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# Telecommunications Standardization

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## 14.1 Introduction

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National economies are increasingly becoming information based, where networking and information transport provide a foundation for productivity and economic growth. Concurrently, many countries are rapidly adopting deregulation policies that are resulting in a telecommunications industry that is increasingly multicarrier and multivendor based, and where interconnectivity and compatibility between different networks is emerging as key to the success of this technological and regulatory transition. The communications industry has, consequently, become more interested in standardization; **standards** give manufacturers, service providers, and users freedom of choice at reasonable cost.

In this chapter, a review is provided of the primary telecommunications standards setting bodies. As will be seen, these bodies are often driven by slightly different underlying philosophies, but the output of their activities, i.e., the standards, possess essentially the same characteristics. An all-encompassing review of standardization bodies is not attempted here; this would clearly take many volumes to describe. Furthermore, as country after country increasingly deregulates its telecommunication industry, new standards setting bodies emerge to fill in the void of the de-facto (but no longer existing) standards setting bodies: the national telecommunications administration.

The principal communications standards bodies that will be covered are the following: the International Telecommunications Union (**ITU**); the United States **ANSI** Committee **T1** on Telecom-

munications; the Telecommunications Industry Association (**TIA**); the European Telecommunications Standards Institute (**ETSI**); the Inter-American Telecommunications Commission (**CITEL**); the Japanese Telecommunications Technology Committee (**TTC**); and the Institute of Electrical and Electronics Engineers (**IEEE**). Not addressed explicitly are other standards setting bodies that are either national or regional in character, even though it is recognized that sometimes there is overlap in scope with the bodies explicitly covered here.

Most notably, standards setting bodies that are not covered, but that are worth noting, include: the United States ANSI Committee X3; the International Standards Organization (**ISO**), the International Electrotechnical Commission (**IEC**) [except ISO/IEC joint technical committee (JTC) 1], the Telecommunications Standards Advisory Council of Canada (TSACC), the Australian Telecommunications Standardization Committee (ATSC), the Telecommunication Technology Association (TTA) in Korea, and several forums (whose scope is, in principle, somewhat different) such as the asynchronous transfer mode (ATM) forum, the frame relay forum, the integrated digital services network (ISDN) users' forum, and telocator. As will be described later, many of these bodies operate in a coherent fashion through a mechanism developed by the Interregional Telecommunications Standards Conference (ITSC) and its successor, the Global Standards Collaboration (**GSC**).

## 14.2 Global Standardization

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When it comes to setting global communications standards, the ITU comes to the forefront. The ITU is an intergovernmental organization, whereby each sovereign state that is a member of the United Nations may become a member of the ITU. Member governments (in most cases represented by their telecommunications administrations) are constitutional members with a right to vote. Other organizations, such as network and service providers, manufacturers, and scientific and industrial organizations also participate in ITU activities but with a lower legal status.

ITU traces its history back to 1865 in the era of telegraphy. The supreme organ of the ITU is the plenipotentiary conference, which is held not less than every five years and plays a major role in the management of ITU. In 1993 the ITU as a U.N.-specialized agency was reorganized into three sectors (see Fig. 14.1): The *telecommunications standardization* sector (**ITU-T**), the *radiocommunications* sector (**ITU-R**), and the *development* sector (BDT). These sectors' activities are, respectively, standardization of telecommunications, including radio communications; regulation of telecommunications (mainly for radio communications); and development of telecommunications.

It should be noted that, in general, the ITU-T is the successor of the international telephone and telegraph consultative committee (**CCITT**) of the ITU with additional responsibilities for standardization of network-related radio communications. Similarly, the ITU-R is the successor of the international radio consultative committee (**CCIR**) and the international frequency registration bureau (IFRB) of the ITU (after transferring some of its standardization activities to the ITU-T). The BDT is a new sector, which became operational in 1989.

### 14.2.1 ITU-T

Within the ITU structure, standardization work is undertaken by a number of study groups (SG) dealing with specific areas of communications. There are currently 14 study groups, as shown in Table 14.1.

Study groups develop standards for their respective work areas, which then have to be agreed upon by consensus—a process that for the time being is reserved to administrations only. The standards so developed are called **recommendations** to indicate their legal nonbinding nature. Technically,

