

**Fifth SG13 Regional Workshop for Africa on
"ITU-T Standardization Work on Future Networks:
Towards a Better Future for Africa"
(Cairo, Egypt, 2-3 April 2017)**

**Overview of the ITU works
on Cloud Computing**

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Cloud Computing



Evolution of Cloud Computing



Mainframe

A photograph of a large, black, multi-tiered mainframe computer system.

PC computer

A photograph of a desktop PC system including a monitor, keyboard, mouse, and tower unit.

Cloud Computing

A diagram showing a central blue cloud labeled 'Cloud computing' connected to various mobile devices like a smartphone, tablet, laptop, and PDA.

Client - server

A network diagram showing a central server icon connected to several client computer icons.

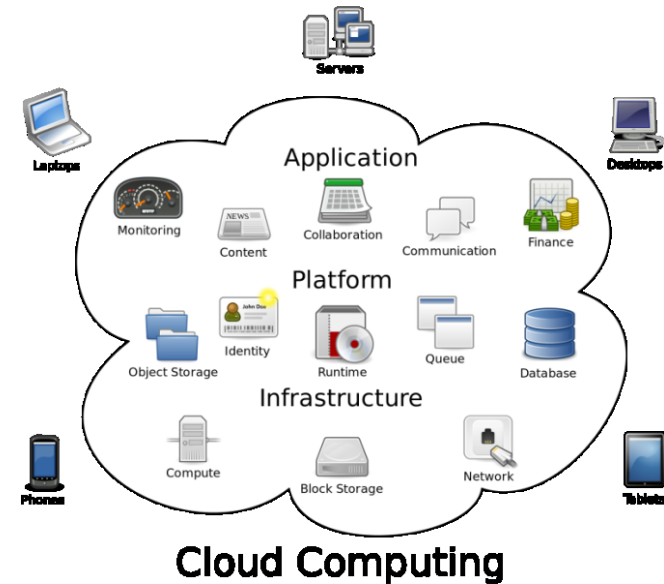
Desktop internet

An icon representing internet connectivity, featuring a globe with a network card symbol in the center.



