Huawei Puts its Head in the Clouds
2011 Huawei Global Analyst Summit
Contents

- IT and CT collide
- Huawei cloud solution
- Opening business opportunities for operators
- Expanding beyond telecom
- Proven solutions
Building a new business model

- Convergence: Telecom, internet and media
- Value increasing: Device + service
- Subscribers loyalty: Move to ISP/CP

- “Golden pipe”: Core business of carriers
- 2-Side Business Model: “Change competitors into partners”
- “Digital Supermarket”: Desire of buyer and seller
Focus on new opportunities

Beyond Broadband
- Beyond Voice, New Service
- 3 Billion Mobile BB Subscribers

Beyond Internet of Things
- Beyond People, New Subscribers
- From 6 Billion to 50 Billion Machines

Last year we said...

In the next five years
- 3B MBB users, 300M FBB users
- 500M M2M users, 73M Cable users
- 270X MBB traffic, 5X FBB traffic
- USD 100B data center market

Home Network
- Beyond Telecom, New Industry
- On-line Contents replace traditional Media

Cloud Computing
- Beyond PIPE, New Value Extension
- IaaS/SaaS replace “Box” Hardware/Software
Cloud is already revolutionizing our lives

**Cloud is:**

- Broadband technology
- Distributed processing
- Virtualization
- Resources rental
- Capability rental
- Self-built
- Cooperative eco-system

**Wikipedia says:**

Cloud computing is Internet-based computing, whereby shared resources, software and information, are provided to computers and other devices on-demand, like the electricity grid.

**Gartner says:**

A style of computing where massively scalable-related capabilities are provided ‘as a service’ using Internet technologies to connect multiple external customers (Gartner, 2008).
But Cloud has more to offer

"Cloud computing may multiply the benefits of the internet by a factor of 10…but we may also face 10 times the challenges"

---Participant, cloud workshop, California, USA

- In the short-term, Cloud can improve IT efficiency
- In the medium-term it can improve the customer’s experience and efficiency
- In the long-term it will enhance society

source: World Economic Forum 2010
Cloud computing has huge potential

- **Public IT cloud, 2009**: $17Bn
- **Enterprise cloud service, 2010**: $12Bn
- **Cloud service, 2010**: $12Bn
- **Public IT cloud, 2014**: $55Bn
- **Enterprise Cloud service, 2015**: $36Bn
- **Cloud service, 2015**: $35Bn
- **Cloud service, 2020**: $25Bn
- **Cloud service, 2009**: $13Bn
Everyone wants a piece of the cloud

Industry Offerings
- SaaS (ICT)
- PaaS (ICT)
- IaaS (ICT)
- Software Solution
- Hardware Solution
- Broadband

IT
- Google
- Amazon
- IBM
- Microsoft
- Salesforce
- GAE
- AWS
- Azure

EC2/S3
/Hadoop/Tivoli
Windows
Azure
App
Engine

Force.com

CT
- BT
- &
- at&t
- NTT

BizCITY
Synaptic
Business
Store
Cloud
Broker
Services
VDC

IT moves downwards
CT moves upwards

ICT
Innovate vs. disrupt for solutions

Public Cloud Evolution

Silo-ed Cloud ➔ Public Cloud ➔ Hybrid

- Federation with public clouds
- Interoperability
- Cloud bursting

Private Cloud Evolution

Consolidate
Standardize

Silo-ed ➔ Grid ➔ Private Cloud ➔ Hybrid

- Physical
- Dedicated
- Static
- Heterogeneous

- Virtual
- Shared services
- Dynamic
- Standardized appliances

- Self-service
- Policy-based resource mgmt
- Chargeback
- Capacity planning

Virtual Private Cloud
Major telcos making strategic move to Cloud

Identify **Cloud Infrastructure & Video Solution** in TOP 5 Strategy

**Telefonica**

Reorganized around new services BUs: Cloud Infra. Video, M2M, eHealth & Financial

**at&t**

“**Synaptic Hosting**”, offering cloud infrastructure services (storage & computing)

**Verizon**

Cloud based “**Everything as a Service**”, start offering Cloud infra. services

**China Mobile**

Cloud for VDI, IDC, Data Analytic Engine (Big Cloud), targeting SMB, OSS/BSS

**China Telecom**

“**Nebular Plan**”, consolidate Data Centers, from renting facility to cloud infra offering

**Most start building cloud infrastructure while exploring new services**
Telcos' cloud computing implementation strategy

**Initial Stage**
- Easy implementation
- Low risk applications

**Next Stage**
- Sensitive data
- High risk applications

**Implementation Steps**
- IDC for own
- Hosting IDC for business clients
- Use public data to analyze & model

**Data sensitivity level**
- Low End Public Cloud
- Private Cloud High End Public Cloud
- Mixture

**Complexity Level**

**Key Apps. Sensitive Customer Data**
- BSS/OSS

**Non-sensitive data**
- Telecom Services / Enterprise Application
- Non-sensitive data

**Initial Stage**
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**Data sensitivity level**

**Initial Stage**
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Huawei disruptive positioning

Carriers
Cloud Services and Marketplace

- Service-oriented public cloud
- Large scale, highly reliable, **low cost**, and **private system**