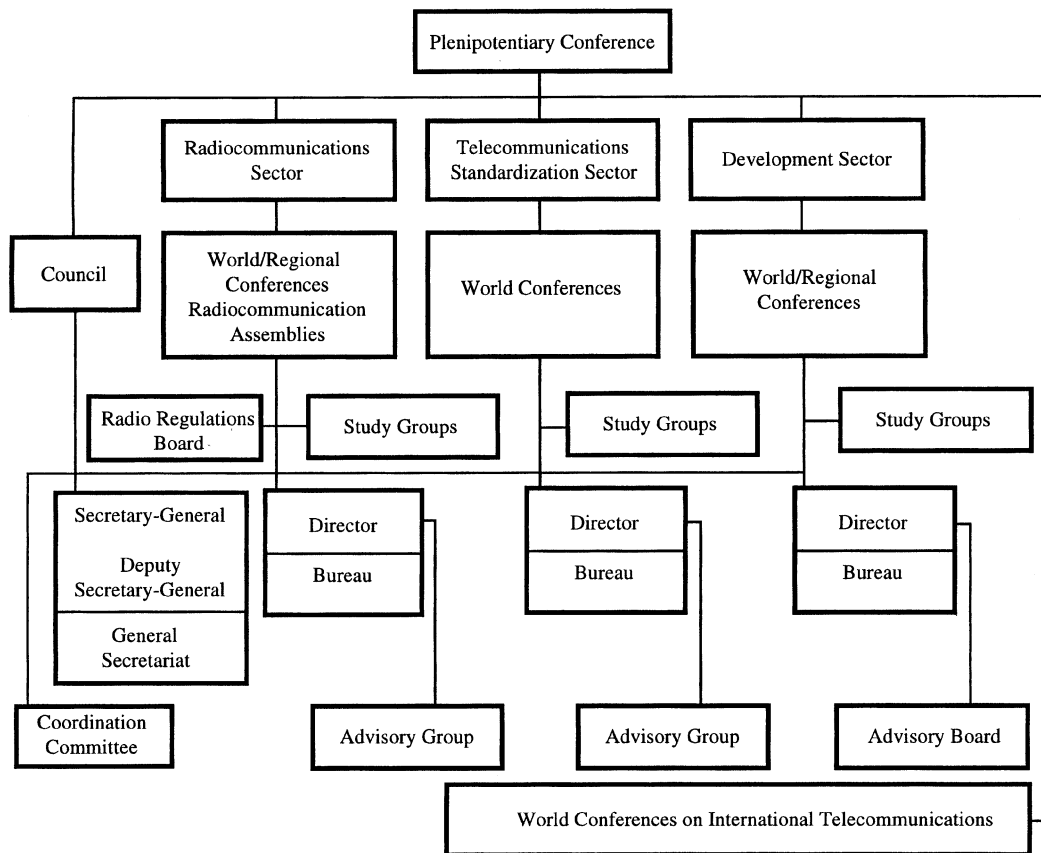


FIGURE 14.1: The ITU structure.

however, there is no distinction between recommendations developed by the ITU and standards developed by other standards setting bodies.

The study groups' work is undertaken by delegation members, sent or sponsored by their national administrations, and delegates from recognized private operating organizations (RPOA), scientific and industrial organizations (SIO) or international organizations. Because an ITU-T study group can typically have from 100 to more than 500 participating members and deal with 20–50 project standards, the work of each study group is often divided among working parties (WP). Such working parties are usually split further into experts' groups led by a chair or "rapporteur" with responsibility for leading the work defined in an approved active question or subelement of a question.

To coordinate standardization work that spans several study groups, two joint coordination groups (JCG) have also been established (not shown in Fig. 14.1): International Mobile Communications (IMT-2000) and Satellite Matters.

Such groups do not have executive powers but are merely there to coordinate work of pervasive interest within the ITU-T sector.

Also part of the ITU-T structure is the telecommunications standardization bureau (TSB) or, as it was formerly called, the CCITT secretariat. The TSB is responsible for the organization of numerous meetings held by the sector each year as well as all other support services required to

**TABLE 14.1** ITU-T Study Group Structure

SG 2	Network and service operation Lead SG on Service definition, Numbering, Routing and Global Mobility
SG 3	Tariff and accounting principles
SG 4	TMN and network maintenance Lead SG on Telecommunication management network (TMN) studies
SG 5	Protection against electromagnetic environmental effects
SG 6	Outside plant
SG 7	Data networks and open systems communications Lead SG on Open Distributed Processing (ODP), Frame Relay and for Communications System Security
SG 8	Characteristics of telematic services Lead SG on Facsimile
SG 9	Television and sound transmission
SG 10	Languages and general software aspects for telecommunications systems
SG 11	Signalling requirements and protocols Lead SG on Intelligent Network and IMT-2000
SG 12	End-to-end transmission performance of networks and terminals
SG 13	General network aspects Lead SG on General network aspects Global Information Infrastructures and Broadband ISDN
SG 15	Transport networks, systems and equipment Lead SG on Access Network Transport
SG 16	Transmission systems and equipment Lead SG on Multimedia services and systems

ensure the smooth and efficient operation of the sector (including, but not limited to, document production and distribution). The TSB is headed by a director, who holds the executive power and, in collaboration with the study groups, bears full responsibility for the ITU-T activities. In this structure, unlike other U.N. organizations, the secretary general is the legal representative of the ITU, with the executive powers being vested in the director.

Finally, the ITU-T is supported by an advisory group, i.e., the telecommunications standardization advisory group (TSAG), which together with interested ITU members, the ITU-T Director, and ITU-T SG chairman, guides standardization activities.

### 14.2.2 ITU-R

The radiocommunications sector emphasizes the regulatory and pure radio-interface aspects. The functional structure of the ITU-R currently includes eight study groups, (shown in Table 14.2) a radiocommunications bureau, and an advisory board. The role of the latter two elements is very similar to the ITU-T and, thus, need not be repeated here.

As within the ITU-T, there are areas of pervasive interest, and so areas of common interest can be found between the ITU-T and ITU-R where activities need to be coordinated. To achieve this objective, two intersector coordination groups (ICG) have been established (not shown in Fig. 14.1) dealing with international mobile telecommunications (IMT-2000), and satellite matters.

