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Intelligent Next Generation Network and Cloud Computing

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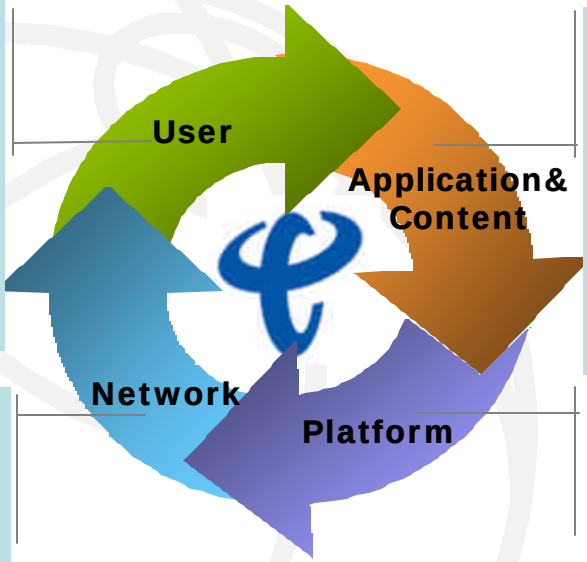
China Telecom Overview

- **Broadband**：more than **80 million users**
- **Mobile**：more than 135 million, more than 43 million 3G user
- **Fixed line telephone**: 168 million, including 37million government/ enpterprise users ***(until 2012-Q1)***

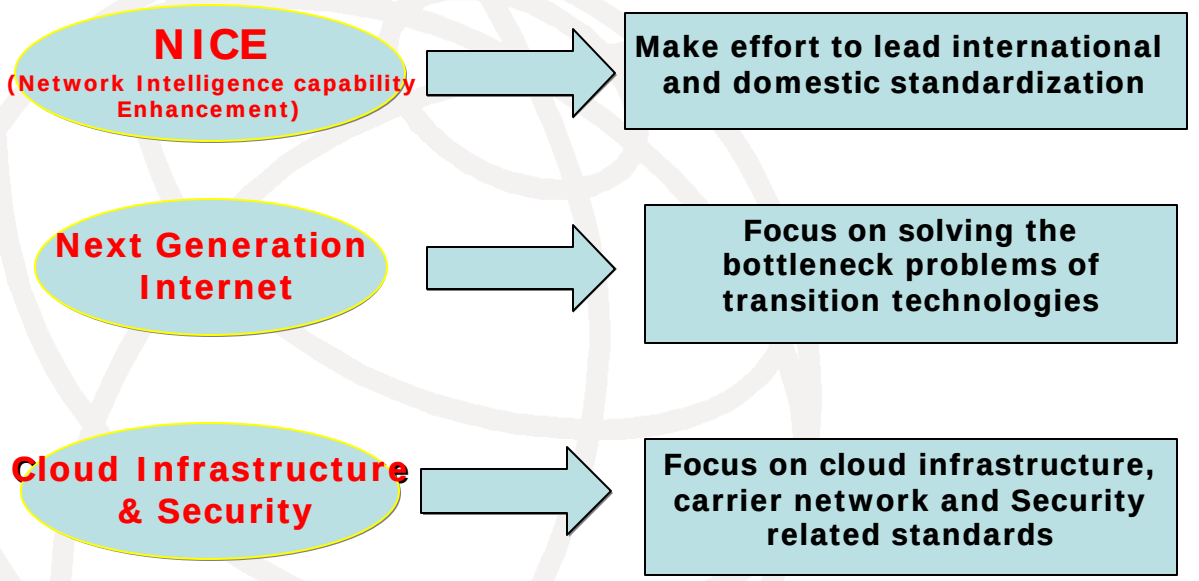


- **Content services**：applications store、online video/music/ reading, etc
- **ICT applications**：Bestone,government/ enterprise applications
- **Cloud services**：Cloud storage, Cloud server

- The globally largest **CDMA** mobile network
- The large IP **backbone** network in China, backbone bandwidth **22T**, International bandwidth **760G**
- The largest scale of **DataCenters** (400 above)

- **Tele-capability open paltform**：Open capabilies of SMS/MMS/Voice/ Locationing/Payment/Cloud resources

