QUESTION 1/1

**Policy, regulatory and technical aspects of the
migration from existing networks to broadband networks in
developing countries, including next-generation networks,
m-services, over-the-top (OTT) services and the implementation of IPv6**

1   Statement of the situation or problem

Increased access to broadband is widely credited with improving development outcomes, fostering economic growth and increasing competitiveness. Broadband is a key input to achieving a people-centred, inclusive and development-oriented information society.

Despite impressive gains in access to telecommunication/ICT infrastructure, services and applications, many developing countries, particularly least developed countries (LDCs), still lack sufficient access to broadband connectivity. ITU data from 2012 estimate that 31 per cent of the population and 28 per cent of households in developing countries have access to the Internet, and in the world's 49 LDCs, less than 10 per cent have Internet access. The gender gap is also more pronounced, as 16 per cent fewer women than men use the Internet. Of the more than 1 billion people who have a disability that affects their access to modern communications, 80 per cent are in the developing world. Penetration rates for mobile-broadband subscriptions in developing countries stood at 20 per cent in 2013, with fixed-broadband penetration at 6.1 per cent. Further**,** the cost of access to broadband service remains prohibitively high in many developing countries owing to a variety of factors, including a lack of infrastructure investment and the need to develop, implement and enforce enabling policies and regulations, in particular those that would promote effective competition.

ITU-D, with active participation from Member States and Sector Members, should endeavour to increase the availability of affordable broadband services during the 2014-2018 study period by carefully analysing the policy and technical issues related to broadband deployment, adoption and use. In particular, ITU members and BDT must identify, elevate and address the stated needs of the LDCs and others in improving broadband deployment and use. Members will benefit from analysing the technical issues involved in deploying broadband access technologies, including integration of access network solutions with existing or future network infrastructure.

Broadband access policies, implementation and applications should be studied together, so that developing countries can better evaluate their best options for sustainable broadband deployment. Combining these topics will eliminate fragmentation of these related issues and more accurately provide a clear roadmap of options for developing countries to close the existing gap in broadband service.

The proposed study Question and expected outputs reflect elements from study Questions from the previous study period 2010-2014, notably Question 19-2/1, on implementation of IP telecommunication services in developing countries, and Question 26/2, on migration from existing networks to next-generation networks for developing countries: technical, regulatory, and policy aspects.

During the 2010-2014 study period, under Question 19-2/1, the rapporteur group within Study Group 1 studied the implementation of IP telecommunication services in developing countries. A study report was drafted containing relevant information and data that will be of use to Member States, and particularly the developing countries.

Global implementation of IPv6 remains a challenge for all countries, and will be achieved in stages. Studies are therefore proposed on transitioning from IPv4 to IPv6 and its impacts.

The Internet Engineering Task Force (IETF) develops Internet Protocols, including IPv4 and IPv6.

Many countries and international organizations are interested in this Question. The World telecommunication Standardization Assembly (WTSA) (Johannesburg, 2008) adopted Resolution 64 (Johannesburg, 2008), on IP address allocation and facilitating the transition to and deployment of IPv6, which was revised by WTSA-12. The ITU Council at its 2012 session, in Decision 572, decided that the 2013 World Telecommunication/ICT Policy Forum (WTPF-13) would address the issue of IP-based networks. The forum was held from 14 to 16 May 2013 in Geneva (the previous WTPF had been held from 21 to 24 April 2009 in Portugal, and had discussed convergence, Internet and the ITRs). WTPF is organized by ITU and aims to encourage discussion and seek consensus among the different stakeholders in the form of "opinions" reflecting a common vision which serves to guide policy in the ICT sector as well as regulatory and standardization activities throughout the world. WTPF-13 issued six opinions (Document WTPF-13/16), as follows:

– Opinion 1 (Geneva, 2013): Promoting Internet exchange points (IXPs) as a long-term solution to advance connectivity

– Opinion 2 (Geneva, 2013): Fostering an enabling environment for the greater growth and development of broadband connectivity

– Opinion 3 (Geneva, 2013): Supporting capacity building for the deployment of IPv6

– Opinion 4 (Geneva, 2013): In support of IPv6 adoption and transition from IPv4

– Opinion 5 (Geneva, 2013): Supporting multistakeholderism in Internet governance

– Opinion 6 (Geneva, 2013): On supporting operationalizing the enhanced cooperation process.

Many countries are also now discussing at the highest policy level the adoption of laws and regulations on "net neutrality". This subject involves all the stakeholders, including political leaders, regulators, operators and providers. Given the complexity of the matter and the different market conditions in each country, there is no "one size fits all" approach to this issue.

In 2005, the Federal Communications Commission (FCC) published an Internet Policy Statement in which it made clear its support to preserve and promote the open and interconnected nature of the public Internet and has recognized the role of appropriate network management. In Europe, the EU, citing Article 1, paragraph 8*(*g), of Directive 2009/140/EC, published a Communication on the open Internet and net neutrality in Europe (COM(2011)0222). The Body of European Regulators for Electronic Communications (BEREC/ORECE) in December 2011 published its Guidelines on transparency in the scope of net neutrality and a framework for work on quality of service. In France, the *Conseil National du Numérique* in its report of 12 March 2013 calls for recognition of the principle of net neutrality as a fundamental principle of a constitutional character.