Three major special activities have been organized within ITU-R:

- IMT-2000 (formerly known as Future Public Land Mobile Telecommunications Systems FPLMTS). The objective of the International Mobile Telecommunications (IMT)-2000 activity is to provide seamless satellite and terrestrial operation of mobile terminals

**TABLE 14.2** ITU-R Study Group Structure

SG 1	Spectrum management
SG 3	Radio wave propagation
SG 4	Fixed satellite service
SG 7	Science services
SG 8	Mobile, radio determination, amateur and related satellite services
SG 9	Fixed service
SG 10	Broadcasting services: sound
SG 11	Broadcasting services: television

throughout the world—anywhere, anytime—where communication coverage requires interoperation of satellite and terrestrial networks. This is to be accomplished using technology available around the year 2000.

- Mobile-satellite and radionavigation-satellite service (MSS-RNSS). The rapid growth of service in these areas has created a need to focus attention on interference and spectrum allocation.
- Wireless Access Systems (WAS). This is an application of radio technology and personal communications systems directed toward lowering the installation and maintenance cost of the local access network. The traditional high cost has prevented penetration of basic telephone service in evolving and developing countries of the world. Overcoming this barrier is an objective of the BDT, described next.

### 14.2.3 BDT

Unlike the ITU-T (and to some extent ITU-R), which deals with standardization, the BDT deals with aspects that promote the integration and deployment of communications in developing countries. Typical outputs from this sector include implementation guides that expand the utility of ITU recommendations and ensure their expeditious implementation. Communications has been recognized as a necessary element for economic growth. The BDT also seeks to arrange special financing involving communication suppliers and governments or authorized carriers within developing countries to enable provision of basic communications service where otherwise it would not be possible.

### 14.2.4 ISO/IEC JTC 1

Two global organizations are active in the information processing systems area, the International Standards Organization (ISO) and the International Electrotechnical Commission (IEC), particularly through the Joint Technical Committee 1 (JTC 1).

The ISO comprises national standards bodies, which have the responsibility for promoting and distributing ISO standards within their own countries. ISO technical work is carried out by some 200 technical committees (TC). Technical committees are established by the ISO council and their work program is approved by the technical board on behalf of the council.

The IEC comprises national committees (one from each country) and deals with almost all spheres of electrotechnology, including power, electronics, telecommunications, and nuclear energy. IEC technical work is performed by some 200 TCs set up by its council and some 700 working groups. Part of this organization, a President's Advisory Committee on future technology (PACT) advises the IEC president on new technologies which require preliminary or immediate standardization work.

PACT is designed to form a direct link with private and public research and development activities, keeping the IEC abreast of accelerating technological changes and the accompanying demand for new standards. Small industrial project teams examine new work initiatives which can be introduced into the regular IEC working structure.

In 1987 a joint technical committee was established incorporating ISO TC97, IEC TC83, and subcommittee 47B to deal with generic information technology. The international standards developed by JTC1 are published under the ISO and IEC logos. The activities of ISO/IEC/JTC 1 are listed in Table 14.3 expressed in terms of its subcommittees (SC).

**TABLE 14.3** ISO/IEC/JTC1 Subcommittees

SC 1	Vocabulary
SC 2	Coded character sets
SC 6	Telecommunications information exchange between systems
SC 7	Software engineering
SC 11	Flexible magnetic media for digital data interchange
SC 17	Identification cards and related devices
SC 22	Programming languages, their environments and systems software interfaces
SC 23	Optical disk cartridges for information interchange
SC 24	Computer graphics and image processing
SC 25	Interconnection information technology management
SC 26	Microprocessor systems
SC 27	IT security techniques
SC 28	Office equipment
SC 29	Coding of audio, picture, multimedia and hypermedia information
SC 31	Automatic data capture
SC 32	Data management services
SC 33	Distributed application services

The ISO and IEC jointly issue directions for the work of the technical committees. The scope (or area of activity) of each technical committee (TC)/subcommittee (SC) is defined by the TC/SC itself, and then submitted to the Committee of Action (CA)/parent TC for approval. The TCs/SCs prepare technical documents on specific subjects within their respective scopes, which are then submitted to the National Committees for voting with a view to their approval as international standards.

## 14.3 Regional Standardization

Today the ETSI comes closest to being a true regional standards setting body, together with CITEL, the regional (Latin-American) standardization body.

ETSI is the result of the Single Act of the European community and the EC commission green paper in 1987 that analyzed the consequences of the Single Act and recommended that a European telecommunications standards body be created to develop common standards for telecommunications equipment and networks. Out of this recommendation, the Committee for Harmonization (CCH) and the European Conference for Post and Telecommunications (**CEPT**) evolved into ETSI, which formally came into being in March 1988. It should be noted, however, that even though ETSI attributes at least part of its existence to the European Community, its membership is wider than just the European Union Nations.

