1. Preamble

1.1 The fifth World Telecommunication/Policy Forum (WTPF)

1.1.1 Originally established by the 1994 Plenipotentiary Conference, the World Telecommunication Policy Forum (WTPF) aims to provide a forum where ITU Member States and Sector Members can discuss and exchange views and information on emerging telecommunication/ICT policy and regulatory matters, especially global and cross-sectoral issues (Resolution 2, Guadalajara, 2010).

1.1.2 By Decision 562, the 2011 Session of ITU Council highlighted the importance of working with stakeholders and experts leading up to and during the 2013 WTPF. In addition and in accord with Plenipotentiary Resolution 2 (Rev. Guadalajara, 2010), it agreed and decided that WTPF-2013 would discuss all the issues raised in: Resolution 101: “Internet Protocol (IP)-based Networks” (Rev. Guadalajara, 2010); Resolution 102: “ITU’s role with regard to international public policy issues pertaining to the Internet and the management of Internet resources, including domain names and addresses” (Rev. Guadalajara, 2010); and Resolution 133: “Roles of administrations of Member States in the management of Internationalized (multilingual) domain names” (Rev. Guadalajara, 2010).

1.1.3 The ITU Secretariat prepares annual reports to Council on ITU’s activities in relation to the implementation of Resolution 101 (Rev. Guadalajara, 2010), Resolution 102 (Rev. Guadalajara, 2010) and Resolution 133 (Rev. Guadalajara, 2010). Other related activities are also undertaken by ITU within the framework of its Strategic, Operational and Financial Plans.

1.1.4 Building on the work of the Dedicated Group, the Council Working Group on International Internet-Related Public Policy Issues (CWG-Internet) was established as a separate group by 2011 Council Resolution 1336, in accordance with Resolutions 102 and 140 of the 2010 Plenipotentiary Conference. Participation in the CWG-Internet is limited to Member States, with open consultation among all stakeholders. The terms of reference for CWG-Internet are to identify, study and develop matters related to Member State international Internet-related public policy issues, including those issues identified in 2009 Council Resolution 1305.

1.1.5 WTPF-2013 shall prepare reports and adopt non-binding opinions by consensus for consideration by ITU membership and relevant ITU meetings, bearing in mind items 1.1.3 and 1.1.4, and the need to avoid contradiction between the debates at WTPF and ongoing activities undertaken as part of ITU’s mandate under Plenipotentiary Resolutions (and other decisions of ITU Conferences and Assemblies).
1.1.6 All information relating to WTPF-2013 is posted at: http://www.itu.int/wtpf.

1.2 Preparatory process for the Secretary-General’s Report

1.2.1 Discussions at WTPF-2013 shall be based on a report from the Secretary-General, incorporating the contributions of ITU Member States and Sector Members, which will serve as the sole working document of the Forum, and shall focus on key issues on which it would be desirable to reach conclusions (2011 Council Decision 562). This draft Report outlines a potential scope for discussions and presents some of the Internet-related public policy issues under consideration in different stakeholder groups.

1.2.2 According to Decision 562, the Secretary-General shall convene a balanced, informal group of experts, each of whom is active in preparing for the Policy Forum, to assist in this process.

1.2.3 A circular letter [DM12-1003] outlining the preparatory process of the fifth WTPF was sent to ITU membership on 1 February 2012 (http://www.itu.int/en/membership/Pages/letters.aspx). The proposed timetable, included in the letter, is given below:

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 March 2012</td>
<td>Deadline for membership to submit materials considered relevant for the first draft of the Secretary-General’s Report.</td>
</tr>
<tr>
<td>13 April 2012</td>
<td>Online posting and circulation to membership of the first draft of the Secretary-General’s Report.</td>
</tr>
<tr>
<td>15 May 2012</td>
<td>Deadline for receipt of membership comments on the first draft and additional materials for the second draft. Deadline for nominations for the informal expert group (IEG) to advise the Secretary-General.</td>
</tr>
<tr>
<td>5 June 2012</td>
<td>First meeting of the informal group of experts. Preliminary second draft of the Secretary-General’s Report.</td>
</tr>
<tr>
<td>31 July 2012</td>
<td>Online posting and circulation of second draft (incorporating comments and broad outlines for possible draft opinions).</td>
</tr>
<tr>
<td>30 September 2012</td>
<td>Deadline for receipt of comments on the second draft.</td>
</tr>
<tr>
<td>Jan-Feb 2013</td>
<td>Second meeting of the informal group of experts.</td>
</tr>
<tr>
<td>1 March 2013</td>
<td>Finalization of the Report of the Secretary-General, and deadline for its publication.</td>
</tr>
<tr>
<td>13 May 2013</td>
<td>Proposed date for a high-level Strategic Dialogue.</td>
</tr>
</tbody>
</table>

2. Themes for WTPF-2013

2.1 By Decision 562, in accord with Decision 2 (Rev. Guadalajara), the 2011 Session of Council decided that the fifth WTPF would discuss all the issues raised in Resolution 101 (Rev. Guadalajara, 2010), Resolution 102 (Rev. Guadalajara, 2010) and Resolution 133 (Rev. Guadalajara, 2010). Resolutions 101 (Rev. Guadalajara, 2010) and 102 (Rev. Guadalajara, 2010) were adopted in 1998
and amended most recently at PP-10. Resolution 133 (Rev. Guadalajara, 2010) was adopted in 2002 and amended recently at PP-10. **Discussions of the WTPF should not be limited to these resolutions however and should be conducted in a broader context such as the role of the Internet in achieving Growth and Development objectives.**

2.2 Issues raised in Plenipotentiary Resolutions 101, 102 and 133 that are under consideration for the purposes of this report (bearing in mind item 1.1.5) have been extracted from the aforementioned Plenipotentiary Resolutions and are listed in the sections below.

