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50 years of CCITT/ITU-T 1956 - 2006

Standardization

Driving global communications

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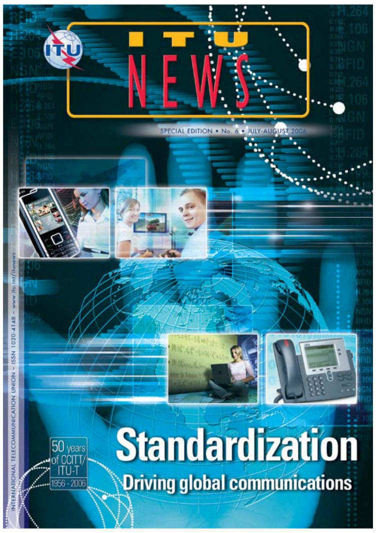

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C O N T E N T S

No. 6 JULY-AUGUST 2006

SPECIAL EDITION:

Standardization — driving global communications

ITU's role as a developer of internationally recognized standards for the telecommunication industry goes as far back as the organization itself. ITU was formed in 1865 to harmonize European telegraph systems and facilitate the transmission of messages across national borders. Fifty years ago in 1956, ITU's core standardization activities were centralized under the *International Telephone and Telegraph Consultative Committee* (known under its French acronym, CCITT). This signalled a new era for standardization, acknowledging the need for a specific standards making-entity within ITU. In 1993, CCITT was transformed into the Telecommunication Standardization Sector (ITU–T).

ITU standards have formed the backbone of the world's communication systems at each stage of technological advance. The *Timeline* on pages 9–14 highlights some of the most influential standards produced by ITU, while articles examine in more detail work on such important areas as next-generation networks (NGN) and radio-frequency identification (RFID) technology.

C O N T E N T S

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ITU standards must remain a pillar of progress

Yoshio Utsumi
ITU Secretary-General

Since its inception in 1865, ITU has been working towards interoperability for the telecommunication industry. But the year 2006 takes on heightened significance. It marks a half-century since standardization within ITU was brought under a single, specific entity. In 1956, two technical committees were merged to create the International Telephone and Telegraph Consultative Committee (known under its French acronym, CCITT), where all standards-setting activities of ITU were consolidated for wire and wireless networks. This was an acknowledgement of the significance of standardization in telecommunications. CCITT was transformed into the ITU Telecommunication Standardization Sector (ITU–T) in 1993.

For almost the entire history of ITU, standardization activities remained relatively simple. They were dedicated to establishing agreed protocols to secure interoperability of networks. A common scenario then was: one country, one telecommunication provider. However, today, after the onset of liberalization and competition in many parts of the world, the picture is much more complicated. Often, technology is tested in local markets before the wider — global — market's considerations are taken into account. And while this has allowed rapid progress of technology, it has often been at the expense of interoperability and global harmonization.

Liberalization and the ever-evolving technology behind today's communications mean that standards developers have to learn to adapt continuously. Today's players in the information and communication technologies (ICT) industry have to find the right balance between serving the global market by developing the necessary standards, and making profit through rapid implementation of newly invented technologies.

ITU has a responsibility to its members to find the best way of achieving this balance, while ensuring the development of a just information society. Therefore, I firmly believe that ITU should urgently take the lead in developing the global vision and planning for standards, in cooperation with other standards-setting bodies, in particular the International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC), the Internet Engineering Task Force (IETF) and the Institute of Electrical and Electronics Engineers (IEEE), as well as other key forums and consortia. The ultimate objective is to have common recognition of an appropriate role for each standards-setting body so that, together, we can develop useful ICT standards and ensure global interoperability.

Celebrating the achievements of the past 50 years gives us an excellent opportunity to examine the role of ITU in future standards development. As we celebrate on 20 July 2006 with some of the top executives from the world of ICT, we must also develop a vision that will help ensure that ITU standards remain a pillar of progress. This is crucial, as standardization has an important role in helping to bridge the digital divide that exists both among and within countries.

Turkey signs agreement with ITU on hosting the upcoming Plenipotentiary Conference

An agreement was signed on 5 June 2006 between ITU and the Government of Turkey on hosting the seventeenth ITU Plenipotentiary Conference in Antalya on 6–24 November 2006. The signing ceremony was held at the ITU headquarters in Geneva, with the participation of Tayfun Acarer, President of the Turkish Telecommunications Authority, and ITU Deputy Secretary-General Roberto Blois (on behalf of Secretary-General Yoshio Utsumi).

Tayfun Acarer, President of the Turkish Telecommunications Authority (left), and ITU Deputy Secretary-General Roberto Blois

Mr Blois commented that the upcoming Plenipotentiary Conference would be the third major ITU event to be organized in Turkey. He said that it showed how the international community had recognized the country's role "at the forefront of the reform process in the telecommunication sector." The World Radiocommunication Conference was hosted by Turkey in Istanbul in 2000, as was the World Telecommunication Development Conference in 2002.

Sungate Port Royal Hotel in Antalya will be the venue for the conference. Further information on the event is available at http://www.itu.int/plenipotentiary/2006/ and at a host country website http://www.pp06.org/

ITU Secretary-General honoured by Geneva

The State Council of the Republic and Canton of Geneva announced on 7 June 2006 that it has granted honorary citizenship to ITU Secretary-General Yoshio Utsumi and his wife, Masako. The award recognizes the key role Mr Utsumi has played at the helm of ITU, particularly his efforts to promote universal access to information and communication technologies (ICT), and his major contribution to enhancing the reputation of the Canton of Geneva by organizing the World Summit on the Information Society and TELECOM exhibitions and forums.

JPEG marks 20th anniversary with new compression standard

The twentieth anniversary of the formation of the Joint Photographic Expert Group (JPEG) by CCITT/ITU–T and the International Organization for Standardization (ISO) has been marked with the release of an alpha version of software for a new, more efficient compression scheme for images. The new ITU extension to JPEG (known as ITU–T Recommendation T.851) means that images will take up less space on people's hard drives or digital cameras.

ITU–T Recommendation T.851 is a royalty-free extension to T.81, which is more commonly known simply as JPEG. The program allows users to input image files for compression at a more efficient rate. T.851 also extends the precision of JPEG to a maximum 16 bits per colour component, which is seen as essential in applications such as medical imaging, professional photography and high quality printing. The group responsible for producing the open source software is inviting people to test and contribute to the development of the project.

JPEG was founded in 1986 and the original standard T.81 is its most famous product. It is the most widely used format for storing and transmitting photographs on the internet, in digital photography and in many other image compression applications. ■

Digital cameras use the JPEG standard

Fotosearch

Next-generation networks and industry convergence:

A standards challenge

By Houlin Zhao

In the last ten years, telecommunication networks have carried a burden of heavy data traffic for which they were never designed. That they have been able to carry this massive amount of data is testament to the solid nature of the underlying technology. This is technology that is fully reliant on a sophisticated mesh of international standards, many of which have a home in ITU. Now the scene is set for a fundamental change in the way that all of this traffic is carried. A converged network carrying video, data, voice, games and all based on the same — packet — technology that gives us the internet is the demand of industry. And crucial standards work to facilitate this move is well under way across the world, spearheaded by the Next-Generation Network Global Standards Initiative (NGN-GSI) of the ITU Telecommunication Standardization Sector (ITU–T).

Industry convergence: The road is rocky

The world's businesses in information and communication technologies (ICT) are taking the first steps towards defining an altogether new working environment. Throw traditional television and radio broadcasters as content providers into the mix and the scene is set for a revolution in the way that we communicate and process information. To many outside the industry, this news may be prosaic — after all, the distinction between the two is already blurred. Your internet connection comes via a telephone line, right? And in many cases it is a telephone company that is your internet service provider. The bottom line is that consumers do not care from where the service is coming or on what platform. Why should they, as long as they are getting what they want, good service?

It is in the underlying technologies that provide these services that the revolution is taking place. And while this convergence has been creeping up on us for a number of years, we are approaching the most crucial and difficult stage.

History plays a part in determining the difficult nature of this transition. These industry sectors come from quite different backgrounds. The telecommunication industry can trace its roots back as far as the middle of the nineteenth century. But it was nearly a hundred years later that the modern age of computing started. To further complicate matters there is

Houlin Zhao, Director, ITU Telecommunication Standardization Bureau also the issue of regulatory environment, specifically the largely unregulated one from which the computer industry has sprung and the more heavily regulated communications and media industries.

Voice, video, and data convergence is easy to see. Market deregulation and globalization have led to unprecedented levels of innovation and competition in the sectors — and there are obvious synergies. But the road to true convergence is rocky. Different architectures, business models, and philosophies have led to the formation of distinct camps. And while convergence is a word that has been on everyone's lips for years, it is only now that the advent of the next-generation network (NGN) concept has us moving towards a truly converged ICT world.

Setting the scene: An industry overview

While traditional carriers are looking to move up the value chain into data and audiovisual content offerings, large internet application service providers with strong brands and often large cash piles are entering voice markets and even, in some cases, infrastructure provisioning. Television and radio broadcasters are looking to provide content in different media.

Traditional telecommunication carriers are faced with fierce competition, rapid convergence, and separate infrastructure for voice and data businesses. Almost all of them have begun an examination of the business requirements and necessary investments to move to a common internet protocol (IP)-based infrastructure and deploy high-speed connectivity to customers.

For providers of services such as internet, broadcast TV, radio, telephony and e-mail, it is increasingly obvious that alternatives to their current infrastructure may provide more cost efficiency and bring the ability to offer a wider variety of services. This convergence needs an underlying infrastructure to deliver and support it. IP is a way to manage this converged traffic and service in a new and more sophisticated market. Importantly for telcos (telecommunication companies), it will also level the playing field and allow traditional players to compete with the "upstarts" of the internet world.

This shift from the traditional public switched telephone network (PSTN) to a fundamentally different infrastructure, however, presents what some say is a Herculean task for the telecommunication industry. Certainly, it is one of the most complex transitions ever to have occurred in telecommunications.

First steps towards NGN standards

Convergence between PSTN, internet, cable television (CATV), wireless local area network (WLAN) and mobile technologies is a task that many believe is impossible without the development of global standards spanning these technologies and defining how each will interoperate. ITU has worked on NGN for some years but, in May 2004, the work

Nokia

towards the goal of standards to support NGN found a new home at ITU with the formation of the Focus Group on NGN (FGNGN). Focus Groups provide an effective and rapid response mechanism for progressing the work of ITU–T.

Industry is backing NGN to the tune of billions of dollars. We see evidence of this both in terms of announced plans by many operators around the world to shift to a packet-based network, and in the investment that industry is making in standardization. ITU is proud that the world's manufacturers of telecommunication equipment, network and service providers, and administrations have entrusted it with this work. They understand that global standards will stimulate innovation and state-of-the-art technology and will enable interoperability, protecting current and future investment. ITU's status as an international organization, and its unique partnership between industry and governments, means that it is the only body in the world that will be able to offer the necessary convergence between different NGN platforms on a global basis.

NGN is a term that is now understood, as defined by ITU experts, to describe networks that use IP to transport data — whether that data is voice, video, internet, or e-mail, for example. But, also importantly, NGN must support legacy services and allow the circuit-switched infrastructure to still work. Network operators need to ensure that if they are migrating to IP-based infrastructure, there is continued support for legacy systems. This is particularly relevant for the developing world, where broadband access will remain a dream for many inhabitants.

