INTERNATIONAL TELECOMMUNICATION UNION

No. 3 May | June 2015

ITU NEWS

itunews.itu.int

ITU's 150 Years of Innovation

Special Anniversary Edition

150 ITU 1865 2015

Celebrating 150 Years of Innovation

150 years ago, the International Telegraph Conference led to the creation of ITU as the custodian of a historic Convention and a unique platform to build a connected society for social good. In this issue of *ITU News*, we celebrate both the vision of ITU's founding members, as well as the ongoing commitment of ITU membership towards the principles of global collaboration and harmony that helped to found ITU back in 1865. Indeed, these are values that as Secretary-General I am determined to uphold firmly — to ensure that the collaboration and unity of purpose which marked our beginnings underpin our ongoing work in radio-spectrum management, telecommunication standards and connecting the world.

Throughout a century and a half of global challenges — including two World Wars and a Cold War — ITU membership has striven to provide telecommunications and universal access to information and communication technologies (ICTs) to promote peace, harmony and economic prosperity. Today, based on a mounting body of evidence for the economic growth gains realizable from ICTs, this challenge is even more significant. Important policy debates continue — on the funding of universal access, the neutrality of networks, and how to galvanize growth in the Small- and Medium-sized Enterprise (SME) sector which is vital to driving innovation and entrepreneurship. ITU's work is helping to research and provide options to all these tough policy questions.

Our 150th celebrations this year bring together ITU Member States, Sector Members, Associates and Academia members in a demonstration of their strong support for the principles embodied by ITU. The celebrations are a tribute to the extraordinary innovation of the global ICT community and the crucial role that ITU plays as a platform to bring cohesion to this innovation.

There are a total of 13 ITU members generously partnering with ITU for the anniversary celebrations, and on behalf of ITU, I would like to thank our Gold Partners, Silver Partners and Bronze Partners for their generous support. The celebrations also extend far beyond Geneva, with many Member States having informed us that they will be hosting celebrations and various activities in honour of ITU's contribution to 150 years of innovation in the telecommunication and ICT sectors.

Houlin Zhao,
ITU Secretary-General

150 years of

1865
The first International Telegraph Convention is signed on 17 May and ITU is founded as the International Telegraph Union

1869
The ITU secretariat (Bureau) is established in Berne, Switzerland, with just 3 members of staff

1885
ITU begins to draw up international legislation governing telephony

1906
The first International Radiotelegraph Conference in Berlin produces the first regulations (today called the Radio Regulations)

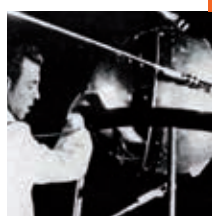
The 'SOS' international distress call is adopted — a vital step in the field of emergency communications

1934
The Union changes its name to International Telecommunication Union (ITU) to reflect its full range of responsibilities

1947
ITU becomes the specialized United Nations (UN) agency for telecommunications and headquarters are moved from Berne to Geneva

1949
ITU's first technical standards for television are released

1963
The space age began in 1957 with the launch of Sputnik-1 — Six years later, in 1963, ITU holds an Extraordinary Administrative Conference for space communications



1966
ITU begins to collaborate with the UN Development Programme (UNDP) to promote the expansion of networks around the world

1971
The story of ITU Telecom World starts with the success of TELECOM 71, in Geneva, the very first world telecommunication exhibition

1985
The Missing Link Report (Maitland Report) is produced, highlighting the imbalance in access to telecommunications between developed and developing countries

1989
The World Wide Web is invented. The global expansion of the Internet owes much to technical standards from ITU, from the early days of modems to today's broadband

Source: Overview of ITU's history
Photo sources: AFP, ITU, Shutterstock, Thinkstock

innovation

1992
ITU makes spectrum allocations for the first time to serve the needs of Global Mobile Personal Communications by Satellite (GMPCS)

1994
The high-level World Telecommunication Policy Forum (WTPF) is established to encourage the free exchange of ideas and information on policy issues

2002
Bridging the digital divide is confirmed as a priority for ITU at the Plenipotentiary Conference (PP-02) in Marrakesh

2008
ITU receives a Primetime Emmy Award for its work on the H.264/AVC (Advanced Video Coding) standard for high-definition television, videoconferencing and 3G mobile multimedia

2011
A new category of Academia is introduced for ITU membership

2014
PP-14 strengthens ITU's mandate across existing work areas, passes several landmark resolutions, and approves the Connect 2020 Agenda, which sets out a clear vision and shared objectives for the future of the ICT sector

1992 | 1993 | 1994 | 2000 | 2002 | 2003 | 2008 | 2010 | 2011 | 2012 | 2014 | 2015

1993
ITU agrees radio-frequency spectrum allocations for 2G mobile telephony

2000
The first Global Symposium for Regulators (GSR) is held providing a unique meeting place for global regulators and policy-makers

2003
The first phase of the World Summit on the Information Society (WSIS) is held in Geneva for global leaders to address how best to create a safe and truly inclusive information society. The second phase takes place in 2005 in Tunis

2010
ITU and UNESCO set up the Broadband Commission for Digital Development in response to calls to step up efforts to meet the Millennium Development Goals

ITU establishes 'Girls in ICT Day' aiming to inspire girls to consider a future in technology

2012
ITU agrees specifications for IMT-Advanced — a global platform on which to build the next generation of interactive mobile services

ITU convenes WCIT-12 with the goal of revising the International Telecommunication Regulations of 1988 to suit the new age

ITU headquarters opens its interactive exhibition 'ICT Discovery' to the public

2015
On 17 May, ITU holds a special commemorative event in Geneva to celebrate 150 years of innovation

The World Radiocommunication Conference (WRC-15) is to be held from 2–27 November to review and revise the Radio Regulations, the international treaty governing the use of the radio-frequency spectrum and the geostationary-satellite and non-geostationary-satellite orbits

150 ITU 1865-2015

Note: This timeline reflects some important dates in ITU's history, as well as the scope of ITU's work. It is not intended to represent a comprehensive overview of all ITU's achievements over the past 150 years.

ITU's online history portal can be found on the ITU website: http://www.itu.int/

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ISSN 1020–4148
itunews.itu.int
6 issues per year

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Printed in Geneva by the ITU Printing and Dispatch Division.

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ITU's 150 Years of Innovation

ITU

The Origins of the ITU, and their Relevance Today

On 17 May 1865, representatives of twenty Continental European governments signed the International Telegraph Convention of Paris, which laid the foundations for the International Telegraph Union (which later became the International Telecommunication Union or ITU). At 150 years, the ITU is the oldest international organization in the United Nations system. It is particularly interesting to see how the nature of the global order of telegraphic communications established so many years ago is, at its centre, still quite relevant today.

Why was ITU established?

There is no single explanation for why the ITU was established — political considerations were at the origins of multilateral telegraph regulation, but there were other reasons as well.

The International Telegraph Convention was preceded by over 100 international telegraph agreements concluded between continental European governments governing the operation of their telegraph systems. Among the first bilateral agreements was

On 17 May 1865, representatives of twenty continental European governments signed the International Telegraph Convention of Paris

a treaty concluded in 1848 between the Kingdoms of Prussia and Hanover, dealing with technical cooperation issues relating to the Prussian telegraph line bridging Hanoverian territory.

Within a few years, the continent was covered by a network of overlapping telegraph agreements. In 1850, the German Austrian Telegraph Union (GATU) was established in Dresden, led by Prussia. Two years later, in 1852, a Convention signed in Paris brought together Prussia and France and the initiator, Belgium. In 1855, the West European Telegraph Union (WETU) was established in Paris, under the leadership of the French Government. These treaties regulated various aspects of international telegraphy — from access to technical standards, from tariffs to censorship.

In practical terms, however, the Conventions contained multiple overlapping tariff regimes, so the system had become complicated and confusing. Governments sought to simplify and harmonize the regulatory system through the ITU, thereby improving the conditions for telegraph traffic in Europe. The free exchange of ideas also corresponded to beliefs at the time about the benefits of free trade and technological progress. In his speech at the Paris Conference of 1865, the French Foreign Minister Edouard Drouyn de Lhuys called the founding conference of the ITU in Paris a "veritable Congress of Peace" based on telegraphy as a "prodigious means of communications establishing a rapid means of dialogue between the human family".

The ITU provided a unified framework for technical cooperation and coordination, which proved beneficial to its members, as evidenced by the subsequent rapid growth in telegraph traffic, the expanding geographical scope of communications and falling prices for telegrams (mainly through the introduction of a uniform tariff in the 1865 Convention, although telegrams still remained unaffordable for many people). The ITU asserted control over the international development and operation of the first global telecommunication technology, a technology with potentially transformative aspects on trade, the public sphere and diplomacy. The ITU effectively simplified the regulation of international telegraphy and provided a broad framework for technical cooperation and common standards (such as the Morse system, adopted by the ITU for the international telegraph service). The International Telegraph Convention acted as a knowledge-sharing community to provide a consistent basis for the exchange of telegrams between its Member States.

Another important point is the private sector involvement in ITU. Today, there are 567 ITU Sector Members. The 1865 Convention provisioned that States had to impose the rules set out in the Convention on private operating companies. Three years later, the Vienna Convention 1868 stipulated that private companies could accede to the Convention *(see separate article in this edition on private sector involvement in ITU).*

How is the original global order of communications still relevant today?

The 1865 International Telegraph Convention and the founding of the International Telegraph Union were influenced by the need for multilateral technical cooperation, standards, and the simplification of existing regulations. This Convention, however, still provides a relevant background to many of today's current debates.

Standards-setting seems a very technical activity, but it was not always a neutral activity. Evidence shows that experts involved in techno-diplomatic negotiations at the time were aware of the power dimension to technological agreements — it is important that all participants involved in standards setting activity are on a par in their technical knowledge. The ITU provided a solution to this challenge, as a knowledge-sharing community.

The second point is about the routes taken by messages. Article 31 stated that Member States could lower their tariffs, while Article 37 established the principle of the least costly route for

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messages. Taken together, these Articles had a far-reaching influence on the routing of messages, as Member States could change their pricing structures to attract international telegrams, which came within the purview of the countries they were routed through. The routing of communications is still relevant today, with relevance to the routing and surveillance of messages over the Internet.

The prioritization of messages is also relevant today (as defined in Article 11 of the Convention). First came State telegrams by contracting governments, then so-called 'service telegrams' by the telegraph administrations, and lastly, all other correspondences, including private messages. This issue of prioritizing messages may be regarded as a distant predecessor of today's debates about packet prioritization and net neutrality.

Article 5 of the Convention stipulated secrecy of correspondence, which signatories were obliged to ensure (subject to certain qualifications), while Article 9 dealt with ciphered messages. The concept of secrecy is related to today's debates about the erosion of privacy on the Internet — albeit with a huge difference in scale.

The original ITU simplified the regulation of international telegraphy, and provided a broad framework for technical cooperation, coordination and standards-setting. A number of aspects of this original global order of communications are still relevant to today's public debates around Internet use. It remains to be seen in the future how ITU will accommodate these global debates.

This article is an adaptation of an ITU Talk given by Dr Kars Aznavour on 'The History of the ITU', at the ITU Headquarters in Geneva, Switzerland, on 30 January 2015. Dr Aznavour specializes in historical and present-day perspectives on ICTs, politics and culture, and holds a PhD in International Studies from the Graduate Institute (IHEID) in Geneva. His ITU Talk can be accessed from the ITU website.

ITU

> *"The electric telegraph is the most perfect invention of [current] times – anything more perfect than this is scarcely conceivable, and we really begin to wonder what will be left for the next generation, upon which to expend the restless energies of the human mind."*
>
> *Melbourne Argus newspaper, Australia, 1853*

Evolving Radiocommunications

By Fabio Leite

Former Deputy-Director of the ITU Radiocommunication Bureau

Inventiveness

ITU was in the process of being founded, following the invention of the electrical telegraph, when James Maxwell formulated what has been called the 'second great unification in physics' (after the first realized by Isaac Newton): the classical theory of electromagnetic radiation. The world waited another twenty years for Heinrich Hertz to conduct his laboratory experiments in Germany conclusively demonstrating the existence of the electromagnetic waves predicted by Maxwell.

The first post-World War One ITU radiotelegraph conference was held in Washington D.C. in 1927

The start of the 20th Century saw inventors, scientists and entrepreneurs using electromagnetism to create radio devices driving the first wireless telegraph transmissions, broadcasting, and transatlantic communications. Various developments in radio technology flourished almost simultaneously in different parts of the world: Hertz-Henry's damped wave spark-generated transmission systems; Popov's coherer; Tesla's tuned transformer circuits; Marconi's one-way wireless spark-generated transatlantic communications; Fessenden's heterodyne principle; and Armstrong's superheterodyne receiver (which remains the standard radio-receiving method until today).