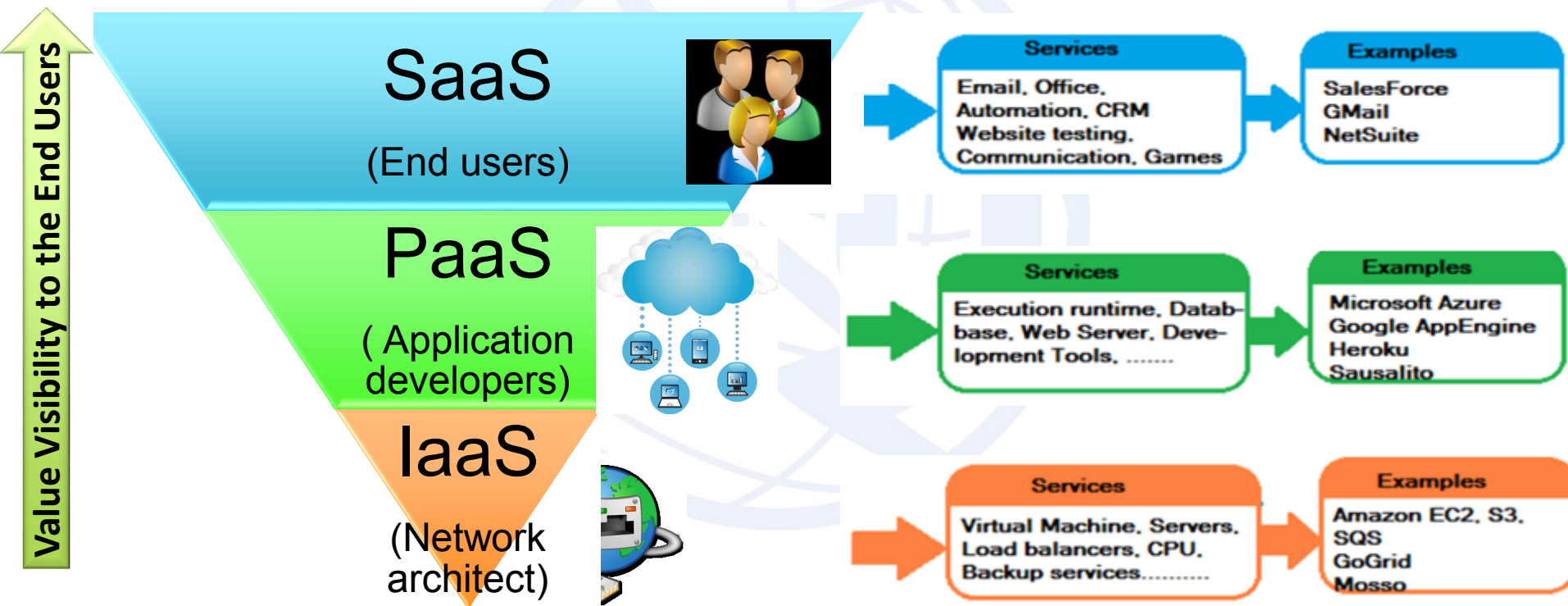
What's the Cloud Computing

Cloud computing is a paradigm for enabling network access to a scalable and elastic pool of shareable physical or virtual resources with self-service provisioning and administration on-demand.

