ITU Workshop on "Developments regarding telecommunication network architectures and services"

(Kampala, Uganda, 2 April 2012)

Cloud Computing Perspectives and Standardization

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Outline

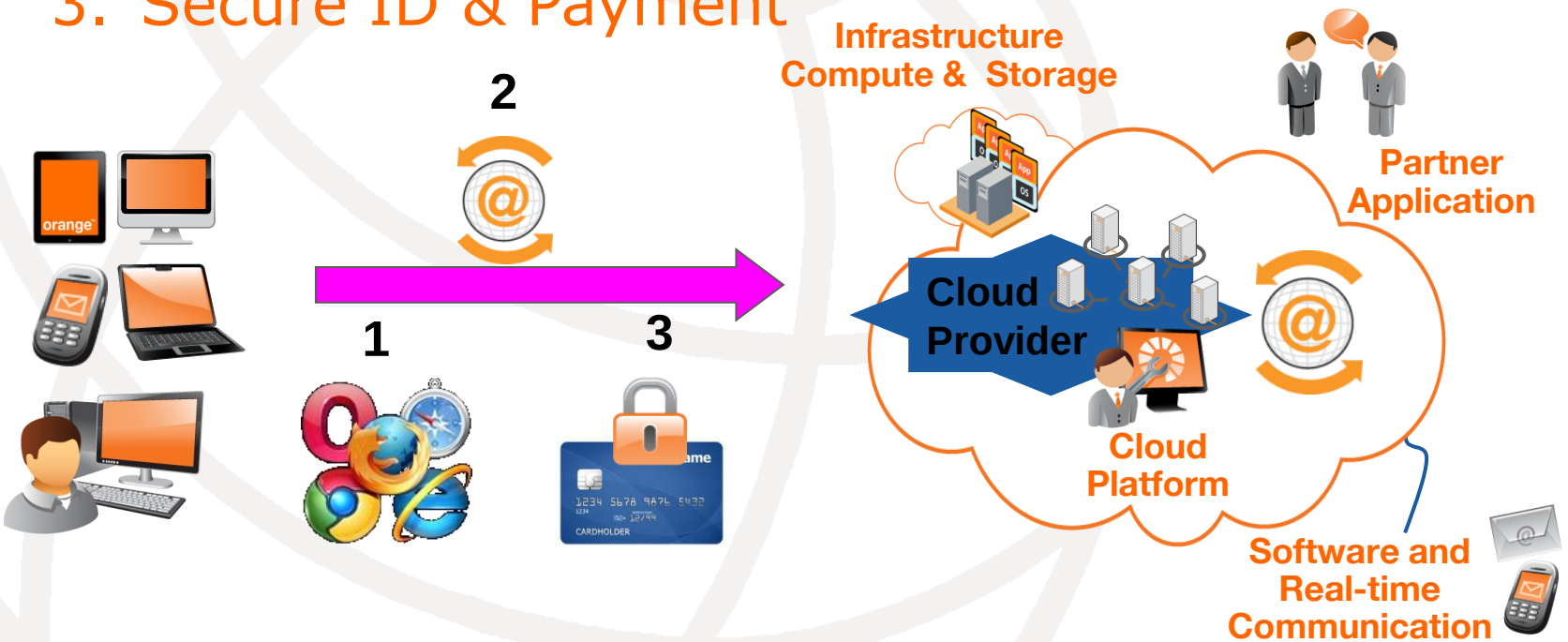
1. Understanding Cloud Computing
2. Cloud definitions Ecosystem and interoperability
3. France Telecom Orange Business Services Portfolio
4. Cloud Functional Reference Architecture and Network Model
5. Cloud Security & Privacy
6. Cloud Standards and ITU-T positioning