Regulating early radio

The early 1900s saw the first major use of radio to provide a widespread communication service for ships at sea, which had proved impossible with traditional electrical telegraphy. As more and more ships became equipped with radio, however, problems soon arose. The lack of any kind of international regulation meant that operators could do more or less as they pleased. Interference became an acute problem, and the efficiency of communications was greatly reduced.

This situation led to the first International Radiotelegraph Conference in 1906 in Berlin, where the first International Radiotelegraph Convention was signed. The Annex to that Convention contained the first regulations governing wireless telegraphy. These regulations, which have since been expanded and revised by numerous radio conferences, are now known as the Radio Regulations, maintained by ITU.

The rapid development of maritime radiocommunications, including the need to enable equipment of different manufacturers to interoperate, and the aftermath of the Titanic disaster, encouraged governments to adopt a new set of international regulations at a subsequent Conference in London in 1912, which included the obligation to install radio aboard ships and to set up a continuous radio watch.

The first post-World War One ITU radiotelegraph conference was held in Washington D.C. in 1927. This conference marked a turning point in the technical provisions of the Radio Regulations, as it then became necessary to restrict the use of some of the older types of emitters, the spark-type sets (although relatively cheap, these transmitter sets occupied a broad frequency band) and to divide up the radio spectrum more efficiently among a rapidly growing number of services. Governments agreed on some fundamental principles for the ITU regulations to successfully ensure growth in radiocommunications: procedures for vesting rights to use of specific radio channels "free from interference" from stations of other nations, and the importance of participation of private companies in the ITU. It is also fair to say that the notion of the economic value of the spectrum started to emerge around this time.

Broadcasting

On 24 December 1906, Professor Fessenden presented the world's first radio broadcast transmission consisting of a speech by himself as well as some selected music for Christmas. However, it was only from the 1920s that broadcasting began its widespread growth, following the discovery of the long-distance propagation proprieties of short-waves (high frequency or HF) and the developments of radio technology resulting from the First World War (e.g. the spectrum-efficient vacuum tube transmitter).

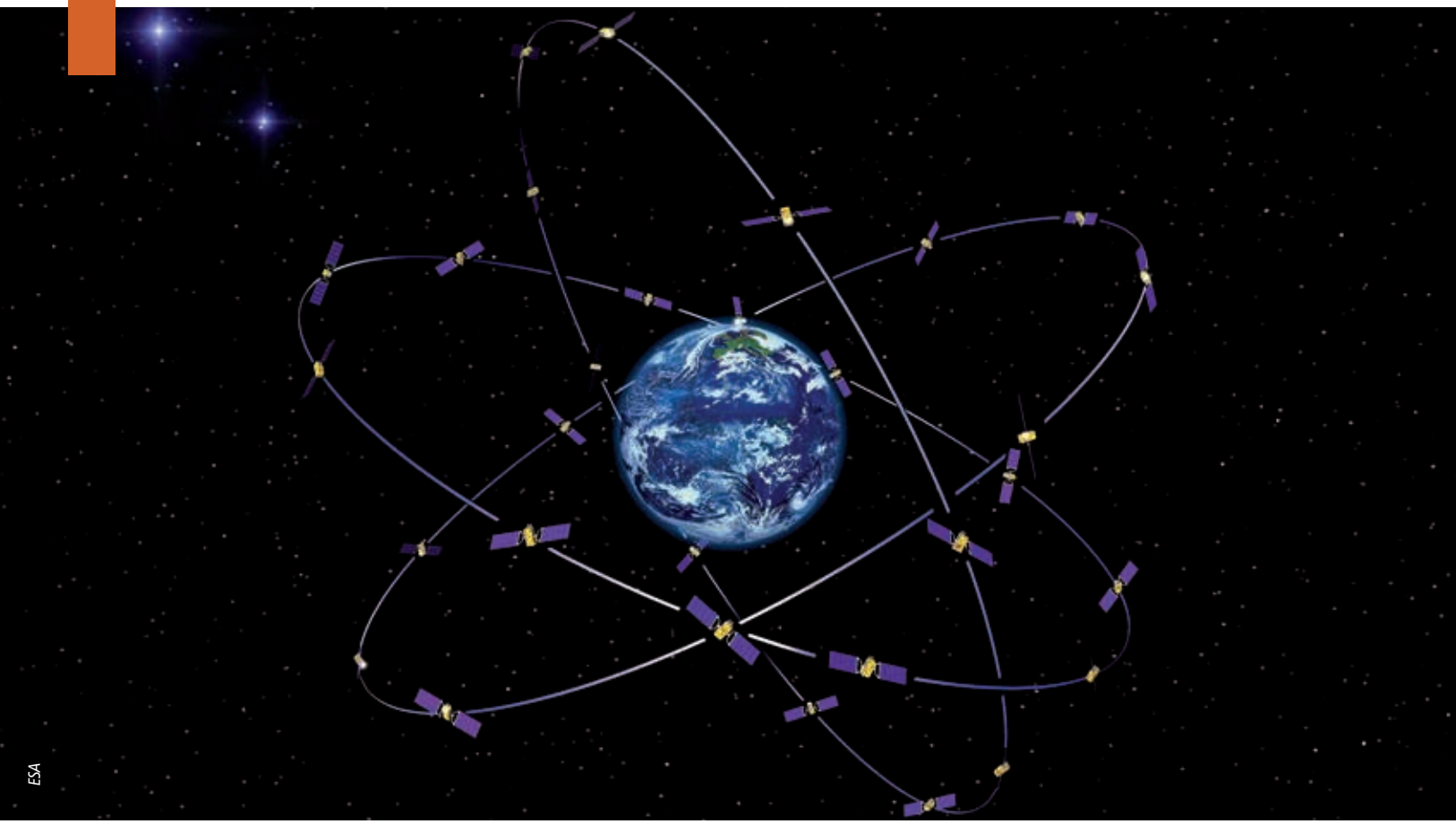
Amplitude Modulation (AM) was the earliest modulation method used to transmit voice by radio. It was developed during the first two decades of the 1900s starting with Fessenden's radiotelephone experiments. Wartime research greatly advanced the art of AM modulation, and after the First World War, the availability of cheap tubes sparked a significant increase in the number of radio stations experimenting with AM transmission of news or music. The vacuum tube was responsible for the rise of AM radio broadcasting around 1920, the first electronic mass entertainment medium.

Already by 1925, there were over 500 broadcasting stations in operation in the United States, while almost every European country hosted a regular broadcasting service. AM remains in use today in many forms of communication and broadcasting: for example, portable two-way radios, VHF aircraft radio and medium-wave AM radio broadcasting. AM remained virtually the only type used for radio broadcasting until frequency modulation (FM) broadcasting began after World War Two. Digitalization substantively improved both video and audio broadcasting, allowing high-fidelity CD-quality audio and high-definition video transmission, as well as a range of interactive services for users.

During the 1950s, the need to operate broadcasting services on a more planned basis became evident for the sake of efficiency and equity. Consequently, plans were established in the ITU Radio Regulations and Regional Agreements applicable to terrestrial broadcasting in different frequency bands (low frequency (LF), medium frequency (MF), very high frequency (VHF)/ultra high frequency (UHF)) at the start of the 1960s. HF broadcasting remained a very contentious issue, to the extent that the arrangements adopted for this service require little more from the nations than trying to coordinate a broadcasting schedule among themselves, with the administrative assistance of ITU. In general, however, actions taken in the framework of ITU, particularly the establishment of plans, notably helped stimulate the orderly development of broadcasting across all ranges of the radio spectrum.

Fixed communications

Microwave relay links were first tried in the 1940s, intended mainly for point-to-point communications using short wavelengths, which allows conveniently sized antennas to direct the radio waves in narrow beams. They experienced significant growth in the 1950s when ITU, having already allocated spectrum in different bands for fixed service, promptly adopted frequency channel arrangements to allow the systematic use of microwave radio-relay links in different parts of the world. Today, the fixed service continues to be used extensively to provide different applications for local and long-distance communications to the public, in the control of gas pipelines and electric powerline networks, and for coordinating local government activities. Another common application is for services ancillary to broadcasting, used by broadcasters to distribute programmes within a broadcaster's operations, e.g. to transfer a TV programme between the studio and a mountain-top transmitter site.



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Radio and regulations in space

Following the first experimental launches of artificial satellites in the 1950s, the first active communications satellites appeared in the 1960s. During the subsequent decade, advances in satellite performance came thick and fast, and a global industry began to develop rapidly. At first, satellites were used mainly for international and long-haul telephone traffic and the distribution of television, both internationally and domestically.

The first general revision of the Radio Regulations was made by the ITU radio conference, in Geneva in 1959, which took account of the advances in radio technology to extend the ITU Table of Frequency Allocations up to 40 GHz and to define a new satellite radiocommunication service. In order to meet the challenges of new space communications systems, the ITU also set up a Study Group responsible for studying space radiocommunication in 1959. In addition, an extraordinary conference for space communications was held in 1963 in Geneva to allocate frequencies to the various space services. Subsequent conferences made further allocations and put in place regulations governing the use, by satellites, of the radio-frequency spectrum and associated orbital slots.

Despite its high upfront investments and risky nature, the satellite industry continues to expand rapidly — today, its total annual revenue has been estimated at above USD 190 billion from satellite services, manufacturing and launches. The satellite international regulatory framework established by ITU has proved responsive to the needs of industry, technological evolution and growth in traffic. ITU will continue to provide regulatory certainty, orbit and spectrum resource allocation and assistance to all players in the satellite industry.

The mobile revolution

Although the concept of low-power transmission in hexagonal cells was introduced in the late 1950s, electronics only became sufficiently advanced to achieve this one decade later. However, there was still no method for handover from one cell to the next. That problem was solved with the first functioning cell system and first cellular phone calls in the early 1970s, using a phone developed by Martin Cooper of Motorola in the United States, which weighed about 3 kilograms. In the late 1970s, cellular phone services began in Japan and the Nordic Mobile Telephone (NMT) system was deployed in Norway, Sweden, Finland, and Denmark and in 1983 in the United States. These systems represent first-generation (1G) analogue cellular telephony.

The second generation (2G) of mobile communications was introduced in the early 1990s and was characterized by digital technology and the introduction of texting. Digital mobile cellular systems provided for a rapid expansion of the service by allowing for good-quality voice, texting, and personalization. The Global System for Mobile communications (GSM) became a successful standard in Europe and later in the rest of the world, where other digital systems were also in use, such as the Personal Digital Cellular system (PDC) in Japan and Personal Communication Service (PCS) in North America.

At that moment, ITU membership decided to create a group of experts to work on a high-capacity global mobile communication system — the International Mobile Telecommunication (IMT) system, to establish the basis for 3G. The first designation of global spectrum was made in 1992 in the 2 GHz band and an agreed family of standards was established in 2000, based on packet switching for data transmission. Today, according to ITU's latest estimates, 3G accounts for over a third of the around 7 billion mobile-cellular subscriptions in the world. ITU continues to guide governments, regulators and industry towards the expansion of the mobile service landscape through its work providing for spectrum identification, frequency channel arrangements, numbering resources and free-circulation of terminals for existing and future generation systems.

Regulating modern wireless systems

The 1980s and 1990s saw extensive changes to the Radio Regulations as the output of the ITU World Radiocommunication Conferences. Frequency allocations were identified for emerging wireless applications, mainly in the field of space communications, broadband non-geostationary satellite systems, and plans for broadcasting and fixed-satellite services. Spectrum has also been identified for advanced mobile communications for the use of IMT-2000, the ITU-developed third-generation global standard.