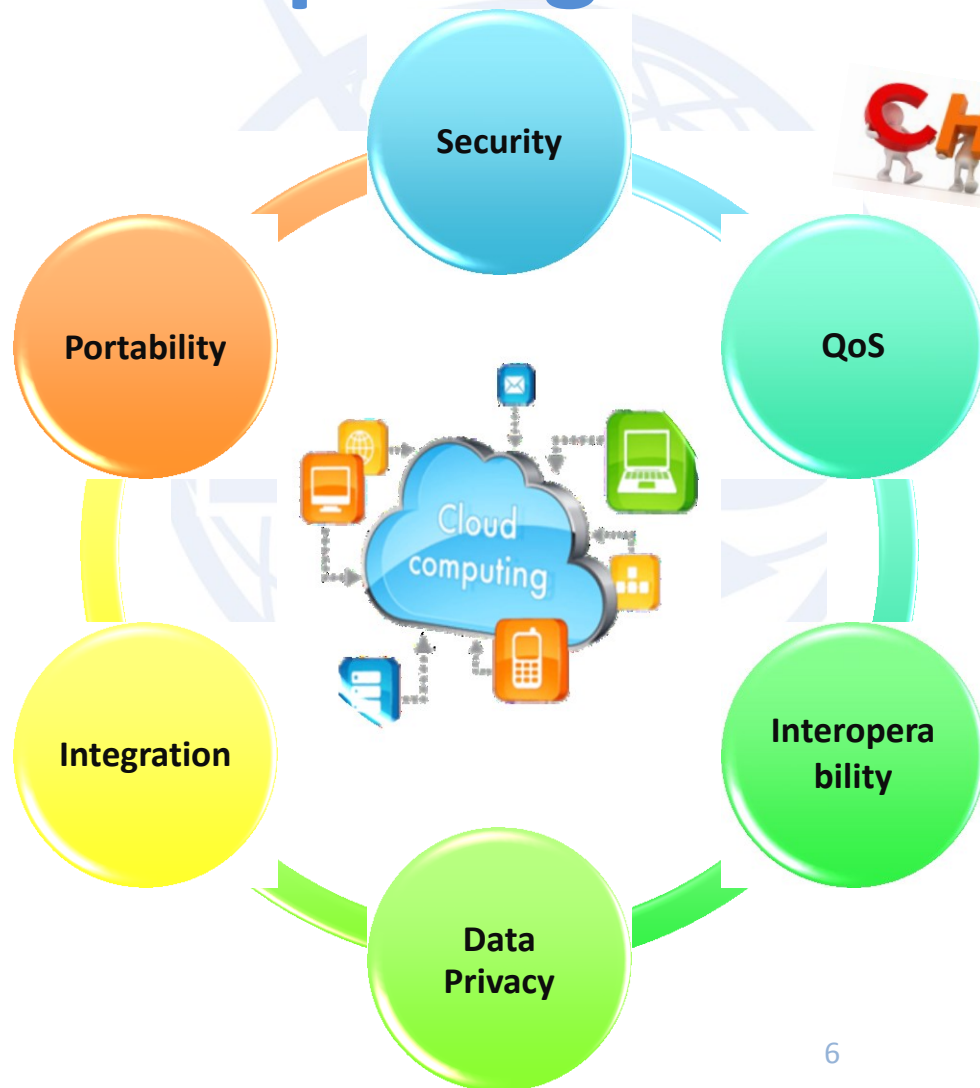


(Source : ISO/IEC 17788 | Recommendation ITU-T Y.3500 “Information technology - Cloud computing - Overview and vocabulary”)