1
Understanding Cloud Computing

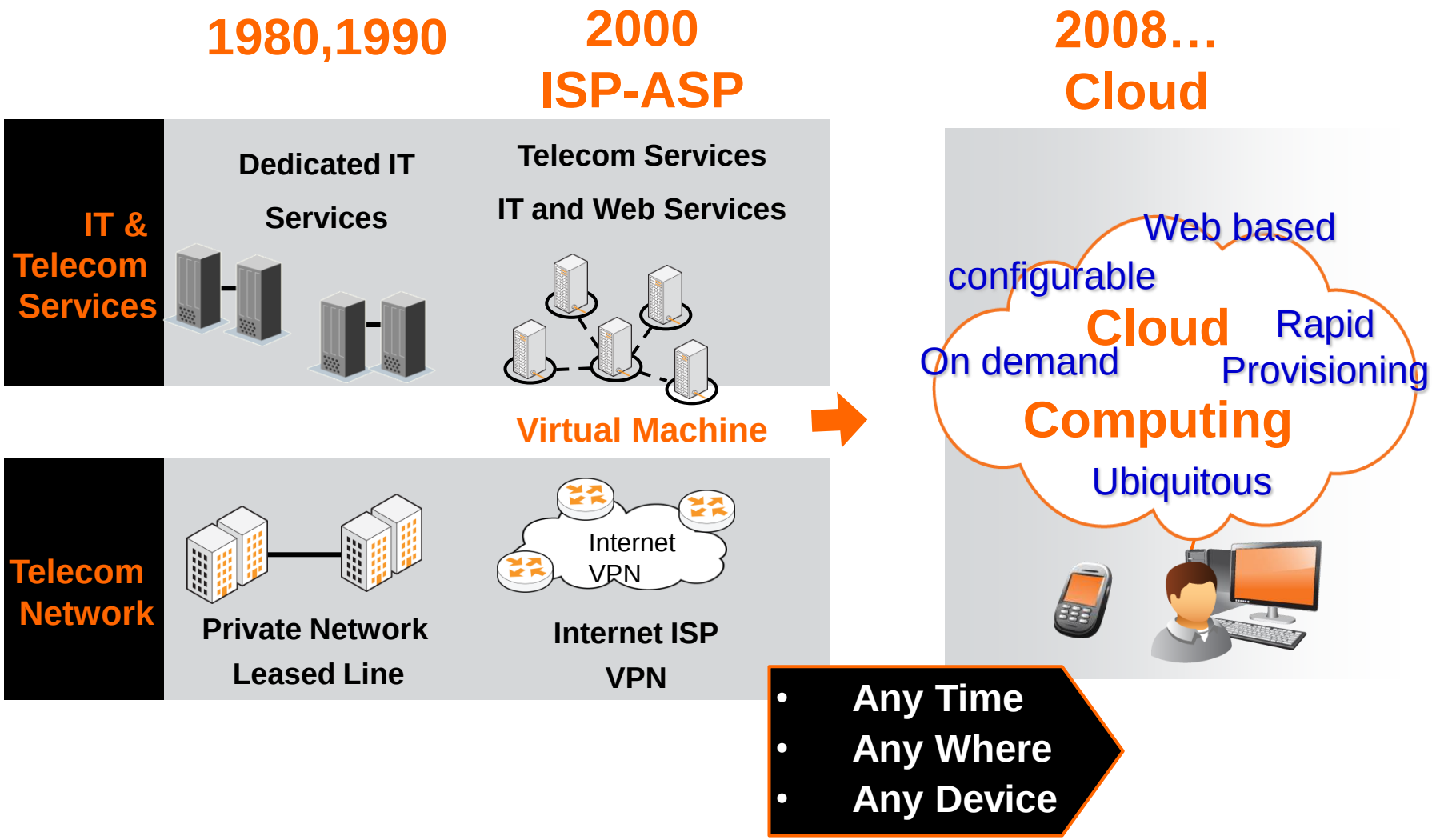
A simple way to understand Cloud

Access a Web based Application from Any connected devices using:

1. Web Browser
2. Internet /VPN network connectivity
3. Secure ID & Payment

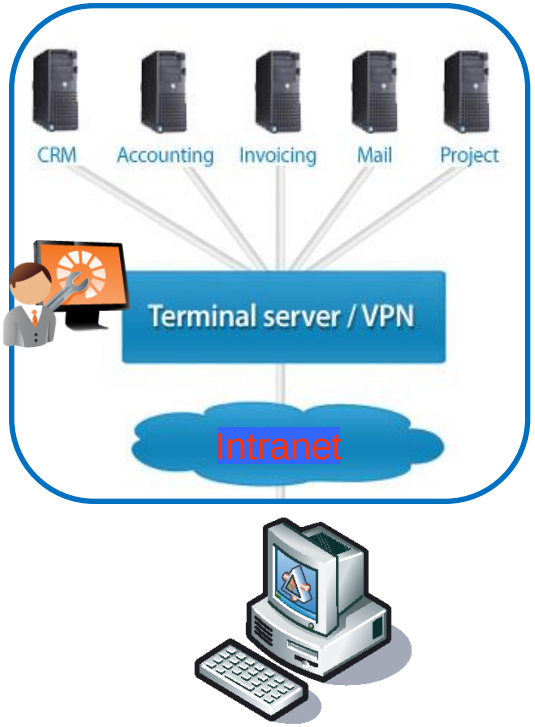


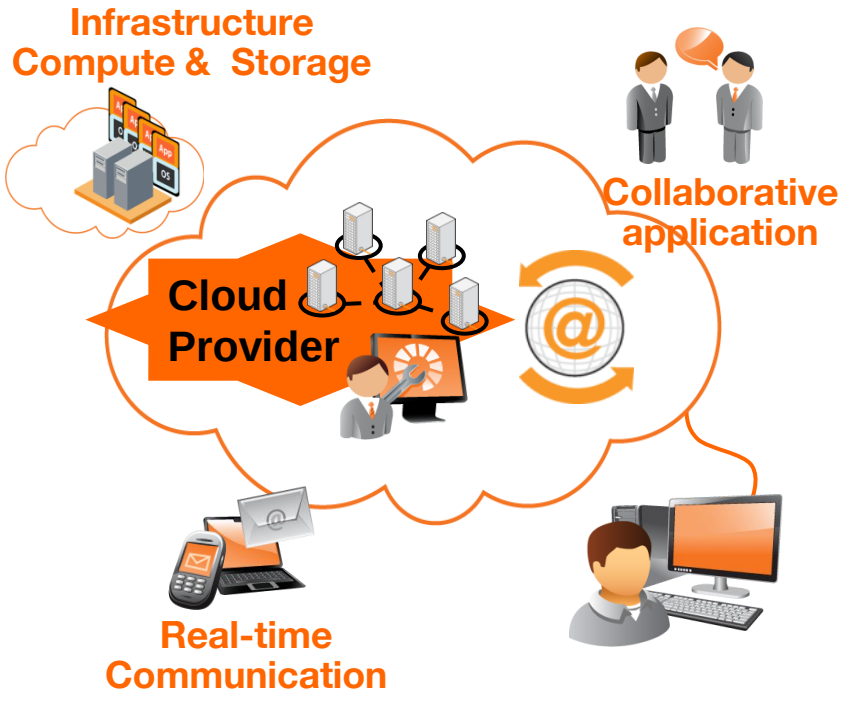
From Internet Service Provider ISP to Application Services Provider ASP and Cloud Computing



Moving to the Cloud

Mode	On site	Online-Cloud
License	Buy	Subscription/Transaction
Localization	On site	via Internet (3rd party hosted)
Management	Enterprise/IT	SLA