On 18 April 2013, ITU published a report on regulation, *Trends in Telecommunication Reform 2013: Transnational aspects of regulation in a networked society.* Chapter 2 of this report is devoted to the issue of net neutrality. As the report shows, the debate on net neutrality continues to be obscured by the lack of a generally agreed definition of the term among regulators themselves.

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)" services. Consumer demand for such services is rapidly growing as consumers want more of, and perceive large benefits from, these services. Consumers expect to be able to access legal content, applications and services and want information about their subscriptions. Such services create demand for broadband access and services but also are requiring network operators to seek new business models and arrangements, particularly in developing countries.

Also, the Question should focus on new issues that have arisen from the cross-sectoral nature of the telecommunication/ICT market in developing countries, where new applications, services and players bring a host of emerging regulatory matters. The study group should provide analysis of regulatory models and frameworks for cooperation among the various entities involved in the development, deployment and management of these new applications and services.

2 Question or issue for study

2.1 Policy and regulation

a) Policies and regulations that promote affordable broadband networks, services and applications, including ways to optimize spectrum use.

b) Effective and efficient ways to fund increased broadband access for the unserved and underserved.

c) The regulatory and market conditions necessary to promote deployment of broadband networks and services, including organizational options for national regulatory authorities resulting from convergence, as well as coordination with related ministries and regulators due to the cross-cutting nature of the services such as mobile money transfer, m-banking, m-commerce and e-commerce.

d) Success stories and lessons learned.

e) Ways to remove practical barriers to broadband infrastructure deployment, and best practices for improving cross-border connectivity and small island developing states' connectivity challenges.

f) Considering the fact that meeting demand for content requires improved access to broadband services, study the following:

   – pattern and trends in broadband services in regard to, *inter alia*, broadband deployment, international traffic and applications, etc.;

   – access-supporting applications primarily used for development, i.e. e-government, e-education, e-health, etc., in an affordable manner, taking into consideration previous guidelines on the subject.

g) Commercial impact of new investments required to meet the growing demand for access to the Internet generally, and bandwidth and infrastructure requirements for delivering affordable broadband services to meet development needs.

h) Impacts of the provisioning of IP-based applications and services offered by content providers to users over a broadband Internet connection, independent of the telecommunication network operator providing the internet connection, often referred to as "over-the-top (OTT)" services, including impacts on regulation, competition, network infrastructure and business models.

2.2 Transition and implementation

a) Methods to implement broadband service, including the transition from narrowband networks and interconnection and interoperability features.

b) Operational and technical issues associated with deploying broadband networks, services and applications, including the transition from narrowband to broadband networks.

c) Ways to remove practical barriers to broadband infrastructure deployment.

d) Success stories and lessons learned.

e)   Continued study of issues relating to facilitating access to IP networks, thereby enabling access to IP services and associated applications, as identified in § 2 of the wording of Question 19-2/1 for the 2010-2014 study period.

f)   Study of the policy and technological aspects of a) the transition from IPv4 to IPv6 and, separately, b) ways to manage access to networks, balancing network performance, competition and consumer benefits.

3   Expected output

Reports, best-practice guidelines, case studies and recommendations, as appropriate, that take into account the issues for study and the following expected outputs:

a)   Broadband policy and regulation

i)   Policies promoting incentives for broadband deployment through effective competition, public and private investment, inter-platform competition, and private-public partnerships towards accomplishing universal access to broadband services.

ii)   Examination of, and best practices for encouraging, regional policies and practices that promote and address cross-border connectivity and small island developing state connectivity.

iii)   Best practices to develop technology-neutral and service-neutral policies.

iv)   Methods to open markets to effective competition through transparent regulatory and taxation reforms.

v)   Policies to encourage efficient and innovative mobile-broadband practices for new market entrants and consumers, including by allocating and assigning spectrum.

vi)   Best practices for infrastructure sharing and access to networks to promote market entry, where appropriate.

vii)   Capacity building in rural and/or underprivileged communities.

viii)   Studies to examine new and innovative pricing methodologies for broadband services, trends in broadband services in regard to, *inter alia*, broadband deployment, international traffic and applications, and assessment of the current demand for broadband at global and regional level.

ix)   Best practices and guidelines for stimulating investment in broadband that allows the delivery of services for development in an affordable manner.

x)   Identification of policy tools to facilitate the availability to consumers at local and national levels of competitive IP-based services and applications, so called "over-the-top" (OTT) services.

xi)   Identification of the range of alternative successful business arrangements that have been used to meet growing demand and other changes in the market.

xii)   Identification of the best practices and policies that create incentives for investment in IP-based services and applications.