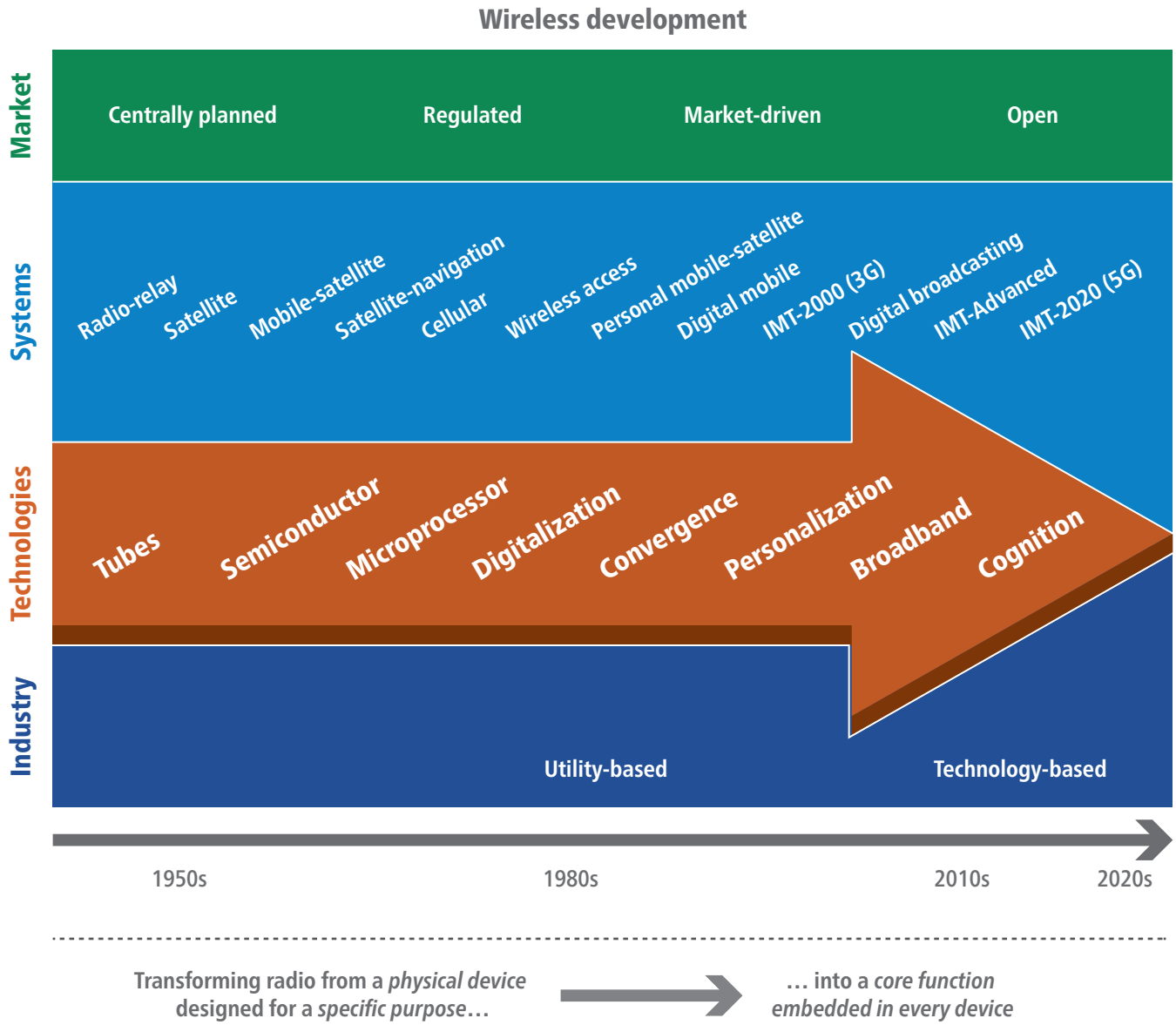
The 2002 ITU Plenipotentiary Conference held in Marrakesh, Morocco, took the landmark decision that "world radiocommunication conferences can include in agendas for future conferences, items relevant to spectrum regulation of frequencies above 3000 GHz and take any appropriate measures, including revision of the relevant parts of the Radio Regulations". This was a significant milestone in the regulatory history of radiocommunications, as it paved the way for the exploration of optical free-space telecommunications within the framework of radiocommunications.

Evolving radio technologies

The development of radiocommunications has seen constant technological breakthroughs throughout its history. I shall briefly mention some of the inventions which have leveraged all kinds of radio applications to become as pervasive as we see today.

In 1948, the invention of the semiconductor 'transistor' revolutionized every aspect of the telephone industry, and indeed, the broader communications industry. Fragile and bulky vacuum tubes have been replaced by transistors. Compact, low-cost, rugged radios were developed. The first transistor radio went on sale in 1954 with four transistors, and the first portable, transistorized TV, in 1960, using 23 silicon and germanium transistors. In 1965, Intel's Gordon Moore came up with what came to be known as Moore's Law, which stated that the number of transistors on a chip would double about every two years. Sixty years later, Moore's Law still holds surprisingly true.

Broad trends in the development of wireless communications



Source: Author.

In 1983, the first commercial mobile phone was powered by transistors. The path to miniaturization means that today, 45-nanometer electronic chips holding 820 million transistors are now possible.

The move from analogue to digital technology has had a major impact in the development of radio systems (see Figure). The first digital microwave links were in operation from the 1980s onwards, and the large-capacity systems from the 1990s, which were more robust to propagation impairment and interference, as well as transporting higher data capacity. Actions coordinated by ITU have been key in providing for countries to implement their analogue to digital switchover on a timely basis to allow the general public to enjoy the benefits of digital broadcasting. Digitalization quickly extended to all domains of radio applications, promoting convergence in fixed, mobile and broadcasting, and forcing regulatory regimes to adapt.

More recently, developments such as the push to broadband and the use of software-defined and cognitive radio systems are redefining the radiocommunication landscape. Once more, the impact of these factors on regulations have been the subject of continuous debate given, on the one hand, the increasing demand for spectrum resources and, on the other hand, the potential need for new paradigms of spectrum management at all levels.

Built on an elaborated combination of technical, legal and administrative treaty-based texts, the ITU international regulatory process has been responding in an effective and timely way to the ITU membership needs. Take for example the responsiveness of ITU radiocommunication conferences for spectrum and regulatory requirements of IMT, radio LANs (local area networks), high-altitude platforms, mobile satellite uses, emergency communication systems including aviation, and many other cases based on the current forty radio services described in the ITU Radio Regulations. In addition, several planning conferences have provided the appropriate spectrum and orbit assignment approach for some specialized communications services and applications.

Conclusions

The development of radiocommunications and spectrum management encompasses several marked transitions in the technology (including the invention of the semiconductor and microprocessor, the introduction of digitalization and convergence, trends of personalization and the push for broadband). Today, we are experiencing spectrum cognition in radio devices. At the same time, regulatory frameworks have evolved from being centrally planned and regulated, to a market-driven and what may ultimately become, a truly open radio environment.

During this period, radio has also broadly moved from utility-based to technology-based devices. Further, penetration rates show that wireless has evolved from an exclusive technology, which started out appearing in a few homes, later existing in almost every home, as the world's most ubiquitous technology available to 6 billion people. Today, wireless is becoming a 'vanishing' technology, as a core function embedded in every device.

The success of radiocommunications is thanks to the inventiveness of humankind in creating innovative technological solutions, but also to the responsiveness of ITU in evolving its international regulatory framework on a timely basis.

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Mainstreaming Innovations and Enhancing Performance Decade by Decade

History of the ITU Telecommunication Standardization Sector

Standardization has been integral to ITU since the very beginning, and was indeed part of the raison d'être *for founding ITU in 1865, when representatives of twenty European States first met in Paris to coordinate and set standards for the telegraph systems in Europe* (see separate article in this edition based on the ITU Talk by Dr Kars Aznavour). *In their simplest form, agreed (or voluntary) standards represent a common way of doing things and can help ensure interoperability. They may also set a benchmark for quality and common knowledge, as well as a set of market norms and/or expectations of service.*

The International Service Regulations or Telegraph Regulations (annexed to the International Telegraph Convention) governed operational issues for telegraphs, including tariffs. These Regulations were revised and updated by subsequent conferences to match the technological advances of the day (such as the development of telephony).

To fully exploit the power of these new and rapidly evolving technologies, governments and companies quickly realized that international cooperation was necessary. As early as 1885, ITU Member States saw the need to add the international telephone service to the Telegraph Regulations. However, it took a further forty years before the standardization process became fully formalized, with the mainstreaming of two consultative committees at the 1925 International Telegraph Conference:

- The *International Telephone Consultative Committee* (CCIF) to study and develop standards for terminal equipment, transmission quality and tariffs for long-distance telephony (already established in 1924, but brought into the League of Nations system in 1925); and
- The *International Telegraph Consultative Committee* (CCIT) to deal with the technical and operational aspects of telegraphy, to standardize phototelegraphy and to establish tariffs and international terminology.

To facilitate their work, these Committees were to operate through Study Groups to carry out research and develop proposed standards (called Recommendations) for approval at regular Standardization Conferences (later called Plenary Assemblies).

By the 1950s, telephony and telegraphy were using the same transmission channels: overhead wires, underground cables, underwater cables and radio circuits. In view of the similarity of many of the technical problems faced by the CCIF and CCIT, in 1956, a decision was taken to merge the two committees into the single *International Telegraph and Telephone Consultative Committee* (or CCITT, basing the acronym on the French version) to study technical, operating and tariff questions related to telegraphy and telephone and to issue recommendations on them. The CCITT was charged with examining telegraph operational and tariff matters, transmission rules, the gentex service, terminal charges in Europe, phototelegraphy, tariff problems and procedures for the international telephone service.

The 1960s saw huge advances in telecommunications, such as the development of the Improved Mobile Telephone System (IMTS, also known as 0G), an early forerunner of today's mobile telephony systems, as well as the introduction of the first modems. In the early 1960s, the CCITT researched different aspects of intercontinental connections (such as submarine cable and evolved numbering and routing plans, all of which ITU–T is still engaged in today). This led to Recommendations such as ITU–T E.29, Numbering for international work, national and international numbering plans (ITU–T E.160) and the international routing plan (ITU–T E.171). The international telephone numbering plan defined by ITU–T has governed country codes, area codes and local numbering ever since.

The value of ITU's work was reflected in rapid growth in ITU membership, with the number of ITU Member States growing from 96 to 129 between 1959 and 1965. The CCITT also held its first meeting (its Second Plenary Assembly) outside Europe in New Delhi, India, reflecting the vibrant, growing global interest in telecommunications. More and more nations started to participate in ITU's work, and its Recommendations started to gain universality. The Fourth CCITT Plenary Assembly held in Mar del Plata, Argentina, in 1968, culminated in important outcome reports on the telephone network, transmission systems and automatic telephone networks, and the first-ever international standards for fax machines (used extensively by international news corporations and meteorological services).

In the late 1960s, the CCITT completed its Signalling System No. 6 (SS No. 6) specification for international circuits, a major advance in defining the signalling links for the transfer of all information and control signals between exchanges. Another key standard for data exchange in circuit switched networks was also approved in 1968 — Recommendation ITU–T X.21 on interfaces between data terminal equipment (DTE) and data communications equipment (DCE) for synchronous operation on public data networks. Meanwhile, the Defense Advanced Research Projects Agency (DARPA) of the United States started work on a little-known network called the ARPANET…

The 1970s saw a sweeping technical revolution in telecommunications, with a massive changeover to digital techniques, while the formerly separate domains of computers and communications became increasingly — and inextricably — linked. Long-distance transmission capacity exploded — via new technologies for high-capacity submarine cables and satellite techniques, while old services were upgraded using new techniques. These innovations meant that the cost of services was no longer dependent on distance, and costs fell dramatically. Many of these changes could not have been effectively realized, without the invaluable work of international standardization. CCITT's work evolved continuously to match the changes in telecommunication technologies.

In the late 70s and the early 80s, there was important progress in standardization work on public switched data networks, new specifications on digital techniques, programming languages and digital networks. The Seventh CCITT Plenary Assembly in Geneva in 1980 endorsed ISDN (Integrated Services Digital Network) as an international communications standard for allowing voice and data to be transmitted simultaneously across the world, using end-to-end digital connectivity. Recommendation ITU–T X.25, the highly influential ITU–T standard protocol suite for packet-switched wide area networks (WAN), was also approved during this period. ITU–T approved its packet-switched Signalling System 7 (SS7) protocols to ensure that telecom systems worldwide could interoperate, and which is also important for linking VoIP (Voice over IP) traffic into PSTN (Public Switched Telephone Network).

In Melbourne, Australia, in 1988, the World Administrative Telegraph and Telephone Conference (WATTC-88) agreed the International Telecommunication Regulations (ITRs) as the basic rules for international telecommunications. The original ITRs aimed to promote the development of telecommunication services and their most efficient operation while harmonizing the development of facilities for worldwide telecommunications. They helped establish the international accounting rates and defined procedures on how to agree the level of these rates as well as how to settle accounts and in what form to provide this detail. This agreement helped pave the way for the liberalization of the telecommunication industry and the explosive growth in international telecommunication traffic throughout the 1990s. In 1992, certain standards-setting activities of the CCIR (International Radio Consultative Committee), and those of the CCITT, were brought together to form the Telecommunication Standardization Sector (ITU–T), with effect from 1993.

Enter the Internet — An era of explosive growth

ITU–T specifications were widely used in earlier forms of Internet access over telephone lines, such as via cable modem. ITU–T approved its ITU–T J.112 standard for modulation protocols for interactive cable television services in 1998 for high-speed, bi-directional IP data transmissions. Recommendation ITU–T J.117, approved in 1999, covers the connection of cable television feeds into digital high-definition television (HDTV) sets.