Focused standards in Intelligent Next Generation Network and cloud computing



Driving force for network evolution

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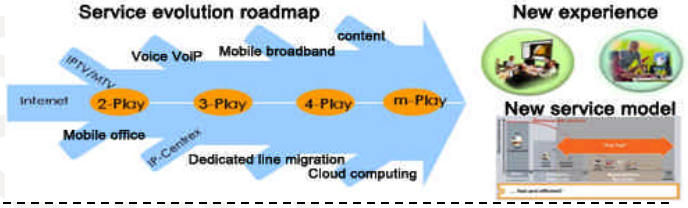
Service diversity

Integrated architecture evolution



Mass-bandwidth services

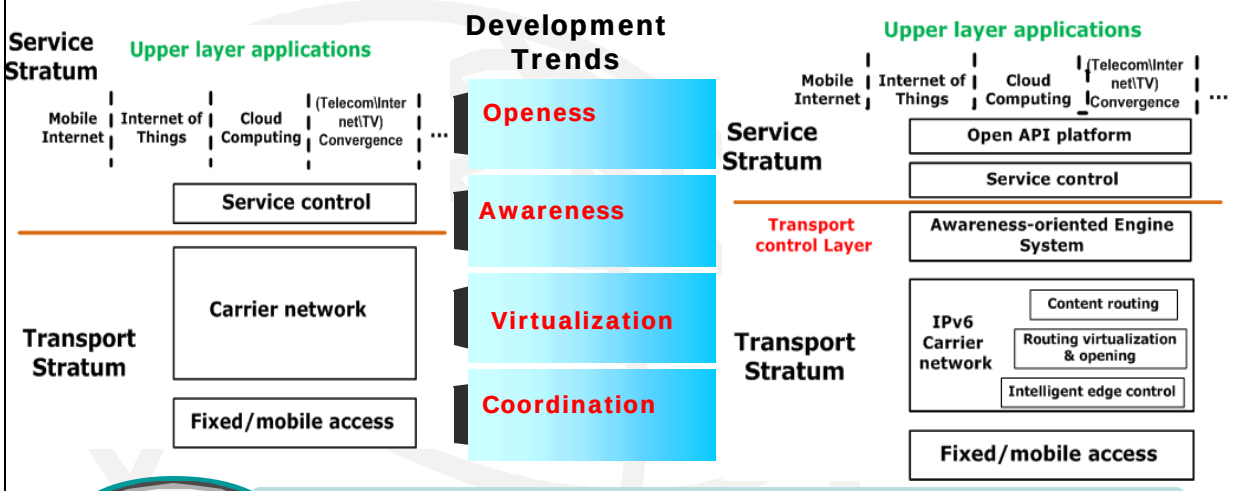
Network capacity and efficiency

Quality of experience（QoE）

Differentiated service capabilities

More types of services, personalized requirements → **Scale of users and bandwidth are steadily increasing.** → **Multi-service convergence has new requirements with network** → **Netwrok architecture facing evolution**

