

Buenos Aires Action Plan

STUDY GROUP 1

QUESTION 3/1

Emerging technologies, including cloud computing, m-services and OTTs: Challenges and opportunities, economic and policy impact for developing countries¹

1 Statement of the situation or problem

Emerging technologies, including cloud computing, m-services and over-the-top (OTT) offerings, present new opportunities for economic development, particularly in developing countries. Cloud computing is a concept in the world of multimedia, and one towards which the world is now gradually moving, in view of the many powerful advantages it offers. This concept can be summarized as a model enabling ubiquitous, convenient, 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.

The key characteristics of cloud computing are: broad network access, measured service, multi-tenancy, on-demand self-service, rapid elasticity and scalability, and resource pooling. For many countries, cloud computing represents a possible solution to the lack of adequate computing resources and it has achieved remarkable growth in many of the most developed countries, particularly after the adoption of this trend by mobile-telephone operators and manufacturers. Cloud computing is considered by key industry leaders to be the next technological revolution of the twenty-first century.

The main key characteristics of cloud computing are economies of scale (infrastructure sharing) and flexibility of use.

IP-based services are often offered by providers to users over an Internet connection, independent of the telecommunication network operator providing the Internet connection. These services are often referred to as "over-the-top" (OTT) offerings. Consumer demand for such offerings is rapidly growing as consumers want more of, and perceive great benefits from, these offerings. Consumers expect to be able to access legal content, applications and services and want information about their subscriptions. Such offerings create demand for broadband access and services, but are also obliging network operators to seek new business models and arrangements, particularly in developing countries.

The growth in broadband networks also leads to the development and deployment of new services and applications, such as mobile money transfer, m-banking, m-commerce and e-commerce.

¹ These include the least developed countries, small island developing states, landlocked developing countries and countries with economies in transition.

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In view of the importance of the topic, cloud computing is dealt with by two study groups in the ITU Telecommunication Standardization Sector (ITU-T). ITU-T Study Group 13 develops standards that detail requirements and functional architectures of the cloud-computing ecosystem, covering inter- and intra-cloud computing and technologies supporting XaaS (X as a Service). This work includes infrastructure and networking aspects of cloud-computing models, as well as deployment considerations and requirements for interoperability and data portability. Study Group 13 also develops standards enabling consistent end-to-end, multi-cloud management and monitoring of services exposed by and across different service providers' domains and technologies. Study Group 13's standardization work also covers network aspects of the Internet of Things (IoT), additionally ensuring support for IoT across future networks (FN) as well as evolving next-generation networks (NGN) and mobile networks. Cloud computing in support of IoT is an integral part of this work.

ITU-T Study Group 20 is responsible for studies relating to Internet of Things (IoT) and its applications, and smart cities and communities (SCC). This includes studies relating to big data aspects of IoT and SCC, e-services and smart services for SCC.

Collaboration is therefore required between both Sectors in order to successfully deal with the challenges and opportunities facing the developing countries in terms of access to cloud computing.

2 Question or issue for study

Cloud computing

- a) Infrastructure needs for supporting and enabling access to cloud services.
- b) Strategies, policies and infrastructure investments to foster the emergence of a cloud-computing ecosystem in developing countries, taking into consideration relevant standards recognized or under study in the other two ITU Sectors.
- c) Cloud-computing trends.
- d) Features of networks that support effective access to cloud-computing services.
- e) Building and developing a sufficient group of existing frameworks to support investment in infrastructure for cloud computing, taking into consideration relevant standards recognized or under study in the other two ITU Sectors.
- f) Cost models for the adoption of cloud computing.
- g) Continued elaboration of case studies of successful cloud-computing platforms used in developed and developing countries.

M-services

- a) Policies, strategies and relevant approaches in the field of m-services.
- b) Methods of development and deployment of cross-cutting services such as e-commerce, e-finance and e-governance, including money transfer, m-banking and m-commerce.
- c) Strategies for availability, access and use of mobile services and applications.

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- d) Ways to promote an enabling environment among ICT stakeholders for the development and deployment of m-services.

Over-the-top

- a) Impacts of the provisioning of OTTs, including impacts on regulatory frameworks, network infrastructure, economic impacts and business models.
- b) Assessments of the competition effect on the market.
- c) Identification of policy tools to facilitate the availability of competitive OTT to consumers at the local and national levels.
- d) Identification of best practices and policies that create incentives for investment in OTTs.
- e) Continued study of issues relating to facilitating access to IP networks, thereby enabling access to OTTs.
- f) National case studies and experiences regarding legal frameworks and partnerships seeking to facilitate the development and deployment of OTT.
- g) National experiences describing the economic and business model among telecom operators and OTT providers.

3 Expected output

- a) Annual progress report on the above study items.
- b) A progress report midway through the study cycle.
- c) A final report for the Question that includes:
 - An analysis of the factors influencing effective access to support emerging technologies, including cloud computing, m-services and OTT offerings.
 - A set of guidelines, such as policy or technical approaches, among others, for facilitating infrastructure deployment, which could be delivered, *inter alia*, through training seminars in accordance with the ITU Telecommunication Development Sector (ITU-D) programme on capacity building.
 - A handbook on infrastructure and services supporting cloud computing in developing countries, including consideration of strategies and policies that could be implemented.

This handbook will be the result of study group collaboration between ITU-T Study Groups 3 and 13 and the rapporteur group dealing with this Question under ITU-D Study Group 1.
 - Draft Recommendation(s), as appropriate and if justified.

4 Timing

The interim report on this Question is expected by 2019. The final report is expected in 2021 at the end of the ITU-D study period.

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5 Proposers/sponsors

Arab States; African States; United States; Mexico

6 Sources of input

- 1) Results of related technical progress in relevant ITU-T study groups, in particular Study Groups 3 and 13.
- 2) ITU publications on emerging technologies, including cloud-computing services, m-services and OTT offerings.
- 3) Relevant reports of national and/or regional organizations in developing and developed countries.
- 4) Contributions on experiences with providing access to emerging technologies, including cloud computing, m-services and OTT offerings in developed and developing countries.
- 5) Relevant inputs from service providers and manufacturers.
- 6) Relevant inputs from Telecommunication Development Bureau (BDT) programmes relating to emerging technologies, including cloud computing, m-services and OTT offerings.

7 Target audience

a) Target audience

Target audience	Developed countries	Developing countries
Telecom policy-makers	Yes	Yes
Telecom regulators	Yes	Yes
Service providers/operators	Yes	Yes
Manufacturers	Yes	Yes
ITU-D programme	Yes	Yes

b) Proposed methods for implementation of the results

The work of the rapporteur group will be conducted and publicized through the ITU-D website as well as through documents and appropriate liaison statements. The results of the work will also be used by relevant BDT programmes as components of the toolkit BDT uses when solicited by Member States and Sector Members to support their efforts to develop and deploy emerging technologies, including cloud computing, m-services and OTT offerings.

8 Proposed methods for handling the Question

The Question will be handled by a rapporteur group of ITU-D Study Group 1.

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9 Coordination and collaboration

In order to coordinate effectively and avoid duplication of activities, the study should take into consideration:

- outputs from the relevant ITU-T study groups, in particular those made available by ITU-T Study Groups 3 and 13;
- the relevant outputs from ITU-D Questions;
- inputs from the relevant BDT programmes.

10 BDT programme link

The relevant programme will be the programme on network infrastructure and services.

11 Other relevant information

As may become apparent within the life of the Question.
