NaaS Functional Requirements and Architecture

Ying Cheng (程莹)

Associate Rapporteur of ITU-T SG13 Q19

China Unicom

Nan Chen (陈楠)

Associate Rapporteur of ITU-T SG11 Q14

China Telecom

Agenda

- **Overview of cloud standard activities in ITU-T SG13**
- **NaaS concept and milestones**
- **Functional requirements and architecture of NaaS**
- **Conclusion**

Some History

- 2010, February:
  - o Establishment of the FG Cloud by TSAG
    - In operation 2/2010 – 12/2011
    - Delivered 7 Technical Reports
- 2012, January:
  - o TSAG entrusted the lead SG responsibility for cloud computing to SG13
  - o TSAG established JCA-Cloud with SG13 as parent
- 2012, February:
  - o Extraordinary SG13 meeting focused on cloud computing work organization
  - o France, CT, China Unicom and ZTE proposed to start new Questions on cloud computing in SG13
  - o Proposal to set up a dedicated WP in SG13 to concentrate on the cloud computing work
  - o First meeting of JCA-Cloud
- 2012, April:
  - o First meetings of cloud computing Questions of SG13 (in Geneva)

Study Group 13, structures for Cloud Computing

WP2/13 as a center of CC study (Q.17, 18, 19/13)

- Collaborative Teams with ISO/IEC JTC1 SC38
  CT-CCVOCAB (terminated in July 2014)
  CT-CCRA (terminated in July 2014)
- JCA-Cloud
- JRG-CCM: Joint Rapporteur Group on cloud computing management (with ITU-T SG2)
- WP2/13 chairman, Dr. Jamil Chawki from Orange France
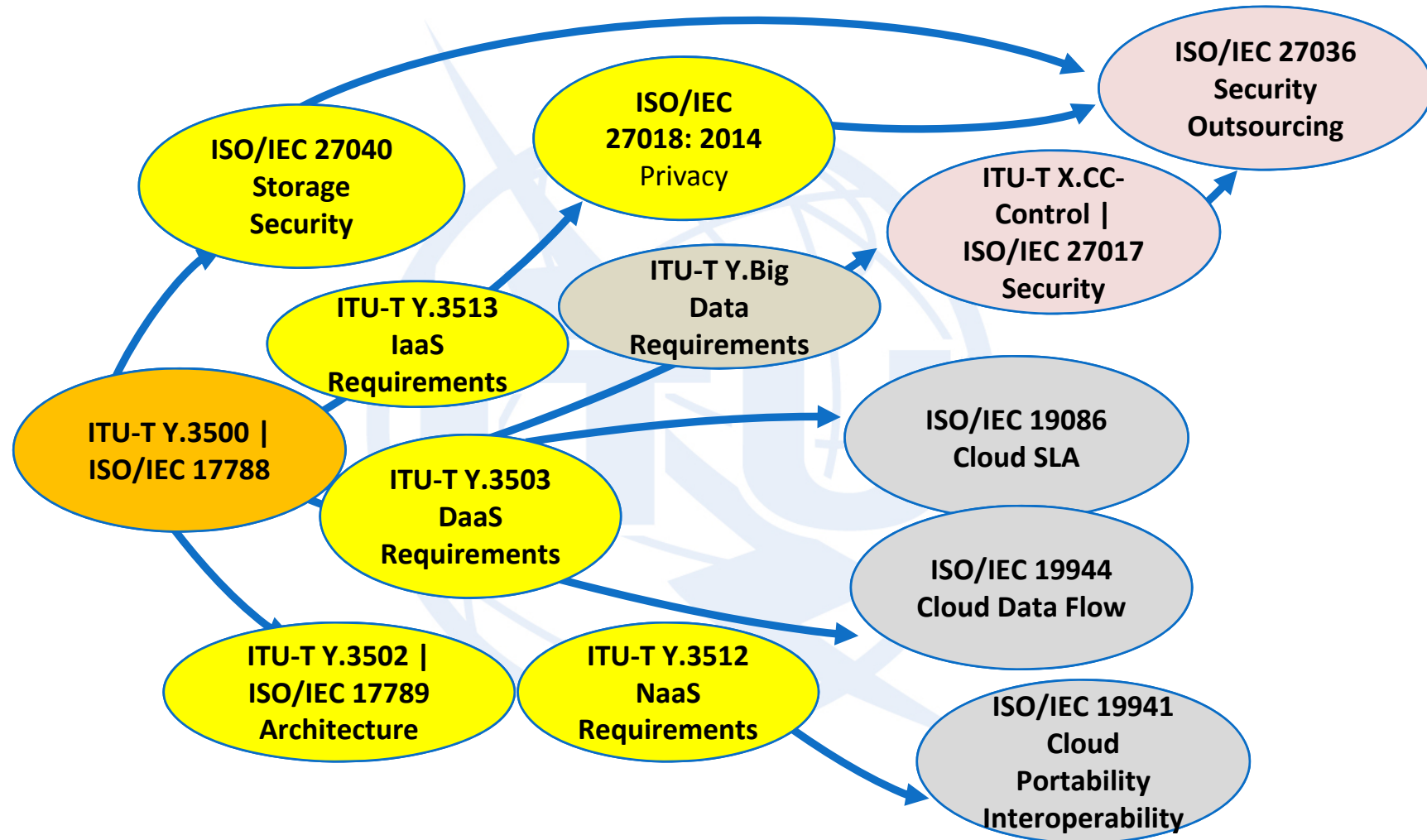
WP2/13- Cloud Computing