Intelligent Next Generation Network Evolution

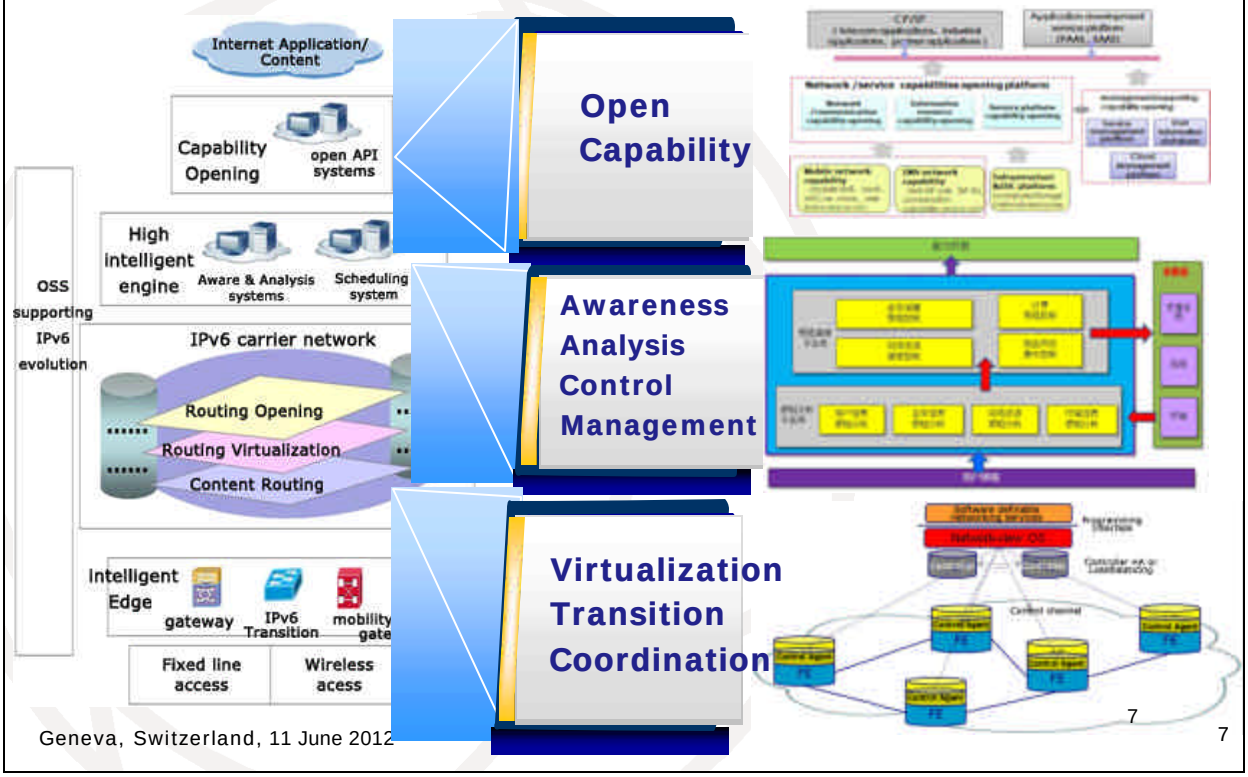


Service Layer — Provide interfaces to services/applications

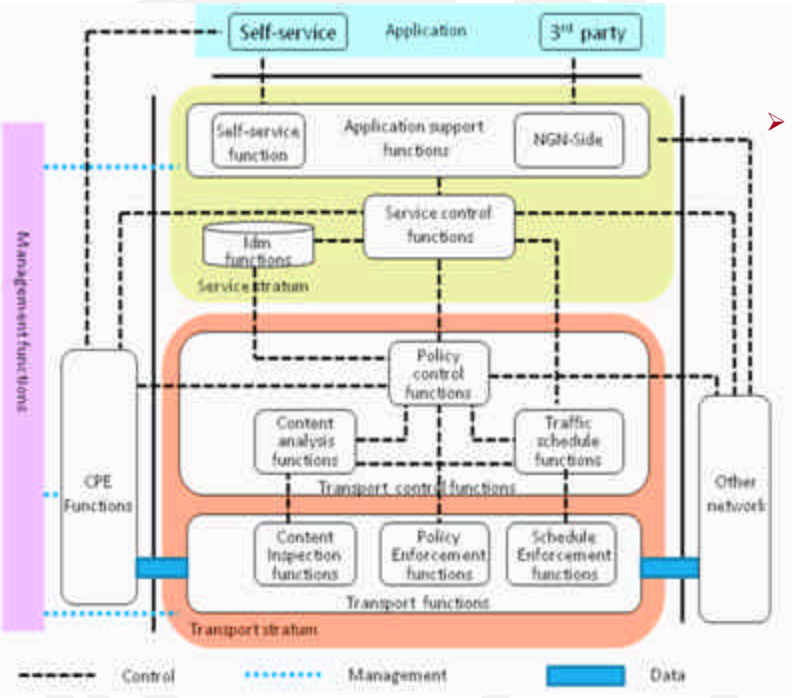
Transport control Layer — Use awareness based policy control and resource management

Transport Layer — IPv6 transition, network virtualization , intelligent forwarding and edge control