xiii)   Evaluation of challenges and an overview of best practices and guidelines regarding legal frameworks and cooperation mechanisms among appropriate government entities seeking to facilitate, and avoid barriers to, the development and deployment of new services and applications, such as mobile money transfer, m-banking, m-commerce and e-commerce.

b)   Broadband transition and implementation

i)   Best practices to finance broadband access to underserved and unserved communities, including universal service funds, coverage requirements and alternative means of financing broadband access.

ii)   Guidelines for making the transition from narrowband to broadband networks, taking into account in particular the potential challenges, benefits and opportunities that developing countries may encounter when implementing broadband networks, services and associated applications.

c)   Transition from IPv4 to IPv6

i)   Compilation of the questions raised by, and requirements of, developing countries in their transition to IPv6.

ii)   Consolidation and coordination of efforts to ensure the transition to IPv6.

iii)   Survey of procedures, methods and time-frames for the effective transition to IPv6, having regard to the experience of ITU Member States.

The final report may also contain best practices on transition to IPv6, which may address the following issues:

1)   Transition to IPv6 for telecommunication operators:

   1.1) stages in the transition, including best practices for top-level domain operators and application service providers in migration efforts;

   1.2) transition for network backbones;

   1.3) transition for access networks;

   1.4) collecting best practices for routing;

   1.5) network service;

   1.6) quality-of-service issues;

   1.7) issues of network security throughout the transition process.

2)   Combined use of IPv6 and IPv4.

3)   Participation required of the regulator.

4   Timing

Annual progress reports. This study is expected to last four years.

Within two years, a draft report on the subjects should be submitted to Study Group 1.

A final report and guidelines or Recommendation(s) are to be submitted to Study Group 1 within four years.

The rapporteur's group will work in collaboration with BDT to implement the lessons learned from study of the Question through training seminars.

The activities of the rapporteur's group will end within four years.

5   Proposers/sponsors

Arab States; African Telecommunications Union; Asia-Pacific Telecommunity; Brazil; Regional Commonwealth in the field of Communications; India; United States.

6   Sources of input

The major source of input will be the experiences of those Member States and Sector Members that have deployed broadband networks and that have begun implementation of IPv6. Contributions from Member States and Sector Members will be essential to the successful study of the issue.

Interviews, existing reports and surveys should also be used to gather data and information for the finalization of a comprehensive set of best-practice guidelines.

Material from regional telecommunication organizations, telecommunication research centres, manufacturers and working groups should also be used, in order to avoid duplication of work.

Close cooperation with ITU-T study groups, in particular Study Group 13 and the Global Standards Initiative (GSI-NGN), other standards groups involved in the activities discussed in the study Question and other activities within ITU-D will also be essential.

Contributions are expected from Member States, Sector Members and Associates, and from relevant ITU-R, ITU-T and ITU-D study groups, and other stakeholders.

7   Target audience

Target audience	Developed countries	Developing countries[1]
Telecom policy-makers	Yes	Yes
Telecom regulators	Yes	Yes
Service providers/operators	Yes	Yes
Manufacturers	Yes	Yes
Consumers/end users	Yes	Yes
Standards-development organizations, including consortia	Yes	Yes

a)   Target audience

All national telecom policy-makers, regulators, service providers and operators, especially those in developing countries, as well as manufacturers of broadband technologies.

b)   Proposed methods for implementation of the results

The results of the Question are to be distributed through ITU-D interim and final reports. This will provide a means for the audience to have periodic updates of the work carried out and to provide input and/or seek clarification/more information from ITU-D Study Group 1 should they need it.

8   Proposed methods of handling the Question or issue

a)   How?

1)   Within a study group:

– Question (over a multi-year study period)   ☑

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

2)   Within regular BDT activity (indicate which programmes, activities, projects, etc., will be involved in the work of the Study Question):

    –   Programmes   ☑
    –   Projects   ☑
    –   Expert consultants   ☑
    –   Regional offices   ☑

3)   In other ways – describe (e.g. regional, within other organizations with expertise, jointly with other organizations, etc.)   ☐

b)   Why?

The Question will be addressed within a study group over a four-year study period (with submission of interim results), and will be managed by a rapporteur and vice-rapporteurs. This will enable Member States and Sector Members to contribute their experiences and lessons learned with respect to policy, regulatory and technical aspects of the migration from existing networks to broadband networks.

9   Coordination and collaboration

The ITU-D study group dealing with this Question will need to coordinate with:

–   Relevant ITU-T study groups, particularly Study Group 13

–   Relevant focal points in BDT and ITU regional offices

–   Coordinators of relevant project activities in BDT

–   Standards-development organizations (SDOs)

–   Experts and experienced organizations in this field.

10   BDT programme link

WTDC Resolution 77 (Dubai, 2014).

Links to BDT programmes aimed at fostering the development of telecommunication/ICT networks as well as relevant applications and services, including bridging the standardization gap.

11   Other relevant information

As may become apparent within the life of the Question.