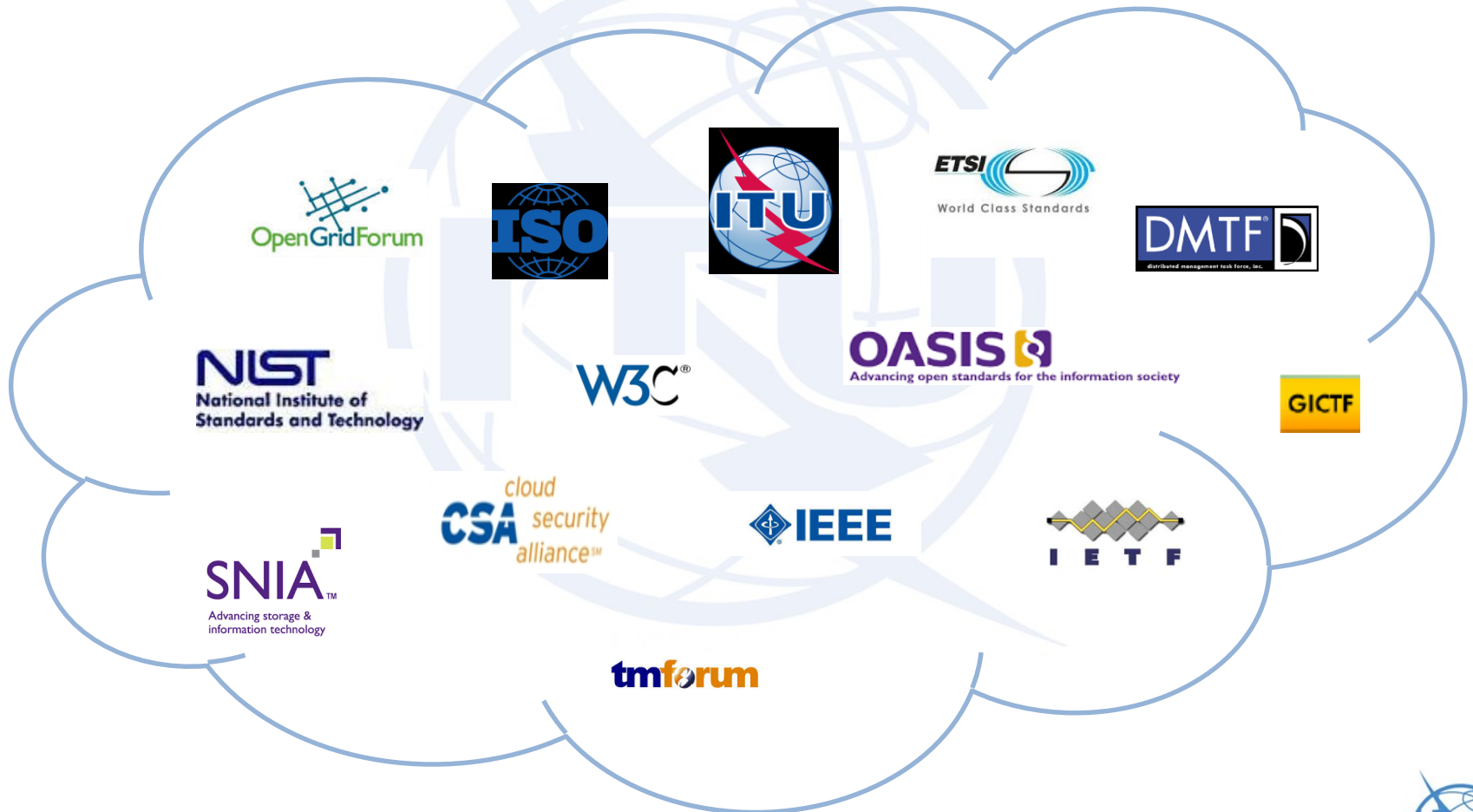
Cloud Computing service's



Cloud Computing standardization



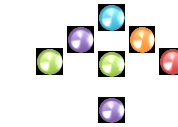
Cloud Computing Standarization





Work on Cloud Computing

2012



Publication & Workshop



Collaboration



Working Party



2009



Focus Group

Focus Group Cloud Computing

Established further to **TSAG agreement** at Geneva meeting,
8-11 February 2010



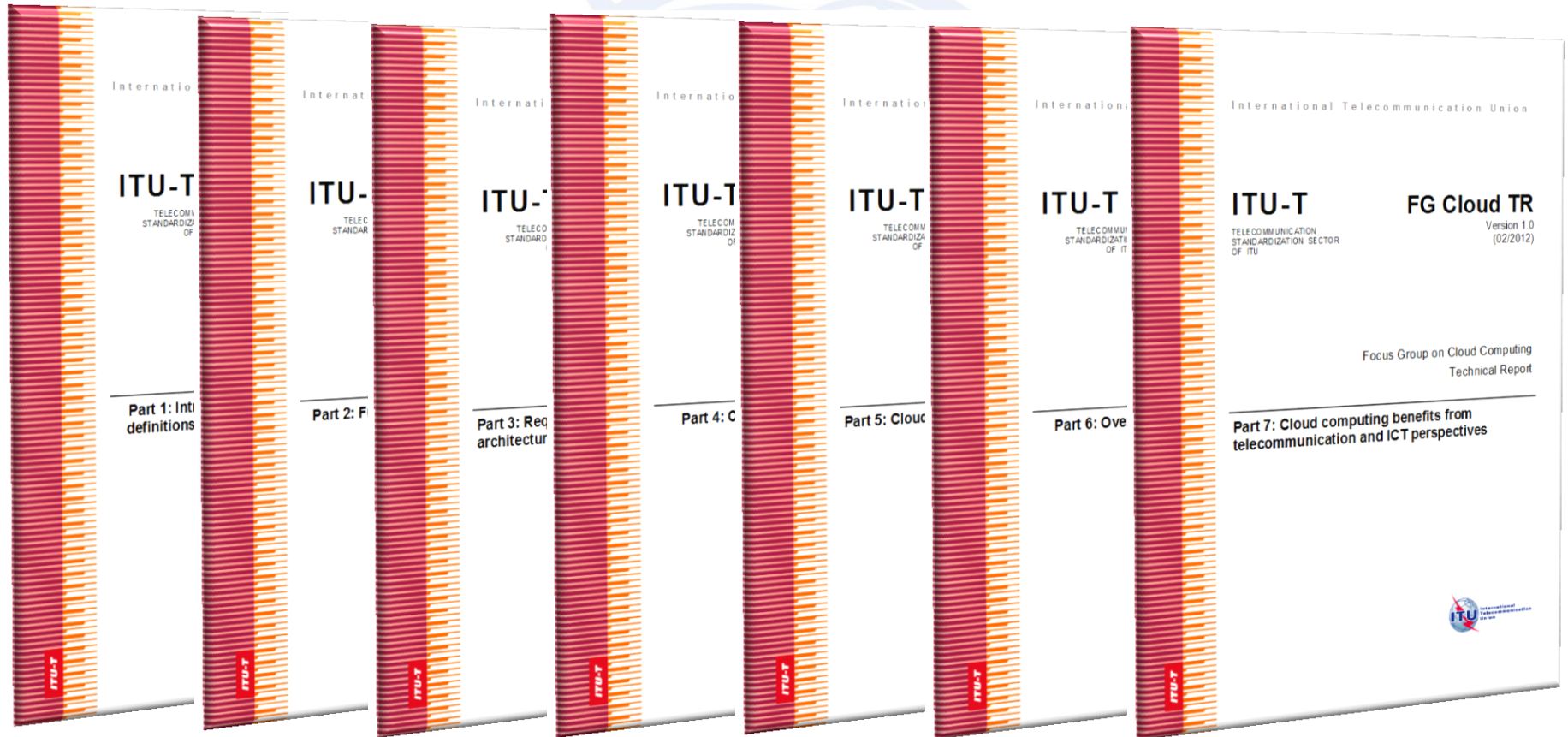
Objective

Collect and document information and concepts that would be helpful for developing Recommendations to support cloud computing services/applications from a telecommunication/ICT perspective

Focus Group concluded in **December 2011** with the publication of technical report in **7 parts**



Focus Group Cloud Computing



Study Group 13

Study Group 13 (SG13) was designed by *TSAG agreement in January 2012* as lead study group on Cloud Computing



SG13 - *Future networks including cloud computing, mobile and NGN*

Lead study group on *future networks*

Lead study group on *mobility management and NGN*

Lead study group on *cloud computing*

Working Party

In *February 2012*, the SG13 create 3 new questions forming new dedicated *Working Party 6 (WP6)* (Requirements, Architecture and Management)



Q26/13

- Cloud Computing ecosystem, inter-cloud and general requirements

Q27/13

- Cloud functional architecture, infrastructure and networking

Q28/13

- Cloud Computing resource management and virtualisation

SG13 Collaborations

Set up 2 Collaborative Teams establish by SG13 and ISO/IEC JTC1 SC38/WG3 in *June 2012* :

Collaborative Team for *Cloud Computing Overview and Vocabulary* (CT-CCVOCAB) : The goal of the project is the development of Cloud Computing Overview and Vocabulary.