Intelligent Next Generation Network Design

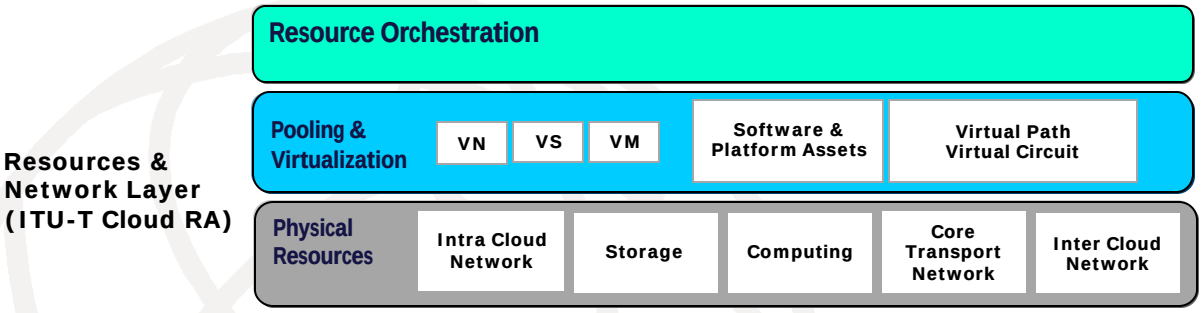


Innovation - NICE functional architecture (Network Intelligence capablity enhancement)



- In ITU-T Feb 2012 meeting, we propose to start a new draft Recommendation Y.NICE-arch
- NICE architecture reflects enhancement requirements for five main capabilities
  - **Openness**：Unified interfaces, adaption of services and network
  - **Awareness**：Users, application,network based perception and analysis
  - **Optimization**：Network virtualization, content routing, resource provision and traffic optimization
  - **Coordination**：Multi-access coordination and service experience consistent
  - **Evolution**：a new hierarchical architecture, standardized protocol and interface, compatible with existing network architecture

Cloud Infrastructure Requirements



Compute

① Physical machine
Virtualization Ready, Availability,High-density, Energy-Saving

② Virtual machine
Virtualization,isolation, migration,automation

③ Software assets
automated provisioning, centralized management, compatibility

Storage

① Physical storage
Space: PB level
Interfaces: block, object, filesystem, structure

② Layered model
Infrastructure sub-layer
Presenting sub-layer
Access sub-layer

Orchestration

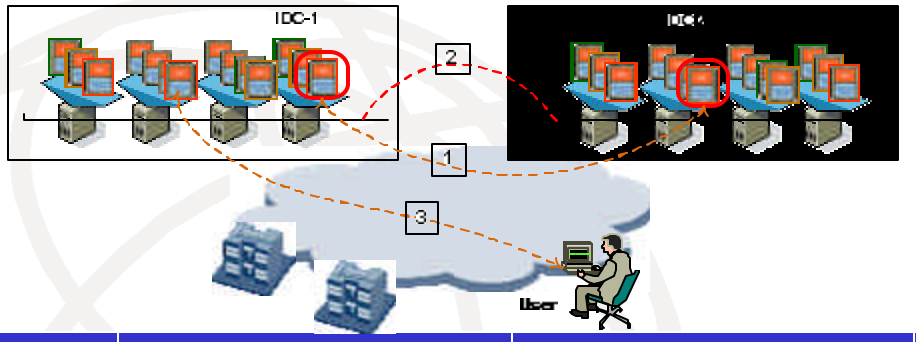
① Resource encapsulation
heterogeneous resource into homogeneous

② Orchestration& Provision

③ Resource Template

④ Monitoring:

Network requirements for deliverying cloud services

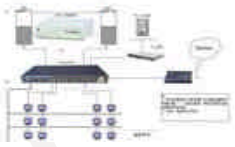


Functional Requirements	Capability requirements	Current netwok capability	Urgency
1) VM migration intra-IDC and inter-IDCs	**Aware of virtual machines + Migration of network policies**	Virutalization awareness not supported	★★★★★
	End to end layer 2 netwrok	Large layer 2 network in intra-IDC suported Inter-IDCs through IP layer connections, Layer 2 not suported	★★★★
2) Multiple IDCs virtualization	**Virtualize multiple IDCs into one VDC with layer 2 network**	Multiple IDCs virtualization not supported	★★★
3) Routing controllable and customizable	**Transport network could achieve customized forwarding and routing for different cloud services and users**	Fine-grained agile controling and scheduling not supported	★★