Because of the way ETSI came into being, ETSI is characterized by a unique aspect, namely, it is often called upon by the European Commission to develop standards that are necessary to implement legislation. Such standards, which are referred to as technical basis reports (TBR) and whose application is usually mandatory, are often needed in public procurements, as well as in provisioning for open network interconnection as national telecommunications administrations are being deregulated. Like ITU, however, ETSI also develops voluntary standards in accordance with common international understanding against which industry is not obliged to produce conforming products. These standards fall into either the European technical standard (ETS) class when fully approved, or into the interim-ETS class, when not fully stable or proven.

ETSI standards are typically sought when either the subject matter is not studied at the global level (such as when it may be required to support some piece of legislation), or the development of the standard is justified by market needs that exist in Europe and not in other parts of the world. In some cases, it may be necessary to adapt ITU standards for the European continent, although a simple endorsement of an ITU standard as a European standard is also possible. A more delicate case arises when both the ITU and ETSI are pursuing parallel standards activities, in which case close coordination with the ITU is sought either through member countries that may input ETSI standards to the ITU for consideration or through the global standards collaboration process.

The highest authority of ETSI is the general assembly, which determines ETSI's policy, appoints its director and deputy, adopts the budget, and approves the audited accounts. The more technical issues are addressed by the technical assembly, which approves technical standards, advises on the work to be undertaken, and sets priorities. The ETSI technical committees are listed in Table 14.4.

**TABLE 14.4** ETSI Technical Committees

TCEE	Environmental engineering
TCHF	Human factors
TCMTS	Methods for testing and specification
TCSEC	Security
TCSPS	Signalling protocols and switching
TCTM	Transmission and multiplexing
TCERM	EMC and radio spectrum matters
TCICC	Integrated circuit cards
TCNA	Network aspects
TCSSES	Satellite earth stations and systems
TCSTQ	Speech processing, transmission and quality
TCTMN	Telecommunications management networks
ECMA TC32	Communication, networks and systems interconnection
EBU/CENELEC/ETSI JTC	Joint technical committee

It can be seen that ETSI currently comprises 14 technical committees reporting to the technical assembly. These committees are responsible for the development of technical standards. In addition, these committees are responsible for prestandardization activities, that is, activities lead to ETSI technical reports (ETR) that eventually become the basis for future standards.

In addition to the technical assembly, a strategic review committee (SRC) is responsible for prospective examination of a single technical domain, whereas an intellectual property rights committee defines ETSI's policy in the area of intellectual property. Although by no means unique to ETSI,

the rapid pace of technological progress has resulted in more standards being adopted that embrace technologies that are still under patent protection. This creates a fundamental conflict between the private, exclusive nature of industrial property rights, and the open, public nature of standards. Harmonizing those conflicting claims has emerged as a thorny issue in all standards organizations; ETSI has established a formal function for this purpose. Finally, the ETS/EBU technical committee coordinates activities with the European broadcasting union (EBU), whereas the ISDN committee is in charge of managing and coordinating the standardization process for narrowband ISDN.

### 14.3.1 CITEL

On June 11, 1993, the Organization of American States (OAS) General Assembly revised the existing Inter-American Telecommunication Commission (CITEL) strengthening and reorganizing the activities of CITEL, creating a position for the executive secretariat of CITEL and opening the doors, as associate members, to enterprises, organisms, and private telecommunication organizations, to act as observers of the permanent consultative committees of CITEL and its working groups.

CITEL's objectives include facilitating and promoting the continuous development of telecommunications in the hemisphere. It serves as the organization's principal advisory body on matters related to telecommunications. The commission represents all the members states. It has a permanent executive committee consisting of 11 members, and three permanent consultative committees. The permanent consultative committees, whose members are all member states of the organization, also have associate members that represent various private telecommunications agencies or companies.

The general assembly of CITEL, through resolution CITEL Res.8(I-94) established the following specific mandates for the three permanent consultative committees and the steering committee.

**Permanent Consultative Committee I: Public Telecommunication Services.** To promote and watch over the integration and strengthening of networks and public telecommunication services operating in the countries of the Americas, taking into account the need for modernization of networks and promotion of universal telephone basic services, as well as for increasing the public availability of specialized services and the promotion of the use of international ITU standards and radio regulations.

**Permanent Consultative Committee II: Broadcasting.** To stimulate and encourage the regional presence of broadcasting services, promoting the use of modern technologies and improving the public availability of such communication media, including audio and video systems, and the promotion of the use of international ITU standards and radio regulations.

**Permanent Consultative Committee III: Radiocommunications.** To promote the harmonization of radiocommunication services bearing especially in mind the need for a reduction to the minimum of those factors that may cause harmful interferences in the performance and operation of networks and services. To promote the use of modern technologies and the application of the ITU radio regulations and standards.

**Steering Committee.** The Steering Committee shall be formed by the chairman and vice-chairman of COM/CITEL and the chairman of the PCCs. The committee will be responsible for the revision and proposal to COM/CITEL of the continuous updating of the regulations, mandates and work programs of CITEL bodies; the executive secretary of CITEL will act as the secretary of said committee.

## 14.4 National Standardization

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As standardization moves from global to regional and then to national levels, the number of actual participating entities rapidly grows. Here, the function of two national standards bodies are reviewed,

primarily because these have been in existence the longest and secondarily because they also represent major markets for commercial communications.