However, few doubt that the existing PSTN will eventually be replaced by infrastructure that delivers end-to-end IP service.

NGN takes advantage of rapid advancements in technology such as the increase in core and access bandwidth capacity, and in a revolutionary way for voice traffic to be handled — voice over IP (VoIP). Since extending the reliability of telecommunication networks into IP-based systems is key to the success of NGN, quality of service (QoS) specifications have been a strong focus of NGN work. In addition, important topics have been covered that include security aspects, universal access, and the separation of services from the underlying network. NGN will raise the quality threshold traditionally associated with IP to PSTN levels and better.

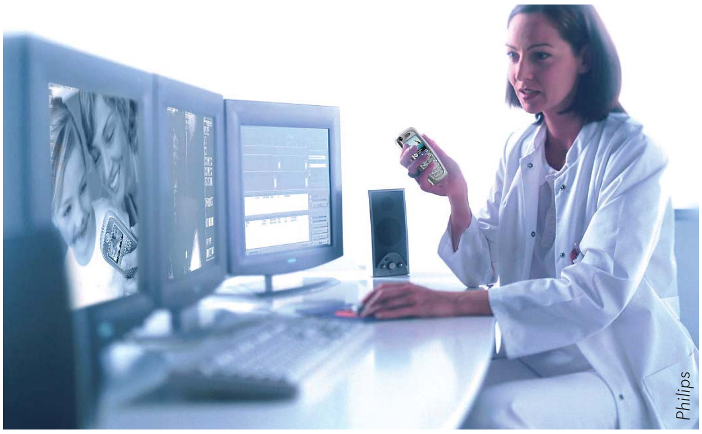
In the NGN world, today's services will be delivered at lower cost by removing duplication in networks, and future service delivery will be underpinned. For traditional PSTN operators, the move to NGN will simplify operations considerably. This has led to demand for an approach that is multi-service and future proof. These companies are looking to migrate to NGN so that they can reduce costs and provide a wider range of services. For many of these businesses, the potential capital and operational cost savings of running multiple services on a single infrastructure are too good to ignore. One European telco — BT — has put a figure of EUR 1.45 billion on savings that it expects to make by moving to leaner IP-based networks. The other driving force for this move is the market. Today's consumers, be they business or home users, have a far more sophisticated set of requirements than before. Service differentiation will be key to the survival of players in this field.

In the mobile market, handsets need to offer ever-increasing and sophisticated functionality. The ability to quickly roll out and support these "value-adds" has to be there. NGN will allow service providers to more quickly respond to new service requirements. In addition, the mobility concept in NGN will give users and devices the ability to communicate and to access services regardless of changes of location or technical environment. This merging of the previously distinct worlds of fixed and mobile telecommunications into a coherent whole represents the most obvious form of convergence, and stems from a user need for simplicity.

Broadband has driven the demand from internet users for voice services, video and online games, and increasingly, people will expect to watch broadcast quality television on demand and wherever they are in the world.

These new technologies have not taken the industry by surprise, but they have developed rapidly. The need for standardization to support these services is imperative. Standards will foster an environment where

Cisco



Voice, video and data services are converging

service providers can pick and choose equipment from a variety of suppliers, and also ensure that networks belonging to one operator interoperate with another's. In short, global standards mean global interconnectivity and interoperability.

First results

Intense work took place in the Focus Group on Next-Generation Networks from its formation in 2004. And the all-encompassing nature of NGN has made this topic a key area of study for most ITU–T study groups. For example, Study Groups 2, 4, 11, 13 and 19 now have a significant NGN focus. Study Group 13 is the lead Study Group for NGN activities. These study groups are moving towards the development of standards that will define services, network, and systems architecture in IP-enabled next-generation communication systems.

The 18-month lifetime of FGNGN (its mandate ended in November 2005) saw great momentum in the work on NGN, characterized by growth in participation and in the number of contributions from the ITU–T membership. FGNGN held nine meetings, received more than 1200 input documents and attracted more than 1400 participants. On 18 November 2005, FGNGN issued the first set of "draft deliverables" for next-generation networks. Some of the high-level architecture and frameworks for NGN are contained within its 900 pages.

The definition of a general NGN environment will give the world's systems vendors and service providers the confidence to move to NGN. Defining this scope was a very important part of early NGN work. ITU's next phase of NGN work — under the banner of NGN-GSI (for global standards initiative) — will focus on the detailed protocols necessary to offer the wide range of services expected in NGN. It is also expected that GSI will aim to harmonize different approaches to NGN architecture in different parts of the world.

Next steps

NGN-GSI will build on the momentum generated in the Focus Group on Next-Generation Networks. The period 2004-2005 saw meetings and workshops that progressed the work on NGN around the world. Participation in, and contributions to, this work are continuing to increase. In 2005, there were four NGN workshops, including one held in collaboration with the Internet Engineering Task Force (IETF). In 2006, there have already been three workshops, including one collaboration with the Alliance for Telecommunications Industry Solutions (ATIS) in Las Vegas, United States; one in Hanoi, Viet Nam; and one focusing on NGN and its Transport Networks in Kobe, Japan.

The meeting schedule for this next phase of ITU–T NGN work has been designed to continue the brisk pace established during the first phase.

Study Group 13 is developing a Release plan for ITU–T NGN Recommendations indicating where the work is being, or will be, done and by when. FGNGN's deliverables are being processed as draft Recommendations (where appropriate) either by Study Group 13 or by other study groups, depending on the subject.

January 2006 saw a gathering of hundreds of NGN experts in Geneva for the first NGN-GSI (global standards initiative) event. Good progress was reported in several key areas. For example, Study Group 13 alone saw over 250 contributions, many a result of the work of FGNGN. It is expected that many other of its outputs will be considered at the second NGN-GSI meeting in July 2006.

International cooperation

On many levels, NGN represents an unprecedented example of unification, bringing together as it does some very important constituents of the global economy. From an ITU perspective, we have seen experts from across the 13 study groups pooling efforts and adjusting to new work programmes. From a standards world perspective, we have witnessed great cooperation with forums and other standards-development organizations (SDO). Ongoing involvement of other SDOs and regional standards organizations in NGN planning and standards-development activities is essential.

In short, we believe that we are well on track to ensure that the roll-out of this revolutionary new approach to information and communication provision is underpinned by a solid standards foundation. ■

CCITT ITU-T 50 YEARS 1956 2006

STANDARDIZATION TIMELINE

ITU standards have played a vital part in shaping the information and communication technologies (ICT) and services of today. As of June 2006, there were 3145 ITU–T Recommendations (standards) in force. This work has rapidly gained pace in recent years. In 2005, for example, 62 new Recommendations were approved, 89 revised and 101 amended. Here, we highlight just some of the main achievements in standardization, as well as some key moments in CCITT/ITU–T history.

1956 ~ The creation of CCITT

In the mid-twentieth century, telephony and telegraphy were using the same transmission channels, wires, cables and radio circuits. Therefore, in 1956, ITU decided to merge its International Telephone Consultative Committee, set up in 1924, and the International Telegraph Consultative Committee, established in 1925. They became the International Telegraph and Telephone Consultative Committee (CCITT, from its French title), comprising study groups whose work was conducted in four-year cycles in line with Plenary Assemblies.

1958 ~ International telegrams

Recommendations for telegraph operational and tariff matters were approved at a special CCITT Plenary Assembly in 1958. These referred to transmission rules, transmission of international telegrams, the gentex service, determination of terminal rates in the European system, and rules for phototelegraphy over circuits normally used for telephone traffic.

1960 ~ Cooperation with other organizations

The second CCITT Plenary Assembly, in New Delhi, India, approved Resolution No.8 on cooperation with the International Electrotechnical Commission (IEC) in the standardization of cables, wires and waveguides. This decision marked the first example of formal cooperation with an external body. In 1984, the CCITT Assembly's Resolution 7 became the cornerstone for collaboration with IEC and the International Organization for Standardization (ISO).

1964 ~ International telephone numbering plan

Between 1960 and 1964, CCITT researched all aspects of intercontinental connection by submarine cable, and evolved numbering and routing plans in anticipation of worldwide automatic telephony and telex services. This led to the approval in 1964 of Recommendations such as E.29 "Numbering for international work." International telephone numbering plans defined by ITU–T have governed country codes, area codes, and local numbering ever since.

1968 ~ The fax goes global

The fourth CCITT Plenary Assembly, held in Argentina, approved the first international standards for facsimile machines. Known as "Group 1" standards, they helped the fax to go global. It took six minutes to transmit an A4 page. In 1972, "Group 2" standards were adopted for facsimile machines. It now took three minutes to transmit a page, with a vertical resolution of 100 scan lines per inch. In 1980, a standard was agreed for "Group 3" fax machines, which used digital transmission techniques and took less than one minute per page with a resolution of 200 lines per inch. The mid-1980s explosion in the use of fax technology was in part fuelled by ITU's fax standards allowing interoperability between devices.

Note — The year next to each item is when the standard was first approved. Several have since been updated, revised or superseded.

Organizing phone numbers and calls
A telephone numbering plan is a system defined by ITU that allows people to make and receive telephone calls across long distances and national borders. It governs the country codes, area codes, and local numbering for all phone numbers, around the world. In the process of setting up and clearing calls, automatic telephone exchanges must be able to communicate with one another. This is achieved by signalling systems that are also devised by ITU and, for international communications, signalling standards are particularly important.

1969 ~ Improved mobile telephone service

A precursor of today's mobile telephony systems was the improved mobile telephone service (IMTS), introduced in 1969. Known by some as "0G" (as opposed to third-generation, 3G) the pre-cellular VHF/UHF radio system linked to the public switched telephone network (PSTN). IMTS was the radiotelephone equivalent of land dial phone service. It was introduced as a replacement to mobile telephone service (MTS) and improved on most MTS systems by offering direct-dial rather than connections through an operator.

1976 ~ Packet switched networks

Recommendation X.25 was used to provide the first international and commercial packet switching network, the international packet switched service (IPSS). X.25 is a suite of influential ITU–T standard for wide-area networks (WAN). Packet switched networks enjoyed large coverage throughout the world in the 1980s and 1990s before being largely supplanted by newer technologies, such as ISDN, asymmetric digital subscriber line (ADSL), and the internet protocol (IP).

1981 ~ Signalling System 7

Signalling System 7 (SS7) was approved in 1981 in the Q.7XX-series of Recommendations. Before its implementation, not all nations were party to standards agreements on handling international telephone calls. SS7 paved the way for efficient operation of international networks. SS7 moved to a system in which the signalling information was out-of-band, carried in a separate signalling channel. This avoided the security problems of earlier systems. SS7 is also important in linking voice over internet protocol (VoIP) traffic to the PSTN, and it supports intelligent network (IN) services.

1984 ~ ISDN appears

Integrated services digital network (ISDN) became the international communications standard for allowing voice and data to be transmitted simultaneously across the world, using end-to-end digital connectivity. It supports data transfer rates of 64 kbit/s. Work on this first, fully digital, circuit-switched telephone system started in 1984. A family of Recommendations (I-series) was developed which provided principles and guidelines on the ISDN concept, as well as detailed specifications of the interfaces between users and networks.