2.3.1 Development & Diffusion of Information and Communication Technologies Globally

a) The Internet traces its origins\(^1\) to concepts developed in the United States more than 40 years ago, which made significant investments – financial, intellectual and human – in the development of early and later iterations of the Internet. Indeed, some of the key characteristics of the Internet today reflect priorities and historical choices made during the course of its development (e.g., the architecture, the fundamental importance of information-sharing and exchange, and the possibility of anonymity).

<table>
<thead>
<tr>
<th>Box 1: Key Stages in the Development of the Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1969</strong> — <strong>ARPANET</strong> (US Department of Defense)</td>
</tr>
<tr>
<td><strong>1972</strong> — <strong>CYCLADES</strong> (The French government developed its own computer network, named CYCLADES, designed by Louis Pouzin in 1972)</td>
</tr>
<tr>
<td><strong>1975</strong> — <strong>TCP/IP</strong> (allowing not only computers to be networked, but also networks to communicate with each other. It was designed by Robert E. Kahn and Vint Cerf working at ARPA)</td>
</tr>
<tr>
<td><strong>1983</strong> — <strong>The Domain Name System (DNS)</strong> [Invented by John Postel at USC]</td>
</tr>
<tr>
<td><strong>1989</strong> — <strong>The World Wide Web</strong> (invented by Tim Berners-Lee at CERN)</td>
</tr>
</tbody>
</table>

b) The Internet has evolved far beyond its initial experimental setting. Today’s global information infrastructure encompasses a host of public and private Internet Protocol (IP)-based and other networks.

c) The Internet is today global in scale and supports applications that touch on virtually all aspects of society. The Internet has become a critical national resource for governments, a vital part of national infrastructure, and a key driver of socio-economic growth and development, among other drivers.

d) Total global Internet users numbered some 2.4 billion by the start of 2012, among which, total mobile broadband subscribers amounted to 1.192 billion. The increased use of the Internet introduces additional applications in telecommunication/services based on its highly advanced technology, e.g. the utilization of e-mail and text messaging, Voice over IP (VoIP), video and real-time TV (IPTV) over the Internet. By the end of 2011, there were some 135.4 million VoIP subscribers and 60 million IPTV subscribers worldwide (Point Topic, 2012\(^2\)).

---

\(^1\) [http://www.computerhistory.org/internet_history/](http://www.computerhistory.org/internet_history/)

### Table 2: Summary Statistics for High-Speed Connectivity

<table>
<thead>
<tr>
<th></th>
<th>Total, 2011</th>
<th>High-speed, 2011</th>
<th>% Global Total high-speed, 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.159 billion (2011)</td>
<td>591 million (2011)</td>
<td>51%</td>
</tr>
<tr>
<td>Mobile subscriptions</td>
<td>5.981 billion</td>
<td>1.192 billion</td>
<td>19.8%</td>
</tr>
<tr>
<td></td>
<td>1.186 billion (2011)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handset shipments</td>
<td>1.5452 billion</td>
<td>491.4 million</td>
<td>31.8%</td>
</tr>
</tbody>
</table>

Figure 1: Global Internet Users, by geographic region, 2011


---

e) Advances in the global information infrastructure, including the development of IP-based networks and especially the Internet, and future IP developments, are an engine of economic growth and socio-economic development in the world economy in the twenty-first century. A ten per cent increase in broadband penetration has been estimated to yield a 1.21 – 1.38% increase in Gross Domestic Product (GDP) growth on average for high-income and low/middle income countries respectively (World Bank, 2009). Country case studies yield similar estimates for individual countries (e.g., for Panama, the Philippines and Turkey – www.itu.int/broadband/).

f) The Internet has fundamental value as a platform for innovation, democratic expression, access to information and scientific progress. In the growing digital economy, the Internet represents a portal for knowledge, education and entertainment which is becoming increasingly available to more of the world’s population, especially if growth in the use of mobile broadband can mirror the recent overall growth in mobile communications.
g) Today, the information and knowledge provided over the Internet are often cited as examples of global public goods. It is widely recognized that the utility and value of a network increases with growth in the number of nodes and users of that network.

h) The Internet, as a decentralized and open system, must be permitted to enable the world’s citizens to freely connect and express themselves consistent with fundamental principles of freedom of expression, while taking into consideration national security or of public order (ordre public), or of public health or morals. Consistent with the nature of knowledge, information and forms of expression provided over the Internet as global public goods, ITU Member States may wish to consider policy measures to increase and protect the growth of the Internet.

At the World Summit on Information Society (WSIS), world leaders and Heads of State adopted general principles on a multi-stakeholder governance model, which offer a fundamental framework on which to base such policy measures. Various initiatives have been undertaken at the national level to enunciate high-level governing principles for cyberspace including, inter alia, the United States International Strategy for Cyberspace and Brazil’s ten “Principles for the Governance and Use of the Internet”.

i) Advances in global information infrastructure, including the development of IP-based networks and the Internet, taking into account the requirements, features and interoperability of next-generation networks (NGN) and future networks, are vitally important as a major engine for growth in the world economy in the twenty-first century.