### 14.4.1 ANSI T1

Unlike the ETSI, which came into being partly as a consequence of legislative recommendations, the ANSI Committee T1 on telecommunications came into being as a result of the realization that with the breakup of the Bell System, de-facto standards could no longer be expected. In fact, T1 came into being the very same year (1984) that the breakup of the Bell System came into effect.

The T1 membership comprises four types of interest groups: users and general interest groups, manufacturers, interexchange carriers, and exchange carriers. This rather broad membership is reflected, to some extent, by the scope to which T1 standards are being applied; this means that nontraditional telecommunications service providers are utilizing the technologies standardized by committee T1. This situation is the result of the rapid evolution and convergence of the telecommunications, computer, and cable television industries in the United States, and advances in wireless technology.

Committee T1 currently addresses approximately 150 approved projects, which led to the establishment of six, primarily functionally oriented, technical subcommittees (TSC), as shown in Table 14.5 and Fig. 14.2 [although not evident from Table 14.3, subcommittee T1P1 has primary responsibility for management of activities on personal communications systems (PCS)]. In-turn, each of these six subcommittees is divided into a number of subtending working groups, and subworking groups.

**TABLE 14.5** T1 Subcommittee Structure

TSC: T1A1	Performance and signal processing
TSC: T1E1	Network interfaces and environmental considerations
TSC: T1M1	Interwork operations, administration, maintenance, and provisioning
TSC: T1P1	Systems engineering, standards planning, and program management
TSC: T1S1	Services, architecture, and signalling
TSC: T1X1	Digital hierarchy and synchronization

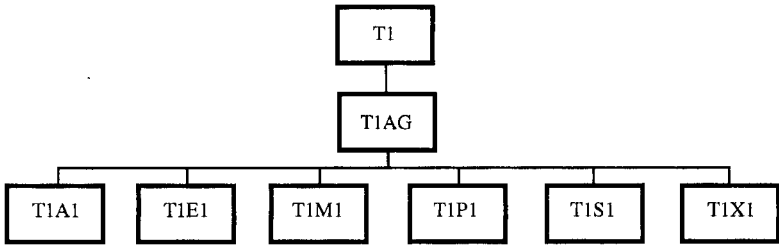


FIGURE 14.2: T1 committee structure.

Committee T1 also has an advisory group (**T1AG**) made up of elected representatives from each of the four interest groups to carry out committee T1 directives and to develop proposals for consideration by the T1 membership.

In parallel to serving as the forum that establishes ANSI telecommunications network standards, committee T1 technical subcommittees draft candidate U.S. technical contributions to the ITU. These contributions are submitted to the U.S. Department of State National Committee for the ITU, which administers U.S. participation and contributions to the ITU (see Fig. 14.3). In this manner, activities within T1 are coordinated with those of the ITU. This coordination with other standards setting bodies is also reflected in T1's involvement with Latin-American standards, through the formation of an ad hoc group with CITEL's permanent technical committee 1 (PTC 1/T1). Further coordination with ETSI and other standards setting bodies is accomplished through the global standards collaboration process.

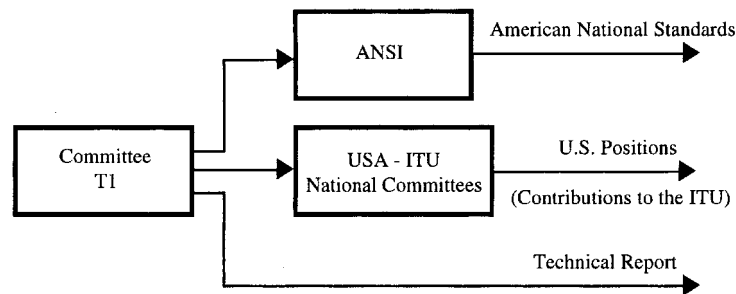


FIGURE 14.3: Committee T1 output.

#### 14.4.2 TIA

The TIA is a full-service trade organization that provides its members with numerous services including government relations, market support activities, educational programs, and standards setting activities.

TIA is a member-driven organization. Policy is formulated by 25 board members selected from member companies, and is carried out by a permanent professional staff located in Washington D.C. TIA comprises six issue-oriented standing committees, each of which is chaired by a board member. The six committees are membership scope and development, international, marketing and trade shows, public policy and government relations, and technical. It is this last committee that in 1992 was accredited by ANSI in the United States to standardize telecommunications products. Technology standardization activities are reflected by TIA's four product-oriented divisions, namely, user premises equipment, network equipment, mobile and personal communications equipment, and fiber optics.

In these divisions the legislative and regulatory concerns of product manufacturers and the preparation of standards dealing with performance testing and compatibility are addressed. For example, modem and telematic standards, as well as much of the cellular standards technology, has been standardized in the United States under the mandate of TIA.

### 14.4.3 TTC

The third national committee to be addressed is the TTC in Japan. TTC was established in October 1985 to develop and disseminate Japanese domestic standards for deregulated technical items and protocols. It is a nongovernmental, nonprofit standards setting organization established to ensure fair and transparent standardization procedures.

TTC's primary emphasis is to develop, conduct studies and research, and disseminate protocols and standards for the connection of telecommunications networks. TTC is organized along six technical subcommittees that report to a board of directors through a technical assembly (see Fig. 14.4).