2

Cloud Definitions, Ecosystem and Interoperability

ITU-T FG Cloud Definition

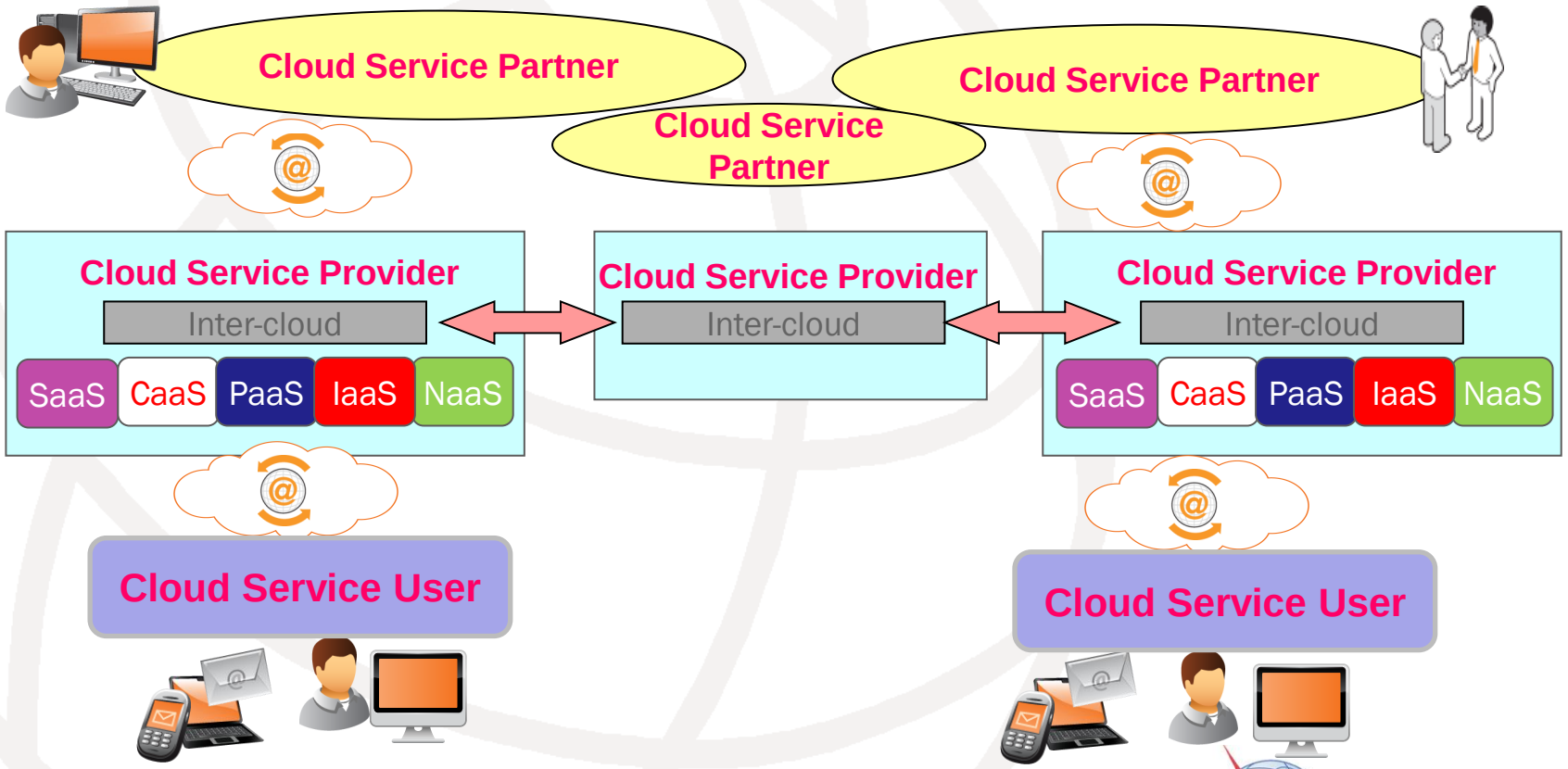
- **ITU-T FG Cloud Computing (2011)**
  - **Cloud Services**: Products and solutions that are delivered and consumed on demand (utilizing IT Resources & capabilities of Platform) at **any time**, through **any access network** (fixed & mobile) using **any connected devices** and cloud computing technologies.
  - **5 Cloud service categories (SaaS, CaaS, PaaS, IaaS, NaaS)**
  - **Cloud Computing***: an emerging IT development, deployment and delivery model, enabling service users to have ubiquitous, convenient and on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services), that can be rapidly provisioned and released with minimal management effort or service-provider interaction. **Cloud computing enables cloud services.**

* **Partially based on NIST cloud definition**

Cloud Ecosystem

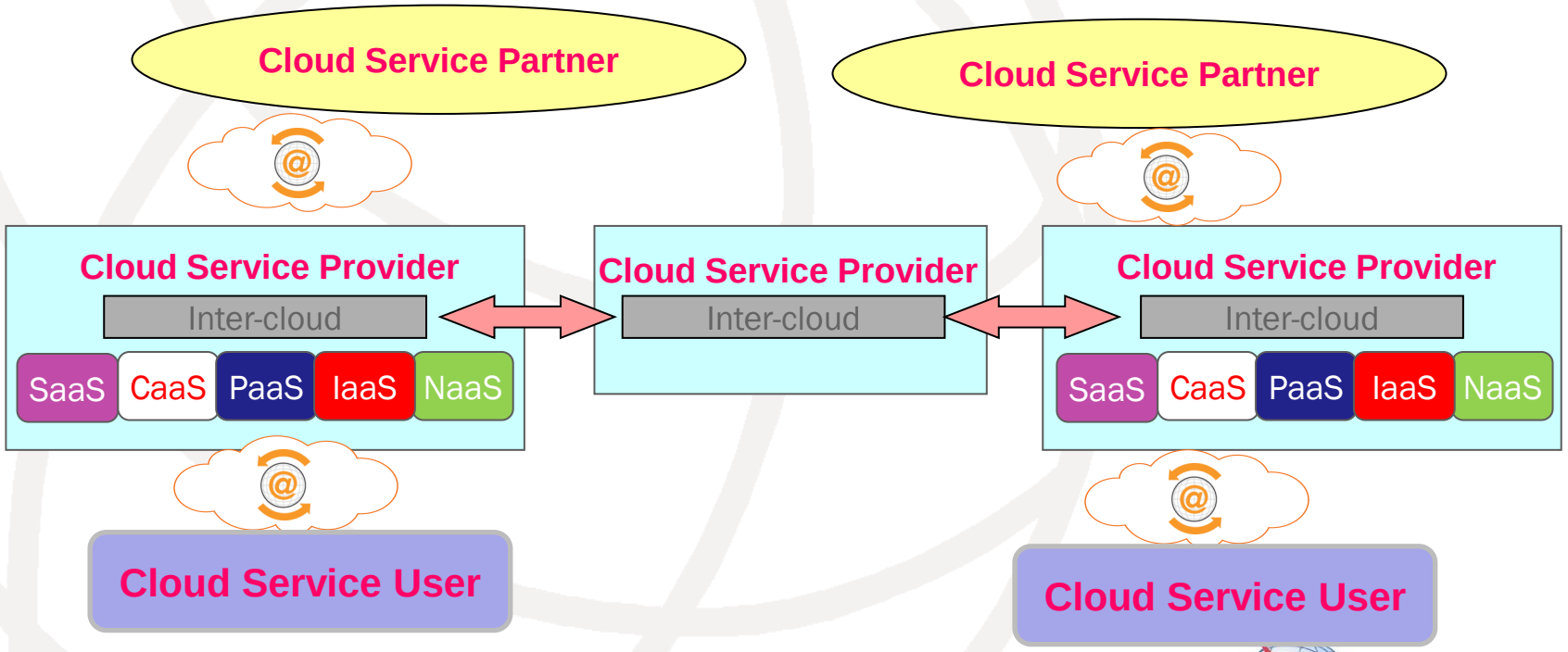
Three actors playing different roles:

1. Cloud Service Provider CSP: XaaS Provider, Inter-Cloud…
2. Cloud Service User CSU: Consumer, Enterprise…
3. Cloud Service Partner CSN: Application Developer, Integrator…



Cloud interoperability

1. Service cooperation between Cloud providers
2. Cloud interoperability between private & public clouds
3. Cloud Service portability between cloud providers
4. Mutual backup and recovery from a disaster



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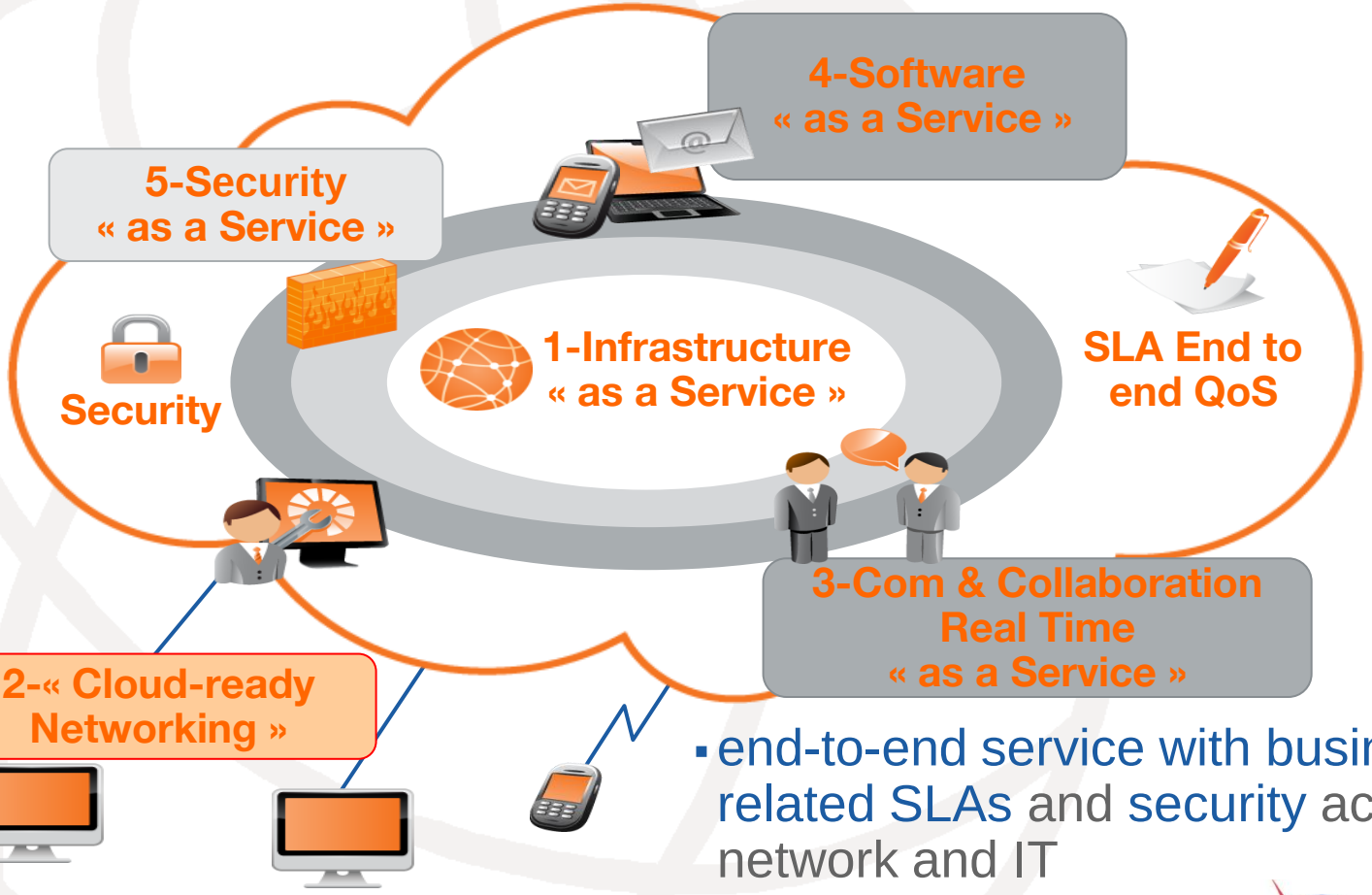
An example of Telecom Operator view

France Telecom /Orange Business Services Cloud services:

a complete catalogue to simplify access to solutions delivered “as a service” with security and end-to-end SLAs