2.3.2 The Multi-stakeholder Model

a) The development of the Internet is today economic and essentially market-led and has been driven by both private and government initiatives. According to many, the Internet grew within an environment facilitated by voluntary, decentralized and consensus-based processes. The private sector continues to play an important role in the expansion of the Internet - for example, through investments in infrastructure and services.

b) The management of the Internet is a subject of valid international interest and must flow from full international and multi-stakeholder cooperation on the basis of the outcomes of the two phases of the World Summit on the Information Society (WSIS).

c) The Tunis Agenda for the Information Society (Tunis Agenda) (para 34) provides “a working definition” of Internet governance as “the development and application by governments, the private sector and civil society, in their respective roles, of shared principles, norms, rules, decision-making procedures, and programmes that shape the evolution and use of the Internet”.

d) The Tunis Agenda (para 50) highlights key issues for the growth, development, and measures to increase affordability of infrastructure:

50. We acknowledge that there are concerns, particularly amongst developing countries, that the charges for international Internet connectivity should be better balanced to enhance access. We therefore call for the development of strategies for increasing affordable global connectivity, thereby facilitating improved and equitable access for all.

---

1 Article 19, International Covenant on Civil and Political Rights (1966); Article 34 of the ITU Constitution
a. Promoting Internet transit and interconnection costs that are commercially negotiated in a competitive environment and that should be oriented towards objective, transparent and non-discriminatory parameters, taking into account ongoing work on this subject.
b. Setting up regional high-speed Internet backbone networks and the creation of national, sub-regional and regional Internet Exchange Points (IXPs).
c. Recommending donor programmes and developmental financing mechanisms to consider the need to provide funding for initiatives that advance connectivity, IXPs and local content for developing countries.
d. Encouraging ITU to continue the study of the question of International Internet Connectivity (IIC) as a matter of urgency, and to periodically provide output for consideration and possible implementation. We also encourage other relevant institutions to address this issue.
e. Promoting the development and growth of low-cost terminal equipment, such as individual and collective user devices, especially for use in developing countries.
f. Encouraging Internet Service Providers (ISPs) and other parties in the commercial negotiations to adopt practices towards attainment of fair and balanced interconnectivity costs.
g. Encouraging relevant parties to commercially negotiate reduced interconnection costs for Least Developed Countries (LDCs), taking into account the special constraints of LDCs.

e) The WSIS and the Tunis Agenda provide the framework for discussions on Internet-related public policy issues including a broad framework for establishing governing principles for the management of the Internet. Endorsed by world leaders in 2005, it touches on public policy issues related to the Internet and the multi-stakeholder governance model:

i. §§ 71 and 78a) of the Tunis Agenda with regard to enhanced cooperation on Internet governance and the establishment of the Internet Governance Forum (IGF).

ii. The relevant outcomes (§§ 29-82 Tunis Agenda) concerning Internet governance.

iii. The management of the Internet encompasses technical and public policy issues and should involve all stakeholders and relevant intergovernmental and international organizations in accordance with §§ 35 a)-e) Tunis Agenda which state:

a) Policy authority for Internet-related public policy issues is the sovereign right of States. They have rights and responsibilities for international Internet-related public policy issues.

b) The private sector has had, and should continue to have, an important role in the development of the Internet, both in the technical and economic fields.

c) Civil society has also played an important role on Internet matters, especially at community level, and should continue to play such a role.

d) Intergovernmental organizations have had, and should continue to have, a facilitating role in the coordination of Internet-related public policy issues.

e) International organizations have also had and should continue to have an important role in the development of Internet-related technical standards and relevant policies.

f) As stated in the WSIS outcomes, all governments should have an equal role and responsibility for international Internet governance and for ensuring the stability, security and continuity of the existing Internet and its future development. The need for development of public policy by governments in consultation with all stakeholders is also recognized.

---

5 Resolution 102 (Rev. Guadalajara, 2012), §68 of the Tunis Agenda (2005)
g) Management of the registration and allocation of Internet domain names and addresses must fully reflect the geographical nature of the Internet, taking into account an equitable balance of interests of all stakeholders.\(^6\)

h) Member States represent the interests of the population of the country or territory for which a ccTLD has been delegated. Countries should not be involved in decisions regarding another country’s ccTLD\(^7\).

i) ITU membership has been discussing Internet governance for many years, from both a narrow and broad perspective. The narrow approach focuses on Internet architecture and infrastructure (DNS, IP numbers, and root servers), a field in which the Internet Corporation for Assigned Names and Numbers (ICANN), the regional Internet registries, and many stakeholders play a significant role. According to the broad approach, Internet governance discussions should go beyond infrastructural points and address other legal, economic, developmental, and socio-cultural issues, as adopted by the World Summit on the Information Society (WSIS). The IGF and regional IGFs have played and should continue to play a critical role in debates of this nature.

j) While many are satisfied with the current state of Internet governance, others have expressed dissatisfaction, expressing that further evolution is needed to keep pace with the global spread of the Internet, how the Internet is used today and the roles of the various players who need to work together to ensure its ongoing evolution. Those dissatisfied point out that the current governance of Internet could be improved in accordance with the WSIS outcomes (especially on the roles and responsibilities of different stakeholder groups as outlined in § 35 of the Tunis Agenda – with some citing, for example, that governments currently have a limited decision-making role in formulating international public policy) and call for all governments to have an equal role and responsibility in an inclusive global management framework of the Internet. Some others call for more balanced representation of all stakeholder groups.