Collaborative Team for *Cloud Computing Reference Architecture* (CT-CCRA) : The goal of the project was the development of Cloud Computing Reference Architecture.



Joint Coordination Activity for Cloud Computing

Established after the *TSAG agreement in January 2012* meeting with SG13 as parent group (Cf. TSB Circular 261)



Objective

Coordination of the ITU-T cloud computing standardization work within ITU-T, For example: SG11 on protocols and interoperability and SG17 on security.



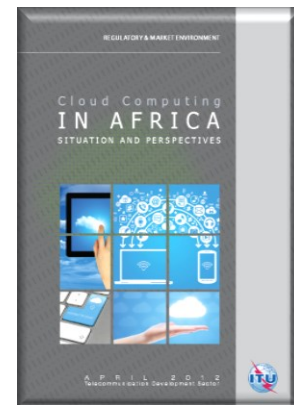
Coordination of the communication with standards development organizations and forums working on Cloud Computing protocols and standards.

Publication & Workshop

Privacy in Cloud Computing - ITU-T Technology Watch Report (March 2012) : This report analyses the challenges posed by cloud computing and the standardization work being done by various standards development organizations (SDOs) to mitigate privacy risks in the cloud, including the role of privacy-enhancing technologies (PETs)



Cloud computing in Africa - Situation and perspectives (April 2012) : This study presents recommendations related to regulation, the establishment of a regulatory watch, content outsourcing contracts on CC mode, the implementation and quality of data centers, the training programs, the standardization and the cross-border regulation.



Publication & Workshop

ITU Workshop on "Cloud Computing"

Tunis, Tunisia, 18-19 June 2012.

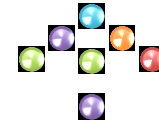
The goals of this workshop were :

- To present the general characteristics of the cloud technology, benefits, technical barriers and development issues; and
- To introduce regulatory aspects of cloud computing and standardization efforts.