- Q17:Cloud computing ecosystem, general requirements, and capabilities
- Q18:Cloud functional architecture, infrastructure and networking
- Q19:End-to-end Cloud computing service and resource management

Published recommendations since 2013

o Y.3500: Cloud computing - Overview and Vocabulary*

o Y.3501: Cloud computing framework and high-level requirements

o Y.3502: Cloud computing - Reference architecture*

o Y.3503: Requirements for Desktop as a Service

o Y.3510: Cloud Computing Infrastructure Requirements

o Y.3511: Framework of inter-cloud computing

o Y.3512: Cloud computing - Functional requirements of NaaS

o Y.3513: Cloud Computing - Functional requirements of IaaS

o Y.3520: CC framework for e-2-e resource management

* Common text with ISO/IEC JTC1 SC38/WG3

ITU-T Standards and relation with common texts with ISO/IEC

ISO/IEC 27040
Storage
Security

ISO/IEC
27018: 2014
Privacy

ISO/IEC 27036
Security
Outsourcing

ITU-T X.CC-
Control |
ISO/IEC 27017
Security

ITU-T Y.3513
IaaS
Requirements

ITU-T Y.Big
Data
Requirements

ITU-T Y.3500 |
ISO/IEC 17788

ITU-T Y.3503
DaaS
Requirements

ISO/IEC 19086
Cloud SLA

ISO/IEC 19944
Cloud Data Flow

ITU-T Y.3502 |
ISO/IEC 17789
Architecture

ITU-T Y.3512
NaaS
Requirements

ISO/IEC 19941
Cloud
Portability
Interoperability

1865
2015

NaaS concept (1)

- **Network as a Service (NaaS) [Y.3500]: cloud service category** in which the capability provided to the **cloud service customer** is **transport connectivity and related network capabilities**

- NaaS services are divided into **network application service**, **network platform service**, and **network connectivity service**. In particular, NaaS connectivity service is an "infrastructure capabilities type" service (limited to networking resources).

NOTE – NaaS can provide any of the three cloud capabilities types.

NaaS con...

NaaS Application: application capabilities type of service where NaaS CSC can use network applications provided by CSP. Examples of NaaS applications include virtual router, virtual content delivery network (vCDN), virtualised evolved packet core, virtual firew...

NaaS Connectivity: infrastructure capabilities type of service where NaaS CSC can provision and use networking connectivity resources provided by NaaS CSP. This includes for example flexible and extended virtual private network (VPN), bandwidth on demand (BoD), etc.
In this category, CSP offers network connections between two or more endpoints, which may include additional network functionalities.

NaaS Platform: platform capabilities type of service where NaaS CSC can use the network platform provided by NaaS CSP. The NaaS platform offers one or more software execution environments and one or more programming languages to deploy, manage and run customer-created or customer-acquired network applications.

User Laye...

Access Lay...

NaaS
Application / Platform / Connectivity

R...

aS
using the layering framework defined in [ITU-T Y.3502]

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2015

Development methodology of NaaS related WIs

- Considering the standardization methodology and conventional study sequence, the abstractions of **functional entities and their mutual interactions** are based on the **functional requirements** and the **corresponding use cases** analysis, which form a standardization body together. Therefore, it is required to progress NaaS functional requirements and architecture according to the following steps and priorities.