k) Under the framework of the WSIS principles, ITU Resolutions 101, 102 and 133 resolve “to explore ways and means for greater collaboration, cooperation, and coordination between ITU and relevant organizations involved in the development of IP-based networks and the future internet, through cooperation agreements, as appropriate, in order to increase the role of ITU in Internet governance so as to ensure maximum benefits to the global community” (* including, but not limited to, the Internet Corporation for Assigned Names and Numbers (ICANN), the regional Internet registries (RIRs), the Internet Engineering Task Force (IETF), the Internet Society (ISOC) and World Wide Web Consortium (W3C), on the basis of reciprocity’ [Brazilian and ARIN contributions to WTPF; see Documents 9 and 8 at: http://www.itu.int/md/S12-WTPF13PREP-C-0009/en and ARIN http://www.itu.int/md/S12-WTPF13PREP-C-0008/en].

2.3.3 Internet Protocol (IP)-Based Networks and Management of Internet Resources

a) Advances in global information infrastructure, including the development of IP-based networks and especially the Internet, and future IP and technical developments, are an engine of growth in the twenty-first century. Broadband Internet is today a critical infrastructure in the growing global economy. The increased use of the Internet introduces additional applications in telecommunication services based on the use of associated advanced technologies, e.g. the utilization of e-mail and text messaging, VoIP, video, and real-time IPTV

\(^6\) Resolution 102 (Rev. Guadalajara, 2012)

\(^7\) Resolution 102 (Rev. Guadalajara, 2012)
over the Internet. These services have become commonplace, although challenges regarding quality of service, uncertainty of origin, and high costs of international connectivity persist.

b) The Internet, and IP-based networks more broadly, are today critical information infrastructure for governments and a vital part of national infrastructure. Current and future IP-based networks and future IP developments will continue to introduce dramatic changes in the way we acquire, produce, circulate and consume information.

c) On the basis of such growth, demands are now growing on the existing Internet design and infrastructure. New applications, services and functionality are needed. Some experts have suggested that the underlying technical architecture of the present Internet may not have been designed for, and hence may not be sufficiently robust, to support some new classes of applications and services, with security, identity management and multilingualization as commonly cited examples. Others point to the fact that the Internet has facilitated amazing change and allowed for innovation and for new technologies to flourish.

d) The high costs of the international connections circuit for Internet connectivity between least developed countries and the Internet backbone networks remains a serious problem for these countries. Paragraph 50 of the Tunis Agenda (2005), noted above, acknowledged significant concerns and calls for the charges for international Internet connectivity to be better balanced to enhance access, particularly from developing countries. It therefore called for the development of strategies for increasing affordable global connectivity, thereby facilitating improved and equitable access for all, by:

I. Promoting Internet transit and interconnection costs that are commercially negotiated in a competitive environment and that should be oriented towards objective, transparent and non-discriminatory parameters, taking into account ongoing work on this subject.

II. Setting up regional high-speed Internet backbone networks and the creation of national, sub-regional and regional Internet Exchange Points (IXPs).

III. Recommending donor programmes and developmental financing mechanisms to consider the need to provide funding for initiatives that advance connectivity, IXPs and local content for developing countries.

IV. Encouraging ITU and other relevant institutions to continue the study of the question of International Internet Connectivity (IIC) as a matter of urgency, and to periodically provide outputs for consideration and possible implementation.

V. Promoting the development and growth of low-cost terminal equipment, such as individual and collective user devices, especially for use in developing countries.

VI. Encouraging Internet Service Providers (ISPs) and other parties in the commercial negotiations to adopt practices towards attainment of fair and balanced interconnectivity costs.

VII. Encouraging relevant parties to commercially negotiate reduced interconnection costs for Least Developed Countries (LDCs), taking into account the special constraints of LDCs.

e) Rates for International Internet Connectivity (IIC) have been studied in ITU-T Study Group 3 with several recommendations having been made on methods to reduce connectivity rates.

f) With the move from traditional networks (based on dedicated service-channels and/or separate networks for each service) to integrated (transport) services on a single packet-based transport infrastructure, pre-defined transmission planning of Quality of Service (QoS) has become a major challenge, since IP-based networks cannot provide for self-standing end-to-end QoS, but only transport classes, which enable QoS differentiation.

---

8 For example: www.itu.int/ITU-T/worksem/apportionment/201201/index.html

9 As defined by ITU Recommendation E800.
g) Due to the dramatic increase in mobile communications, both in terms of the number of registered devices and of the volume and transmission of requested resources, many experts have cautioned that migration scenarios and hybrid connections with existing wire-bound and traditional networks and terminals may be neglected and it may become increasingly difficult to establish or enforce appropriate QoS standards.

h) Some commentators have stressed the importance of standardization so that the quality of service of telecommunications is consistent with international standards. They opine that it is in the public interest that IP-based networks and other telecommunication networks should be both interoperable and provide, at a minimum, the level of QoS provided by traditional networks.

i) According to some, the present situation of the wide penetration of OTT (Over The Top) services over operators’ networks and their enhanced impact on operators’ services, may require ITU to consider management of QoS of OTT services which are carried over the Internet [Russian contribution – see Document 10 at http://www.itu.int/md/S12-WTPF13PREP-C-0010/en].

j) Today, from a commercial perspective, there is a growing discrepancy between the growth in traffic (requiring corresponding significant growth in investment in telecommunication infrastructure) and trends in pricing and revenues (Figure 2). This poses a significant challenge to the future of the telecommunication and Internet services industry going forward.

