry comes to loom large gradually. Thanks to the largest IPO in American history, emergence of the Internet-based finance, and all-round pervasion of social software, the Internet industry has outperformed the telecom industry with its strong development trend. Real-time chat software has threatened the traditional territory of the telecom industry. For example, the revenue of the most profitable SMS service of a carrier decreased by 20% in 2014, compared with the revenue in the previous year. The Internet is successful because it provides diverse services and has deeply penetrated into every aspect of people's daily life (such as transportation, entertainment, social networking, shopping, and finance), changing people's habits and behavior utterly. Technically, the Internet architecture is an advanced one because it has cloud-based infrastructure and adopts universal and standard IT hardware. As a result, new services develop rapidly and the costs are low. The Internet supports the scale-out mode to improve service processing capabilities, and the capacity expansion is simple, resulting in rapid development of the Internet. The traditional telecom industry adopts the inflexible chimney-type IT architecture. The service update is slow. Single types of services (voice, SMS, and broadband) are outperformed by diverse Internet services. To change the current situation and implement successful transformation, a standard and flexible infrastructure platform needs to be built to implement IT-based networks. This can provide a solid basis for digital service development and ICT convergence, and implement quick development and flexible expansion of various new

services, improving operation efficiency by ten times. With the development of technologies such as cloud computing and high-performance x86 servers, cloud data centers become the best choice for telecom industry transformation.

## 2. Cloud Transformation Solution

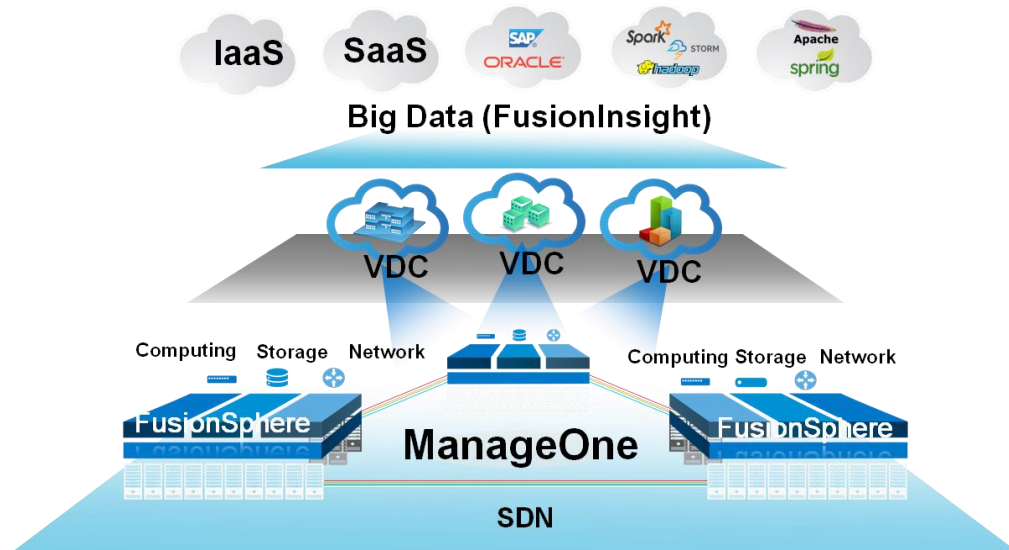
Huawei proposes that the IT-based carrier network development is an irreversible trend in the future. All control layers and service layers become software-based and run on the universal IT infrastructure in the cloud data centers. Therefore, future networks will be built with data centers being the center. Agile, efficient, and open cloud data centers are the basis to support carriers' ICT transformation.



Note: Cloud BB is the abbreviation of Cloud Base Band

With the Huawei service driven-distributed cloud data center (SD-DC) as reference architecture and the OpenStack-based cloud OS FusionSphere as the core, and the OpenStack-based cloud OS FusionSphere as the core, the Huawei cloud transformation solution uses IT infrastructure (server, storage, and network resources) to build a standard and shared cloud resource pool, improves resource utilization and reduces OPEX by migrating existing services (such as VAS and BSS) onto cloud, and assist carriers to expand new services (such as public cloud) to increase revenue. Based on automation and process orchestration technologies, users can install hardware, middleware, OSs, and applications by dragging icons on the network management interface. In

this mode, services can be deployed within days instead of months, quickly responding to business requirements and market changes.



## 2.1 SD-DC <sup>2</sup>Architecture

To build a next generation data center, and according to characters of telecom, The SD-DC <sup>2</sup> makes technical innovation in hardware, software, service deployment and big data.