2016



Workshop



Collaboration



Working Party

2013



Focus Group

Focus Group

The focus group on Aviation Applications of Cloud Computing for Flight Data Monitoring (FG AC) was established further to *TSAG agreement* in *June 2014*



Objective

Identify the requirements for telecommunication standards for an aviation cloud for real-time monitoring of flight data (protection and security, data ownership and access to flight data,...)

Focus Group concluded in **February 2016** with the publication of technical report in **4 parts**



Focus Group AC



Study Group 13

The mandate of study Group 13 was extended to include *Big Data* and *Trusted cloud*



SG13 - *Future networks including cloud computing, mobile and next-generation networks*

Lead study group on *future networks*

Lead study group on *mobility management* and *NGN*

Lead study group on *cloud computing*

Lead study group on *Software-Defined Networking (SDN)*



Working Party

In *February 2012*, the SG13 create 3 new questions forming new dedicated *Working Party 2 (WP2) : Cloud Computing and Common Capabilities*



Q17/13 (Continuation of Q26/13)

- Cloud computing ecosystem, general requirements, and capabilities

Q18/13 (Continuation of Q27/13)

- Cloud functional architecture, infrastructure and networking

Q19/13 (Continuation of Q28/13)

- End-to-end Cloud computing service and resource management

Cloud Recommendations

Y series : Global information infrastructure, internet protocol aspects and next-generation networks

- **Y.3501:** Cloud computing framework and high-level requirements
- **Y.3503:** Requirements for Desktop as a Service
- **Y.3510 :** Cloud Computing Infrastructure Requirements (2nd edition in AAP procedure)
- **Y.3511:** Framework of inter-cloud computing
- **Y.3512:** Cloud Computing -Functional requirements of NaaS

Cloud Recommendations

Y series : Global information infrastructure, internet protocol aspects and next-generation networks

- **Y.3513**: Cloud Computing -Functional requirements of IaaS
- **Y.3520** (2nd editions): framework for end to end Cloud resource management
- **Y.3521 /M.3070** : Overview of end-to-end cloud computing management (in AAP procedure)
- **Y.3600**: Big data –cloud computing based requirements and capabilities

Cloud Recommendations

X series : Data networks, open system communications and security

- **X.1601 (2nd editions)**: Security framework for cloud computing
- **X.1602**: Security requirements for SaaS (in TAP procedure)
- **X.1642**: Operational security for cloud (in TAP procedure)

Q series : Switching and signalling

- **Q.4040**: Framework and overview of cloud computing interoperability testing

SG13 Collaborations

The Specific Collaborative Teams between ITU-TSG13 & ISO JTC1 SC38 were closed as accomplishing their mandate in *July 2014*

- ITU-T Y.3500 (*ISO/IEC 17788*) : Cloud computing - Overview and Vocabulary
- ITU-T Y.3502 (*ISO/IEC 17789*) : Cloud Computing - Reference architecture
- ITU-T X.1631 (*ISO/IEC 27017*) : Code of practice for information security controls based on ISO/IEC 27002 for cloud services



Joint Coordination Activity for Cloud Computing

During *June 2013* meeting, the *TSAG* endorsed the continuation of JCA-Cloud with revised ToR and SG13 as a parent.



On *1st May 2015* JCA-Cloud was terminated as exhausted its mandate by the decision of its parent group (SG13) at its meeting of *April – May 2015*.

Joint Rapporteur Group on Cloud Computing Management

Established by *SG2* at its meeting of *May 2014* and *SG13* at its meeting of *July 2014*



Objective

The development of Cloud Computing Management draft Recommendations based on the common understanding from both *SG2* and *SG13* perspectives.

This work was based on the 3 new draft recommendations :

- ITU-T Y.3500, Cloud Computing Overview and Vocabulary (*ITU-T Q17/13*);
- ITU-T Y.3502, Cloud Computing Reference Architecture (*ITU-T Q18/13*);
- ITU-T Y.3520, Cloud computing framework for end-to-end resource management (*ITU-T Q19/13*).