Figure 2: Trends in pricing and revenues\textsuperscript{10}

k) IP-based networks have evolved into a widely accessible and flexible medium used for global commerce and communication. There is hence a need to identify the global activities related to IP-based networks with respect to, for example:

i) infrastructure, interoperability and standardization;

ii) Internet naming and addressing;

iii) dissemination of information about IP-based networks and the implications of their development for ITU Member States, particularly among developing countries.

2.3.3.1 Infrastructure, interoperability and standardization\textsuperscript{11}

\textsuperscript{10} TeleGeography (www.telegeography.com)

2.3.3.2 Internet Naming and Addressing

a) Convergence of traditional telecommunications technology with the Internet is making the Internet the most important infrastructure of modern telecommunications, while the Internet and telecommunication services are becoming indistinguishable.

b) There have been calls for bold new initiatives to continue to expand the flexibility of the Internet well beyond incremental improvements to its deployed capabilities. In order to provide additional functionality to accommodate current and new and unforeseen innovations, further research and development and innovation in the fundamental design of the Internet (including architecture, protocols, interfaces and services) may need to be encouraged.

c) Given the depth to which Internet is today embedded in the socio-economic fabric of many societies, any evolutionary approach to building the future Internet should ensure full interoperability with the existing one.

d) Open and voluntary standards will play an important role in ensuring this interoperability, while promoting the continuous development of the Internet and its capabilities. Significant work and research on IP-related issues and the future Internet is being conducted by many bodies at the national, regional and international levels, some examples include: ITU; the Internet Engineering Task Force (IETF); US National Science Foundation (NSF) projects, including the Global Environment for Network Innovations (GENI) and Future Internet Design (FIND) projects; Japan’s National Institute for ICT (NICT) Akari project; and the European Union’s Future Internet Research & Experimentation (FIRE) initiative.

2.3.3.2 Internet Naming and Addressing

a) Every device connected to the Internet is identified by an IP address or unique numerical label used to route data packets globally across the Internet. IP addresses are a finite resource. The first implementation, IP version 4 or ‘IPv4’, was deployed on 1 January 1983 and uses 32 bits to represent addresses, generating a theoretical total limit of $2^{32}$ (4 billion addresses). It is still the most widely used today.

b) The Internet Assigned Numbers Authority (IANA) is responsible for globally coordinating the IP addressing systems and its role is to allocate IP addresses form the pools of unallocated addresses to the Regional Internet Registries (RIRs) according to their needs.

c) The continued rapid growth of the number of devices connected to the Internet is leading to the exhaustion of IPv4 addresses. In February 2011, IANA assigned the last five remaining blocks of IPv4 addresses to the five RIRs and IANA’s global IPv4 pool was exhausted. To adapt to this scenario, a new version (IPv6) has been developed, which provides a greatly expanded address space since it uses 128 bits to represent addresses (generating a new limit of $2^{128}$ addresses is equivalent to some 340 trillion). IANA began deploying the IPv6 protocol in 1999.

d) The smooth migration from IPv4 to IPv6 represents a key global issue. According to some, deployment of IPv6 should become a clearly-stated priority objective for the Internet community and all stakeholders to enhance the pace of IPv6 deployment. In the mean time, and although IPv4 and IPv6 are distinct protocols, it is possible for network operators to run dual-stack in their networks, allowing both IP versions to run over the same network.

e) The background report of WSIS Working Group on Internet Governance (WGIG) in 2005 has acknowledged that “the current numbering management is required to ensure equitable distribution of resources and access for all into the future”. It should be acknowledged that the quasi inexhaustibility of the IPv6 space means that any past issues regarding imbalances should be avoided in the future.

12 Number Resources, IANA, http://www.iana.org/numbers
The Internet Service Providers (ISPs) using IPv6 still need to use IPv4 in order to be able to access most of the existing content. For this reason, policies have been implemented by the Regional Internet Registries to secure blocks of IPv4 addresses for the new networks in the long term. This is a critical measure to allow new networks to reach both the IPv4 and IPv6 Internets while IPv6 reaches its full deployment.

f) The WTSA 2008, WTDC-2010, and Plenipotentiary 2010 contained resolutions related to IPv6 addressing that stressed the need for human capacity development and training with respect to IPv6 address deployment. As the Internet evolves, major changes are underway in Internet routing and addressing policy. Resource Public Key Infrastructure (RPKI)14 is a security technology that would create a hierarchy of digital certificates which would be used to authenticate the allocation of address blocks and route announcements using those blocks in order to improve the security of the global routing system.