By the mid-eighties, many carrier backbone networks and telephone exchanges were already digital. In 1986, the ITU-CCITT Study Group VIII and the ISO/TC97/SC2/WG8 group formed the Joint Photographic Expert Group (JPEG), which resulted in ITU–T Recommendation T.81 ISO/IEC 10918-1, first approved by ITU in 1992, specifying a process for digital compression and the coding of continuous-tone still images. Today, this standard is known by the name of the group, JPEG, a breakthrough format still widely used for photographs on the Internet.

ITU also produced a key security standard, Recommendation ITU–T X.509, published in 1988 for public key infrastructure (PKI) or electronic authentication over public networks. This is widely used in a range of applications from securing the connection between a browser and a server on the web to providing digital signatures enabling e-commerce transactions.

Recommendation ITU–T D.1, published in 1991, was another key factor in the growth of the Internet, as it obligated telecom operators to provide and connect leased lines to the Internet. It therefore became possible for Internet Service Providers (ISPs) to lease lines from telecom operators for Internet traffic. Leased lines are still needed to build corporate networks and serve as access circuits for Frame relay, ATM, IP-VPNs and the Internet in many developing countries today.

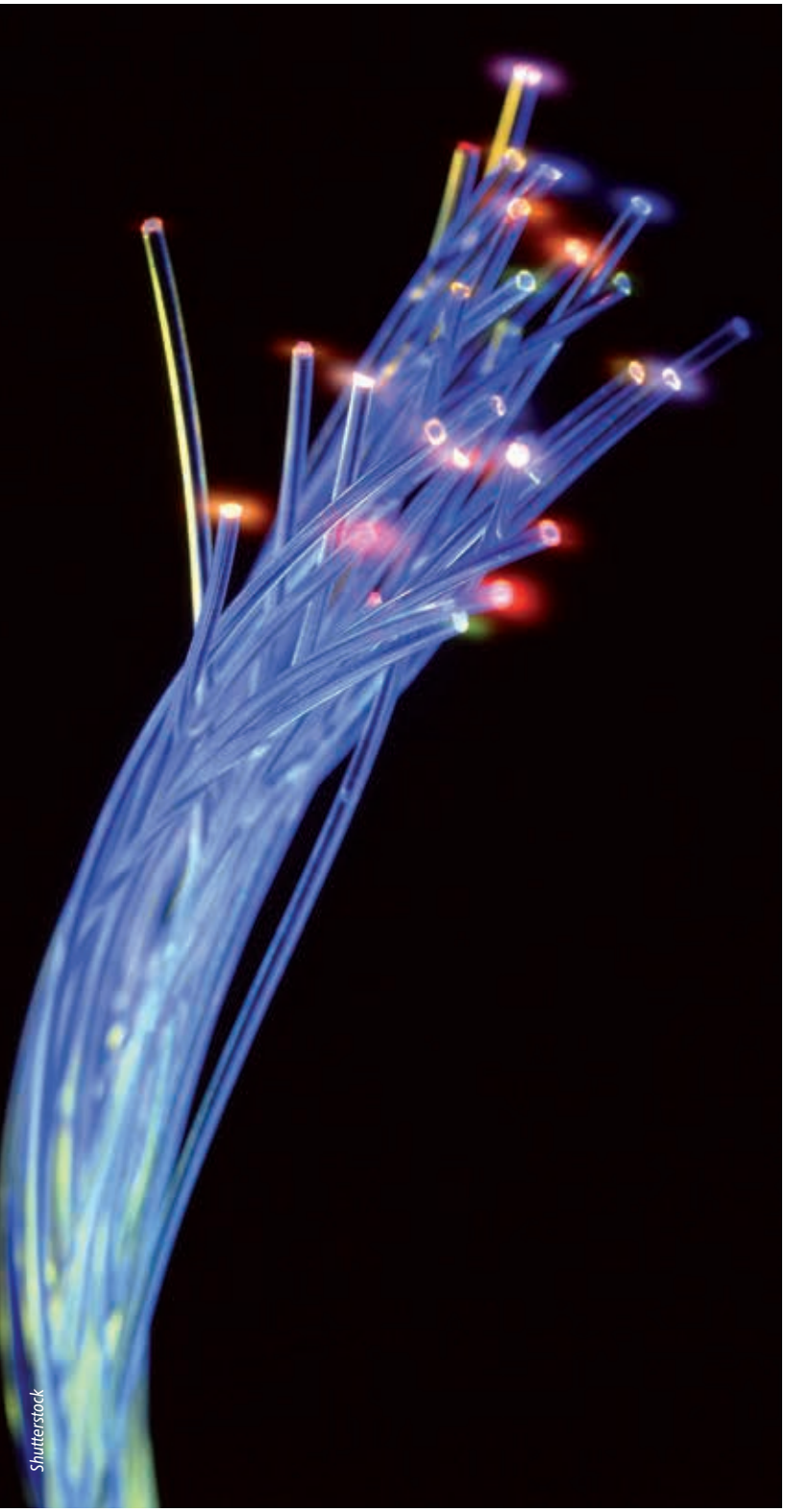
All ITU–T study groups have also focused on security-related questions to combat growing threats to network security, with nearly a hundred ITU–T Recommendations addressing this issue. ITU–T's work on security covers a wide area, including studies into: security from network attacks, theft or denial of service, theft of identity, eavesdropping, telebiometrics for authentication, security for emergency telecommunications and telecommunication network security requirements.

Market transformation and the transition to IP networks

The late 1990s and early years of the millennium saw an almost total transformation of the telecom/information and communication technology (ICT) industry. Recommendations ITU–T D.140 and ITU–T D.150 were published in the late 1990s to facilitate the shift from the accounting rate system to the termination rate system and to help harmonize the interconnection rates for international telephony.

For the early transition to IP networks, ITU–T standards on Bearer Independent Call Control (BICC) technology represented a historic step toward packet-based and broadband multimedia networks used to support legacy PSTN/N-ISDN services over packet-based (IP or broadband) backbone networks. ITU–T developed a number of early standards in Voice over Internet Protocol (VoIP), such as Recommendation ITU–T G.799.1 (specifying the functions and characteristics of VoIP gateways) and Recommendation ITU–T H.323 adopted in 1996 (used in videoconferencing and the delivery of voice, video and data over IP networks).

Alamy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ITU's H.264/AVC (Advanced Video Coding) standard, approved in 2002, was the first truly scalable video codec, delivering excellent quality for high-definition television, videoconferencing and 3G mobile multimedia. The video compression standard (ITU–T Recommendation H.264 or MPEG-4 pt.10/ AVC) was jointly developed by ITU–T SG16 and the ISO/IEC Moving Picture Experts Group (MPEG) and is used in products from many companies (including Apple, Sony, BT, France Telecom, Intel, Motorola, Nokia, Polycom, Samsung, Tandberg and Toshiba) and services (such as over-the-air broadcast television, HD DVD and Blu-Ray disc formats, and a large number of deployments of direct-broadcast satellite-based television services). In 2008, ITU received a Primetime Emmy Award from the Academy of Television Arts & Sciences (ATAS) for its work on ITU–T H.264.

On security, the 2003 Recommendation ITU–T H.235 provides protocols for VoIP and videoconferencing calls to be authorized and securely routed, while protected against security threats through real-time multimedia encryption and PKI certificates.

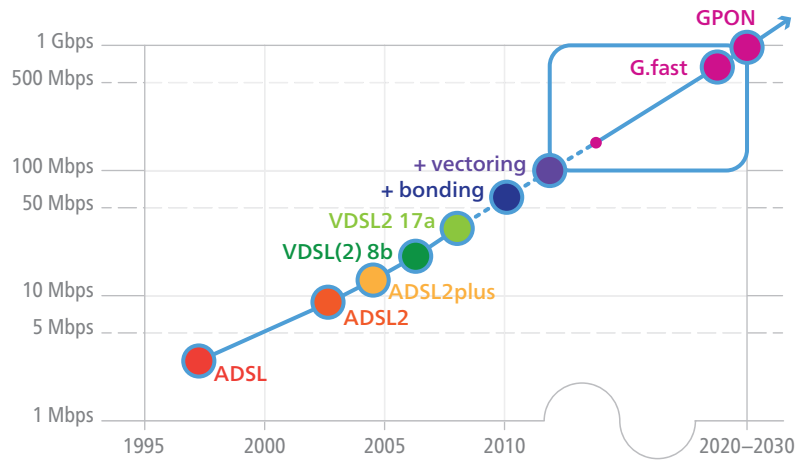
Fibre passive optical networks

ITU approved an early set of standards for fibre networks in the late 1980s — most notably, ITU–T Recommendations G.707, G.708, and G.709 for communicating digital information over optical fibre. Subsequently, ITU also approved its ITU–T Recommendations (G.983.1, G.984.1/2) for Passive Optical Networks (PONs). A PON is a point-to-multipoint fibre to the premises network architecture in which optical splitters are used to enable a single optical fibre to serve multiple premises. PON technology is used in the local loop to connect residential and SME end-users premises in an all-fibre network. By eliminating expensive active network elements, PONs can enable telecom carriers to make significant savings. A PON configuration reduces the amount of fibre required, compared with point-to-point architectures. ITU also produced its first ITU–T G.984 (GPON) standard, representing a significant boost in both the total bandwidth and bandwidth efficiency through the use of larger, variable-length packets.

In order to avoid overlapping investments in different standards development organizations (SDOs), ITU–T is actively engaged in collaborating and cooperating with other forums. This collaboration is necessary to avoid duplication of work and the consequent risk of conflicting standards in the market place. ITU–T recognizes the valuable work also done in other institutions and is in a privileged position to cooperate with many of its relevant partners.

Growth in speeds for fixed and mobile technologies

The evolution of copper — bridging the gap between xDSL and fibre speeds



Source: Alcatel-Lucent.

From the xDSL suite of standards to G.fast — getting the most out of copper

The first Digital Subscriber Line (DSL) standard was approved in 1993. Also in the 1990s, ITU–T approved its first ITU–T ATM (Asynchronous Transfer Mode) Recommendations as a key layer technology for many ADSL implementations today. Throughout the late 1990s and early years of the millennium, ITU–T continued work upgrading its ground-breaking suite of xDSL standards (see Figure). xDSL enables the use of standard copper telephone cables to offer services such as high-definition TV (HDTV), video-on-demand, videoconferencing, high-speed Internet access and advanced voice services, such as VoIP. Although governments and operators in many industrialized countries are now looking to deploy or upgrade to fibre networks, it is important to note that globally, in 2014, xDSL still accounted for over half of all Internet access lines in use worldwide.

Technological innovation continues, with further advances continuing to help prolong the lifetime of existing infrastructure. ITU–T Study Group 15 approved the Very high bit-rate Digital Subscriber Line 2 (VDSL2) standard in 2005, enabling telecom operators to offer triple-play video, Internet and voice services at speeds ten times faster than ADSL. Although many operators are extending fibre into their network, this can prove expensive and copper lines are not redundant today — indeed, the most exciting use of copper promises to be where it is used in conjunction with fibre. The ITU–T approved its G.fast ITU–T 9701 standard in December 2014, which continues the exciting work to get the most out of legacy copper lines. G.fast promises to deliver 'fibre-like' speeds of up to 1 Gbps over short ranges. G.fast could be used by many operators as part of a Fibre-to-the-Distribution-Point (FTTdp) solution or as an ideal accompaniment to a fibre-to-the-premises (FTTP) roll-out, where fibre optic lines are used to link large premises like office or apartment blocks to the PSTN, and ordinary copper cables can be retained and used within the building to connect tenants or residents to high-speed services.

Looking to the future

ITU–T will continue to adapt and upgrade its work programme to meet the evolving requirements of its membership, including Sector Members and Member States. As Chaesub Lee, Director of the ITU Telecommunication Standardization Bureau (TSB) has stated, "sometimes standardization gets ahead of the technology, sometimes technology and the industry leads standardization". Regardless of which is ahead at any point of time, ITU–T will continue its work in defining and shaping industry standards, maintaining and monitoring network performance and working with its industry partners and other SDOs to ensure the smooth operation of telecommunication/ICT networks, taking into account the accelerating convergence of technologies and industry sectors.

Standardization experts must consider the significance of 'trust' in the digital ecosystem as well as value chains, taking into account the communications of cyber-physical systems such as billions of networked devices, things, and objects, and must preempt relevant technologies' requirements on supporting trustworthy ICT infrastructures. How will standards bodies provide the required level of trust for such a ubiquity of connected devices, things, and objects? And in the presence of data collection, storage, processing, analysis, and sharing on such a massive scale, how can the telecom industry build reliable and resilient ICT infrastructure?