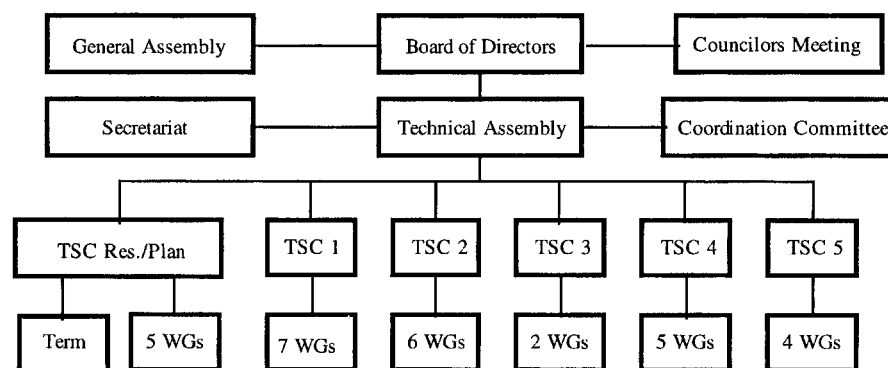


FIGURE 14.4: Organization of TTC.

The TTC organization comprises a general assembly, which is in charge of matters such as business plans and budgets. The councilors meeting examines standards development procedures in order to assure impartiality and clarity. The secretariat provides overall support to the organization; the technical assembly develops standards and handles technical matters including surveys and research. Each technical subcommittee is partitioned into two or more working groups (WG). The coordination committee handles all issues in or between the TSCs and WGs, and it assures the smooth running of all technical committee meetings.

Under the coordination committee, a subcommittee examines users' requests and studies their applicability to the five-year standardization-project plan. This subcommittee also conducts user-request surveys. The areas of involvement of each of the five subcommittees are shown in Table 14.6.

TTC membership is divided into four categories. Type I telecommunications carriers, that is, those carriers that own telecommunications circuits and facilities; type II telecommunications car-

**TABLE 14.6** TTC SubCommittees

Strategic Research and Planning Committee: Technical Survey and International Collaboration
TSC 1 Network-to-network interfaces, mobile communications
TSC 2 User-network interfaces
TSC 3 PBX, LAN
TSC 4 Higher level protocols
TSC 5 Voice and video signal coding scheme and systems

riers, that is, those with telecommunications circuits leased from type I carriers; related equipment manufacturers; and others, including users.

Underlying objectives that guide TTC's approach to standards development are 1) to conform to international recommendations or standards; 2) standardize items, where either international recommendations or standards are not clear, or where national standards need to be set, and where a consensus is achieved; and 3) to conduct further studies into any of the items just mentioned whenever the technical assembly is unable to arrive at a consensus.

These objectives, which give highest priority in developing standards that are compatible with international recommendations or standards, have often driven TTC to adapt international standards for national use through the use of supplements that:

- Give guidelines for users of TTC standards on how to apply them
- Help clarify the contents of standards
- Help with the implementation of standards in terminal equipment and adaptors
- Assure interconnection between terminal equipment and adaptors
- Provide background information regarding the content of standards
- Assure interconnection.

These supplements also include questions and answers that help in implementing the standards, including encoding examples of various parameters and explanation of the practical meaning of a standard.

## **14.5 Intellectual Property**

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In the deregulating telecommunication arena patents have become increasingly more important. New ideas that are incorporated in standards often have global market potential and patent holders are seeking to obtain an income from their intellectual property as well as from products. In addition, the general effort to develop standards quickly places them closer to the leading edge of technology. There are some cases, for example speech encoding algorithms, where terms of reference for performance are typically set as objectives that no one can meet when the objectives are defined. The state of the art is being pushed by goals of the standards development organization. In this environment, incorporation of some intellectual property in standards is practically unavoidable.

With regard to intellectual property rights in the ITU, the TSB has developed a "code of practice" which may be summarized as follows.

The TSB requests members putting forth standards to draw the attention of the TSB to any known patent or patent pending application relevant to the developing standard. Where such information has been declared to the TSB, a log of registered patent holders for each affected recommendation is maintained for the convenience of users of ITU standards. If a recommendation, which is a nonbinding international standard, is developed and contains patented intellectual property there are three situations that may arise.

- The patent holder waives the rights and the recommendation is freely accessible to everybody.
- The patent holder will not waive the rights but is willing to negotiate licenses with other parties on a nondiscriminatory basis and on reasonable terms and conditions. What is reasonable is not defined, and the ITU-T will not participate in such negotiations.

- The patent holder is not willing to comply with either of the above two situations, in which case the ITU-T will not approve a recommendation containing such intellectual property.

The patent policy of the American National Standards Institute (ANSI), which governs all standards development organizations accredited by ANSI, is defined in ANSI procedures 1.2.11. It is similar to that of the ITU in that it requires a statement from patent holders or identified parties to indicate granting of a royalty-free license, willingness to license on reasonable and nondiscriminatory terms and conditions, or a disclaimer of no patent. Unlike the ITU, ANSI advises that is prepared to get involved in resolving disputes of what is considered “nondiscriminatory” and “reasonable.” Additional information on ANSI patent guidelines can be found at <http://web.ansi.org/public/library/guides/ppguide.html>.