Private cloud /public cloud in China Telecom

- More than 10,000 virtual desktops
  - ✓ Internal office automation
  - ✓ Call centers
- Apply virtualization, and distributed technologies in the fields of
  - ✓ IT system consolidation
  - ✓ Service platform consolidation
- Cloud data center covers the whole country.
  - ✓ Three data centers for public cloud services have been built in Shanghai, Guangzhou, Chengdu.
  - ✓ Assistant the government to implement "Inteligent Cities"

IT system consolidation



Servcie platform consolidation

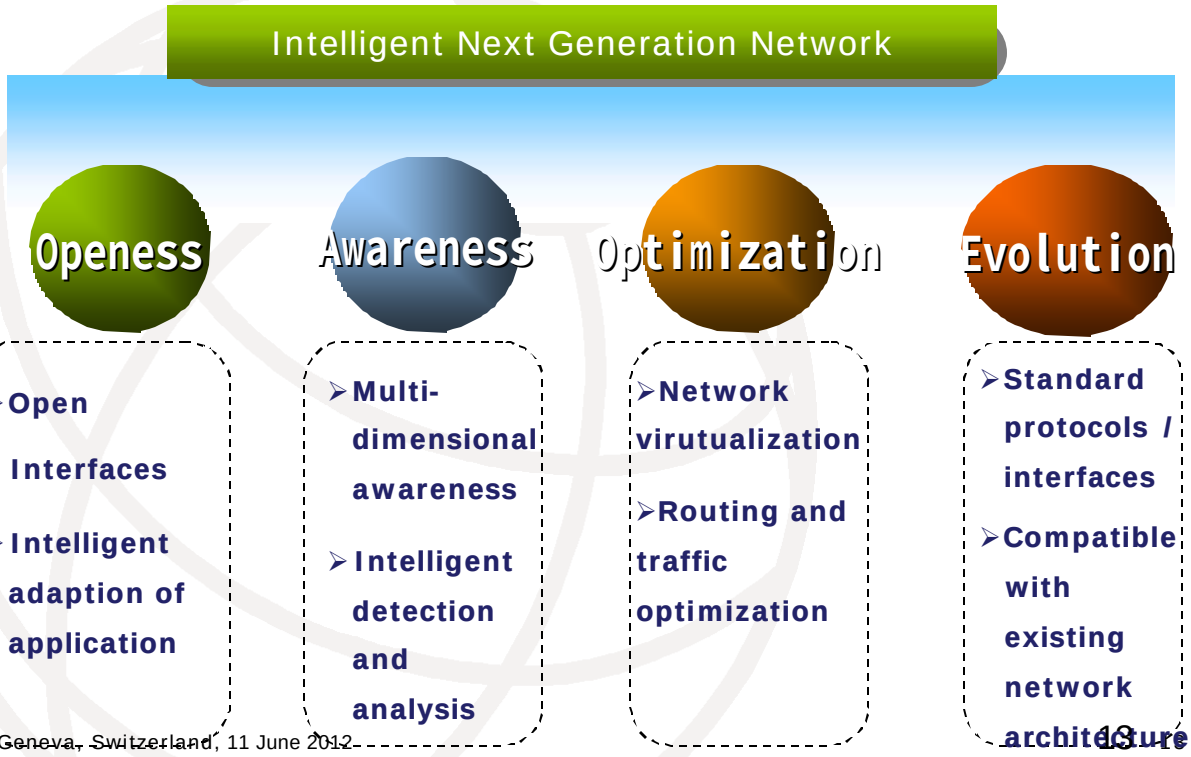
Virtual deskop

MEF Work in Progress for Cloud Services

- Elastic Ethernet Service Attributes
  - On-demand change of EVC or UNI attributes for specific time period
    - Once time period ends, revert back to prior state
    - Investigating on-demand and reservation models
- Example Elastic Attributes
  - Increase CIR of existing EVC
  - Add or Remove UNI endpoints in multipoint EVP-LAN or EVP-Tree service

- On-demand bandwidth approaches
  - Based on bandwidth usage (X MBytes/month)
  - Based on CIR and/or EIR (200 Mbps CIR and 400 Mbps EIR)
- Network/Cloud/Subscriber Management Orchestration
  - End-to-End service management and SLAs

Conclusion: General Features of Intelligent Next Generation Network



Thank You !

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