Embedding trust into the information society will provide a greater level of certainty, confidence, and predictability in network interactions, expanding their scope and benefits. To achieve this, ITU will work in harmony with other standards bodies to enhance the level of trust in the current digital ecosystem while also considering the impacts of possible future developments. ITU will continue to support smart, context/content-aware, user-centric technologies, while being cognizant of, and in turn informing, the relevant policy and regulatory debates and frameworks.

The value of ITU–T standards stems from the value of their development process. As a United Nations (UN) specialized agency, ITU's standardization process must enable peer learning and knowledge exchange to assist developing countries in advancing their ICT infrastructure and encouraging economic development. The benefits of international and national standards should be open to all, as should the global meeting of expertise that drives their development. ITU–T's success in cooperating and collaborating with other bodies such as the IEEE Standards Association is another key measure of the value of ITU–T standards.

These questions are multifaceted: there are a myriad of different perspectives to be considered, and ITU–T will work to provide the global standardization community with an open, neutral platform to bring cohesion to ICT innovation through year 2020 and beyond. ITU–T is committed to ensuring that its work represents the latest, and most modern, developments in telecommunication/ICT technologies, with up-to-date, easily usable standards that meet the needs and requirements of users.

This article is an adaptation from the brochure, 'CCITT: Fifty Years of Excellence'.

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Bridging the Digital Divide

History of the ITU Telecommunication Development Bureau

The ITU Telecommunication Development Bureau was established in 1989, during the Plenipotentiary Conference held in Nice, France, from 23 May to 29 June 1989. At that Conference, Resolution 19 reflected the decision of ITU membership "to set up a new permanent organ, the Telecommunication Development Bureau (BDT), with the same status as other permanent organs of the Union and headed by a Director."

The background of this move to create a separate Bureau is complex, and can be traced back, considerably earlier. A Technical Cooperation Department had already been created as early as 1960 within the General Secretariat to foster the establishment and improvement of telecommunication networks in developing countries. This department, with the assistance of the United Nations Development Programme (UNDP) and various financial institutions, implemented a number of national and regional projects aimed at the development of telecommunication networks and the enhancement of capacity-building programmes. Among the regional projects, it is noteworthy to mention the *Réseau Panafricain des Télécommunications* (PANAFTEL); the *Réseau Africain de Communications par Satellite* (RASCOM); the *Réseau Interamericain des Télécommunications* (RIT); the *Réseau Asiatique*; and *Arab Telecommunications* (ARABTEL). Regarding capacity-building, a number of national and regional centres were created, including the *École Supérieure Multinationale des Telécommunications* (ESMT) in Dakar, Sénégal; and the *African Advanced Level Telecommunications Institute* (AFRALTI) in Nairobi, Kenya.

In 1978, ITU and the UNDP jointly published a booklet in which the then UNDP Administrator, Bradford Morse, observed that "within countries, telecommunications, if given adequate capacity, can support national goals in villages far from capital cities, in factories and mines and urban areas, government offices, corporate suites and university halls. Among developing countries, closing telecommunication gaps can help to overcome some of the crippling constraints in, for example, trade, co-operative product development and natural resource utilization. It can also help to expand the exchange of knowledge about development planning and practice".

The ITU Plenipotentiary Conference 1982 held in Nairobi, Kenya, from 28 September to 6 November devoted considerable attention to increasing technical cooperation and assistance to developing countries. This Plenipotentiary Conference adopted Resolution 20 establishing an Independent International Commission for World-Wide Telecommunications Development. The Commission, chaired by Donald Maitland, a former senior British diplomat, was mandated to identify the obstacles hindering communications infrastructure development, and to recommend ways in which the expansion of telecommunications across the world could be stimulated.

The Commission submitted its report in January 1985. Officially entitled ***The Missing Link Report*** (also informally known as the ***Maitland Report***), the report drew international attention to the huge imbalance in telephone access between developed and developing countries. The report underlined the direct correlation between the availability of, and access to, telecommunication infrastructure and a country's economic growth, and it proposed concrete solutions to fix the missing link. For example, the report observed that, "of the 600 million telephones in the world, three-quarters are concentrated in nine countries. The remainder is distributed unevenly throughout the rest of the world. While telecommunication is taken for granted as a key factor in economic, commercial, social and cultural activity in industrialized countries and as an engine of growth, in most developing countries, the telecommunication system is not adequate even to sustain essential services. In many areas, there is no system at all. Neither in the name of common humanity nor on grounds of common interest is such a disparity acceptable".

Following the publication of ***The Missing Link Report,*** a historic first World Telecommunication Development Conference (WTDC) was convened in Arusha, Tanzania, from 27–30 May 1985. This Conference united the ITU membership to:

- study and exchange views on the report;
- find practical ways of implementing relevant recommendations; and
- discuss a range of issues relevant to the development of telecommunications, particularly in the developing regions of the world.

After intense debate, the Conference endorsed the conclusions and recommendations embodied in ***The Missing Link Report*** and unanimously adopted the Arusha Declaration on World Telecommunications Development. The Arusha Declaration called on governments and other stakeholders to work to ensure that there would be a telephone within "easy reach" of "virtually the whole of mankind" by the early part of the 21st century. It urged the

governments of developing countries to accord a higher priority to the telecommunication sector in their national plans and resource allocations, and the governments and telecommunication manufacturing and operating entities in developed countries to devote greater financial and technical resources to telecommunications within the various aid programmes then available.

The work of the Maitland Commission led to the establishment of the Centre for Telecommunications Development (CTD) in 1986 and, three years later, the establishment of BDT by the Plenipotentiary Conference (Nice, 1989). At that Conference, Member States requested that the "Telecommunication Development Bureau (BDT) begins to function with immediate effect, to enable the Union to fulfil its responsibilities in respect of technical cooperation and telecommunication development in a more satisfactory manner".

The specific objectives of BDT were set out in the ITU Constitution, and included:

- **To raise the level of awareness** of decision-makers about the important role of telecommunications in the national socio-economic development programme, and to provide information and advice on policy options.
- **To promote the development, expansion and operation of telecommunication networks and services**, particularly in developing countries, taking into account the activities of other relevant bodies, by reinforcing capabilities for human resources development, planning, management, resource mobilization, and research and development.
- **To enhance the growth of telecommunications** through cooperation with regional telecommunication organizations and with global and regional development financing institutions.
- **To encourage participation by industry** in telecommunication development in developing countries, and offer advice on the choice and transfer of appropriate technology.
- **To offer advice, carry out or sponsor studies**, as necessary, on technical, economic, financial, managerial, regulatory and policy issues, including specific projects.


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- **To collaborate** with the International Consultative Committees and other concerned bodies in developing a general plan for international and regional telecommunication networks so as to facilitate the coordination of their development with a view to the provision of telecommunication services.

Under Resolution 55 of the Nice Plenipotentiary Conference 1989, ITU membership also established a High-Level Committee to examine how ITU could respond effectively to the challenges of a changing telecommunication environment, based on an in-depth review of the structure and functioning of ITU. The Committee concluded its work with a report, entitled '*Tomorrow's ITU: The Challenges of Change*', which recommended that "the substantive work of the ITU should be organized in three Sectors: Development, Standardization and Radiocommunication". The report further stated that the Development Sector "should encompass the current work of BDT". These recommendations were adopted by the 1992 Additional Plenipotentiary Conference held in Geneva, Switzerland.

Under the new structure, the Telecommunication Development Bureau (BDT) became the administrative arm of the Development Sector, with responsibilities ranging from programme supervision and technical advice to the collection, processing and the publication of information relevant to telecommunication development. The first BDT Director was elected on 16 December 1992. Arnold Ph. Djiwatampu from Indonesia took up his duties on 1 February 1993, with a priority to accelerate telecommunication development in all developing countries, especially Least Developed Countries (LDCs).

BDT carries out its work through world development conferences. Held every four years, World Telecommunication Development Conferences (WTDCs) give the ITU Telecommunication Development Sector (ITU–D) Members the opportunity to debate the latest trends in telecommunications and information and communication technologies (ICTs) and to establish the priorities of the Development Sector. Each WTDC is preceded by six regional preparatory meetings.

To date, there have been seven World Telecommunication Development Conferences:

- WTDC Arusha, Tanzania, 27–30 May 1985;
- WTDC Buenos Aires, Argentina, 21–29 March 1994;
- WTDC Valletta, Malta, 23 March–1 April 1998;
- WTDC Istanbul, Turkey, 18–27 March 2002;
- WTDC Doha, Qatar, 7–15 March 2006;
- WTDC Hyderabad, India, 24 May–4 June 2010; and
- WTDC Dubai, United Arab Emirates, 30 March–10 April 2014.

The 1994 World Telecommunication Development Conference held in Buenos Aires, Argentina, sought to review progress in telecommunication development since ***The Missing Link Report*** and to address the serious imbalance in world telecommunication development. In his Keynote Address, United States Vice-President Al Gore called on legislators, regulators and businesses to work together to build a Global Information Infrastructure (GII) to bring improved social and economic conditions to all people. He underlined the need for all countries to participate in this 'network of networks' and urged the Conference to bring this goal quickly within the reach of developing countries. A number of other ministers stressed the indisputable potential of telecommunications, and underlined the serious imbalance in world telecommunication development as a constraint to the development of the global economy and a common concern to the international community as a whole. The Buenos Aires Declaration also highlighted the potential of telecommunications and ICTs to close the development gaps between developed and developing countries, as well as between densely and sparsely populated areas within individual countries.

The Buenos Aires Action Plan updated existing programmes and work already initiated by BDT and established two study groups. The conference also recognized the importance of paying special attention to the needs of LDCs, with a special programme of assistance to LDCs.

The 1998 World Telecommunication Development Conference held in Valletta, Malta, raised the question of women's participation in telecommunication development for the first time, and emphasized the need to reflect gender balance and the needs of youth and indigenous peoples. Emergency telecommunications was another area where renewed efforts were required. BDT was also requested

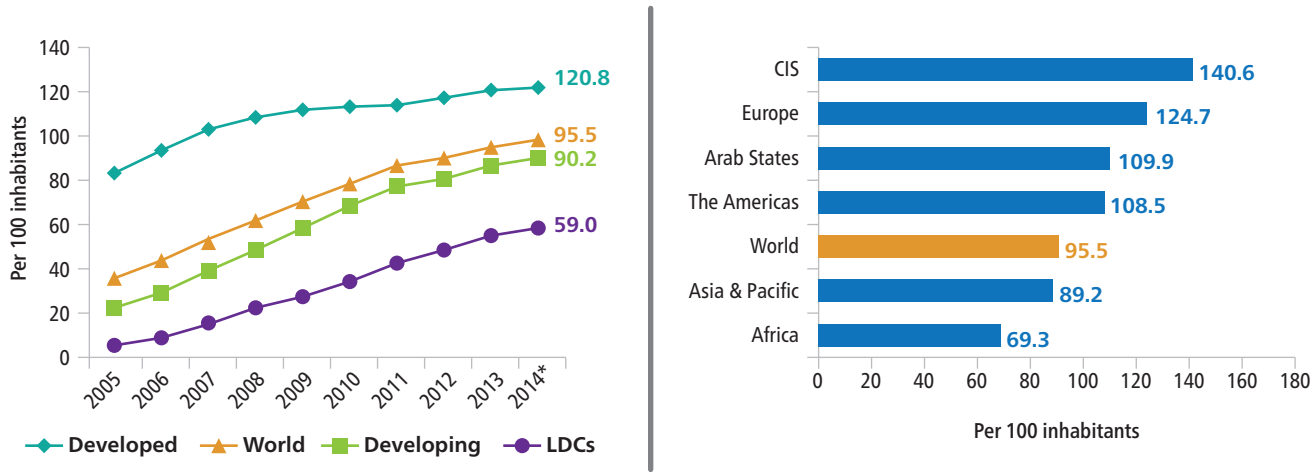
to enhance participation of the private sector in the activities of ITU–D and to facilitate the creation of partnerships between governments and private enterprises.

The 2002 World Telecommunication Development Conference in Istanbul, Turkey, adopted new work programmes to be implemented by BDT, focusing on regulatory reform, new technologies, e-strategies and e-services and applications, economics and finance, human capacity building and special assistance to LDCs. The Istanbul Action Plan enhanced BDT's information collection and dissemination activities, as statistics and analysis are crucial for benchmarking countries, evaluating e-readiness and making informed national policy, legislation and regulation choices for ICT development.