As mentioned earlier ETSI produces a combination of mandatory and voluntary standards. This can create additional complications when intellectual property issues are encapsulated within the standards. To formally address these issues an intellectual property rights committee defines ETSI’s policy in the area of intellectual property.

Given the different patent policies adopted by various standards organizations, it is recommended that companies developing products based on standards investigate and understand the patent policy of the associated standards body and the patent statements filed regarding the standard being implemented.

## 14.6 Standards Coordination

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The pace of technological advancements coupled with deregulation has given rise to increased global telecommunications standards activities. At the same time a growth of regional standards bodies has occurred which has increased the potential for duplication of work, wasting resources, and creating conflicting standards. This potentially adverse situation was addressed by a number of interregional telecommunications standardization conferences (ITSCs) that were held in the early 1990s. A global standards collaboration (GSC) group was established to oversee collaborative activities including electronic document handling (EDH) and five high-interest standards subjects:

- Broadband integrated services digital network (B-ISDN)
- Intelligent Networks (IN)
- Transmission management network (TMN)
- Universal personal telecommunications (UPT)
- Synchronous digital hierarchy/synchronous optical network (SDH/SONET)

This early activity was successful in avoiding duplication of effort and coordinating activities on these major standardization efforts. Today the level of cooperative activities, again driven by the pressure to avoid wasting valuable resources and reaching agreed standards more rapidly, are being driven to lower levels through the use of liaison statements between regional standards groups and permitting “documents of information” to flow between standards development organizations. The processes for this information flow are evolving and the electronic addresses provided at the end of this chapter should be consulted for the current interstandards organization communication mechanisms.

## 14.7 Scientific

Another global, scientifically based organization that has been particularly active in standards development (more recently emphasizing information processing) is the IEEE. Responsibility for standards adoption within the IEEE lies with the IEEE standards board. The board is supported by nine standing committees (see Fig. 14.5).

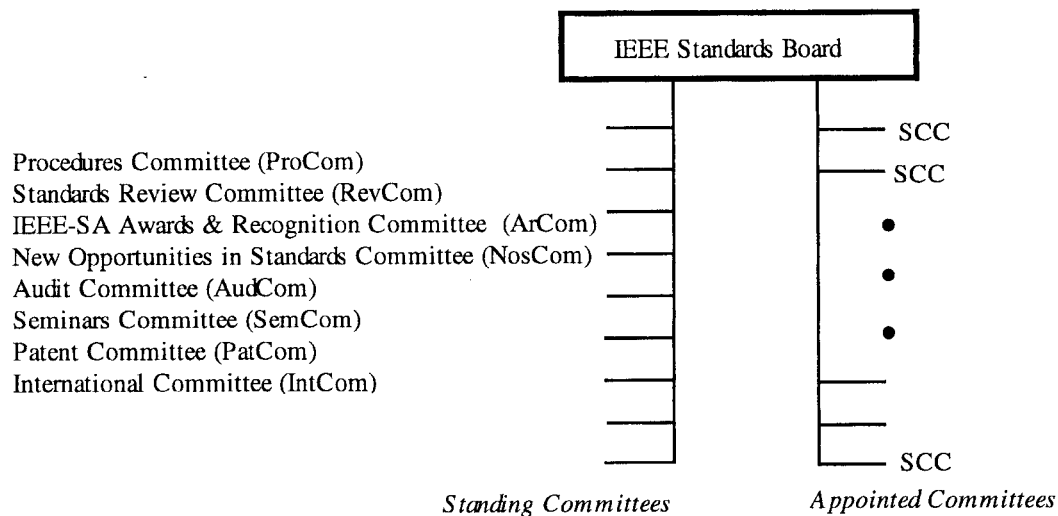


FIGURE 14.5: IEEE standards board organization.

Proposed standards are normally developed in the technical committees of the IEEE societies. There are occasions, however, when the scope of activity is too broad to be encompassed by a single society or where the societies are not able to do so for other reasons. In this case the standards board establishes its own standards developing committees, namely, the standards coordinating committees (SCC), to perform this function.

The adoption of IEEE standards is based on projects that have been approved by the IEEE standards board, while each project is the responsibility of a sponsor. Sponsors need not be an SCC, but can also include technical committees of IEEE societies; a standards, or standards coordinating committee of an IEEE Society; an accredited standards committee; or another organization approved by the IEEE standards board.

## 14.8 Standards Development Cycle

Although the manner in which standards are developed and approved somewhat varies between standards organizations, there are common characteristics to be found.

For most standards, first a set of requirements is defined. This may be done either by the standards committee actually developing the standard or by another entity in collaboration with such a committee. Subsequently, the technical details of a standard are developed. The actual entity developing a standard may be a member of the standards committee, or the actual standards committee

itself. Outsiders may also contribute to standards development but, typically, only if sponsored by a committee member. Membership in the standards committee and the right to contribute technical information towards the development of the standard differs among the various standards' organizations, as indicated. This process is illustrated in Fig. 14.6.