1984 ~ Abstract Syntax Notation 1

Abstract Syntax Notation 1 (ASN.1) is an extremely important part of today's networks. ASN.1 is used, for example, in the Signalling System 7 behind most telephone calls; in package tracking, credit card verification and digital certificates, as well as in many of the most popular software programs. ASN.1 is a formal language or notation that describes data structures for representing, encoding, transmitting, and decoding data. It provides a set of formal rules for describing the structure of objects that are independent of machine-specific encoding techniques, and is a precise, formal notation that removes ambiguities.

The transition to digital
During the late 1970s and early 1980s, telecommunications saw a revolutionary shift to digital technologies. Computers and communications became bound together. Long-distance communications became much cheaper as capacity increased via submarine cables and satellites, and there was important progress in public-switched data networks and other areas. One of the most important changes was the move from separately demarcated services to an integrated digital network — known as the integrated services digital network (ISDN). Amid this revolution, ITU's standardization work was crucial.

1986 ~ JPEG

The Joint Photographic Expert Group (JPEG) was founded in 1986 by ITU, ISO and IEC to establish a standard for the sequential progressive encoding of continuous tone grayscale and colour images. The JPEG standard is a widely used format for storing and transmitting images online, in digital photography and in many other image compression applications.

1988 ~ IMSI codes used in SIM cards

ITU–T Recommendation E.212 describes a system to identify mobile devices as they move from network to network. International mobile subscriber identity (IMSI) is a critical part of the modern mobile telecommunication system, allowing a roaming mobile terminal to be identified in another network and for querying of the home network for subscription and billing information.

1988 ~ Public key infrastructure

A key reference for security standards in use today, Recommendation X.509 provides electronic authentication over public networks. It is a cornerstone for designing applications related to public key infrastructure (PKI), and is used in a wide range of applications, from securing the connection between a browser and a server on the web, to providing digital signatures that enable e-commerce transactions to be conducted with confidence. Without wide acceptance of X.509, the rapid rise of e-commerce would have been impossible.

1988 ~ Audio coding

The speech communication technology most in use today — PSTN — uses speech coding standards developed by ITU–T (G.711 and the G.72x series). The latest codecs, developed in the 1990s, are used in most VoIP deployments.

1988 ~ Telecommunications Management Network

The Telecommunications Management Network (TMN) provides a framework to support the management and deployment of telecommunication services. Methods are defined for managing networks using object-oriented principles, and standard interfaces facilitate communication between management entities. Interoperability is a key aspect of TMN-compliant networks. It is used by many of the world's largest telecommunication carriers.

1989 ~ Digital information over optical fibre

In 1989, CCITT issued synchronous digital hierarchy (SDH) standards (G.707–G.803) for synchronous data transmission over fibre-optic networks. These are employed in a significant portion of the telecommunication backbone. Carriers' use of synchronous digital transmission in their backbone fibre-optic and radio networks put in place the enabling technology for many, new broadband data services. It not only brought about high-speed gigabit networks, but also simplified access, bringing the full benefits of software control in the form of flexibility and introduction of network management.

The internet and broadband
Many ITU standards improve internet access and speeds, beginning with the V-series for computer modems which provided most people with their first online experience. Other examples are the SDH standard for the synchronous transmission of data over optical fibre, much used in backbone networks for broadband data services, and the standards for digital subscriber line (DSL) technologies. Also, ITU standards for image and video coding; public key infrastructure (PKI), and voice over IP (VoIP) have significantly shaped our online lives.

1993 ~ The birth of ITU–T

The additional ITU Plenipotentiary Conference in 1992 adopted structural reforms to give the Union more flexibility to adapt to an increasingly complex environment. In 1993, the new Telecommunication Standardization Sector (ITU–T) was formed, encompassing CCITT and standards-setting activities for wireless systems previously carried out by the former International Radio Consultative Committee (CCIR). The Telecommunication Standardization Advisory Group (TSAG) was also established in 1993.

1993 ~ Digital subscriber line (DSL)

1993 saw the first standardization of digital subscriber line (DSL) technology. ADSL, defined in the ITU–T G.992 series of Recommendations, used the discrete multi-tone technique (DMT) to allow a greater variety of services to be provided over traditional copper-based telephony networks. DSL meant that copper cable systems owned by incumbent telecommunication companies were given an extended lease of life, while bringing higher bandwidth to small businesses and residential customers. DSL is still the number-one choice for broadband technology.

1996 ~ International freephone numbers

The first international standard for universal international freephone numbers (UIFN) were adopted in 1996. A UIFN means that a marketer can use the same number throughout the world, allowing customers to make free calls while the company picks up the bill. There are currently over 29 000 UIFNs in service.

1996 ~ Helping to deliver VoIP

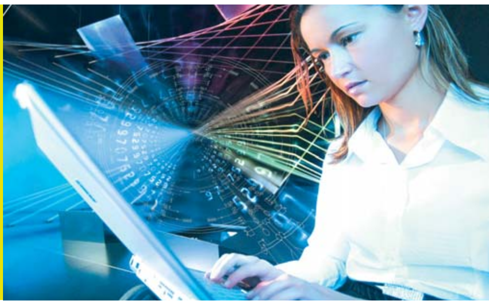
H.323 facilitates the delivery of voice, video and data over computer networks, such as the internet, and remains the most used standard for this job. The H.323 family of standards has been crucial in fostering the development of new VoIP services, winning widespread support from equipment vendors because of the interoperability that it enables. It is estimated that systems using H.323 carry billions of voice minutes each month.

1996 ~ Passive optical networks

Passive optical network (PON) technology was standardized (G.983.1, G.984.1/2) during the period 1996–2006. PONs are an effective way of implementing optical fibre connections to homes and businesses, and a crucial step towards all-optical networks. PON technology is used in the local loop to connect end-users' premises in an all-fibre network. By eliminating the dependence on expensive, active network elements, PON enables carriers to make significant savings. The most recent standard, G.984 (GPON), represents a significant boost in total bandwidth and bandwidth efficiency, through the use of larger, variable-length packets. A GPON network delivers up to 2488 Mbit/s of downstream bandwidth, and 1244 Mbit/s upstream.

Next-generation networks

The term next-generation networks (NGN) refers to the move from circuit switched to packet-based networks that many operators worldwide will undertake over the next few years. It will mean reduced costs for service providers, who will also be able to offer a richer variety of services. In 2004, work on NGN standards found a home at ITU following intense industry debate. ITU–T created a Focus Group that went on to produce global standards for NGN.



1996 ~ Asynchronous transfer mode (ATM)

ATM is a network transport technology based on transferring data in cells (fixed-size packets) and is applicable from low to high data rates. It is a key broadband enabler that is widely used. Many ADSL implementations use ATM as a layer technology, and the technology offers flexible high bandwidths (hundreds of megabits per second), performance measurement and quality of service (QoS) features that are useful for point-to-point and multipoint applications.

1997 ~ New international telephone numbering plan

In 1997, "The international public telecommunication numbering plan" (E.164) was approved for numbers worldwide. It provides the structure and functionality for the four categories of numbers used for international public telecommunication: geographic areas, global services, networks, and groups of countries. The standard is essential for today's public phone networks, and without E.164 we would not be able to easily communicate internationally.

1998 ~ Dial-up modems

Without ITU–T's modem standards, the internet might not be as widespread as it is. Anyone accessing the internet before the advent of ISDN or broadband technologies would have used a modem built according to ITU specifications. If proprietary standards had been adopted, the internet's development might have been far more fragmented. Even today, modems remain a very important way of accessing the internet. In 1998, the V.90 standard appeared for the new generation of 56 kbit/s dial-up modems. Work on the V.92 standard began in 1999, and it was approved in 2000. It achieved a two-fold improvement for incoming data speeds.

1998 ~ Broadband access by cable

Cable is an increasingly common means of accessing broadband services. If you have a cable modem, chances are that it was built according to specifications from ITU–T. The J.112 standard for interactive cable television services was approved in 1998. It fixes modulation protocols for high-speed, bi-directional data transmissions, allowing the transfer of IP traffic over all-coaxial or hybrid fibre/coaxial networks. Recommendation J.117, approved in 1999, covers the connection of cable television feeds into digital television sets. This can be used in high-definition television (HDTV) and conventional sets, anywhere in the world, as well as for terrestrial and satellite television feeds. It allows for the passage of large amounts of data at 200 million bit/s, which is important for digital video and data services.

1998 ~ Harmonizing interconnection rates

Interconnection rates are what service providers pay when linking networks to exchange traffic. This work has become increasingly complex with market liberalization and globalization. In order to cope with this paradigm shift, ITU–T developed principles for negotiating rates, and measures to help developing countries adjust to the changing market (Recommendation D.140). It also introduced a new concept of international remuneration, moving from an accounting rate system to a termination rate system (Recommendation D.150).

Cybersecurity

Standardization is an effective way of coordinating resources to boost cybersecurity against such threats as phishing, identity theft or spam. All 13 study groups of ITU–T examine security-related questions, and workshops are held with other standards-development organizations. There are over seventy ITU–T Recommendations focusing on cybersecurity, such as X.805, which gives telecommunication network operators and enterprises the ability to provide an end-to-end architecture description from a security perspective. Key players from industry and governments defined the specifications that allow operators to pinpoint all vulnerable points in a network and mitigate them. Incorporating X.805 into a risk-management policy can give network owners the confidence to say that they have addressed security issues to the best of their ability.

2000 ~ Bearer independent call control (BICC)

BICC protocols were a historic step towards packet based and broadband multimedia networks, enabling the seamless migration of circuit-switched to packet based high-capacity broadband multimedia networks. BICC signaling protocols are used to support legacy PSTN/ISDN services over packet based (IP or broadband) backbone networks, without interfering with interfaces to the existing networks and end-to-end services.

2002 ~ Advanced video coding

The H.264/AVC video coding standard, approved in 2002, is the first truly scalable video codec, delivering high quality across the entire bandwidth spectrum — from HDTV to videoconferencing and 3G mobile multimedia. In addition to the potential of better image quality, the improved data compression offered by H.264 gives advantages in terms of bandwidth usage (more channels over existing systems) or greater media storage (more video files on media such as DVDs.) Many application areas are likely to benefit from the standard, and it is already deployed in products from major companies.

2006 ~VDSL 2

The ITU–T Recommendation for very-high-bit-rate digital subscriber line 2 (VDSL2) was published in 2006. It allows operators to compete with cable and satellite providers by offering services such as high-definition television (HDTV), video-on-demand, videoconferencing, high speed internet access and advanced voice services such as VoIP, over a standard copper telephone cable. The new VDSL2 standard delivers up to 100 Mbit/s both up and downstream, a ten-fold increase over ADSL. By doing so, it provides for so-called fibre-extension, bringing fibre-like bandwidth to premises not directly connected to the fibre-optic segment of a telecommunication company's network.

Riding the waves of RFID — A network challenge

By Craig K. Harmon

Over the past six years, wireless communications and radio-frequency identification (RFID) have become part of business language worldwide. The primary publicity has been in the supply chain through programmes initiated by retailers such as Metro AG, Tesco and Wal-Mart, as well as the United States Department of Defense. Less known, though more pervasive programmes have been launched through national initiatives in both the Republic of Korea and Japan, where RFID is expected to play a big part in the creation of a "ubiquitous network society."