The Doha Declaration, adopted at the 2006 World Telecommunication Development Conference held in Doha, Qatar, recognized the success in the implementation of the Buenos Aires, Valletta, and Istanbul Action Plans. The Hyderabad Declaration, adopted at the 2010 World Telecommunication Development Conference held in Hyderabad, India, acknowledged that, together with development partners and other stakeholders, ITU had made great strides to enhance universal access and shape the emerging global information society — the Declaration noted that the level of access to telecommunications/ICTs had improved dramatically across the world.

Today, however, the digital divide remains stubbornly persistent and continues to evolve. BDT continues to track trends in global ICT through its data and statistics on ICT access, use and prices. Although the number of mobile-cellular subscriptions worldwide is approaching 7 billion and almost equals the global population (corresponding to a penetration rate of 96% — see Figure), inequalities in access persist. More than half of total mobile-cellular subscriptions in 2014 were in the Asia-Pacific region. Mobile-cellular penetration was expected to reach 90% in developing countries by end 2014, compared with 121% in developed countries. Despite massive growth, ITU estimates that 450 million people still live out of reach of a mobile signal.

Mobile-cellular subscriptions by level of development, 2005–2014 (left) and by region, 2014* (right)



*Note: *Estimate.*
Source: ITU World Telecommunication/ICT Indicators database.

BDT's Statistics Division tracks ICT trends to help monitor the global information society and identify emerging issues. For example, in 2013, BDT made the first estimates of the digital gender gap of 200 million fewer women online than men by the end of 2013, indicating that women are coming online later, and more slowly, than men. BDT also quantified the global population of digital natives, as 363 million digital natives or 5.2% of the total global population. Nearly a third or 30% of the world's youth have been active online for at least five years. More recently, BDT has looked into the emergence of big data, and its complementarity with existing official statistics, to improve and inform policy-making and help track the information society.

BDT publishes its analysis of regional and global ICT trends in its flagship report, 'Measuring the Information Society'. In addition, BDT's annual World Telecommunication/ICT Indicators Symposium (WTIS) has become the largest gathering of experts and practitioners in the field of information society measurement. BDT has also initiated projects for assisting developing countries to improve the collection and dissemination of telecommunication indicators.

The 2014 World Telecommunication Development Conference held in Dubai, United Arab Emirates, in 2014, was organized under the theme *'Broadband for Sustainable Development'*, to underline ITU's commitment to leverage broadband as a catalyst to meet the goals of sustainable development.

The Dubai Action Plan aims to foster international cooperation; to foster an enabling environment conducive to the development of ICT networks, applications and services; to enhance confidence and security in the use of ICTs and the roll-out of relevant applications and services; to build human and institutional capacity, promote digital inclusion and provide concentrated assistance to countries in special need; and to enhance climate change adaptation and mitigation, and disaster management efforts through telecommunications and ICTs.

Today, BDT's work addresses the many facets of the digital divide. In terms of its ongoing work, BDT maintains dialogue with ICT regulators around the world to promote an equitable regulatory environment. Its annual Global Symposium for Regulators, established in 2000 to promote information exchange among regulatory professionals, has become the industry's flagship regulatory event, regularly attracting over 700 senior representatives from the world's national regulatory bodies as well as private companies. Since 1998, BDT has published the *Trends in Telecommunication Reform* report to identify trends and emerging best practices in order to maximize the benefits of telecommunication development.

BDT is also empowering girls and young women to enter the growing field of ICTs and explore these new opportunities. The Girls in ICT initiative is a global effort to raise awareness on empowering and encouraging girls and young women to consider studies and careers in ICTs. To date, over 111 000 girls and young women have taken part in more than 3500 Girls in ICT Day events held in 140 countries around the world. The digital literacy campaign for women, launched in 2011 in collaboration with the Telecentre.org Foundation, has trained over one million unskilled women to use computers and modern ICT applications to improve their livelihoods.

To explore and capitalize on the opportunities offered by the rapid growth of mobile, in 2012, BDT launched the m-Powering Development and Smart Sustainable Development Model Initiatives. The m-Powering Initiative advocates for the development of technological innovations and initiatives that use mobile phones to deliver computing power to individuals and empowering development in areas such as health care, education, agriculture, commerce, banking, etc. The Smart Sustainable Development Model Initiative focuses on the link between ICT for Development (ICT4D), with ICT for Disaster Management (ICT4DM), and their role in sustainable development processes.

In close collaboration with other UN specialized agencies and programmes, BDT has also developed a number of applications and services supporting the deployment of ICT/mobile applications to improve people's lives worldwide. For example, in cooperation with WHO, ITU launched the Be He@lthy Be Mobile initiative in 2013 to combat non-communicable diseases.

BDT is also using telecommunications/ICTs to respond to natural disasters and is working with Member States and other partners to develop disaster telecommunication preparedness plans and strategies, including taking into account the need for resilient infrastructure and systems as part of disaster risk reduction and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early warning. In recent years, BDT has helped to deploy emergency telecommunication equipment to many countries in need.

Another major work area key to BDT is capacity building. The ITU Academy is a BDT initiative intended to assist developing countries through ICT education, training and development opportunities. Tailored training programmes are delivered in cooperation with numerous public and private sector partners under the Centres of Excellence (CoE) programme for government policy-makers and regulators, senior ICT executives and managers, technical and operational staff. Since the start of the initiative, thousands of professionals in the ICT sector have been trained across all regions. In 2014, the centres held over 128 training sessions which saw over 4400 ICT professionals trained through a combination of face-to-face and online training programmes.

BDT also administers the ICT Development Fund, a special programme launched in 1997. Funds are used by BDT for specific telecommunication development projects, primarily in the LDCs, small island developing States, landlocked developing countries and countries with economies in transition. Numerous telecommunication-related projects have been funded to date in all ITU regions.

Although BDT was originally established to promote technical cooperation and telecommunication development in response to inequities in access to telephony, the digital divide and inequality in access to ICTs remain surprisingly persistent. The digital divide continues to evolve and take on new forms, along with the technologies. BDT, and ITU more broadly, remain committed to connecting the world and all its citizens.

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Private Sector Involvement in ITU

An overview of private sector participation

Cooperation between governments and the private sector has been a vital feature of ITU since its very first years. In some countries, the development of telegraphy was mainly driven by the State (e.g. in France). In other countries, private companies drove the early growth of the telegraph industry (e.g. in Britain and the United States). Historically, this made private companies important partners in implementing the decisions of the Member States of the Union. Today, industry and governments continue to work together to shape the future direction of the telecommunication and information and communication technology (ICT) sector.

Even to this day, private companies retain a unique official status as Sector Members of ITU, rare among United Nations (UN) agencies. Several companies have a very long record of participation in ITU's work. From our records, around sixty companies which are still members today have been active over 25 years or more, an impressive record in a fast-moving industry (see list on pages 34–35). Why were private companies admitted, and why is private sector participation valued? Research in the ITU archives and historical records shows that the collaboration with what we might today call 'the private sector' has taken a number of forms:

- The first, and earliest, way in which companies participated in ITU was by **acceding to the Convention**. The first International Telegraph Convention (1865) stipulated that States were obliged to impose rules on private companies. At the second International Telegraph Conference (1868), it was already agreed to include a provision (Article 66) for private telegraph companies to accede to the Convention and its regulations in order to benefit from "the advantages stipulated in the Convention".

- With the establishment in 1869 of the ITU Bureau, a permanent secretariat located in Bern, Switzerland, with its important responsibility to collect, collate and publish information required for telecommunication operations, private companies could share and exchange **operational and administrative news** in the *Journal télégraphique* and through the *Notification*, the official monthly bulletin that was sent to all Member States.

- At the International Telegraph Conference in Rome in 1871–1872, ITU Member States decided to allow private companies to **attend and be represented in meetings** and ITU conferences with the right of discussion but without the right to vote (Rome Conference Rules, Article 4). As today, in the late nineteenth century, the private sector was a major partner in the technological development of the telegraph, telephone and radio. For example, in Britain, the telegraph system started out mainly as a private affair (at least until Britain nationalized its telegraph system in February 1870). Delegates at international conferences quickly realized they needed the collaboration of all the technical experts in the field, both from the Administrations and from the private companies involved in the practical operation of telegraph systems, to design regulations successfully in terms of common languages and codes, choice of apparatus and equipment permitting fast interconnection, harmonized tariffs and taxes.

- By 1925, the telecommunication industry was maturing, and a number of private companies were already established as key actors in the market. To keep up with the rapid pace of development in new technologies, during the 1920s, three **International Consultative Committees** (CCIs) were established, for the Telephone service (the CCIF in 1924), Telegraph (the CCIT in 1925), and Radio (the CCIR in 1927), whereby technical experts of various countries could meet to exchange views on technical and other problems. The work of the CCIs presented a significant new opportunity for private companies to become involved in ITU and its work.

- At the 1932 International Telegraph Conference in Madrid, more **formal conditions** for participation were introduced for companies (as well as Administrations) wishing to contribute to the work of the CCIs. Administrations and private enterprises interested in participating in the work of a CCI had to formally notify their interest and undertake to contribute to the general expenses of the Committee's meetings, while the Secretariat had an obligation to notify all the other members.

- The participation of private industry in ITU's work was further formalized at the Additional Plenipotentiary Conference in Geneva in 1992, which transformed the CCIs into 'Sectors': the Telecommunication Standardization Sector (ITU–T) and

Radiocommunication (ITU–R) Sector, while a new Development (ITU–D) Sector was established *(see separate articles in this edition on each Sector)*. Sector membership was established for companies and other entities. Private sector companies can now participate in ITU's work either as Sector Members or Associates in any or all of ITU's three Sectors to network with information and communication technology (ICT) regulators, policy-makers and experts from industry and academia, contribute to global standards and best practices, or participate in Study Groups on emerging issues in the ICT field. Today, ITU's work benefits from the insights and expertise of 567 Sector Members, 164 Associates and 92 institutions from Academia.

Looking back: A win-win relationship

In debating questions of technical tariffs, prioritization, censorship and interconnection, ITU Member States needed the collaboration of the private sector companies involved in the operation of telegraph systems for implementing the joint decisions, as well as sharing technical know-how and expertise, from the very beginning of their work. Private companies have an active interest in exchanging information about their networks and in participating in the development of service regulations to help expand their market and achieve scale for their technologies.

The strong and growing participation of private companies throughout the first sixty years of the Union suggests that many private sector companies found their participation valuable and worthwhile. Thirty-one companies from around the world attended three ITU Conferences or more in this period, a notable achievement in an era when intercontinental travel was generally more difficult. Of the 89 companies that participated in ITU's work in its first sixty years, 43 participated in two or more ITU conferences.

Indeed, at the International Telegraph Conference of Rome, 1871–1872, Mr Despecher, representing the seven submarine telegraph companies, thanked the Conference for having agreed to admit them to the proceedings. He hoped that their participation would contribute to extending the sphere of influence of the Convention, and he had every faith that this participation would enhance the Union (p. 262, Documents of the International Telegraph Conference of Rome, 1871–1872).

According to the minutes of the Rome Conference, a number of Administrations responded in kind and welcomed the participation of private sector companies in ITU Conferences. Speaking on behalf of the United Kingdom, Mr Champain considered their participation "a necessity — it would be almost impossible to resolve tariff questions without debating them directly with the representatives of the Companies". Mr Vinchent, the representative of Belgium, stated that the admission of private companies "would bring to the Conferences the sum of their insights and their presence would facilitate uniformity in regulation". Mr Brunner, the representative of Austro-Hungary, also recognized without any doubt the further advantages inherent in companies acceding to the Convention and accepting as far as possible the rules therein.

The growing participation by private companies all around the world accompanied the growing internationalization and geographical scope of the International Telegraph Convention. For example, the West India and Panama Telegraph Company and the Cuba Submarine Telegraph Company participated from 1879 onwards for six or more Conferences each.

Looking forward: Implications for the future

Cooperation between governments and the private sector continues to be a core principle of ITU in its work today. Over nearly two centuries, the telecommunication industry has grown to subsume its early predecessor, the first global communication technology of telegraphy, and in turn now forms part of a broader, more extensive ICT sector. The industry has transformed beyond recognition in terms of scale and scope, as well as the technologies used. ICTs nowadays permeate the very fabric of society, as modern processes and operations become automated and digitized.

In some countries, telecommunications/ICTs has remained a State-owned industry since its inception. In other countries, the telecom/ICT industry has been nationalized and then privatized again. A number of companies with which ITU has longstanding relationships over a number of decades were State-owned incumbents and made the transition to private ownership, following full or partial privatization. Beliefs surrounding the efficiency of monopolies versus competition have altered, while the definitions — and terminology — surrounding the private sector are subject to continual change.