2.3.3 Dissemination of information about IP-based networks and the implications of their development for ITU Member States, particularly developing countries

a) Providing open and equitable access to information about critical Internet resources by enabling the adaptation of adequate national and/or regional policy processes, specifically for IP-based networks - including the transition from IPv4 and migration to deployment of IPv6, domain names and their internationalized versions - and ensuring that countries improve awareness of issues pertaining to Internet-related public policy, including Internet governance, are key issues for all stakeholders including ITU Member States15.

b) With the ever-increasing migration to all-IP based networks and the evolution of the current Internet governance arrangements, many developing countries need to build national capacity and improve their contribution and involvement in the management and effective governance of the Internet.

c) To enable participants from developing and Least Developed Countries to participate in various global fora where Internet-related technical and public policy issues are discussed, organizations from the Internet technical community have developed a range of capacity building programmes. These initiatives should be encouraged and public-partnerships should be developed in this regard. This is critical to ensure equitable participation in the open global decision-making process on Internet-related matters.

d) Resolutions from the WTSA, WTDC, and PP 2010 all point to the importance of coordination and collaboration with respect to human capacity development and training with respect to the deployment of IPv6 addresses and the transition from IPv4 to IPv6.

2.3.4 International public policy issues and the management of Internet resources

2.3.4.1 Inclusion of new generic Top Level Domains (gTLDs) under the Domain Name System

a) The Domain Name System (DNS) specifies a hierarchical structure of the delegation authorities in domain naming. The DNS hierarchy is divided into top-level domains (TLDs), second-level domains (SLDs), etc. TLDs are generally categorized in two different groups: namely, generic Top Level Domains (gTLDs) and country code Top Level Domains (ccTLDs).17

b) Originally, there were only seven gTLDs (.com, .org, .net, .gov, .edu, .mil and .int). Following growth in the demand for more gTLDs, several gTLDs (i.e., .biz, .info, .aero, .coop) have been

14 http://www.apnic.net/services/services-apnic-provides/resource-certificate/RPKI
15 WTDC-10 Programme 2.
16 For example, ccTLD is a TLD with two characters for countries and territories based on the ISP 3166 list (i.e., "ch" for Switzerland) and so a gTLD is a TLD which is not a ccTLD, such as ".com" or ".net".
added to the DNS. Historically, a new gTLD was added to the DNS based on proposals solicited by ICANN during specific application periods. Currently, there are 22 functional gTLDs.

c) In June 2008, ICANN announced its new gTLD expansion policy, under which any public or private-sector entity can apply to create and operate a new gTLD. ICANN clarifies that applying for a new gTLD is not the same as buying a domain name on a “first come, first served” basis, but will be operating a registry business for a new gTLD based on the applicant’s technical and business capability and a commitment to implement ICANN’s policies effectively. After more than three years of preparation, ICANN finally initiated the first round of the new gTLDs application opening on 12 January 2012 for three months. Each gTLD applied-for string requires an online application via ICANN’s online application system and an evaluation fee (currently set at US$ 185,000 per requested application).

d) Some observers have raised concerns about the magnitude and scale of gTLD expansion and transparency in the cost evaluation used in the determination of registry fees. There is no upper limit on the number of applications for new gTLDs. Many observers are concerned about competition in the market for gTLDs, and the risk of creating a multitude of monopolies, rather than increasing competition in the gTLD market.

e) Some stakeholders remain concerned about the impact of multiple new gTLDs on trademark holders or right holders, especially those in developing countries, who would be compelled to assume high costs of addressing the possible proliferation of cyber-squatters inhabiting an unlimited number of new gTLDs. For example, since a domain name navigates to a website for a certain company or organization, there are more possibilities that trademark abusers could use new gTLDs with trademark protected names or look-alike names that may lead users/consumers to spoofed websites (“phishing”) or to rival company websites (“free riders”). It may thus be necessary for “www.A.com” registrant to register the same domain name in all other gTLDs, such as “A.info”, “A.biz”, “A.mobi”, and “A.(all other new gTLDs)” to protect the trademarked name of “A”. With the proposed simultaneous roll-out of multilingual (IDN) gTLDs, observers point out that applicants may find themselves having to pay several multiples of the application fees for multiple domain names in different languages. This could result in a significant financial burden for applicants from developing countries.

f) While ICANN has put in place some dispute resolution procedures to resolve disputes as they arise, some observers note that various policy challenges persist. The protection against the misleading use of the names and acronyms of inter-governmental organizations (IGO) has been cited as one example. Within ICANN, it has been acknowledged that the rights of governments or public authorities in relation to the rights of the sovereign state or territory which they represent cannot be limited or made conditional by any procedures that ICANN introduces for new gTLDs, and as such, ICANN should avoid country, territory or place names, and country, territory or regional language or people descriptions, unless in agreement with the relevant governments or public authorities

2.3.4.2 country code Top Level Domains (ccTLDs) under the Domain Name System

a) A ccTLD is generally used or reserved for a country, territory or area of geographical interest. Its subdivisions are identified in ISO 3166-1 standard and represented by two US-ASCII characters. The two letters chosen for each ccTLD are taken directly from the ISO 3166-1 list or the list of reserved Alpha-2 code elements defined by the ISO 3166 Maintenance Agency.