- end-to-end service with business-related SLAs and security across network and IT

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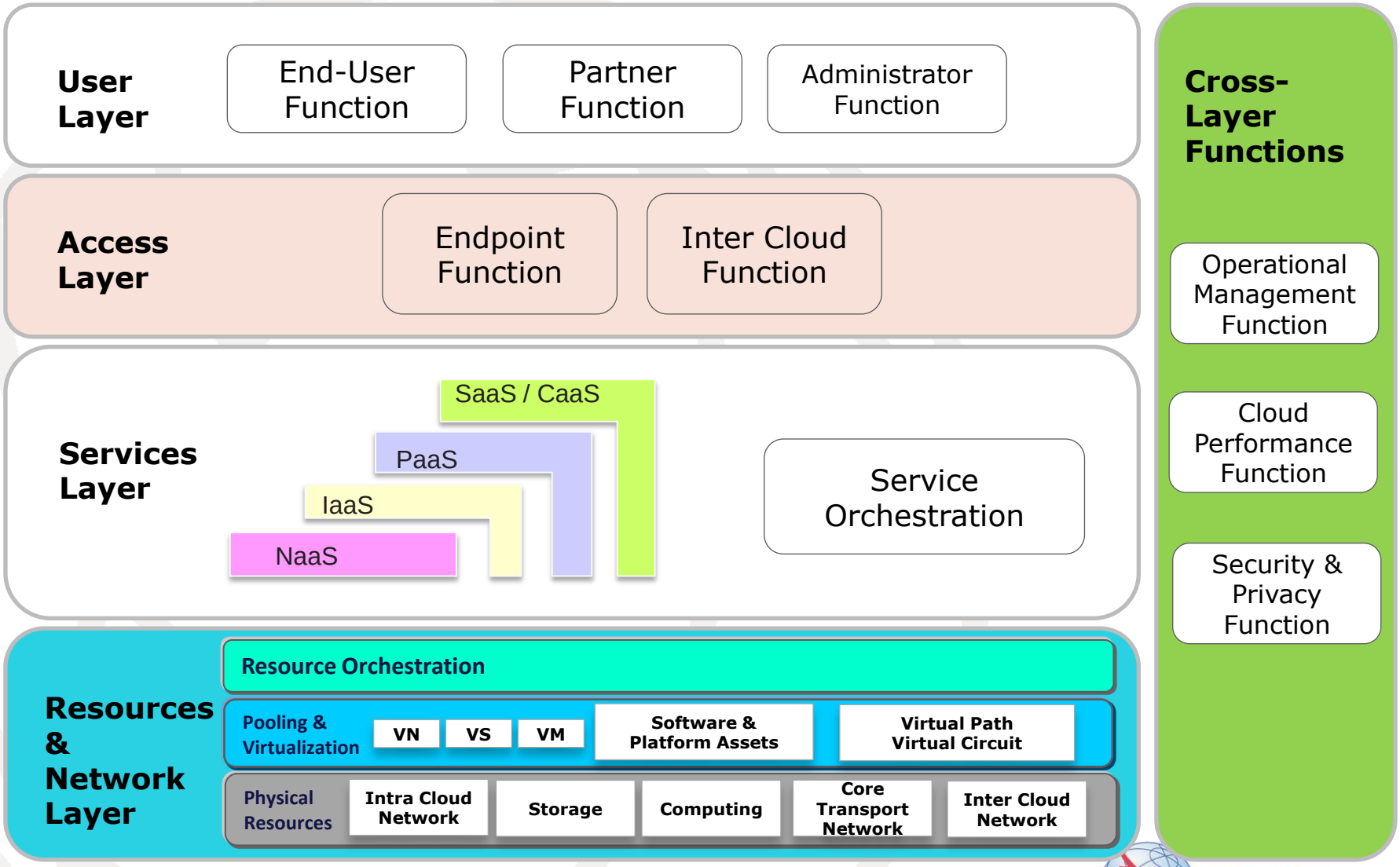
Cloud Functional Reference Architecture & Network Model