Numerous efforts are under way to boost electronic commerce through RFID systems, including business-to-business (B2B), business-to-consumer (B2C), consumer-to-business (C2B), and machine-to-machine (M2M). As such systems evolve to ubiquity, the network aspects of RFID and the demands that will be apportioned between the devices and the network need to be well understood. Likewise, the features required in the next-generation network (NGN) to support "eEverything" need to be examined for sufficiency.

A role for ITU

Following studies in Asia-Pacific and elsewhere, the work of the ITU Standardization Sector (ITU–T) on this increasingly important topic has picked up pace. In 2005, ITU–T study groups saw an increasing number of contributions from members. And at an ITU workshop on "Networked RFID: Systems and Services" in February 2006, participants agreed that standardization is essential in order to roll out RFID technology on a global scale. Experts agree that standards so far have developed in a fragmented way; one example is the weak coordination between different regional bodies to date. Many new work areas were identified for ITU as a result of the workshop, giving further momentum to work already started in some ITU–T study groups.

Specifically, ITU will examine, through its technical study groups, network and service architecture, requirements for machine-to-machine communication, security, information service protocols, interoperability,

Craig K. Harmon
President of Q.E.D. Systems

data format, radio frequency spectrum allocation, network performance and quality of service.

As far as security is concerned, consumer protection, namely privacy and data protection, has hindered user acceptance of RFID. Addressing this area is seen as a prerequisite for public acceptance. ITU has much experience in this field, particularly in the important area of alignment with policy and regulatory issues.

According to some experts, the lack of global frequency harmonization is a hindrance to achieving supply chain efficiencies and security. This topic is expected to be raised at the World Radiocommunication Conference (WRC), scheduled to take place in Geneva on 15 October–9 November 2007, and workshop participants have suggested that RFID be established as a primary service.

ITU is also expected to help coordinate ongoing standardization work in RFID in order to avoid duplication of efforts. Institutions involved in these efforts include the International Organization for Standardization (ISO), the European Telecommunications Standards Institute (ETSI), the Institute of Electrical and Electronics Engineers (IEEE), EPCglobal and the Near Field Communication Forum.

What needs to be done?

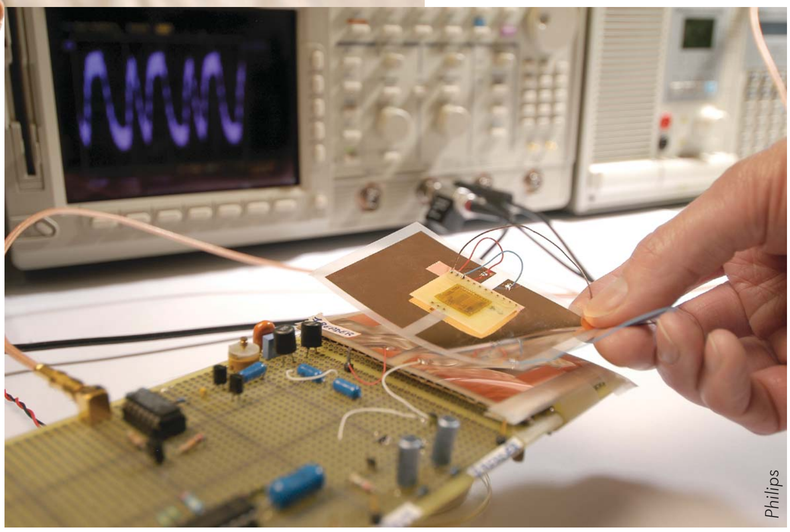
First of all, business models should be examined to identify potential service broker architectures and the extent of data-rich communications. An example from Japan is to read the RFID tag on a food item and to then receive the history of the product and potentially a video tour of the grower's facilities. Additionally, we must examine the architecture and how to evaluate NGN compliance for distributed applications.

As we move towards ubiquitous RFID and sensor networks, the signalling, control, service, and routing protocols must be defined and measured for compliance. As RFID and sensor networks become ubiquitous, security needs to be addressed in terms of confidentiality, privacy, authentication and cryptography. Privacy advocates are voicing concerns that RFID devices can compromise an individual's privacy, because of their potential to be read without the owner's knowledge. Once the RFID device's unique code is able to be determined, its owner can be surreptitiously tracked. Such "electronic purses" must be protected from compromise.

Spectrum allocation is another major issue for RFID. All of the 190 ITU Member States control their own air space for radio waves. Consequently, these countries may allocate different frequencies for RFID. These differences may well affect the efficacy of device connection to ubiquitous networks, leading to a lack of interoperability and endangering features such as roaming. So while most of the issues addressed in this article can be seen as standards issues, it is the regulatory landscape of RFID that is truly the over-arching concern. It is hoped that ITU–T can raise this issue through the Radiocommunication Sector (ITU–R) so as to begin the process of resolving the frequency allocation problem by WRC-07.

While interoperability and roaming are affected by frequency allocation, there are numerous other issues of

Near-field communications (NFC): With an NFC-enabled mobile phone, you can pay for concert or travel tickets simply by holding your phone next to the payment terminal



A plastic RFID chip as thin as paper and no larger than a postage stamp. This new plastic electronics-based RFID tag is capable of transmitting multi-bit digital identification codes at 13.56 MHz, the dominant industry-standard radio frequency for RFID tag applications

interoperability that can be addressed through ITU–T's standards processes.

The data format for communications between the RFID tag and the reader must be well defined to permit interoperability, while at the same time leaving room for individual vendor innovation. Not only is it necessary to specify the communication between reader and tag, but also test procedures and conformity standards are required to ensure that what is claimed is provided.

Similarly, the communications protocol requires specificity and conformity, as does the means by which we are able to manage multiple readers in the same area.

Each of the individual objects that are resident on the tag or exchanged from the reader must have identification schemes that are precise, verifiable, able to be expanded to meet future applications, and provide a technique for identification that is not only accurate but is also fast.

As images are exchanged along with text, the network must be able to identify the type of image in order to display it properly.

The end-user of the systems of the future will expect performance to be, at least, equal to that of current systems and will most likely require higher performance than what is being experienced today. Additionally, the network will need to be flexible enough to deal with both a single individual's access to network content from the tag's identity, and at the same time be able to communicate effectively when hundreds to thousands of consumers attempt to access different content from the same basic location, such as a store or a shopping mall.

Standards for tomorrow's applications

Tomorrow's applications will have substantially greater interaction between the reader and the tag (the consumer and the service). Such innovative applications of the technology cannot be realized without the appropriate standards in place. Standards already exist for intelligent transportation systems (ISO TC 204), personal identification (JTC 1/SC 17), baggage tracking (International Air Transport Association — IATA), and supply chain applications of RFID (ISO TC 122/104 JWG). However, for the technology to become ubiquitous requires an overarching network.

ITU–T will continue this effort in earnest and is preparing a road map in support of global standards work on networked RFID. This road map will be presented at the ITU Telecommunication Standardization Advisory Group (TSAG) on 3–7 July 2006 in Geneva. ■

Animal tracks

RFID technology on the farm and at home

From pasture to plate

A widespread use of RFID technology is for monitoring individual farm animals, throughout their lives and beyond. Demand for this grew dramatically in certain regions as a result of the outbreak of bovine spongiform encephalopathy (BSE) or "mad cow disease" in the 1990s. In order to track down any source of infection, individual cattle had to be traced from birth to the butcher's shop.

RFID capabilities can be added to the identifying ear-tags on cattle

The RFID tag on each animal contains data on its origins, type of food received, veterinary treatments, and so on. This information can also be transferred to meat products, which makes them much easier to recall, if necessary, for reasons of public health. This is why RFID tagging of animals for human consumption is now compulsory in a number of countries. The technology also means that supermarkets can accurately determine whether their packs of meat are truly from prime quality animals, and they can enable customers to access information about the farms of origin.

Transporting meat across national borders is another area where RFID can be useful. In Namibia, for instance, a project began in 2004 to use the technology for tracking shipments of frozen beef and chicken to the European Union. The aim is to ensure that the meat stays in good condition during its long journey — and thus bolster a major source of the country's export earnings.

Meat producers in Namibia, foreign partners and international non-governmental organizations organized the project under which containers of meat are monitored through a sensor-enabled RFID system. This gives real-time information on the location of each container, how long it stayed at a certain point, the name of the employee who sealed the container and whether its seal has been broken.

Protecting your pets

As well as farm animals, RFID technology is increasingly being used to keep track of household pets. In a simple procedure, a microchip (about the size of a grain of rice) is inserted under the skin on the neck of a dog or cat. If the pet strays from home, the RFID tag can be read to identify the animal and trace its owner.

This use of RFID also has a public health aspect. In the European Union, for example, it has been compulsory since October 2004 for cats and dogs to have a "pet passport" before crossing national borders. These documents confirm that each animal has been vaccinated against rabies, and RFID tags carrying this information are being introduced to replace tattoos.

To extract the data from RFID tags, in pets or farm animals, you need to use a reader. And to be effective nationally and internationally, such readers should be usable for tags from any manufacturer. This has been mandated at borders in the European Union, for example, but in the United States, issues of standardization have been difficult to resolve. Commercial rivalry has meant that no single scanner can read the RFID devices from every firm. Reportedly, this means that some lost pets are being euthanized simply because their microchips cannot be read.

Tracing lost pets is easier when they are fitted with RFID

Legislation to solve this problem is now under way in the United States. When it comes to emergencies, standardization of equipment, it seems, can save the lives of pets, as well as people!

Standardization work behind early-warning systems and disaster relief

The experience of ITU in mitigating natural disasters and aiding recovery spans most of its history. Creating disaster-resistant telecommunication networks, for example, has always been a strategic imperative of ITU through the development of the telegraph, then radio and television broadcasting and most recently, the internet. In this work, an essential role has been played by ITU's production of standards that range from SOS signalling to reducing degradation or disruption of communication networks when a disaster strikes. ITU was also instrumental in the development of the Tampere Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations that was adopted in 1998 and ratified by a number of countries in January 2005. This convention should ease the deployment of life-saving telecommunication equipment in emergencies.

The Indian Ocean tsunami: A wake-up call

The sinking of the *Titanic* in 1912 (see article "Sending out an SOS" on page 34) was a notable instance of the international community being spurred into action following a tragedy. Very recently, another sea disaster — the Indian Ocean tsunami in December 2004 — also led to calls for the introduction of better early-warning systems. So, in the 21st century, ITU again finds disaster relief high on its agenda and is committed to cooperating with its Member States, as well as other United Nations organizations, the private sector, the scientific community and civil society to develop an integrated early warning system.

Most of the problems faced in designing early-warning systems today arise from the need to integrate existing systems. Although such concerns as types of sensor, their location, and the required data and models are usually well understood, they are not yet well coordinated. Other issues that need to be taken into account include understanding the hazards and traditional solutions at a local level, dissemination of information, and capacity building. These have important telecommunication components, and in terms of standardization, could lead to new framework Recommendations or system-specific additions to existing Recommendations.