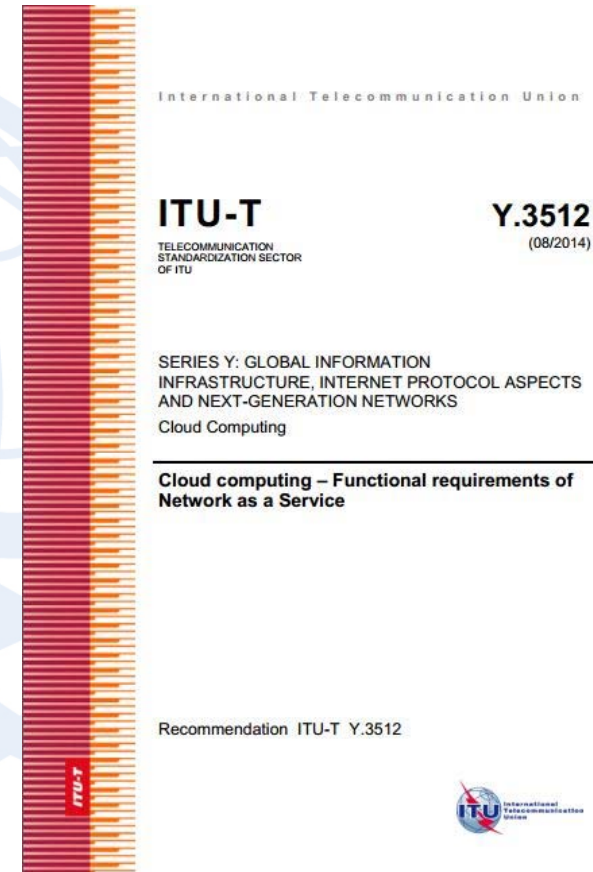| Use Cases	Functional Requirements	Functional Architecture

| Y.3512 | Y.CCNaaS-arch |
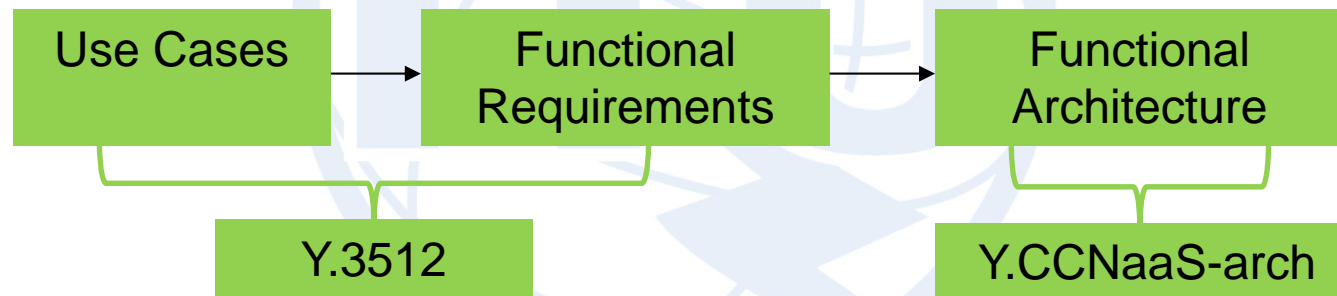
- Additionally, it is needed to align with the high level requirements of NaaS described in the latest edition of Y.3501 (Cloud computing framework and high-level requirements).

Milestones of NaaS related WIs

Timelines	Milestones
2012.4	First proposal from China Unicom on NaaS related WI – agreed to be kept in living list of Q27/13
2012.6	Agreed to launch Y.CCNaaS in study period 2013-2016
2013.2	Initial draft Rec of Y.CCNaaS; Use cases and derived reqts on dynamic transport network and flexible and extended VPN;
2013.6	Re-organization of use cases and functional requirements into three types;
2013.11	Excluding architecture clause from the scope of Y.CCNaaS; New time plan for Y.CCNaaS consent on Q3 2014;
2014.2	Refinement on scope; Modifications on general description including introduction and high level concept of NaaS;
2014.5	Addition and modification of detailed functional reqts in clauses 7-9;
2014.7	Consent of Y.3512 (former Y.CCNaaS) ; Launch of NaaS series WI Y.CCNaaS-arch ;
2014.8	Publishing of Y.3512 after AAP
2015.4	Agreement on development methodology of NaaS functional architecture with the priorities.