---

b) IANA is responsible for the determination, delegation or re-delegation of an appropriate trustee for each ccTLD, but it has no responsibility over the entries on the ISO 3166-1 list. From the list of ccTLDs, the authority over each ccTLD is delegated to a trustee responsible for the policies and operation of the domain.

c) Since ccTLDs are based on a “territory” set, debates over ccTLD often focus on the relationship between a TLD string and a “territory” (per the ISO 3166-1 list). More specifically, questions can arise as to whether a TLD string exactly matches with the territory in the ISO 3166-1 list, whether the ccTLD easily represents the name of the territory, how many ccTLDs are possible for one listed territory, and so on.

d) The current delegation or re-delegation of a ccTLD is a process comprising several stages, with many different players involved in the process. It starts with:19

- a proposed new operator who is an applicant for a name in a ccTLD; and
- the existing operator who confirms the change is appropriate in the case of a re-delegation request.

iii) In many cases, a national government associated with the ccTLD is asked to verify that the re-delegation is supported.

iv) IANA then manages and analyzes the request, including investigating the details of the request, preparing a recommendation for the ICANN Board, and implementing the request if it is approved.

v) the ICANN Board of Directors considers the IANA recommendation and votes on whether the request should move forward.

e) Finally, the IANA report concludes the ccTLD request process. The number of requests for ccTLD re-delegations is growing.

f) Observers note that some serious issues have also arisen with regard to the authority to delegate and administer the ccTLDs. In fact, some governments have sought assistance from the United Nations system to reclaim their own ccTLDs or tried to use national legislation to reclaim ccTLDs from incumbent ccTLD managers.20 The Tunis Agenda (2005) acknowledges that Member States represent the interests of the population of the country or territory for which a ccTLD has been delegated. It goes on to state that countries should not be involved in decisions regarding another country’s ccTLD.

g) The existing role and sovereignty of ITU Member States is recognized with respect to allocation and management of their country code numbering resources as recognized in Recommendation ITU-T E.164.

2.3.4.3 Security of the Domain Name System

a) The DNS resolution mechanism has critical security flaws that malicious entities have taken advantage of in order to launch attacks such as ‘man-in-the-middle’ attacks (a malicious third party can intercept a query, send a fake response and redirect the user to their own site) and ‘cache poisoning’ (the introduction of fake DNS data into the cache stored in DNS name servers). These types of attacks are the source of the majority of identity theft incidents and pose a great threat to the users’ “trust” of the Internet. To counter these threats, a set of Security Extensions to the DNS, known as DNSSEC, have been developed in the IETF to provide origin authentication and validation of integrity of DNS data to DNS clients – a mechanism

---

that provides an added layer of assurance that a responding entity (name server) really is who it purports to be.

b) The resolution process ensures the “origin authentication of DNS data” by establishing an unbroken “chain of trust” between zones – right from the root, through the TLDs, to the domain server – that is resolved. The key characteristic of this chain of trust is that each parent zone vouches for its child. If any part of the authentication chain breaks due to a response from an unrecognized entity, then the resolution of that address is not achieved.

c) For the “chain of trust” in DNSSEC to work, it would need a single origin of trust (at the root) i.e., a trust anchor that the users can have faith in and from where the trust chain can be built. This entity would be responsible for creating and maintaining the key that signs the root. The U.S. Department of Commerce and ICANN have identified a private organization, VeriSign, as the entity to manage and have operational responsibility for the Zone Signing Key. ICANN will manage the Key Signing Key process. ICANN will work closely with VeriSign regarding the operational and cryptographic issues involved. Some observers are concerned about this arrangement supporting this critical function.

2.3.5 Role of administrations of Member States in the management of internationalized (multilingual) domain names

a) The Tunis Agenda for the Information Society adopted by the WSIS made a commitment to advance the process for the introduction of multilingualism in a number of areas, including domain names, e-mail, Internet addresses and keyword look-up.

b) There is a need to promote regional root servers (see section 2.3.5.2) and the use of internationalized domain names in order to overcome linguistic barriers to Internet access.

c) Considering the continuing progress towards the integration of telecommunications and the Internet, and the fact that that Internet users are generally more comfortable reading or browsing texts in their own language, for the Internet to become more widely available to a large number of users, it is necessary to make the Internet (DNS system) available in non-Latin based scripts, taking into account the progress recently made in this regard.

d) Recalling the outcomes of WSIS, there should be a commitment to working earnestly towards multilingualization of the Internet, as part of a multilateral, transparent and democratic process, involving governments and all stakeholders, in their respective roles.

e) The current domain name system does not fully reflect the diverse and growing language needs of all users language (Resolution 133, Rev. Guadalajara, 2010).

f) Internationalized Internet domain names, must be widely accessible to all citizens without regard to gender, race, religion, country of residence or language (Resolution 133, Rev. Guadalajara, 2010).

g) Internet domain names should not privilege any country or region of the world to the detriment of others, and should take into account the global diversity of languages (Resolution 133, Rev. Guadalajara, 2010).

h) Recalling the result of WSIS and the need of linguistic groups, there is an urgent need for:

i. implement programmes that allow for the presence of multilingual domain names and content on the Internet and the use of various software models in order to fight against the linguistic digital divide and to ensure that everyone can participate in the emerging new society.

22 Resolution 133 (Rev. Guadalajara, 2012)
iii. strengthen cooperation between relevant bodies for the further development of technical standards and to foster their global deployment.

i) There are a number of challenges with regard to intellectual property and the deployment of internationalized domain names, and adequate solutions should be explored.

j) The roles played by the World Intellectual Property Organization (WIPO) (with regard to dispute resolution for domain names), and by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) (with regard to promoting cultural diversity and identity, linguistic diversity and local content) are recognized. It is also recognized that ITU enjoys close cooperation with both WIPO and UNESCO.

k) It is paramount to maintain global interoperability as domain names expand to include non-Latin character sets.