- IT-oriented private cloud
- High performance, high reliability, **high cost**, and integrated system
Huawei Cloud computing solution overview

- Desktop Cloud
- ICT Cloud
- Media Cloud

Cloud software operation system:
- Virtualization
- Parallel
- Distribution
- Automation

Cloud hardware platform:
- Compute
- Storage
- Network
- Security

Facilities

- Business Consulting
- DC Design
- Maintenance Consulting
- Optimization & Evaluation
- Professional Service

- Software
- Data
- Network
- Access
- Security Management
E2E hardware product portfolio

- Cloud-Oriented Hardware
  - Virtual rack Server T6000
  - Blade Server E6000
  - Rack
  - SSD
  - Intelligent NIC
  - BOX Storage
  - Rack Storage
  - TOR switch
  - Leaf Switch
  - Root Switch
  - Cloud in a Box
  - Container Solution

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Huawei Confidential
Advanced software architecture

1. Virtualization
   - CPU
   - Memory
   - Storage
   - Network

2. Distributed
   - File system
   - Database management
   - Message bus

3. Parallel
   - Mass data processing
   - High performance computing

4. Automation
   - Dynamic Resource dispatcher
   - Fault Self-heal
   - Zero-touch maintenance

High Capacity
- million servers cluster & million terabyte storage

High Utilization
- 60-70% hardware utilization (20-30% today)

High Performance
- 3 times higher read/write IOPS than IP-SAN storage

High Efficiency
- 10 times improved maintenance efficiency

Green
- 71% power saving (Huawei desktop case)
Flexible scalability for different deployment scenarios

**Single Application**

- App
- Web
- DBMS
- FS
- OS
- Sever
- Storage

**Distributed Computing**

- App
- Web
- DBMS
- FS
- OS
- Sever
- Storage

- Distributed Web Frame
- Distributed Database
- Distributed File Management
- Resource-Pool Management

**One Million Nodes Scalability**

**Up to 1 million computing nodes**
- Middle enterprise: 1000~3000 nodes
- Big enterprise: 5,000~10,000 nodes
- IDC operators: 100K ~ 1Million nodes

**Up to 1 million Terabytes Storage**
- Cost effective: Commodity components instead of dedicated hardware
- Auto management: Self-adaptive, auto-load balancing based on dynamic traffic
Non-blocking network with 100T switch capacity

Traditional data center Network

Cloud Data Center “Data Bus” supports distributed CPU, storage and memory
Lower maintenance costs with intelligent control

- Manual software installation
- Manual resources allocation
- Manual fault repair

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Dynamic resource scheduling
- Automatic load balancing
- Auto scaling
- Energy management based on traffic

Automatic intelligent control
- Automatic software installation
- Fault isolation,
- 10 times operation and maintenance efficiency

Sever 1

Intelligent Control

Master

Agent

Task 1

CPU

Mem

Storage

I/O

Task 2

Agent

Task 1

CPU

Mem

Storage

I/O

Task 2
Designed for data center power efficiency

Precise wind, separate hot & cool area

Module rack, integrate cooling system

Robot, automatic measure (temperature, humidity...)

Intelligent control
Dynamic power & cooling adjustment

Wind
Control
Integration
Measure

60% improvement of cooling efficiency

40% reduction of energy costs

Green dynamic management

Power Efficiency
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Telecom ICT applications, 2-Side business model

Life In Cloud

BOSS in Cloud

Work in Cloud

Cloud-based App (SaaS)
Service cloud, BOSS cloud

Cloud-based platform (PaaS)
Service Delivery Platform; Digital Shopping Mall

Huawei SingleCLOUD Platform
Cloud-based Unified Communication Solutions

Unified Communications
Office & Business applications

Virtual Desktop
Network

Multi-Screen convergence
PC Mobile phone WEB

Call Center Desktop

One ICT
Achieve business success

Win-Win Business Model
Tenancy instead of purchase

Business Intelligent
Understand end users requirements & network quality
User-level QoS guarantee through bandwidth control

- Time-based
- Terminal-based
- Service-based
- URL-based
Combined with CDN to improve media experience

- Media Processing
  - Media Analysis
  - Media Storage
  - Media Business
  - Parallel transcoding according to terminal types

- Media Display
  - Media Router
  - Media Distribution Cache
  - Network-aware content, content cache at different levels
  - Network-aware users, select distribution route based on location
  - Same experience across multiple screens
Partner strategy to build cloud ecosystem