Functional Requirements of NaaS

- **Functional Requirements of Network as a Service**
 - Based on Recommendation ITU-T Y.3512 (Cloud computing - Functional requirements of Network as a Service)

Source: http://www.itu.int/ITU-T/recommendations/rec.aspx?rec=12285

Summary of Y.3512

- **Scope**
  - High level concept of NaaS;
  - Functional requirements of NaaS application, NaaS platform and NaaS connectivity;
  - Typical NaaS use cases of NaaS application, NaaS platform and NaaS connectivity.

- **Statistics**
  - **61** contributions from **8** sector members: China Unicom, Orange Polska SA, Orange, ETRI, ZTE, Microsoft, Huawei, Alcatel-Lucent Shanghai Bell
  - **8** meetings: **7** physical meetings and **1** e-meeting
  - **13** use cases: **3** in general and **10** in detail
  - **26** functional reqts: **4** for NaaS application, **5** for NaaS platform, and **17** for NaaS connectivity

- **Editors**
  - Ying Cheng (China Unicom) and Emil Kowalczyk (Orange Polska SA)

Typical detailed use cases and functional requirements of NaaS application
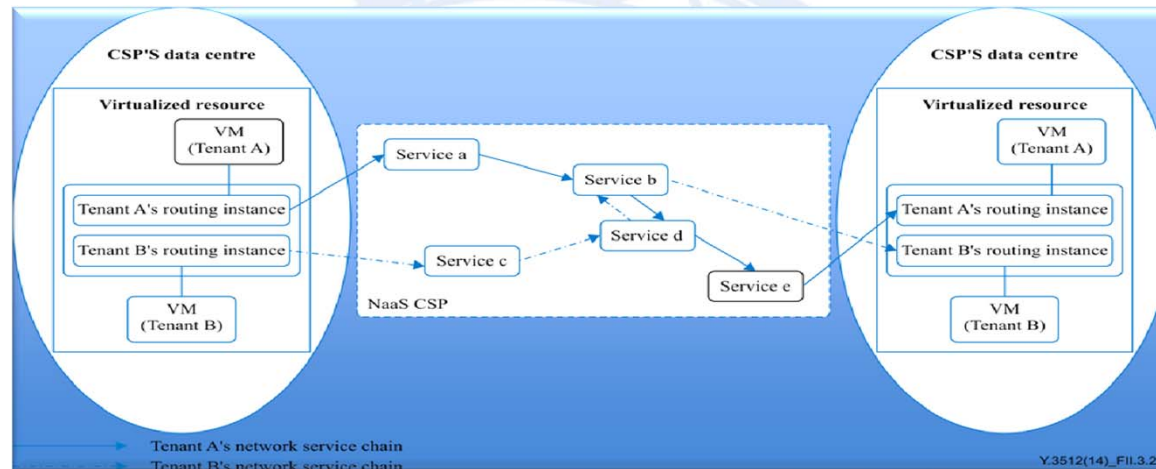
- **Cloud CDN**

Y.3512(14)_FII.2.2.1
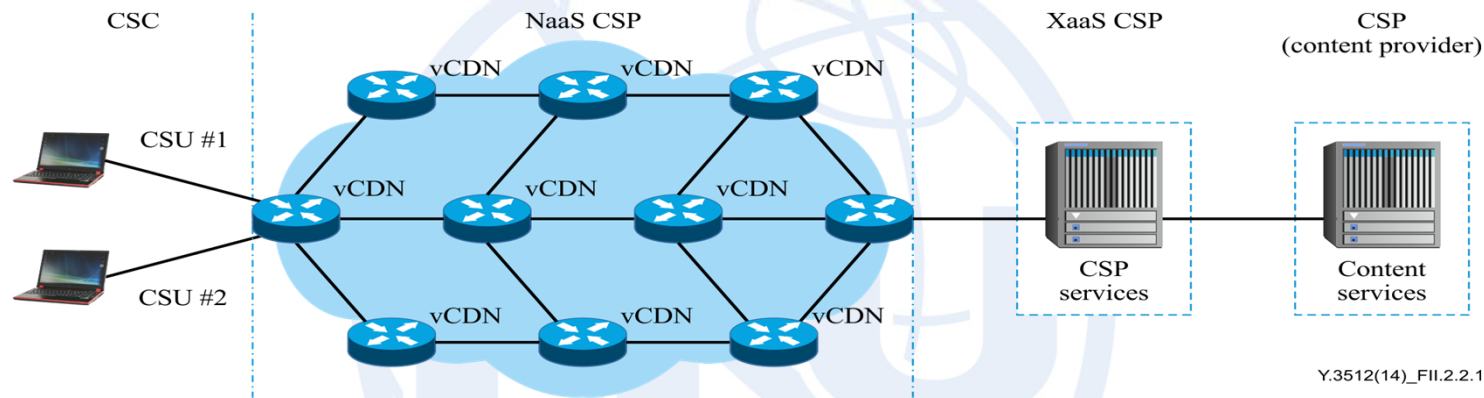
- **Derived functional requirements**