Action Plan for an early-warning system

ITU participated in the forming of the *United Nations International Strategy for Disaster Reduction* at the World Conference on Disaster Reduction, which was held in Kobe, Japan, in January 2005, very soon after the tsunami disaster. ITU also took part in the Ministerial Meeting on Regional Cooperation on Tsunami Early

A woman calling her daughter in Sumatra to inform her of the devastation following the earthquake which struck the central Indonesian island of Java on 27 May 2006

Warning in Phuket, Thailand, later the same month. And substantial effort has since been put into coordinating and working with other bodies. Motivated by the need for new telecommunication standards in the wake of the disaster, ITU–T also developed its *Action Plan for Standardization on Telecommunications for Disaster Relief and Early Warning*. The Telecommunication Standardization Advisory Group (TSAG) agreed to this plan in March 2005.

At a TSAG meeting in Geneva in November 2005, ITU–T Study Group 2 was designated as the *Lead Study Group for Telecommunications for Disaster Relief/Early Warning*. In addition, all study groups were encouraged to increase their activities in defining Recommendations and other materials (such as handbooks) and to provide feedback to TSAG and Study Group 2 on actions taken and proposals for improving the Action Plan.

Partnership Coordination Panel

ITU–T Recommendations already produced in the field include specifications that allow for preference to be given to emergency calls in a disaster. Additionally, ITU–T established in 2003 a Partnership Coordination Panel on Telecommunications for Disaster Relief (PCP-TDR), providing a channel to exchange views and experiences. PCP-TDR gathers people from various bodies working on relevant standardization fields, as well as representatives of such relief organizations as the United Nations High Commissioner for Refugees (UNHCR), the UN Office for Coordination of Humanitarian Affairs (UNOCHA), the International Federation of Red Cross and Red Crescent Societies (IFRC), and Télécoms Sans Frontières (TSF), which is a partner in ITU's *Connect the World* initiative.

A workshop will take place in October 2006 that will bring together such organizations to review current developments in early-warning systems and telecommunications for disaster relief, covering all areas that can benefit from standardization and ensuring that activities in this area are well coordinated.

Crucial Recommendations

A number of ITU–T Recommendations for call priority schemes seek to ensure that relief workers can get communication lines when they need to. For example, E.106 defines the International Emergency Preferential Scheme (IEPS), which aims to give emergency personnel a higher probability of successful communication using the public network at times when it is in high demand, such as in emergencies. There are also Recommendations that extend call priority to internet protocol (IP)-based systems designed by ITU, such as IP-Cablecom, as well as Recommendations covering telecommunication network management in emergencies (M.3350) and a framework to support emergency communications in a next-generation network (Y.1271).

Complementary to the need to provide call priority during emergencies is the ability to deliver warnings. The new Recommendation H.460.21 provides a message broadcast mechanism in H.323 systems, which are deployed worldwide for voice over IP (VoIP) communications. This mechanism is akin to that of *cell broadcasts* for mobile systems and can be used by network operators and service providers to deliver early warning messages via the short message service (SMS) to a large number of users without overloading the network infrastructure.

SOS by SMS

Raising money to help disaster victims is an important area of activity. In December 2005, ITU–T Study Group 2 agreed on the allocation of an international SMS number (+979 0767) to the United Nations International Children's Emergency Fund and the International Federation of the Red Cross and Red Crescent Societies. It allows the two organizations to launch relief campaigns across national boundaries, using a recognizable and non-changing number. Texting emerged as a popular way to contribute to relief efforts following

the 2003 earthquake in Bam in the Islamic Republic of Iran, as well the Indian Ocean tsunami.

Challenges for the future

ITU–T has taken note of the report from the Second Phase of the World Summit on the Information Society in November 2005, in particular paragraph 91 of the *Tunis Agenda for the Information Society.* This paragraph highlights the important role of information and communication technologies (ICT) for disaster early warning, management and emergency communication. ITU–T will contribute to international efforts to implement those aims. In particular, ITU–T standards will be essential to make international early-warning systems practical and effective.

Also, it is necessary to disseminate advice on "best practice" regarding actions to be taken from when a warning of a natural disaster is issued to relief operations, including the crucial question of information flows among all those concerned. In deploying telecommunications for this purpose, the most effective approach is to make sure it is highly focused, taking into account four distinct communication channels:

- ***Citizen to authority:*** Last-mile solutions are important here. Examples include special numbers, such as 911 in North America or 112 in Europe, which provide instant connections to emergency response teams. While this may provide some regulatory challenges, these can be overcome with conditions on telecommunication licensing.
- ***Authority to authority:*** Ways must be found to facilitate communications between the national and international agencies involved in disaster management so as to maximize and coordinate relief efforts. For example, radio communications between police and fire brigades should be made easier, as well as between field health workers and monitoring centres.
- ***Authority to citizen:*** This may be the most critical communication step of all, if citizens are to be warned of an impending disaster and get clear instructions on what they should do. Radio and television broadcasts, internet websites, and perhaps text messages sent *en masse* to mobile phones, can all play important roles.
- ***Citizen to citizen:*** The social concerns of those in the affected regions must also be addressed, as well as the anxieties of their relatives seeking news. Again, radio and television, the internet and mobile telephony could be used for this purpose.

In general, it is necessary to define, together with relevant partners, the need for extensions or add-ons to globally accepted standards, so that early warning and disaster relief capabilities can be introduced into already deployed telecommunication systems and networks. New systems such as next-generation networks (NGN) should have built-in features that support emergency communications, using globally defined standards. ITU–T will continue to pursue one of its core missions of delivering standards that allow systems developers to add, in an interoperable and consistent fashion, facilities to their systems that can reliably respond in emergencies. ■

Emergency workers need to be sure that their communications will be given priority

The road to advanced video coding

Collaborative standardization work leads to higher quality

By Gary J. Sullivan

In recent years ITU's Telecommunication Standardization Sector (ITU–T) has witnessed increased co-operation with other standards developing organizations and forums. This is regarded as essential if market needs are to be addressed in a timely and efficient manner. A good example of collaboration is ITU–T's work in the field of video coding.

Working with other organizations

The task of video coding is to establish efficient formats for storing and transmitting video data, which today may include various multimedia components, such as computer graphics. The work of ITU–T in this field (and its predecessor the Telegraph and Telephone Consultative Committee, or CCITT) was pioneered in joint projects with the International Organization for Standardization/International Electrotechnical Commission (ISO/IEC).

Gary J. Sullivan Chairman of the ITU–T Video Coding Experts Group and Rapporteur on advanced video coding in ITU–T Study Group 16

The first standards

The first international digital video coding standard was ITU–T Recommendation H.120, which was approved in 1984 and enhanced in 1988. Recommendation H.261 was approved in 1990 and was the first really influential video coding standard. It allowed a market to develop for videoconferencing based on standards of interoperability. All other major video coding standards have since been based on its design. Indeed, it was with the H.261 design that ISO/IEC started its work on video coding in its Moving Picture Experts Group (MPEG). The group's original target was the storage of video on compact disks, and in 1992 it created the MPEG-1 video compression standard for this purpose. MPEG-1 was the video compression standard used in video CDs, which were very popular in Asia, but never really took off in other parts of the world.

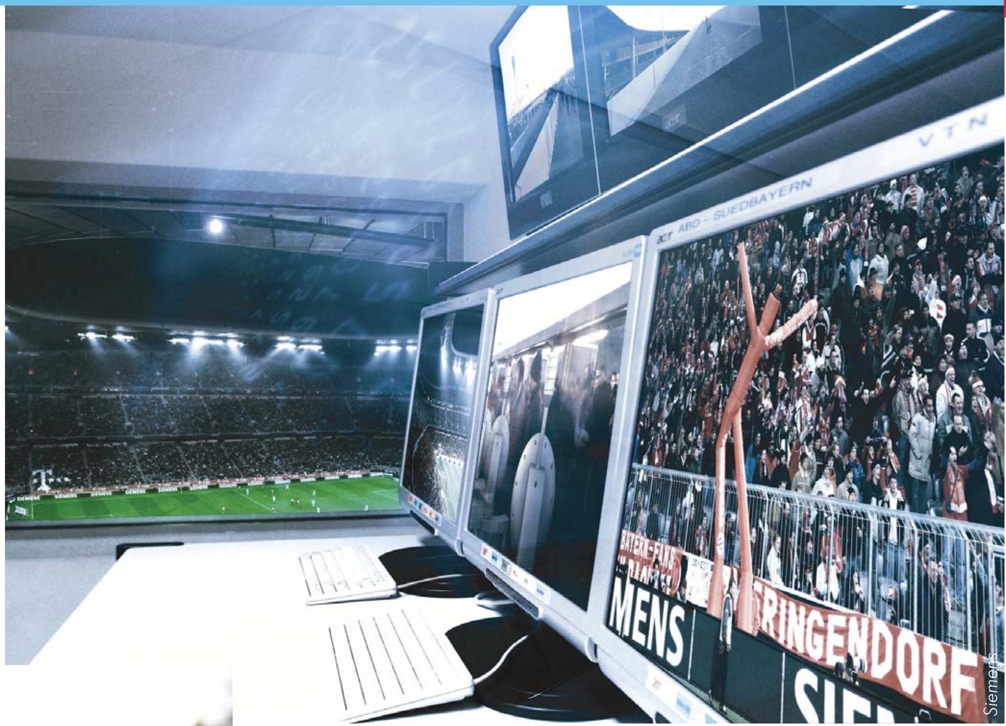
ITU–T and MPEG

There was soon a strong desire to provide a digital video-coding standard for higher-quality video. As a result, a new joint project was created by ITU and MPEG, aimed at making it practical to produce such broadcast-quality output. For video coding, this resulted in the first collaboratively developed and jointly approved digital video standard between ITU–T and ISO/IEC, now known either as MPEG-2 Video, as ITU–T Recommendation H.262, or as ISO/IEC 13818-2. This standard became the foundation for digital video as we now know it, and it has formed the basis of essentially all digital broadcast, satellite, cable, and disk storage video systems in use since the time of its approval in 1994.

As the MPEG-2 project matured, ITU–T's Video Coding Experts Group (VCEG) and the ISO/IEC group MPEG worked separately for a time, with ITU developing the first version of Recommendation H.263 by 1995 and ISO/IEC developing MPEG-4 Part 2 Visual (ISO/IEC 14496-2) a few years later. Each organization also made enhancements through a number of projects.

Halving the bit rate and doubling the quality

In early 1999, ITU–T's Study Group 16 issued a call for proposals for VCEG to start work on an altogether new video coding standard, and the project then known as "H.26L" began to take shape. A first draft design was created in August 1999, and was improved at each subsequent meeting of the group. The primary goal was to substantially



A video wall in a football stadium's control centre during the World Cup, 2006

improve coding efficiency, which is defined as the bit rate needed to achieve a given level of video quality. The frequently cited, unofficial target was to cut in half the bit rate needed when using any of the prior major standards. This was generally considered to be a very difficult goal. At the same time, it was recognized that video delivery networks had become increasingly diverse, so an additional major goal was to provide robustness of the standard in a wide variety of network environments and conditions. The VCEG experts adopted a "clean slate" approach to design, examining and improving every element.

By mid-2001, the design of H.26L had matured to the point where VCEG could demonstrate the standard's capabilities to MPEG, with the aim of finalizing the standard together as a collaborative project. After MPEG's evaluation of the work, the two groups formed a new organization together in late 2001, called the Joint Video Team (JVT).