### 1. Hardware Restructure

The hardware layer consists of hardware such as servers, storage, and network. Based on the experience on chip and entire system hardware design, Huawei implements hardware R&D innovation in three aspects:

- **Scale-up: excellent performance**  
 With the common application requirements being met by mainstream servers and storage devices, Huawei provides the high-end server RH5885 and high-end storage device OceanStor 18000 for core application systems that require optimal computing and storage performance, such as databases.
- **Scale-out: powerful expansion**  
 Compared to the applications of traditional midrange computers, a large number of applications in the Internet era feature distributed architecture as well as large data

processing and storage volume. These requirements cannot be met by the design and architecture of traditional servers and storage hardware. To meet the requirements of the Internet and big data processing applications, Huawei develops distributed multi-node architecture to support servers and storage that can be smoothly expanded, including the X8000 high-density rack server and OceanStor 9000 mass storage.

- Convergence: integration and simplicity

Some applications need to process a large amount of user data in a short period (such as big data analytics). These applications require high data processing and throughput capabilities. In this case, the traditional loose coupling architecture will encounter bottlenecks on processing bandwidth and latency. Based on the computing, storage, and network integration design, Huawei provides the E9000 converged system to resolve this problem.

## 2. Software Define

Based on the hardware solution that is applicable to multiple scenarios, Huawei provides OpenStack-based cloud OS, FusionSphere, and unified management system, ManageOne. Based on the service model of global telecom carriers across multiple areas, Huawei uses the distributed cloud architecture to integrate the computing, storage, and network resources in multiple data centers, forming a large unified resource pool. Resources are allocated by service and in virtual data center (VDC) mode. The cloudized resource pool is turned into a data center as a service (DCaaS) service center, providing carriers with unified resource management and scheduling.

- Computing virtualization:

Implements the seamless connection to the OpenStack Nova service based on the Huawei enhanced keyboard, video, and mouse switch (KVM) virtualization engine, performs VM affinity scheduling and VM live migration, and supports million-level VM deployment capabilities to ensure limitless cloud resource pool expansion.

- Software-defined storage (SDS):

Implements the seamless connection to the OpenStack Cinder service based on the Huawei distributed storage engine, supports a maximum of 128 physical servers for a single cluster, and provides the IOPS that is three to five times of that of the traditional SAN/NAS storage.

- Software-defined network (SDN):

Provides programmable data center switch, virtual switch, virtual service gateway, VxLAN channel, and SDN controller technologies and connects to the OpenStack Neutron service seamlessly, implementing the SDN capabilities across physical and virtual networks.

- Software-defined power supply and cooling:

Automatically adjusts the power supply and cooling based on the load of physical devices, and implements efficient cooling using multiple natural cooling and energy-saving devices.

The lowest PUE is only 1.2.

### 3. Service Driven

- Virtual data center (VDC):

VDC is designed to solve the challenges of long service deployment period, unguaranteed SLA and difficult O&M. VDC provide centralized management of the IT resource distributed in different locations, abstract them into one or more virtual data centers according to carrier's organization and service requirement, and service deployment can be finished in 1 day by visual and GUI-based tools. To guarantee SLA in resource pool, differentiated resource, such as gold, silver and bronze levels, can be selected for services with different priorities, and IT resource can be automatically expanded or reduced according to service load, therefore, SLA is guaranteed with efficient resource usage.

- Multiple data center management (ManageOne):

ManageOne is the management platform for SD-DC<sup>2</sup>, which enables to manage multiple data centers as one, use one data center as many. The four innovative unified management functions of ManageOne (unified management of multiple data centers, cloud and physical resources, heterogeneous virtualization platforms, operation and maintenance) improve

management efficiency by 10 times.

#### 4. Data Innovation

Huawei FusionInsight is a unified platform for big data storage, query and analysis. To meet the requirement of maintenance and application development of carriers, FusionInsight develops reliable, secure and easy-to-use maintenance system and middleware for full data modeling, which enables carriers to discover values in mass data faster and more accurately. FusionInsight not only closely follows open community of Hadoop and integrate its latest components, but also develops data services and open APIs especially for telecom applications to realize the convenient usage of big data.

### 2.2 Customer Benefits

Cloud Transformation Solution assists carriers to build up a unified and flexible ICT infrastructure platform, which is the foundation of digital transformation. The detailed benefits are as follows:

1. Agile: Physical resources are defined by the software and the DCaaS service is provided. Services can be rolled out within one week, meeting the market and business requirements quickly.
2. Efficient: Based on unified management, the service-oriented end-to-end monitoring is implemented, improving management efficiency by 10 times.
3. Open: Based on the FusionSphere with standard OpenStack architecture and the management software ManageOne that is compatible with 3000 mainstream software and hardware in the industry, the vendor lock problems of carriers are resolved.

### 3. Conclusion

Konosuke Matsushita once said, "The so-called death, of course, is an end. However, the birth of a new generation also starts here. The endless death and endless birth are the principle of growth and development." Today's dilemma brings us the chance to transform. Tomorrow's world where things are connected to each other presents a brighter future in front of us. Let's shake off our



burden, make change happen, and embrace the future bravely.

*(Huawei is participating in the Mobile World Congress 2015 in Barcelona, Spain. For more information, please visit: <http://www.huawei.com/mwc2015/en/index.html>)*