The relationship between States and private companies both in telecommunications and in other sectors is dynamic and constantly in flux, and continues to evolve. Unique among the UN, ITU benefits from the membership of both Member States and private-industry Sector Members, and will continue to enjoy the ongoing 'win-win' relationship between them in its endeavours. ITU's work demonstrates how industry and government can collaborate together towards reaching common goals, including the scaling of technology to connect more and more people and to bridge the digital divide. Private and State entities will continue working in partnership at ITU, in the culturally innovative environment that they have successfully created together over a period of a century and a half.

This article is adapted from research undertaken by the Library and Archives Service, based on the records of ITU conferences and CCI plenary assemblies, the ITU Journal and ITU's official monthly Notification bulletin sent to all Member States.

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ITU Sector Members with a long-standing record of participation in ITU's work

ITU's longest standing Sector Member

Cable & Wireless Communications Plc	United Kingdom	1871

More than 75 years with ITU

AT&T, Inc.	United States	1925
Thales SA and Thales Communications & Sécurité SAS	France	1925
TELECOM ITALIA S.p.A.	Italy	1925
Robert Bosch GmbH	Germany	1929
Telefónica, S.A.	Spain	1929
EXELIS, Inc.	United States	1929
SIRTI S.p.A.	Italy	1931

More than 50 years with ITU

British Broadcasting Corporation (BBC)	United Kingdom	1948
Teléfonos de México S.A.B. de C.V.	Mexico	1948
Rai Way S.p.A.	Italy	1950
Nippon Hoso Kyokai (NHK) (Japan Broadcasting Corporation)	Japan	1952
The Japan Commercial Broadcasters Association	Japan	1952
KDDI Corporation	Japan	1953
Nippon Telegraph and Telephone Corporation (NTT)	Japan	1953
SAGEMCOM	France	1954
Alcatel-Lucent International	France	1954
Verizon Communication Corporation	United States	1960
Compañía Dominicana de Teléfonos, C. por A. (CODETEL)	Dominican Republic	1960
Telefon AB — LM Ericsson	Sweden	1960
Aviation Spectrum Resources, Inc.	United States	1963
Rohde & Schwarz GmbH & Co. KG	Germany	1964

More than 25 years with ITU

Prysmian S.p.A.	Italy	1966
Nokia Corporation	Finland	1967
Compañía Anónima Nacional Teléfonos de Venezuela (CANTV)	Venezuela	1968
Norddeutscher Rundfunk (NDR)	Germany	1968
JDSU Deutschland GmbH	Germany	1968
Deutsche Welle	Germany	1968
Zweites Deutsches Fernsehen	Germany	1969
British Telecommunications Public Ltd. Co. (BT Plc)	United Kingdom	1969
Telesat Canada	Canada	1970
Empresa Brasileira de Telecomunicações S.A. (EMBRATEL)	Brazil	1971
Philippine Long Distance Telephone Co. (PLDT)	Philippines	1975
Intelsat	United States	1976
Eutelsat S.A.	France	1982
KT Corporation	Republic of Korea	1982
C.B.S., Inc.	United States	1983
Corning Incorporated	United States	1983
Motorola Solutions Inc. and Motorola Mobility LLC	United States	1984
Zain Kuwait	Kuwait	1984
Fujitsu Limited	Japan	1985
Hitachi, Ltd.	Japan	1985
NEC Corporation	Japan	1985
OKI Electric Industry Company Ltd. (OKI)	Japan	1985
Toshiba Corporation	Japan	1985
Mitsubishi Electric Corporation	Japan	1985
CANON Inc.	Japan	1985
Cisco Systems, Inc.	United States	1986
Telecom New Zealand (Spark NZ Limited)	New Zealand	1987
Royal KPN N.V.	Netherlands	1989
SES ASTRA S.A.	Luxembourg	1989
MEO — Serviços de Comunicações e Multimédia, S.A.	Portugal	1989
Abertis Telecom Terrestre, S.L.	Spain	1990
HISPASAT, S.A.	Spain	1990
Sony Corporation	Japan	1990
Hughes Network Systems, Inc.	Unites States	1990
Japan Radio Co. Ltd.	Japan	1990
CenturyLink	United States	1990

National celebrations around the world

ITU membership and other stakeholders around the world are planning various activities to celebrate the ITU's 150th Anniversary. So far there are more than 80 activities being organized throughout the year to commemorate the history of ITU and its membership, and a map marking these worldwide events is available on the 150th Anniversary website: http://itu150.org/worldwide-events/

On 17 May 2015, ITU will hold its main celebratory event alongside this year's World Telecommunication and Information Society Day (WTISD), with the overall theme 'Telecommunications/ICTs: Drivers of Innovation'. Some members are planning to have an event around the same time to mark the date the original Telegraph Convention was signed back in 1865. Other members have ITU150 celebrations taking place throughout the whole year, based on the ITU monthly thematic calendar. A toolkit and guidelines are available for ITU membership to support their preparation for ITU150 celebrations.

There are various ways in which membership and other stakeholders can become involved in ITU's 150th Anniversary celebrations. These include: organizing an exhibition, competition, or event, launching a project or initiative, issuing a publication, or creating a website, for example.

A number of Member States have expressed their interest in issuing a commemorative stamp or envelope dedicated to ITU's 150th Anniversary (including Argentina, Brazil, Belarus, Bolivia, Bulgaria, Croatia, Ethiopia, Indonesia, Kenya, Kuwait, Moldova, Monaco, Mozambique, Nicaragua, Oman, Portugal, Russia, Switzerland and Thailand).

Several countries have launched competitions to raise awareness about information and communication technologies (ICTs). Spain has the 'Mobile Photo Contest: Technology in our life', Ukraine the 'Competition of scientific works', Uganda the 'Digital Impact Awards Africa', and Uruguay the 'CX Award in Communications'.

Special exhibitions and expositions dedicated to ITU's 150th Anniversary are also scheduled in 2015 and include: Argentina's 'Be part of history', Togo's 'ITU history — Togo history', Portugal's 'The Submarine Cable in a sea of connectivity', Côte d'Ivoire's 'exhibition about history of ICTs', and a United States exhibition dedicated to World Amateur Radio Day on the theme of 'Global Communication and Friendship for All'.

If you are planning an ITU 150th Anniversary activity, we would love to hear about it and feature it on our anniversary website itu150.org.


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Transforming Telecoms: From the Past into the Future

Over the 150 years since ITU was established, information and communication technologies (ICTs) have changed beyond all recognition from standalone telegraphs to today's 'smart' communications embedded, often invisibly, in the environment around us. Telecommunications, information technology (IT) and computing have become infinitely more converged, powerful and versatile. As the price of handsets has fallen and their functionality increased, the majority of people on the planet will soon hold in their hand a device with higher processing power than the most powerful computers from the 1980s. The networks, devices and Internet of today already look completely different to those of the early millennium. This article identifies several key trends that have transformed telecommunications/ICTs over recent decades, and considers how they may contribute to our networked world in the near future.

Mobile, miniature and multiple: Connected devices of course have become portable, smaller and more numerous (Figure 1). In future, we are likely to enjoy even higher speed connectivity while on the move, roaming seamlessly between networks anywhere, anytime, via any device with what has been called 'ubiquitous connectivity'. Moore's Law continues to hold surprisingly consistent (even though Gordon Moore himself recently, in March 2015,

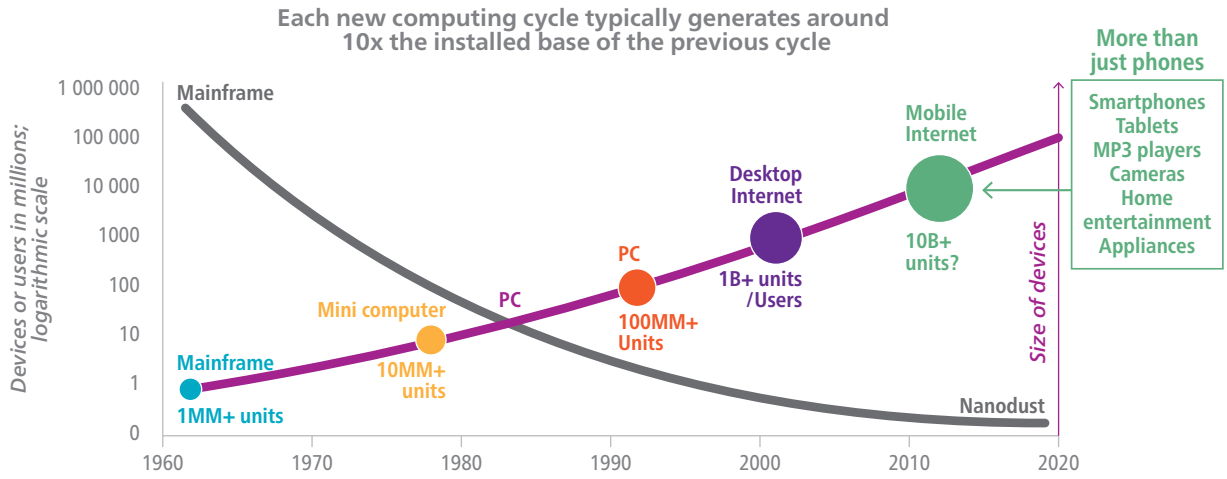
foresaw his Law "dying within the next decade or so"). Technology analyst Mary Meeker estimates that each new computing cycle has typically generated around ten times the installed base of the previous computing cycle (Figure 1). By 2015, the number of connected devices worldwide was estimated to be at around 15.8 billion, outnumbering connected people by a ratio of two to one. By 2020, this ratio could be at least six to one, transforming our concept of the Internet, as well as our connected society, forever.

Mobile phones designed primarily for voice connectivity on the move have expanded to become our portable news outlet, camera, video, wallet, social network and phone directory, compass, metal detector or even a crowdsourced seismometer (Figure 2). Now, if Google's Ara project for a 'modular' smartphone proves successful, phones may even 'go to pieces' on us and disintegrate, overcoming the limitations of their hardware, as users will be able to swap parts (such as screens and cameras) while on the move.

In 2001, modern telecommunications and the Internet were credited with the **death of distance**, as the Internet and communications put people in touch the world over. Mobile phones may now result in the **death of location** — people can talk, work or surf entertainment wherever they are, regardless of any traditional locations for these activities (e.g. the workplace for work, social clubs or the home for entertainment).

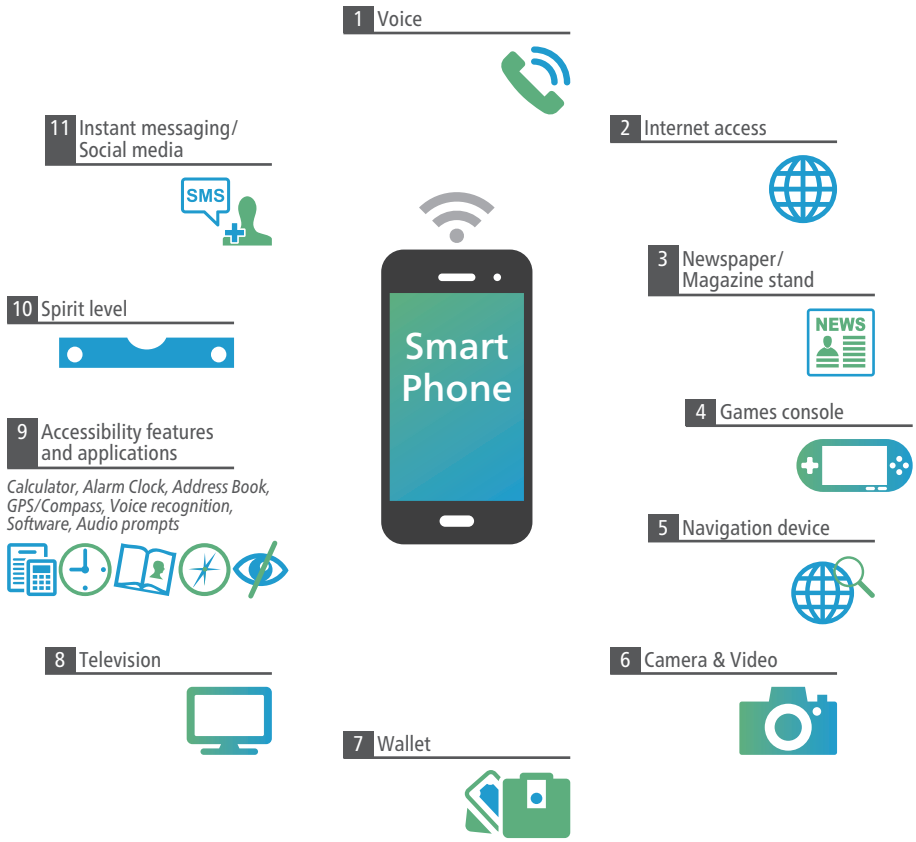
The proliferation of devices and new forms of social media mean that the boundaries between people's personal and professional lives are blurring (do you keep Facebook for friends and personal updates, and LinkedIn for colleagues?). Indeed, social media have transformed content creation from one-way 'one-to-many' broadcasts to 'many-to-many' interactive conversations, as people exchange news and views via a range of different platforms. Social media services (including Facebook, Twitter and LinkedIn) are making communications between individuals more dynamic, interactive and real-time. Information is now a perishable product, with a shrinking lifespan, as web traffic now reflects trending, real-world events in real-time. Social media enables us to get in touch and stay in touch, while wondering whether our 'friends' really are friends. There may not be a 'thumbs-down' icon on Facebook yet, but the registration process for '.sucks' is proceeding apace.