Advanced coding is achieved

After a year and a half of intense work, the team produced the technically aligned standards now known as ITU–T Recommendation H.264 or as ISO/IEC 14496-10 (also known as MPEG-4 Part 10) or, simply, as Advanced Video Coding (AVC). The work on the first version was completed in May 2003. An additional, and important, project to enhance "fidelity-range extensions" was completed in mid-2004. The difficult goal of improving coding efficiency by cutting the bit rate in half without harming quality (equivalent to enabling twice as many programmes to be transmitted in the same channel), had been reached. A number of capability testing efforts confirmed this.

H.264/MPEG-4 AVC was rapidly adopted in many applications, ranging from high-definition (HD) and standard-definition television, to videoconferencing, local area networks (LAN), internet streaming video, the new HD DVD and Blu-Ray Disk storage formats, and mobile devices such as the Republic of Korea's new digital multimedia broadcast service. Within ITU itself, the standard is used in various multimedia conferencing systems developed in ITU–T Study Group 16. In addition, the Radiocommunication Sector (ITU–R) has approved use of the standard in its Recommendation BT.1737 (for HDTV contribution, distribution, satellite news gathering and transmission), and Recommendation BT.1687 (for large-screen digital imagery). Worldwide, a large number of implementations of the standard have taken place, and several books and hundreds of articles have been written about it in a variety of languages.

Collaboration continues

Today, the Joint Video Team continues its work as a collaborative project, drawing on the expertise and application requirements from both its ITU–T and ISO/IEC parent communities. New enhancements of H.264/MPEG-4 AVC are under development to enable scalable video coding and to address the most demanding, high-end professional applications. In addition, further work is under consideration to develop 3-D/free-viewpoint video coding extensions.

As with the MPEG-2 project before it, the ITU–T and ISO/IEC collaboration on advanced video coding shows the strength of momentum that can result when major international standards bodies join forces to create a unified interoperable solution that fulfils industry needs in a key technical area. ■

Recommendation D1 reflects a paradigm shift in the telecommunications market

By Tsunekazu Matsudaira

Study Group 3 of ITU's Telecommunication Standardization Sector (ITU–T), and formerly the Telegraph and Telephone Consultative Committee (CCITT), has always been unique. Generally speaking, standardization in the telecommunication sector relates to the technology enabling global interconnection and interoperation of networks and services. Study Group 3 (SG3), however, does not deal with technology. It deals with money. Its mandate is to study tariff and accounting principles, as well as related economic policy issues, in international telecommunications. And given that the outcome of such studies can directly affect operator revenues, opinions and positions on the issue are often strongly held.

Nick Benjaminsz

In the early 1990s, SG3 faced a series of unprecedented challenges that arose from rapid changes in the marketplace. This was an era characterized by such buzzwords as deregulation, privatization and competition. Several industrialized countries were completely reshaping their national policies to scrap the century-old system of State-run postal, telegraph and telephone (PTT) systems. In addition to the value-added network (VAN) providers that had already emerged in the 1980s thanks to the advent of data communications, new common carriers (NCC) were being authorized. The Uruguay Round of negotiations on the General Agreement on Tariffs and Trade (GATT) saw the birth of the *trade in services* concept, which included telecommunications.

Taking account of liberalization

Against this background, the first major challenge for SG3 was to completely rewrite its Recommendation D1 "General principles for the lease of international private telecommunication circuits." In a way, D1, adopted in 1976, symbolized the *ancien regime* that gave absolute priority to public services over private systems. Article 1.5 of D1 said that "the leased circuit service is normally authorized in international relations where telecommunication circuits remain available after the needs of the public telecommunication services

Tsunekazu Matsudaira, Visiting Professor, Global Information and Telecommunications Institute, Waseda University, Tokyo, and former Chairman of ITU–T Study Group 3

have been satisfied. However, administrations should recognize the requirements for leased circuits in their planning." Furthermore, the Recommendation prohibited third-party traffic over leased circuits, and banned the interconnection of a leased circuit with public telephone networks simultaneously at both ends.

Although proposals to amend D1 had already been voiced in the 1980s, SG3 had to await the outcome of the 1988 World Administrative Telegraph and Telephone Conference (WATTC-88), which adopted the International Telecommunication Regulations, to set the framework for this paradigm shift away from a focus on public networks. And after WATTC-88, it took three years and five meetings for SG3 finally to adopt the revised Recommendation D1, in July 1991. The debate was an awkward one as the telecommunication world was in a state of transition. When SG3's studies began in 1989, only the United States, the United Kingdom and Japan had liberalized their legal frameworks governing entry into the telecommunication business. They were followed by several countries from the European Union and the Organisation for Economic Co-operation and Development (OECD), but the majority of ITU members (i.e. developing countries) still strongly upheld the policy of maintaining the monopoly rights of their PTTs. Although the former D1 was already described as a "monument to compromise" (basically between the Europeans and the Americans), entirely new types of compromise had yet to be worked out. However, the power of change in the environment and fears of the ITU standardization system becoming obsolete finally led to agreement. As a result, for example, Article 1.5, quoted above, was rewritten to read: "The international private leased circuit service is important in international relations and administrations should recognize the requirements for the international private leased circuits in their planning." Regarding third-party traffic, the revised D1 allowed communications amongst users over an international private leased circuit. As for the interconnection of private circuits with public networks, it was prescribed that simultaneous, both-end interconnections may be permitted. In short, Recommendation D1 saw a 180-degree turn in its basic principles. The new compromise was that liberalized arrangements were to be allowed, subject to national laws or mutual agreements between the administrations concerned.

Philips

ITU adapts to the new paradigm

The adoption of a new Recommendation D1 by the CCITT (later to become ITU–T) in 1991 was significant in two ways. First, by rewriting this monumental Recommendation, ITU was able to demonstrate to the world that it could adapt itself to the new paradigm in the telecommunication industry. Without the timely adoption of the new Recommendation, ITU might have "missed the bus." The second point of significance, however, is ironic in the sense that by introducing the principle of liberalization into Recommendation D1, ITU stepped away from the position it had occupied for several decades of being the global regulator of telecommunications. This role was transferred to national bodies, and as deregulation and liberalization swept the industry in the decade that followed, the market eventually became the driving force.

SG3 has continued to work on several other challenging issues concerning basic policies, such as accounting rate reform, countermeasures against "call-back" services, and international internet connection. Whatever the issue, however, it will remain important for the participants in SG3 to bear in mind that the market is the final decision-maker.

Regional Radiocommunication Conference 2006

Landmark digitization framework agreed

On 16 June 2006, an agreement was signed in Geneva that will form the basis of digital television and radio broadcasting in more than 100 countries for years to come. The *Final Acts* of ITU's 2006 Regional Radiocommunication Conference (RRC-06) is an international treaty covering the frequency bands 174–230 MHz and 470–862 MHz. It sets out a plan for ending almost all analogue broadcasts by 17 June 2015 in Africa, Europe, the Commonwealth of Independent States, parts of Asia, and the Islamic Republic of Iran. A future framework for digital broadcasting is assured.

Digital dividend

Digital broadcasting offers more channels and increasing choice for consumers, as well as the possibility of mobile reception of video, internet and multimedia services. It is about six times more efficient than analogue broadcasting, allowing more data to be carried across less bandwidth. This not only means better quality and more applications in countries where services have started; it also promises a "digital dividend" that can help in connecting remote communities and in closing the digital divide.

The dividend comes from the increased efficiency with which the radio spectrum is used, opening the way for innovative wireless technologies and potential new services. In this way, the plans produced by RRC-06 are a powerful and practical response in ITU's Radiocommunication Sector (ITU–R) to the goals of the World Summit on the Information Society (WSIS). RRC-06 was the first treaty-making conference to be held by ITU since the conclusion of WSIS in November 2005.

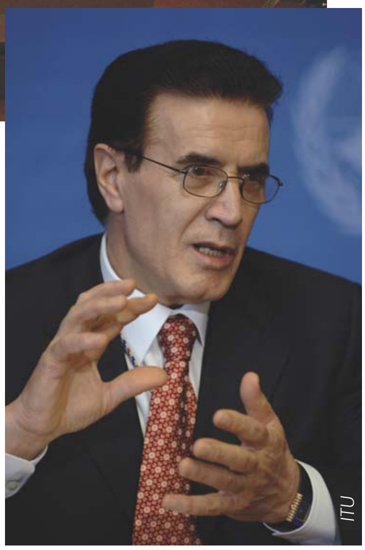
Happy outcome to a complex task

More than 1000 delegates attended RRC-06, which began on 15 May. Under the chairmanship of Kavouss Arasteh of the Islamic Republic of Iran, the conference held

Digital technologies can transform broadcasting and offer many new applications

Philips

More than 1000 delegates took part in the conference



RRC-06 was chaired by Kavouss Arasteh (Islamic Republic of Iran)

some 850 meetings and satisfied 70 493 requests (known as "requirements") for entry in the plan for digital broadcasting. It was also the first time that ITU had undertaken the planning of analogue and digital services, in single and multiple frequencies, all at the same time.

Finding solutions was an enormously complicated task, but nevertheless the conference achieved all the objectives set out by the ITU membership. Almost every requirement was met, while fully complying with the Radio Regulations and a fundamental principle of ITU's Constitution that the Union should "maintain and extend international cooperation… for the improvement and rational use of telecommunications of all kinds."

The reasons for this success lay in the careful preparation begun in 2002 and continued at the first session of the Regional Radiocommunication Conference in 2004. Also, on the sidelines of RRC-06, many discussions and negotiations took place among small groups of neighbouring countries, leading to agreements that were then approved by the plenary session of the conference. Overall, this process was aided by a strong spirit of consensus and cooperation among delegates. During the entire conference, it had never been necessary to take a vote on any contentious point.

A triumph for ICT

A further factor behind the success was ITU's own use of information and communication technologies (ICT). To handle the thousands of items of data and sort out bandwidth allocations and assignments, special computer software had been designed by ITU and the European Broadcasting Union (EBU). And as well as using ITU computers to run these programs, a crucial back-up system was provided by a computer network operated by the European Organization for Nuclear Research (CERN). Meticulous calculations made by these means were the foundation for a plan that everyone could agree to.

This outcome could never have been achieved in 1961, when pencil-and-paper calculations were the main method for working out the Stockholm Agreement, which governed broadcasting in the European region for 45 years until one minute past midnight on 17 June 2006. In a similar way, “we expect the new agreement to last for decades to come,” the Director of ITU’s Radiocommunication Bureau Valery Timofeev told journalists at the conclusion of RRC-06. In order to do so, the plan has been carefully crafted so that it can easily accommodate changing technologies.

Flexibility for the future

A major challenge faced by the conference was to find ways for digital and analogue broadcasting to coexist on the radio-frequency spectrum during the transition period without causing interference. The *Final Acts of RRC-06* include an Analogue Plan, covering this transitional period up to 2015, as well as a Digital Plan for the new services. The latter will need to be adapted as convergence between broadcasting and telecommunications continues, and as technology develops in ways that we can barely imagine today.

However, the Plan contains mechanisms that allow nations to easily submit modifications to spectrum use. According to some delegates, it is a “forward-looking, long-life and flexible system” that will ensure a smooth transition to digitization and continuing efficiency in how the technology is used.