Cloud Functional Architecture

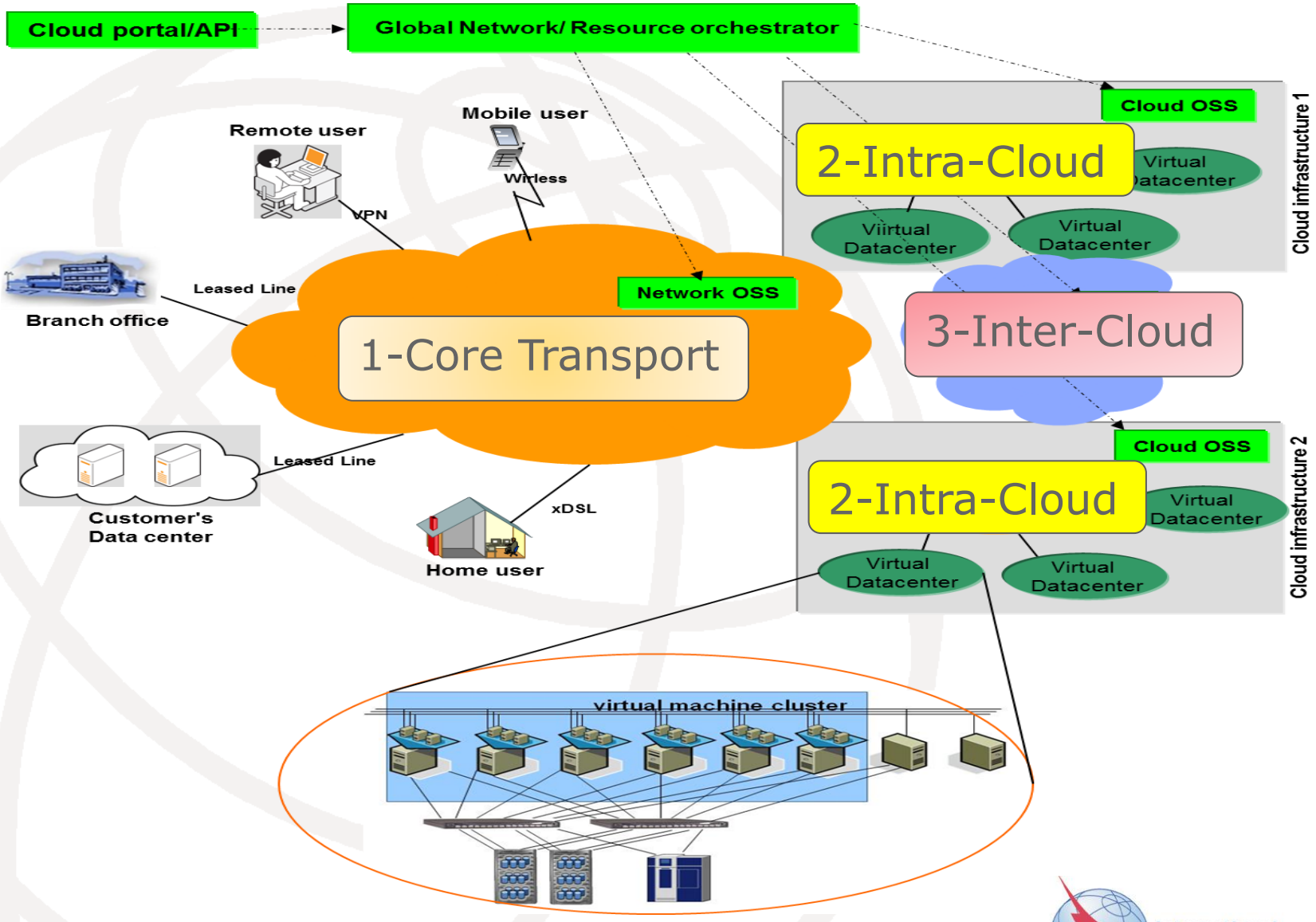
First Cloud ICT architecture



Main Cloud Layers and functions

- Access layer:
  - Endpoint : controls cloud traffic and improves cloud service delivery
  - Inter Cloud: addresses delivering any cloud service across two or more CSPs
- Services layer:
  - Service Orchestration: is the process of deploying and managing "Cloud Services"
  - Cloud Services: provides instances (and composition) of CaaS, SaaS, PaaS, IaaS & NaaS
- Resources & Network Layer:
  - Resource orchestration
  - Pooling Virtualization: compute, storage, network, software & platform assets
  - Physical resources

Network Model for cloud infrastructure



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Cloud Security & Privacy

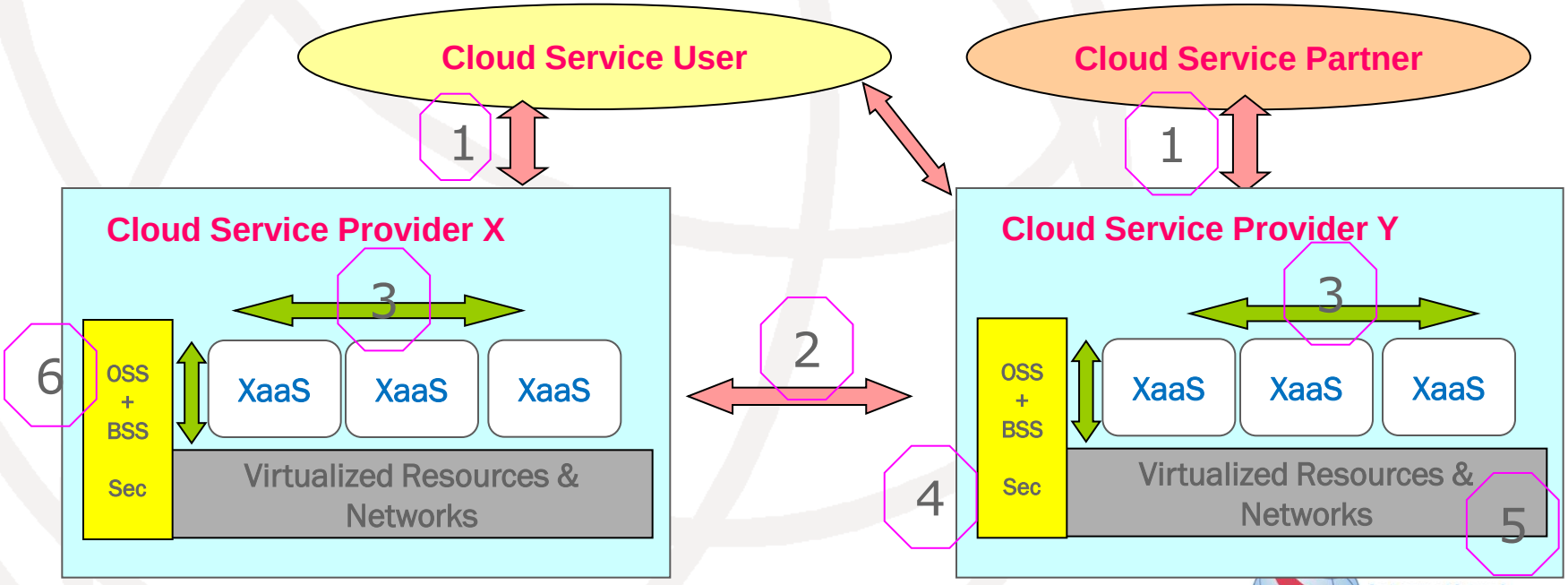
Cloud Security & data Privacy

- **Threats for cloud users:**
  - **Lack of security Information** (data location, backup system, disaster recovery…)
  - **Data loss and leakage** (encryption, authentication key…)
  - **Loss of Account/Service management ID** (Attack phishing, fraud..)
- **Requirements For cloud Services provider**
  - **Method to trust cloud providers**' security level shall be provided
  - **Confidentiality/integrity of data** against loss or leakage shall be required
  - **Proper account/identity management** against account/service hijacking shall be provided.
  - **Data Portability**, The capability to change Cloud Service Provider shall be provided