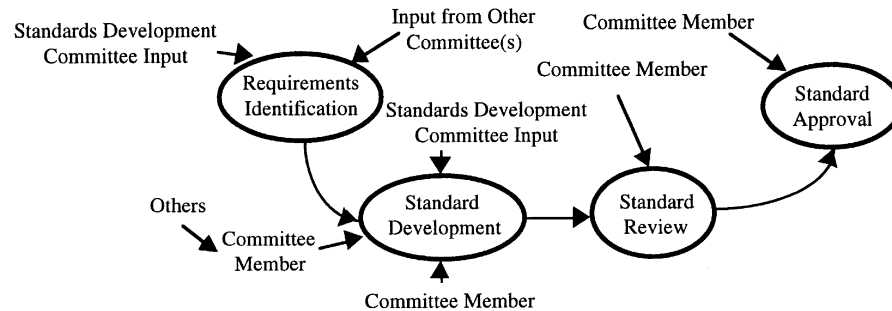


FIGURE 14.6: Typical standards development and approval process.

Finally, once the standard has been fully developed, it is placed under an approval cycle. Each standards setting body typically has precisely defined and often complex procedures for reviewing and then approving proposed standards, which although different in detail, are typically consensus driven.

## Defining Terms

**ANSI:** The American National Standards Institute.

**CCIR:** The International Radio Consultative Committee, the predecessor of the ITU-R.

**CCITT:** The International Telephone and Telegraph Consultative Committee, the predecessor of the ITU-T.

**CEPT:** The European Conference for Post and Telecommunications, a predecessor of ETSI.

**CITEL:** Inter-American Telecommunications Commission, a standards setting body for the Americas.

**ETS:** A European (ETSI) technical standard.

**ETSI:** The European Telecommunications Standards Institute.

**GSC:** The Global Standards Collaboration group.

**ICG:** Intersector Coordination Group, a group which coordinates activities between the ITU-T and ITU-R.

**IEC:** The International Electrotechnical Commission.

**IEEE:** The Institute of Electrical and Electronics Engineers.

**ISO:** The International Standards Organization.

**ITU:** The International Telecommunications Union, an international treaty organization, which is part of the United Nations.

**ITU-R:** The radio communications sector of the ITU, the successor of the CCIR.

**ITU-T:** The standardization sector of the ITU, the successor of the CCITT.

**JCG:** The Joint Coordination Group, which oversees the coordination of common work between ITU-T study groups.

**Recommendation:** An ITU technical standard.

**SCC:** A standard's coordinating committee within the IEEE organization.

**Standard:** A publicly approved technical specification.

**T1:** An ANSI-approved standards body, which develops telecommunications standards in the United States.

**T1AG:** The primary advisory group within ANSI Committee T1 on Telecommunications.

**TIA:** The Telecommunications Industry Association, which is an ANSI-approved standards body that develops terminal equipment standards.

**TTC:** The Telecommunications Technology Committee, a Japanese standards setting body.

## Further Information

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- [1] Irmer, T., Shaping future telecommunications: the challenge of global standardization, *IEEE Comm. Mag.*, 32(1), 20–28, 1994.
- [2] Matute, M.A., CITEL: formulating telecommunications in the Americas. *IEEE Comm. Mag.*, 32(1), 38–39, 1994.
- [3] Robin, G., The European perspective for telecommunications standards. *IEEE Comm. Mag.*, 32(1), 40–50, 1994.
- [4] Reilly, A.K., A U.S. perspective on standards development. *IEEE Comm. Mag.*, 32(1), 30–36, 1994.
- [5] Iida, T., Domestic standards in a changing world. *IEEE Comm. Mag.*, 32(1), 46–50, 1994.
- [6] Habara, K., Cooperation in standardization. *IEEE Comm. Mag.*, 32(1), 78–84, 1994.
- [7] *IEEE Standards Board Bylaws*. Institute of Electrical and Electronics Engineers. Dec. 1993.
- [8] Chiarottino, W. and Pirani, G., International telecommunications standards organizations, *CSELT Tech. Repts.*, XXI(2), 207–236, 1993.
- [9] ITU, Book No. 1. Resolutions; Recommendations on the organization of the work of ITU-T (series A); study groups and other groups; list of study questions (1993–1996). World Standardization Conf. Helsinki, 1–12, Mar. 1993.
- [10] Standards Committee T1., *Telecommunications*. Procedures Manual. 7th Iss. Jun. 1992.

The standards' organizations often undergo structural and substantive changes. It is recommended that the following web sites be visited for the most updated information.

ANSI	<a href="http://www.ansi.org/">http://www.ansi.org/</a>
CITEL	<a href="http://www.oas.org">http://www.oas.org</a>
ETSI	<a href="http://www.etsi.org">http://www.etsi.org</a>
IEC	<a href="http://www.iec.ch">http://www.iec.ch</a>
IEEE	<a href="http://www.ieee.org">http://www.ieee.org</a>
ISO	<a href="http://www.iso.ch">http://www.iso.ch</a>
ITU	<a href="http://www.itu.ch">http://www.itu.ch</a>
T1	<a href="http://www.t1.org">http://www.t1.org</a>
TIA	<a href="http://www.tia.org">http://www.tia.org</a>
TTC	<a href="http://www.ttc.or.jp">http://www.ttc.or.jp</a>