Dawn of a new epoch

The *Final Acts* of RRC-06 do not cover East Asia or the Americas, which have other arrangements for allocating radio spectrum. Also, both the United States and Japan have each established standards for this field that are different from the European one. However, even though a nation in Latin America, say, cannot be formally associated with the 2006 treaty, it is free to use the “Geneva Agreement” as a model for advancing its services. In this way, the agreement might lead to wider adoption of compatible technologies. This would permit even larger economies of scale by manufacturers, thus lowering costs and helping to close the digital divide.

Meanwhile, the new agreement sets the stage for huge advances in broadcasting and telecommunications, with many new applications on the horizon. “More than two-thirds of the world has agreed to one digital technology, and has agreed to go forward within the same timeframe,” ITU Secretary-General Yoshio Utsumi said at a press conference at the end of RRC-06. “It was an epoch-making decision,” he said, and “it will change the whole picture of ICT.”

A mammoth task and a huge achievement

The 2006 Regional Radiocommunication Conference:

- Held some 850 meetings during its five-week duration
- Handled 70 493 requests for radio spectrum usage (compared with about 5000 in forming the 1961 agreement)
- Took just one weekend to draft the highly complex analogue and digital plans, using sophisticated software and computer networks (compared with 20 days for the simpler 1961 plan)
- In the VHF band, 98 per cent of requests for spectrum were accommodated, and 93 per cent in the UHF band (a much higher level than in 1961)
- The Digital Plan is flexible enough to deal with decades of changing technology and thousands more requests for spectrum usage
- The *Final Acts* consists of 1810 pages in its “simplified” version (and is at least double this size when including the complete database)
- The treaty was signed by some 120 countries, binding them to switch to digital by 17 June 2015*.

*except for some VHF services in Africa, which will switch to digital by 2020.

Digital radios can now also record and store programmes

Rural connectivity no longer a dream in Samoa

People in rural villages in the Samoan islands of Upolu and Savaii, who had previously never seen a computer, are now using the internet to communicate with their family members working in Apia, the capital city, or living overseas. This has been made possible through the connectivity project launched by ITU in July 2005, which has established ten multi-purpose community telecentres (MCT).

The centres are intended to provide the rural population with access points to voice communication, as well as applications that will be useful for communities, businesses and schools. For example, the centres are being used to transmit information for a national programme to promote healthy living.

Women have created their own local committees to manage nine of the MCTs, and a youth group runs the tenth. A train-the-trainers programme is being provided. A local expert conducts training in the Samoan language. Training materials have been translated into Samoan, and this has proved very useful for the women. When the trainer is away, they can teach themselves using translated manuals.

Women are excited about this new opportunity to learn again. As one woman from an MCT committee put it: "We can now use the computer for our reports. These reports are now typed and printed, and members take their own copy home after meetings." Another committee member added: "This project is a great help to our committee because we have earned revenue, which is helping us fund our village projects, such as vegetable gardens for the benefit of our whole village."

And a student had this to say: "I am happy that I can now apply what we are learning in school about computers and the internet right here in my own village. It saves my parents the bus fare and cost of using the internet in Apia, where it is more expensive than what we pay at the MCT."

Another new experience for villagers is being able to watch television on large screens set up in the MCTs, with international rugby games being especially popular. Previously, such entertainment could only be found in cinemas in town. The small admission fee that is charged on such occasions also helps to sustain the centres.

The second phase of the project is on the horizon. The next step is to move towards creating a website for each MCT, to give people a new way of exchanging ideas and experience.

ITU is working with Small Island Developing States to implement rural connectivity projects that match countries' needs. In the case of Samoa, rural connectivity is a priority in its national strategic plan for information and communication technologies (ICT). The government believes that ICT cannot be developed at the national level if development continues to concentrate on the business district alone.

Schools and communities in Zanzibar get internet connection

ITU has helped to launch a project linking schools on Tanzanian islands to the internet. Together with the Tanzania Commission for Science and Technology (COSTECH), the Ministry of Education and Vocational Training in Zanzibar, a Dar es Salaam-based private company Satcom Networks Africa Ltd and the Microsoft office in Nairobi, ITU brought together resources for the *Wete School Net and*

Community Access Project. It was officially launched by Zanzibar's President Amani Abeid Karume on 2 June 2006 in the town of Wete on the island of Pemba. The islands of Zanzibar and Pemba lie in the Indian Ocean, off the east African coast.

Utaani Secondary School and the Benjamin William Mkapa teacher-training facility now have access to modern information and communication technologies (ICT). Each school has equipment that includes computers with associated peripherals and software, printers, photocopying machines, digital cameras and television and video sets.

UNHCR

ITU provided the equipment, worth an estimated USD 59 820, and is covering the cost of internet connectivity for one year. The Ministry of Education was responsible for setting up local area networks and providing training, and COSTECH for supervision and overall coordination. As part of this capacity-building effort, the Microsoft office in Nairobi provided a three-week train-the-trainers course in basic computer skills to 40 teachers. Satcom Networks donated two very-small-aperture terminals (VSAT) to the project.

The new equipment and access points will help teachers and students at the two schools to achieve computer literacy. They will use these facilities free of charge during school hours. The local community in the town of Wete will be served as well. Outside school hours, the facilities will be open to public use on a paying basis, as a way of making the project financially sustainable when donor funds dry up.

ICT training for returning Liberians

On 19 April 2006, ITU and the United Nations High Commissioner for Refugees (UNHCR) launched an *Information and Communication Technology Training Centre* in Monrovia, Liberia, to help equip people with skills that make them more employable. The project targets those who have returned to Liberia after years in refugee camps abroad, and will offer them training in core computer and entrepreneurial skills. It is expected that 20 per cent of Liberian refugees go back to urban centres, most of them to the capital city, Monrovia.

The training centre is equipped with 20 computers, peripherals, a backup power supply, a projector, a photocopying machine, a television and video/DVD unit, and a video camera, valued at a total USD 43 000. The equipment was provided by ITU, while local partners installed a wireless internet connection and a payphone.

UNHCR

The centre has the capacity to train about 60 students every two months. It will offer training free of charge to returnees, but will charge a nominal fee for other community members wishing to receive training in ICT. The centre will also provide related services, such as e-mail, internet access, word processing, photocopying, and basic desktop publishing. Modest fees will be charged for these services, so as to make the venture financially sustainable.

This collaboration between ITU and the UN refugee agency is an important effort towards extending ICT access and training to returnees. It is hoped that this model will be replicated in Liberia, and in other countries emerging from war situations in Africa.

From official sources

INSTRUMENTS AMENDING THE CONSTITUTION AND THE CONVENTION OF THE ITU (MINNEAPOLIS, 1998)

The Government of the **Republic of Slovenia** has ratified the instruments amending the above Constitution and Convention. The instrument of ratification was deposited with the Secretary-General on 9 May 2006.

CHANGE OF NAME

Avaya-Tenovis GmbH & Co. KG, a Sector Member of ITU–T, has changed its name to *Avaya GmbH & Co. (Frankfurt, Germany)*. Optical Solutions, Inc., a Sector Member of ITU–T, has changed its name to *Calix Networks, Inc. (Minneapolis, Minnesota, USA)*. Cril Telecom Software, a Sector Member of ITU–R, has changed its name to *CTS International (Vélizy, France)*. Paradyne Corporation, a Sector Member of ITU–T, has changed its name to *Zhone Technologies (Oakland, California, USA)*.

NEW ASSOCIATES

Telecommunication Standardization Sector

Digeo Inc. (Kirkland, Washington, USA) has been admitted to take part in the work of Study Group 9; *Layered Media Inc. (Rochelle Park, New Jersey, USA)* has been admitted to take part in the work of Study Group 16; and *Voxbone SA (Brussels, Belgium)* has been admitted to take part in the work of Study Group 2.

ITU world events

2006

- 6–24 November
(Antalya, Turkey)
ITU Plenipotentiary Conference

- 4–8 December
(Hong Kong, China)
ITU TELECOM WORLD 2006 (Exhibition and Forum)

2007

- 8–12 October
(Geneva, Switzerland)
Radiocommunication Assembly

- 15 October–9 November
(Geneva, Switzerland)
World Radiocommunication Conference

ICT SUCCESS STORIES

Our regular look at projects around the world that use information and communication technologies (ICT) to make a difference

Looking to the *World Ahead*

Launched in 2006 by major manufacturer of microchips, Intel Corporation, the *World Ahead* programme is a USD-1-billion initiative that aims to promote computer training and internet use in developing countries.

Among its ambitious goals over the next five years is the extension of broadband access to one billion users and the training of up to 10 million teachers on the use of ICT in education. Work will initially take place in Brazil, China, India and the Russian Federation, to be followed by other countries.

The *World Ahead* project is developing a low-cost, mobile personal computer, named "Eduwise," and encouraging the wider adoption of WiMAX technology that allows people to make broadband connections to the internet over longer distances. In general, the programme is expected to lead to greater opportunities for widespread ownership and use of ICT, through better training, access, and content. A multi-stakeholder approach will be adopted by establishing an advisory board of non-governmental organizations to guide Intel in the implementation of the *World Ahead* programme.

The project is intended to help achieve the goals set by the World Summit on the Information Society (WSIS). In line with these, Intel, a founding member of the ITU-led *Connect the World* initiative, has initiated a global long-term effort to make a difference in a number of developing countries.

A nationwide network in Nigeria

The *National Rural Telephony* project has been initiated by the Nigerian government to extend telecommunication infrastructure and services nationwide. The first phase of the project, due to be completed by the end of 2006, will link 280 rural communities to the public switched telephone network. In addition, mobile telephony will be deployed in rural areas, which are often under-served by private operators because they represent a less lucrative market.

In Nigeria as elsewhere, the demand for telephone services is constantly increasing, given the benefits that ICT offers in almost every aspect of life. In its quest to bridge the digital divide and achieve the WSIS goal of higher connectivity, the government, together with a network of partners from business, is committed to developing an enabling environment for investment, both local and foreign. The Nigerian market for mobile phone services is one of the most important in Africa, with a steady growth of around 4 million subscribers per year since 2001. The government aims to make Nigeria Africa's most advanced country in mobile communications by 2010.

Kevin Zim

World Bank

Promoting digital inclusion in Chile

Winner in the "Culture" category of a 2006 Stockholm Challenge Award, *Nosotros en Internet* is a project in Chile that seeks to promote expression of people's experience, local cultural heritage and identity, through the training and use of internet applications adapted for these purposes. The lead agency in implementing the project is *BiblioRedes*. Its aim is to use ICT in modernizing public libraries, so as to help Chile bridge the digital divide. BiblioRedes is a private-public initiative, which wants to ensure that every Chilean citizen can access and use ICT to improve their quality of life.

An essential element of the *Nosotros en Internet* strategy is to promote the use of web tools by local communities using a central online service. The project supports diverse cultural, social and economic organizations, which would otherwise have only limited opportunities to take an active role in shaping the information society.

The Nosotros en Internet *project won a Stockholm Challenge Award in 2006*

Reaching children in Afghanistan

The *REACH Project* is designed to help address the educational needs of Afghan children aged from 6 to 16 who, due to conflicts in their country, have received little or no education for a number of years. It is hoped that, by listening at home to the weekly radio programmes on BBC World Service's Persian and Pashto services, children will be exposed to Afghanistan's traditions, culture and history, as well as receive information about present-day concerns, such as health education.