1 *Miniaturizing and multiplying — getting smaller and more numerous*



Adpated from Mary Meeker's Internet Trends Report 2014, available at: http://qz.com/214307/mary-meeker-2014-internet-trends-report-all-the-slides/

2 *Your smartphone as a portal to the online world*



Enter the Internet of Things: After more than a decade of debate, discussion and anticipation, the 'Internet of Things' (IoT) may finally have arrived. According to the ITU Internet Report, 2005, IoT and our hyperconnected world encompasses a set of technological advances from different fields — wireless and mobile connectivity, miniaturization, nanotechnology, radio-frequency identification (RFID) and smart technologies. Advances in these technologies, taken together, could help realize a miniaturized, automated Internet of connected devices communicating regularly and relatively effortlessly through real-time updates in a fully connected environment. Debates continue as to how much M2M traffic will be communicated over the Internet, and the role of interoperability in this context. But M2M and the IoT open doors to communications — and data — on a scale hitherto unimaginable. Meanwhile, techniques such as Software Defined Networking (SDN) and Network Virtualization are helping make networks more scalable and flexible, allowing them to follow the waves of information coming from different services and applications more efficiently and dynamically.

Growth in the data universe: The flipside to this growing connectivity is growth in the size of the data universe. Partly due to the Internet of Things, the International Data Centre estimates that the digital universe is doubling in size every two years and will multiply tenfold between 2013 and 2020 — from 4.4 trillion gigabytes in 2013 to 44 trillion gigabytes in 2020. Currently, 60% of all data in the digital universe is attributed to industrialized 'mature' markets such as Germany, Japan, and the United States, but by 2020, the percentage will flip, and emerging markets (including Brazil, China, India, Mexico and Russia) will account for the majority of data. Harnessing the power of the data universe, while introducing safeguards against potential abuse, is likely to be one of the most urgent challenges for the future.

The trends of growth in power, versatility and scale, look set to continue. But one thing is for sure — in the exciting worlds of telecoms and ICT, we never know what the future will bring.

Statements on the occasion of the ITU's 150th Anniversary

By H.E. Mohamad Ahmad Al Qemzi

Chairman, Board of Directors, Telecommunications Regulatory Authority, United Arab Emirates, Gold Partner

The world will witness a precious occasion on 17 May 2015, when we celebrate the 150th anniversary of the oldest United Nations (UN) agency, the International Telecommunication Union (ITU). As the UN specialized agency for Information and Communication Technologies (ICTs), ITU has an ongoing mission and commitment to connect all of the world's people.

The ITU was founded in 1865 as the International Telegraph Union. Over the years, the Union's activities have expanded to include the entire ICT sector, as well as digital broadcasting, the Internet, mobile technologies and high-definition (HD) TV. These global technological advances have been accompanied by the development of standardization frameworks, and ITU has played a pivotal role in shaping these frameworks since its inception. The ITU's roles and objectives have been centered at the heart of the ICT sector as a mediator to facilitate access to new technologies and the distribution of global resources, including radio-frequency spectrum and satellite orbital positioning, among other important resources, in order to create a seamless global communication system characterized by strength, reliability and continuous innovation.

The United Arab Emirates (UAE) is pleased to be among the ITU's Member States that have left a clear mark through solid participation and representation in the Union and its activities. The UAE joined ITU in 1972, after its independence on 2 December 1971, and has supported the ITU's activities ever since. At the 2006 Plenipotentiary Conference, the ITU's highest decision-making conference, held in Antalya, Turkey, the UAE was represented by the Telecommunications Regulatory Authority (TRA), marking a new chapter of mutual cooperation upon the UAE's accession to membership of ITU Council (the ITU's governing body between Plenipotentiary Conferences) for the very first time. This was a formidable endeavour for the UAE, considering that the TRA had been established only two years earlier.

Since then, the UAE Administration has not looked back. In 2012, the UAE succeeded in hosting and chairing a series of important international ICT conferences, including: ITU Telecom World 2012; the World Telecommunication Standardization Assembly 2012 (WTSA-12); the World Conference on International Telecommunications (WCIT-12); and the World Telecommunication Development Conference 2014 (WTDC-14).

These Conferences have resulted in a number of outputs and important decisions that have contributed to the identification of the ITU's future strategies. They have also played a primary role in helping the leadership of the telecommunication/ICT sector become ever more refined and progressive by providing services for Member

TRA هيئة تنظيم الاتصالات
TELECOMMUNICATIONS REGULATORY AUTHORITY

States to further the principles of collaboration on which the ITU was founded.

The UAE successfully hosted the World Telecommunication Development Conference 2014 (WTDC-14), which achieved its purpose in developing the necessary plans to expand and utilize the telecommunication/ICT sector to reach those who need it most. Along a similar note, and in line with the Dubai Action Plan, the UAE has been an active partner and sponsor of ITU at the World Summit on the Information Society (WSIS) activities, both in terms of stocktaking and in forum-related matters.

Building on the successes of 2012 and 2014, the UAE actively participated in the work of the last Plenipotentiary Conference, held in Busan, Republic of Korea, from 20 October to 7 November 2014, and was successfully re-elected to the ITU Council for the third time in a row to join the 48 Council Member States. In addition, the UAE was also elected to the membership of the twelve-member Radio Regulations Board. Another milestone was the ITU's membership support for the United Arab Emirates to host the next Plenipotentiary Conference, to be held in 2018.

The United Arab Emirates, represented by the TRA, continues to support ITU and its work by contributing actively in the organization's initiatives and activities, as well as entering into bilateral partnerships in a number of leading projects and endeavours. Our desire to host a celebratory event for the ITU's 150th anniversary, as well as our active role on the ITU Council 150th Anniversary preparation committee, is testimony of our sincere commitment.

We wish a prosperous future to the International Telecommunication Union and another successful and bright 150 years to come, filled with intense support from all Member States for the ITU's projects and activities. This organization has offered countless opportunities to individuals all over the world to take advantage of modern digital communications and set objectives to achieve the goals of sustainable development.

By H.E. Hamad Obaid Al Mansoori

Director General, Telecommunications Regulatory Authority, United Arab Emirates, Gold Partner

I am pleased to convey my congratulations on the 150th anniversary of ITU, the principal organ of the United Nations on ICT and telecom related matters. ITU, which started modestly with 20 participating members, now proudly stands firm with the support of 193 Member States in addition to Sector Members, Associates and Academia. The organization which was founded as the International Telegraph Union has emerged as a multi-faceted specialized UN agency dedicated to saving lives in emergencies, assisting developing countries in their ICT projects, developing technical standards for ICT services and facilitating the management of scarce resources. As we mark the sesquicentenary of ITU, let us pledge to work even harder to further the vision and mission of ITU and build a future where all members of the human family are connected and enjoy access to ICT services.

Contributions from the following partners are supporting various global activities related to ITU's 150th Anniversary

Gold Partners

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The Republic of Azerbaijan

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Union - Discipline - Travail

Côte d'Ivoire (Republic of)

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Republic of Zimbabwe

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A R T

RÉPUBLIQUE CENTRAFRICAINE

Central African Republic

НРТБ

HUAWEI

inmarsat

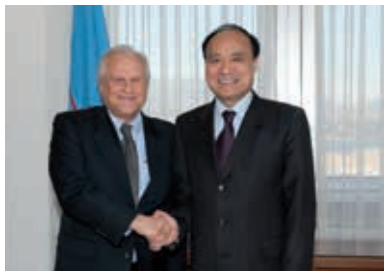
NTT Group

ROHDE&SCHWARZ

Rostelecom

Official Visits

During March 2015, courtesy visits were made to ITU Secretary-General Houlin Zhao by the following ministers, ambassadors to the United Nations Office and other international organizations in Geneva, and other important guests.



Houlin Zhao, ITU Secretary-General and Martin Sajdik, President of the Economic and Social Council (ECOSOC)

Allam Mousa,
Minister of Telecommunications and Information Technology, Palestine

Xie Feibo,
Director-General, Bureau of Radio Regulation, Ministry of Industry and Information Technology, China

Dr Fang Liu,
Secretary-General Elect, International Civil Aviation Organization (ICAO)

From left to right: François Rancy, Director of the ITU Radiocommunication Bureau; Aarti Holla, Secretary-General of the European Satellite Operators' Association (ESOA); and Houlin Zhao, ITU Secretary-General, at the signing of the Memorandum of Understanding between ESOA and ITU

Ekwow Spio-Garbrah,
Minister for Trade and Industry, Ghana,
and former CEO of the Commonwealth
Telecommunications Organisation (CTO)

Aiyaz Sayed-Khaiyum,
Attorney General and Minister for Finance,
Public Enterprise, Public Service and
Communications, Fiji

Manuel González Sanz,
Minister of Foreign Affairs, Costa Rica

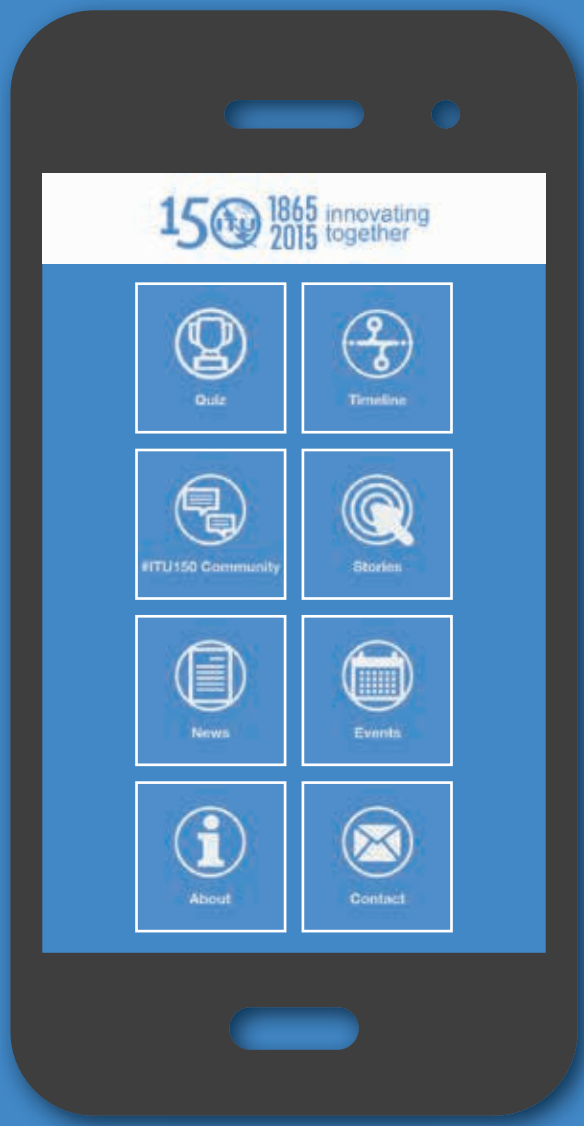
From left to right: DS Park, Executive Director,
European Public Affairs, Samsung Electronics;
Kim Sang Woo, President of Corporate Affairs,
Samsung Electronics; and Houlin Zhao,
ITU Secretary-General

From left to right: Stuart Carlaw, Chief Research Officer,
ABI Research; Aaron Boyd, Chief Strategy Officer,
ABI Research; and Houlin Zhao, ITU Secretary-General

All photos are by Charlyne Restivo/ITU.

ITU 150th Anniversary App

Download the ITU150th Anniversary app to test your knowledge on the history of ITU and telecommunications with our quiz and earn your 'ITU150 Expert Badge'. Other special features include our historical timeline, global stories, news, worldwide events and #ITU150 community.



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ITU Telecom is part of ITU, the lead United Nations agency for information and communication technology.
ITU Telecom organizes the annual influential ITU Telecom World event, bringing together key players from across the global ICT community in strategic debate, knowledge-sharing and networking at the highest level.