  – Monitoring utilization and delivery performance

  – Providing efficient management solution

  – Providing mechanisms allowing for the chaining of NaaS applications

Typical detailed use cases and functional requirements of NaaS platform
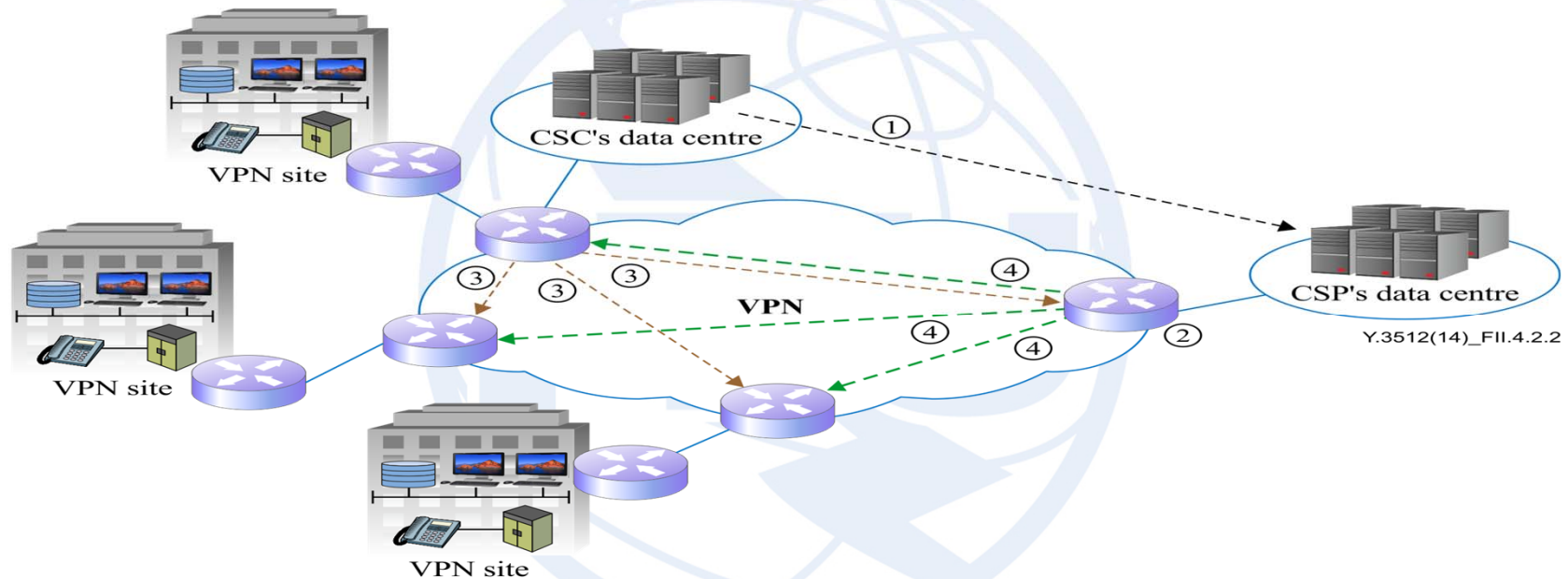
- **Service chain**

- **Derived functional requirements**

  - Programmable NaaS platform;

  - Dynamic and flexible network service composition and steering;