The 15-minute "Our World, Our Future" radio broadcasts are designed to broaden children's horizons and encourage them to become active learners by giving them educational tasks to do during and after the programmes. All of the project's staff, writers, and radio actors are themselves Afghan refugees. They have a practical knowledge of the real needs and aspirations of the country's children, and a strong commitment to broadening their education.

The United Kingdom's Department for International Development, the United Nations Children's Fund (UNICEF), and the Canadian International Development Agency are partners in the project.

e-Madinah takes shape in Saudi Arabia

With technical cooperation from Malaysia, the Kingdom of Saudi Arabia is promoting ICT in the city of Madinah. The aim is to encourage governmental and business sectors to adopt greater use of ICT over a five-year period, under a project called *eMadinah*.

The project includes five elements, to be pursued together: e-commerce, e-government, capacity-building, programme and change management, and knowledge management. All of these are geared towards addressing such challenges as giving every citizen the ability to access ICT, and enhancement of work and business opportunities.

Riyadh

One of the outcomes of *eMadinah* is an ICT training institute, to be established in the country's capital, Riyadh, in 2006. A joint Saudi-Malaysian ICT Fund will also be created, to spearhead private-sector investments in both countries.

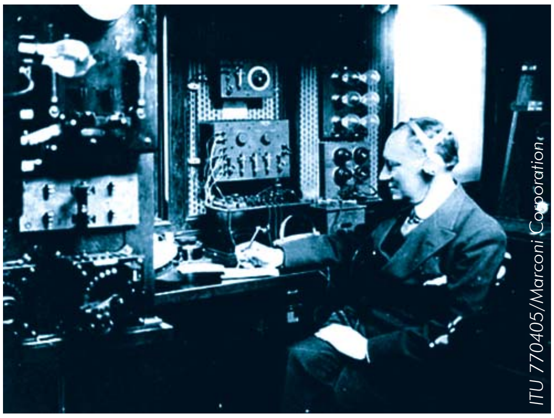
To discover many more ICT Success Stories and to contribute your own, visit www.itu.int/ict_stories. The website is managed by ITU's Strategy and Policy Unit.

Sending out an SOS

How a famous disaster spurred agreement on international rules

Titanic sank in 1912 with the loss of nearly 1600 lives

As reported in the April issue of *ITU News*, this year marks the centenary of the International Radiotelegraph Conference held in Berlin in 1906, where 29 countries signed a convention on wireless communication for ships at sea. Its annex laid down the first international rules for wireless telegraphy — today known as the *Radio Regulations* — which became a cornerstone of ITU's work. Very soon after its invention, this technology had been adopted as a way for ships in distress to summon help. It was necessary to set a standard for communication that everyone, from whatever nationality, would be able to understand, especially in an emergency.



Guglielmo Marconi is seated at a radio transmitter on board a ship. He had booked a passage on Titanic's return journey to Europe, which was never to be made

Morse code

As in the telegraphy that was sent across land, Morse code was the method used by ships' wireless operators for conveying information. But what distress signal would be universally understood? Before the 1906 agreement, various countries and organizations each decided their own signals for shipping. One of the most widely adopted was the "CQD" of the Marconi International Marine Communication Company. The first two letters (CQ) were already used in landline telegraphy for announcing a general call to all stations, and the "D" was added to stand for "distress." This gives part of the answer to the question posed on last month's *Pioneers' Page*: who signalled "CQD…MGY, ….CQD…MGY" and when? It was sent on 15 April 1912 by a ship in distress, which the second group of letters (MGY) specifically identified as "Titanic."

The tragic maiden voyage of the British liner Titanic is a well-known story. On the night of 14-15 April, the ship struck an iceberg off the coast of Canada and sank with the loss of nearly 1600 lives. Could more people have been saved if radio communications had been better managed? Almost certainly, the answer is: yes.

A night of confusion

Six years after the agreement at the Radiotelegraph Conference, not everyone had adopted its rules. More than one emergency signal was still in use. The sinking of the Titanic also highlighted the lack of 24-hour radio communication on ships, and that even when messages were heard, in some cases operators were unwilling to respond.

It was a common practice only to communicate by radio during daylight hours. "Californian," the closest ship to the sinking Titanic, did not hear her distress call because radio operators were not on duty overnight. The rockets fired by Titanic also confused the Californian's crew, perhaps because ships owned by different companies had many differing patterns of lights for communicating at night. Commercial rivalry also played a part. Wireless operators were the employees of the companies that supplied ships' radio equipment, and these firms fought hard to capture market share. This meant that operators working for one firm might not respond to radio signals coming from an operator working for a rival. It seems this is what happened to some of the signals passed between Titanic (using a Marconi system) and other ships.

Another difficulty could have been that Marconi operators were still being instructed to use "CQD" to signal distress, and this was transmitted for much of the time by Titanic's wireless operator John Phillips (who was to die in the sea). Eventually, as suggested by assistant operator Harold Bride, he interspersed this with the new signal, "SOS."

Shocked into action

The "SOS" signal originated in national radio regulations issued in Germany in 1905, and was adopted internationally by the Berlin conference in 1906. The conference decided that "ships in distress shall use the following signal: . . . _ _ _ . . . repeated at brief intervals." It is a continuous group of Morse dots and dashes, rather than separate letters, and was chosen because the pattern is simple and unmistakable. However, because it can be read as "SOS" in Morse code, this became the usual mnemonic for the signal.

The sinking of the Titanic spurred maritime authorities to improve emergency procedures. Just a few months after the tragedy, the 1912 International Radiotelegraph Conference, held in London, agreed on a wavelength of 600 metres (about 500 kilohertz) for ships' radio distress signals. Also, every ship was instructed to maintain a three-minute radio silence at 15 and 45 minutes past each hour, when operators should listen for distress calls. In 1914, the International Convention for the Safety of Life at Sea (SOLAS) was signed, requiring (among other safety measures) all ships carrying more than 50 passengers to have a radio on board.

The final SOS

Because it is such a memorable code, "SOS" has been adopted into general use whenever people want to impart the idea of emergency. Flood victims, for example, have written it on the rooves of their homes to signal rescue helicopters, and the well-known letters can even be seen quite frequently on banners in protest

Janet Burgess

marches for various causes. The use of "SOS" as an official distress signal, though, ended on 1 January 1998, replaced by modern satellite communication systems and the use of voice messages, rather than Morse code. But on the very night before the regulations were to change, a ship in distress used the old signal.

The MV Oak was carrying timber from Canada to the British port of Liverpool when it lost engine power and its cargo shifted dangerously in a storm. On 31 December 1997, it reportedly signalled "SOS…SOS. This is Oak. Position 53 16 N, 24 59 W. Stop engine. We need assistance." The British Coast Guard responded immediately, even though they at first thought the message might have been a joke: it was New Year's Eve and not having heard a Morse code "SOS" for many years, they had suddenly received one on the last day of its official use. Fortunately, the crew of MV Oak proved to be safe in lifeboats, having sent the final "SOS" in the 90 years of the signal's history.

Question for next month

One hundred and fifty years ago this July, a scientist was born in the Balkans at the stroke of midnight during a thunderstorm. He ended his career working on a "death ray." Who was he?

The answer will appear in the next issue of ITU News.

2006

Radiocommunication Sector

- 25 August–1 September (Geneva)
Working Party 4-9S (Frequency sharing between the fixed-satellite service and the fixed service)

- 28–31 August (Geneva)
Working Party 7B (Space radio systems)
Working Party 7D (Radio-astronomy)

- 28 August–1 September (Geneva)
Working Party 4B (Systems, performance, availability and maintenance)
Working Party 7C (Earth-exploration satellite systems and meteorological elements)

- 28 August–1 September (Seoul, Republic of Korea)
Working Party 6M (Interactivity and multimedia broadcasting)

- 29–31 August (Seoul, Republic of Korea)
Working Party 6Q (Performance assessment and quality control)

- 29 August–1 September (Seoul, Republic of Korea)
Working Party 6A (Programme assembling and formatting)

- 29 August–1 September(Geneva)
Working Party 7A (Time signals and frequency standard emissions)

- 4–8 September (Geneva)
Radio Regulations Board (RRB)

- 4–13 September (Geneva)
Working Party 4A (Efficient orbit/spectrum utilization)

- 5 September (Geneva)
Joint Study Groups 4 and 9 meeting

- 5–13 September (Geneva)
Working Party 8B (Maritime mobile service, including Global Maritime Distress and Safety System (GMDSS); aeronautical mobile service and radio-determination service)

- 6–14 September (Geneva)
Working Party 8A (Land mobile satellite service excluding IMT-2000; amateur and amateur-satellite service)

- 7–13 September (Geneva)
Working Party 9C (Systems below 30 MHz (HF and others))

- 11–15 September (Geneva)
Working Party 6E (Terrestrial delivery)
Working Party 8D (All mobile satellite services and radiodetermination satellite service)
Task Group 1/9 (Compatibility between passive and active services)

- 14–15 September (Geneva)
Study Group 4 (Fixed-satellite service)

- 18–19 September (Geneva)
Study Group 6 (Broadcasting services)

- 25–29 September (Geneva)
Meeting of CPM Management Team

- 30 October–3 November (Geneva)
World Radiocommunication Seminar

Telecommunication Standardization Sector

- 2–6 October (Tokyo, Japan)
Study Group 9 (Integrated broadband cable networks and television and sound transmission)

- 23–24 October (Geneva)
ITU–T/GGF Workshop on next-generation networks (NGN) and Grids

Telecommunication Development Sector

- 28 August–1 September (Harare, Zimbabwe)
Regional train-the-trainers workshop on the balanced scorecard for African English-speaking countries

- 31 August–1 September (Geneva)
Meeting on mechanisms for cooperation on cybersecurity and combating spam
Global seminar on quality of service and consumer protection

- 3–7 September (Cairo, Egypt)
Workshop on wireless networking for the Arab region (support to the TAP ON TELECOM project)

- 4–6 September (Geneva)
First meeting of Study Group 1

- 4–8 September (Port Louis, Mauritius)
Workshop on multi protocol label switching (MPLS)

- 5–6 September (Geneva)
Rapporteur's Group on Question 18-1/2

- 7–9 September (Geneva)
First meeting of Study Group 2

- 10–12 September (Cairo, Egypt)
Regional seminar on e-applications (e-health, e-business)

- 11–15 September (Dakar, Senegal)
Workshop on IP and cybersecurity for French-speaking African countries (support to the TAP ON TELECOM project)

- 18–21 September (Yaounde, Cameroon)
Regional seminar on broadband wireless access (BWA) for rural and remote areas in Africa

- 25–28 September (Bucharest, Romania)
Regional workshop on strategic planning for CEE and the Baltic States

- 2–4 October (Buenos Aires, Argentina)
Regional workshop on "knowledge management" for Latin America

- 2–6 October (Nairobi, Kenya)
Workshop on IP and cybersecurity

- 5–7 October (Buenos Aires, Argentina)
14th regional Symposium on training and human resources for Latin America

This information was correct as of 26 June 2006. Updated details of meetings can be checked on the ITU website at http://www.itu.int/events/eventsquery.asp?lang=en


MAKE THE RIGHT CONNECTIONS