6
Cloud Standards and ITU-T positioning

Cloud Standardization Areas

1. Rich Access for users and partners
2. Interoperability & Portability between cloud providers
3. Modular Cloud functional architecture
4. Security & privacy
5. Elastic Network and infrastructure
6. Cloud Management



Organizations active in cloud standards

- OGF – Open Grid Forum
- DMTF – Distributed Management Task Force

→ APIs for managing cloud resources

- SNIA - Storage Networking Industry Association

→ API for Cloud Storage

- GICTF - Global Inter-Cloud Technology Forum

→ Inter-Cloud

- TM Forum – TeleManagement Forum

→ Cloud Services management

- OASIS

→ Identity in the Cloud

- Cloud Security Alliance

→ Security aspects

Definition, Ecosystem & Architectures

- ISO IEC-JTC 1; SC 38: Distributed Application Platforms and Services (SOA, WS, Cloud)
- ITU-T - Cloud Computing Focus Group , *SG 13 and SG 17*
- NIST - National Institute of Standards and Technology
- W3C – activities on HTML-5 (offline mode, multi-device…)
- IETF - Network & Real Time Communication protocols

→ Access & protocols

IEEE Portability/interop & InterCloud

atis Cloud Services/Marketplace

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Focus Group Cloud Computing
(June 2010-Dec 2011)

- **Focus Group on Cloud Computing** has completed its study into cloud computing's and has released its Technical Report in Seven Parts:

1) Introduction to the cloud ecosystem: **definitions,** taxonomies, use cases and high-level requirements
2) Functional requirements and **reference architecture**
3) Requirements and framework architecture of cloud **infrastructure**
4) Cloud resource **management** gap analysis
5) Cloud **security**
6) Overview of **SDOs** involved in cloud computing
7) Cloud computing **benefits** from telecommunication and ICT perspectives

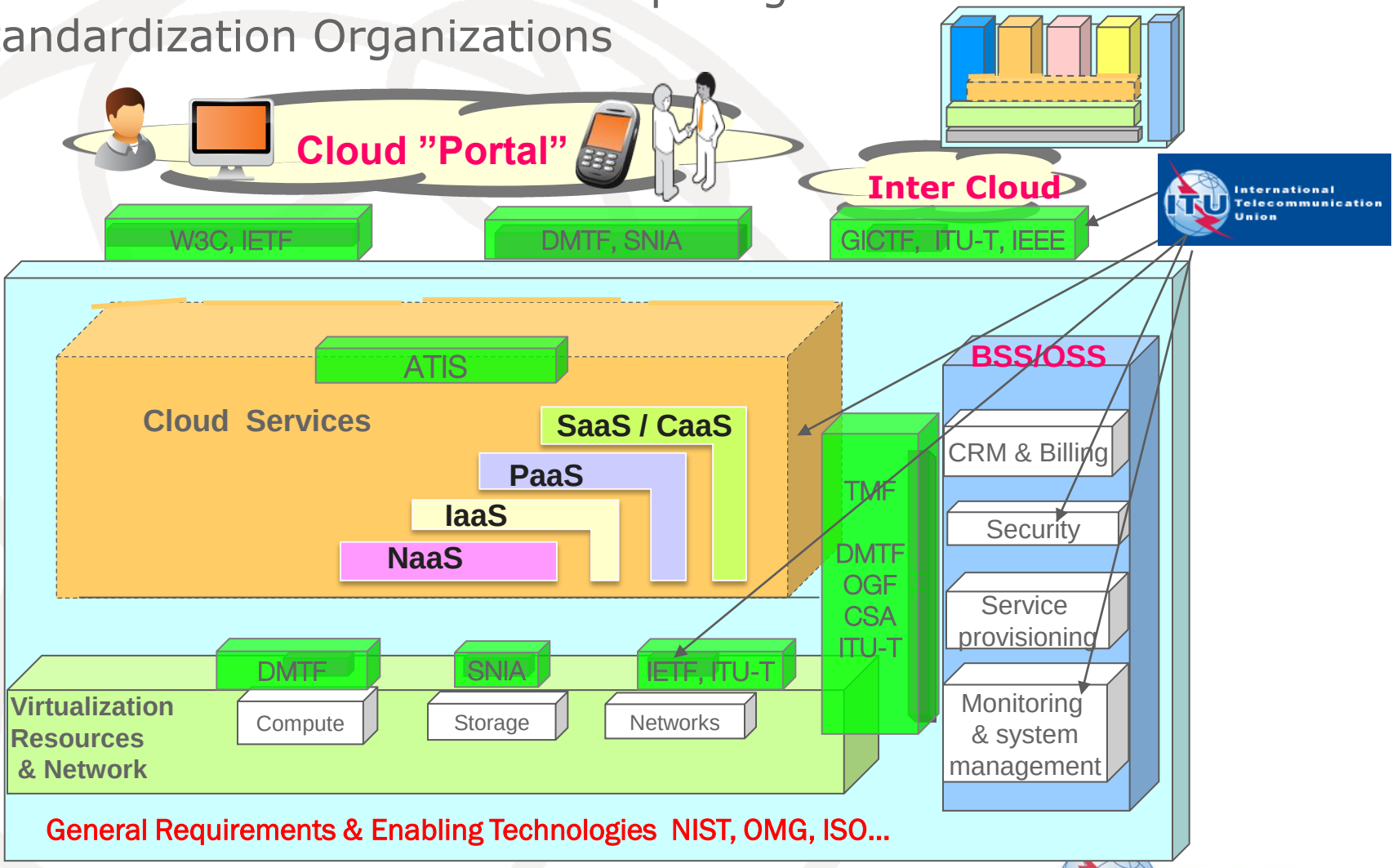
http://www.itu.int/en/ITU-T/focusgroups/cloud/Documents/FG-coud-technical-report.zip