  - Isolation of service chains for tenants

Typical detailed use cases and functional requirements of NaaS connectivity (1)
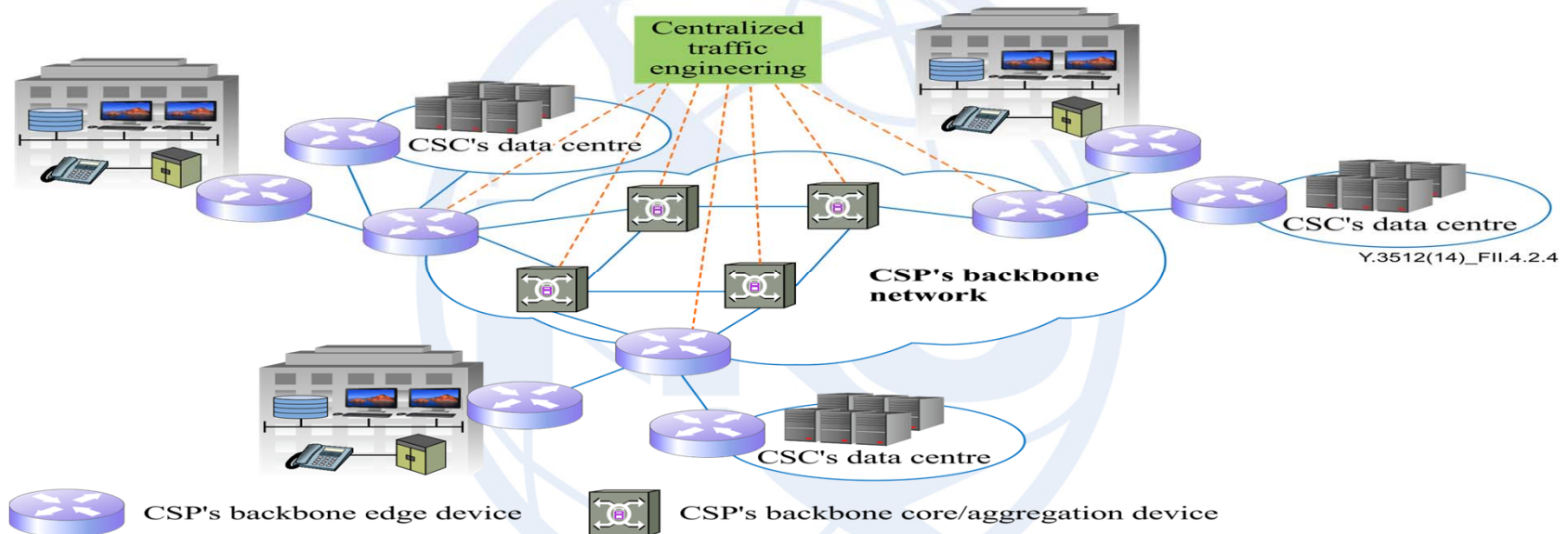
- **Flexible and extended VPN**

① Resource migration   ② New VRF   ③ MP-BGP update   ④ MP-BGP update

- **Derived functional requirements**

  – Elastic network reconfiguration

Typical detailed use cases and functional requirements of NaaS connectivity (2)

- **Optimized traffic engineering**

- **Derived functional requirements**
  - Optimized and fine-grained traffic engineering
  - Coexistence with legacy network services and functions
  - Centralized control view and abstraction view of resources

Functional Architecture of NaaS

- **Functional architecture of Network as a Service**
  - Initiated in July 2014
  - Based on the latest output of draft Recommendation ITU-T Y.CCNaaS-arch (Cloud computing - Functional architecture of Network as a Service), TD 388 (WP 2/13)，Geneva，20 April - 1 May 2015, http://www.itu.int/md/T13-SG13-150420-TD-WP2-0388/en
  - Scope:
    - Overview of NaaS functional architecture,
    - Functionalities of NaaS,
    - Functional components of NaaS,
    - Reference points between functional components of NaaS,
    - Procedures for typical NaaS use cases
  - Agreement has been achieved on the development methodology with the priority sequence **"functionalities based on functional requirements -> functional components for the support of NaaS -> interactions (information flow) and reference points between functional components"**. Each step should be started until the previous one is mature enough.
  - Current development stage: nearly stable functionalities derivation based on functional requirements specified in Y.3512