Workshops

*ITU Workshop on Standardization on IMT, M2M, IoT, Cloud Computing and SDN
Algiers, Algeria, 8 September 2013*

*Second Study Group 13 Regional Workshop for Africa on "Future Networks: Cloud Computing, Energy Saving, Security and Virtualization"
Tunis, Tunisia, 28 April 2014*

*ITU Workshop on "Cloud Computing Standards - Today and the Future"
Geneva, Switzerland, 14 November 2014*

*Third SG13 Regional Workshop for Africa on "ITU-T Standardization Challenges for Developing Countries Working for a Connected Africa"
Livingstone, Zambia, 23-24 February 2015*

*Fourth SG13 Regional Workshop for Africa on "Future Networks for a better Africa: IMT-2020, Trust, Cloud Computing and Big Data"
Accra, Ghana, 14-15 March 2016*



2017

NEW

2020



Workshop



Working Party

Study Group 13

The mandate of study Group 13 was extended to include *IMT-2020* and *Trusted network infrastructure*



SG13 - *Future networks, with focus on IMT-2020, cloud computing and trusted network infrastructures*



Lead study group on *future networks such as IMT-2020 networks (non-radio related parts)*

Lead study group on *mobility management*

Lead study group on *cloud computing*

Lead study group on *trusted network infrastructures*



Working Party

The terms of references of working party 2 (WP2) were modified to include the big data new working items, *WP2 : Cloud Computing & Big Data*



Q17/13 (include Big Data)

- Requirements, ecosystem, and general capabilities for cloud computing and big data

Q18/13 (include Big Data)

- Functional architecture for cloud computing and big data

Q19/13 (include security)

- End-to-end Cloud computing management and security

Question under study

Q17/13 : Requirements, ecosystem, and general capabilities for cloud computing and big data

- Cloud computing and big data definitions, overview, ecosystem, and use cases;
- Cloud computing and big data requirements, and capabilities;
- Requirements for interoperability, data portability, and exchange information in cloud computing and big data;
- Relationship between cloud computing and big data.

Question under study

Q18/13 : Functional architecture for cloud computing and big data

- Cloud computing functional architectures supporting cloud service categories (e.g. NaaS, IaaS, PaaS, BDaaS and XaaS);
- Cloud computing functional architectures of inter-cloud;
- Cloud computing infrastructure including cloud networking aspects (e.g. for the support of network slicing);
- Big data functional architectures including big data exchange functional architecture and cloud computing based big data architecture.

Question under study

Q19/13 : End-to-end Cloud computing management and security

- Cloud service management (in cooperation with SG2) as well as cloud infrastructure and resource management, utilizing ideally common underlying principles, best practices, fundamentals, frameworks and design, a requirement demanded by telecom operators and service developers.
- The scope includes multi-cloud management, end-to-end management scenarios for cloud services and cloud infrastructure/resources.
- Study (in cooperation with SG17) of cloud specific identity, access and security mechanisms that enable effortless trusted access to cloud resources in multi-provider scenarios, to the extent that such cloud specific scenarios do exist (not yet established)

Question under study

An up-to-date statues of work question 5 were done : *Q5/13: Applying networks of future and innovation in developing countries*



The activities of this question is focus on **Recommendations, Technical Papers and Supplements** which study the needs of the eco-system as a whole of **developing country telecom networks** in terms of applying **IMT-2020, cloud computing, big data, trust** and other **emerging technologies** as they deal with the shift towards convergence of previously discrete areas, namely telecoms, data and entertainment under their own specific circumstances.



Workshops

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Conclusion

W
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The **standardization** is one of the fundamental **key** to **develop** the new technology, without standards several problem happen (interoperability, security,...).

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The **SG13** as leader group on **cloud computing** provide serious efforts, in **collaboration** with (government, regulator, provider, standards institutions....), in order to develop the cloud computing standards.



Conclusion

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SG13 work very closely in the region in order to bridge the standardization gaps and enable developing countries to reap the benefits of the technology revolution.



Thank you for your
attention



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