### 2.3.5.1 Internationalized Domain Names (IDNs) under the Domain Name System

a) Historically, the DNS root zone was limited to a set of characters conforming to US-ASCII or the Latin alphabets. This changed with the introduction of Internationalized Domain Names (IDNs), which introduced TLDs in different scripts (e.g., characters in Arabic, Chinese, Cyrillic or Korean), which enables Internet users to access domain names in their own languages.

b) Implementation of IDN in the new gTLDs program and the implementation of IDN ccTLDs raise some complex issues – for example, defining policies for scripts that the registries can accept, agreement on the type and number of characters in the strings etc.  

### 2.3.5.2 Regional Root Servers

a) The DNS associates IP addresses with semantically meaningful domain names assigned to computers. When a user types “www.itu.int”, the DNS resolves this address in a right-to-left order by first going to the root server (“.”), which gives it the location of the “.int” name server, which in turn provides the location of the “itu.int” name server. Here, the root name server is a DNS server that answers requests for the DNS root zone, and re-directs requests for a particular top-level domain (TLD) to that TLD’s name servers. There are currently 12 operators running 13 root servers specified with names in the form “letter.root-servers.net”, where the letter ranges from A to M. The C, F, I, J, K, L and M servers now exist in multiple locations on different continents to provide decentralized service.

Table 3: List of Operators Involved in the Root Zone Management System

---

<table>
<thead>
<tr>
<th>Server</th>
<th>Operator</th>
<th>Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>VeriSign, Inc.</td>
<td>Dulles, Virginia, US</td>
</tr>
<tr>
<td>B</td>
<td>Information Sciences Institute</td>
<td>Marina Del Rey, California, US</td>
</tr>
<tr>
<td>C</td>
<td>Cogent Communications</td>
<td>Distributed using anycast</td>
</tr>
<tr>
<td>D</td>
<td>University of Maryland</td>
<td>College Park, Maryland, US</td>
</tr>
<tr>
<td>E</td>
<td>NASA Ames Research Center</td>
<td>Mountain View, California, US</td>
</tr>
<tr>
<td>F</td>
<td>Internet Systems Consortium, Inc.</td>
<td>Distributed using anycast</td>
</tr>
<tr>
<td>G</td>
<td>U.S. DOD Network Information Center</td>
<td>Columbus, Ohio, US</td>
</tr>
<tr>
<td>H</td>
<td>U.S. Army Research Lab</td>
<td>Aberdeen Providing Ground, Maryland, US</td>
</tr>
<tr>
<td>I</td>
<td>Netnod (formerly Autonomica)</td>
<td>Distributed using anycast</td>
</tr>
<tr>
<td>J</td>
<td>VeriSign, Inc.</td>
<td>Distributed using anycast</td>
</tr>
<tr>
<td>K</td>
<td>RIPE NCC</td>
<td>Distributed using anycast</td>
</tr>
<tr>
<td>L</td>
<td>ICANN</td>
<td>Distributed using anycast</td>
</tr>
<tr>
<td>M</td>
<td>WIDE Project</td>
<td>Distributed using anycast</td>
</tr>
</tbody>
</table>

Source: [www.root-servers.org](http://www.root-servers.org)

b) The 12 operators manage the system used to publish the root zone file that is administered through the IANA functions process.

c) In the geographical sense, only 3 root server operators are located outside of the US (the Netherlands, Sweden and Japan); however, some of the root server operators have deployed mirror copies of existing root servers throughout the world. For instance, while ICANN’s L.root-servers.net is based in California in the United States, mirror copies of ICANN’s L root server are located in more than 90 places in different regions of the world.

d) Many observers have noted the uneven geographical distribution of the DNS root servers (and mirrors)\(^{24}\). Figure 3 highlights the disparity between this geographical distribution and the global distribution of Internet users. In Resolution 133 (Rev. Guadalajara, 2010), ITU membership has highlighted the need to promote regional root servers.

Figure 3: Geographical distribution of DNS root server sites and Internet users, 2011

Geographical distribution of DNS root server sites (left chart) and Internet users (right chart)

2.3.6 It is to be noted that the Government Advisory Committee (GAC), a non-decision making advisory body within the ICANN structure, discusses intensively public policy issues related to the topics highlighted above and many others related to the stability, security and continuity of the Internet domain name system. Many observers have noted that GAC, currently composed of 114 Country Members and 17 Observers, despite its earnest efforts, is however limited by its role as an advisory body only. There are some occasions where the ICANN Board has not requested GAC’s opinions or rejected GAC’s advice despite potentially serious public policy implications relating to the issues under discussion.

3. Conclusion

This draft report of the Secretary-General to the WTPF-2013 aims to provide a basis for discussion at the World Telecommunication Policy Forum, incorporating the contributions of ITU Member States and Sector Members, and serving as the sole working document of the Forum focusing on key issues on which it would be desirable to reach conclusions (2011 Council Decision 562).

25 http://royal.pingdom.com/2012/05/07/the-very-uneven-distribution-of-dns-root-servers-on-the-internet/

26 GAC Communiqué, 43, (16 March, 2012), available at: https://gacweb.icann.org/display/gacweb/GAC+Recent+Meetings

27 ICANN has rejected the GAC’s advice that the definition of “Community-based” strings be expanded to include strings that purport to represent a particular group of people or interests based on historical, cultural, or social components of identity, such as nationality, race or ethnicity, religion, culture, etc., or particular sectors, on the grounds that doing so would be extremely difficult to implement, GAC comments on the Applicant Guidebook (April 15th, 2011 version).