Relationship with cloud computing reference architecture
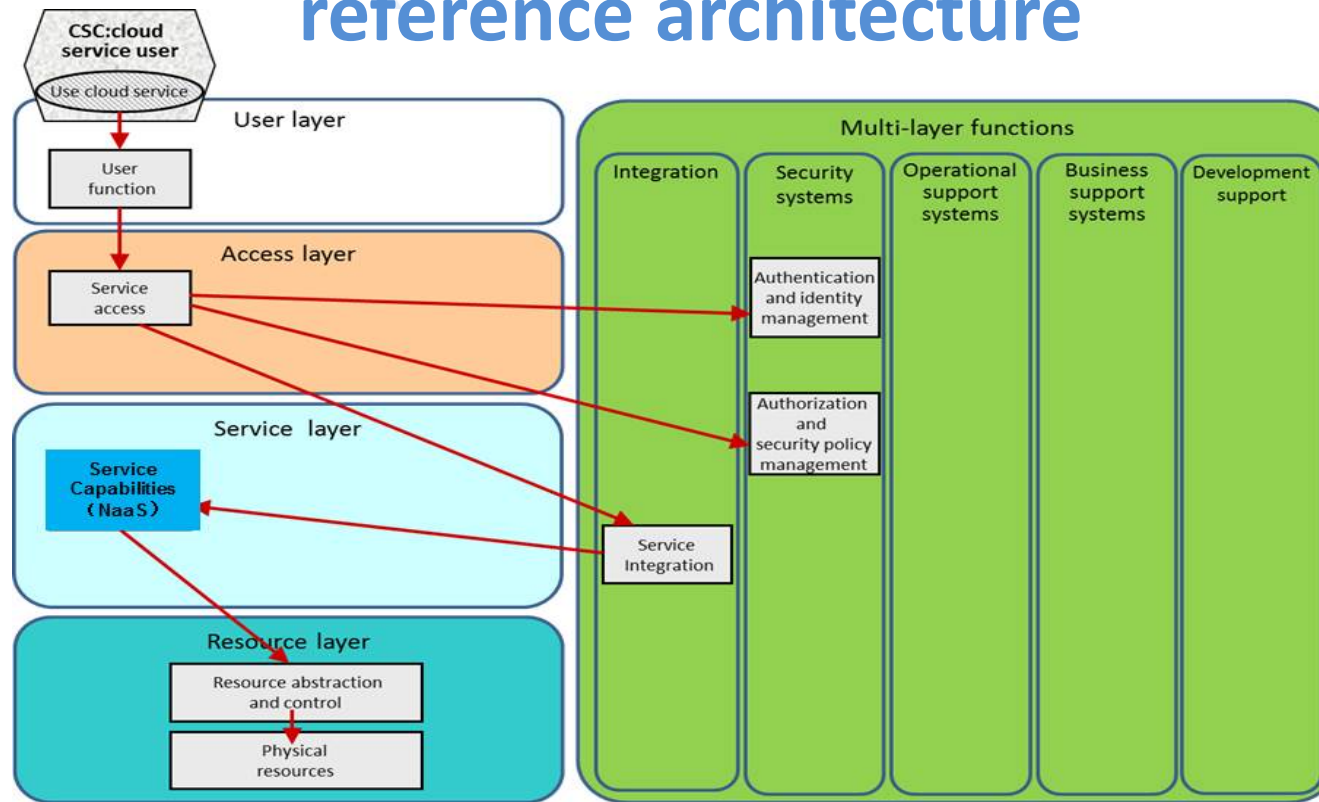
NaaS position in the CSC:Cloud service user relationship for the "Use NaaS service" activity

Conclusion

- NaaS series WIs (Recommendation ITU-T Y.3512 & Y.CCNaaS-arch)
  - One of the first XaaS functional requirements series Recommendations
  - Rigid development methodology following the priority sequence "detailed use cases -> functional requirements -> functionalities -> functional components for the support of XaaS -> interactions (information flow) and reference points -> necessary additions to a future revision of Y.3502
  - First complete NaaS concept illustration from real world use case to functional architecture
  - Covering all the cloud capability types defined in Y.3500
  - Paving the way for possible reference and reuse in other SDOs dealing with cloud networking and virtualization related aspects
- Meeting plan in the near future
  - July 13-24, Geneva, Rapporteur meeting
  - November 30–December 11, Geneva, Plenary meeting

Q&A

Thank you for your attention