Creation of new Cloud WP-6 in SG 13 Future Networks (Feb 2012)

- Question 26/13 :Cloud computing ecosystem, inter-cloud and general requirements"
- Question 27/13 :Cloud functional architecture, infrastructure and networking
- Question 28/13 :Cloud computing resource management and virtualization
- New Recommendations: (Next meetings April & June 2012)
  1. Cloud computing definition and vocabulary
  2. Cloud computing ecosystem , use cases and general requirements
  3. Reference architecture of cloud computing
  4. Cloud computing infrastructure functional requirements
  5. Cloud computing resources management overview & capabilities
- In March 2012, the security aspect was transferred to Question 8 of SG 17 to develop recommendations on Cloud security

ITU-T Positioning in cloud standards

A **JCA-Cloud** (Joint Coordination Activity) is created to coordinate the ITU-T cloud computing work with Other standardization Organizations



Thank You

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Kampala, Uganda, 2 April 2012,

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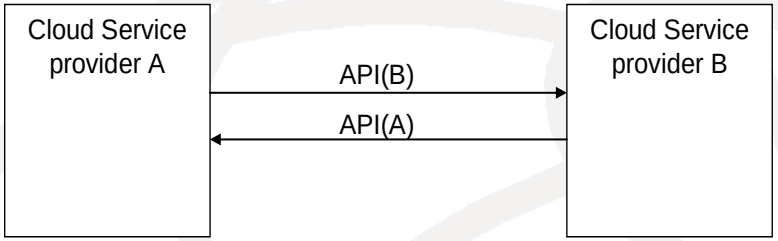
Cloud ecosystem: definitions, taxonomies, use cases & high level requirements

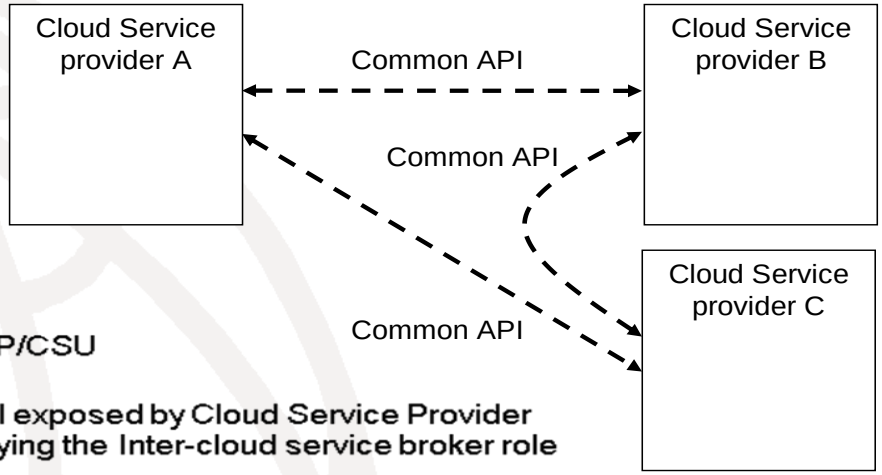
1. Cloud Computing related definitions & taxonomies: 5 Cloud service categories (SaaS, CaaS, PaaS, IaaS, NaaS) with 2 new categories for Communication (real time) and network (transport & inter-cloud)
2. Cloud ecosystem actors (provider, partner & user) and roles
3. Inter-cloud Scenarios : Peering, Federation & Service Broker
4. Telecommunication centric use cases: Service Delivery Platform, Desktop as a Service, Call center, Cloud migration and portability, Inter-cloud (SLA, performance, availability...)
5. High level requirements:
   - For cloud infrastructure accessibility, massive data processing, portability, responsiveness…
   - For cloud services: SLA support, management, Inter-cloud

Inter-cloud

Peering

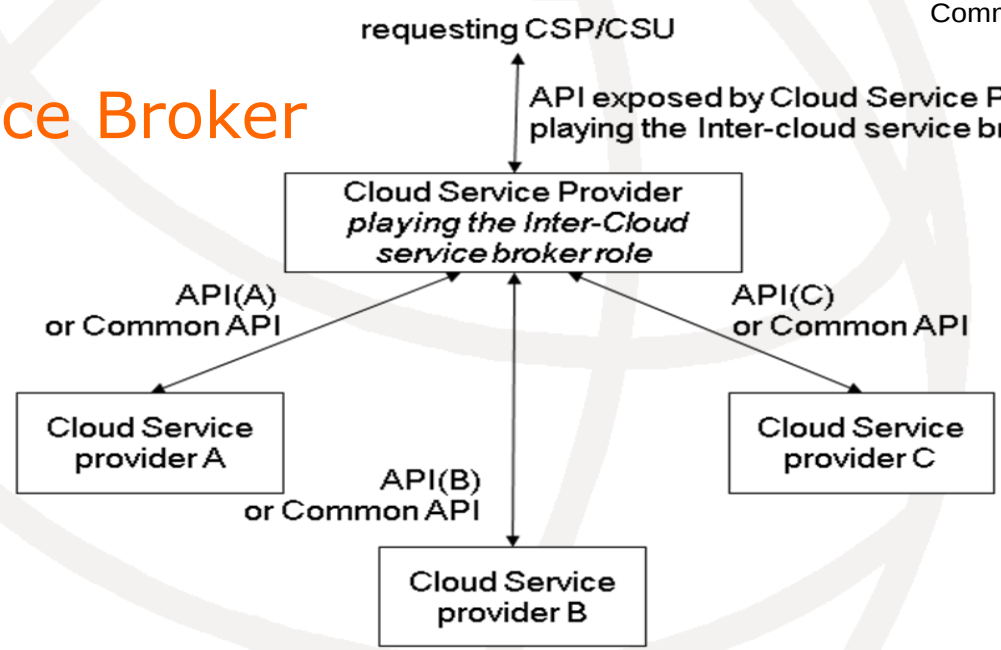


Federation



API(X): API provided by Cloud Service provider X

Service Broker



API(X): API provided by Cloud Service provider X