Compatible with mainstream standards

- Compliance with DMTF
- Compatible with Amazon cloud interface

Partner Alliance

- Cooperation center
- SW Certification center
- IOT lab
- App develop lab
Huawei key advantages for operators

- **Carrier Grade**
  - Scalable, distributed, resilient, network-aware

- **ICT Service-Enabled**
  - Cloud-based Telecom, One-stop solution, media-enhanced

- **Open**
  - Industry-standard interfaces, Amazon web services interfaces
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Enterprise’s unmet needs

- **Large enterprise and government agencies**
  - Limited scalability
  - Reliability and resilience concerns
  - Lack of hierarchical management and control (multi-tenant)
  - Need specialized solutions for large and diverse populations

- **Specialized vertical markets**
  - Need solutions that can be easily distributed
  - Need massively parallel solutions

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**Huawei’s Cloud Solution Meets these Needs**
Key enterprise application: virtual desktop

Traditional desktop vs Virtual Desktop

- **Security**
  - Thin Client vs Physical Office

- **Power consumption**
  - 235W/h vs 70W/h

- **Maintenance**
  - 2~4 Hours vs 3 Minutes

**Deployment scenarios**
- Offices
- Call centers
- Service halls
- Admin centers
Key enterprise application: private Cloud

- **Silo IT system**
  - Service1
  - Service N
  - OS
  - IDC1
  - IDCn

- **IT spending**

- **Applications**
  - Cloud software platform
    - Virtualization
    - Parallel computing
    - Auto scheduling
    - Intelligent management

- **Cloud-oriented hardware**
  - Virtualized server
  - Non-blocking switch
  - Distributed Storage

- **Terminals**
  - ........

- **Distributed resources**
  - Geographic Distribution improves responsiveness and resilience

- **Centralized maintenance**
  - IT management cost reduced from 75% to 30%
Targeted vertical segment: IDC operators

ICT for SME

- Email
- ERP
- TC
- Internet

IDC Operator

- Compute Pool
- Storage Pool
- Switching Pool

- Email
- ERP/CRM
- Conference
- UC
- Messaging

Enterprise

- Virtual Private Cloud
- Virtual storage
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Success story: Huawei R&D VDI

- Reduce IT OPEX & CAPEX
- Improve employee productivity
- Current: 12000+ VMs
- 2011 & beyond: 60K global R&D staff migrate from PC to virtual desktop

<table>
<thead>
<tr>
<th></th>
<th>Traditional</th>
<th>Cloud DC for VDI</th>
<th>Expected Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU utilization</td>
<td>&lt;5%</td>
<td>&gt;52% (VDI+Testing)</td>
<td>10x</td>
</tr>
<tr>
<td>Power consumption</td>
<td>78MW</td>
<td>22MW</td>
<td>Reduce 71%</td>
</tr>
<tr>
<td>New employee prep.</td>
<td>&gt;3 months</td>
<td>&lt;3 days</td>
<td>Reduce 97%</td>
</tr>
<tr>
<td>Maintenance efficiency</td>
<td>&lt;100 / person</td>
<td>&gt;1000 / person</td>
<td>10x</td>
</tr>
</tbody>
</table>
Success story: China Mobile Zhejiang

2009.6-2010.8  16 times internet traffic increase

Challenges
- Long time of preparation for new service: 3 months
- Low maintenance efficiency: many kinds of server
- Low resource utilization: 10%

Phase 1: IDC
- Resource utilization improved to 50%
- New service preparation: 1 week
- Interconnection fee saving: 20M RMB/year

Phase 2: VDI
- Plan to deploy 5,000 VDI
- VDI application scenario: Internal OA, call center, business hall, NOC, rental for enterprise
Success story: China Unicom Shanghai

Phase 1: VDI
- Services
  - Call center, business hall
  - VDI hosting for enterprise
- Progress
  - 89 Business hall, 1,500 VDI

Phase 2: Web Hosting
- Services
  - Resource rental for ICP/ISP (3D video)
- Progress
  - Pilot

Phase 3: One ICT
- Services
  - ICT hosting for SME
  - Mobile office
- Progress
  - Business model discussion
Success story: Pudong Regional Health

Shanghai Pudong Health Cloud

Health Cloud

Virtual Desktop
Outpatient doctor system
Queuing system
Infusion system
HIS
PACS

SingleCloud: New generation data center

TC
TC
TC
TC

TC
TC
TC
TC

Registration
Outpatient
Payment

Hospital
Hospital
Community health station
Huawei’s key strengths for the enterprise market

- **Adaptable**
  - Large organization support, self-healing, distributed, customized

- **Converged**
  - All media (voice, video, data), ICT complete solution

- **Open**
  - Industry-standard interfaces, Amazon Web services interfaces
Summary

- Telecom networks moving “Beyond Telecom”
- Cloud computing driving new business models
- Both telecom operators and enterprises benefit from cloud computing
- Huawei is in a unique position to offer solutions
Thank you

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