

## FURTHER READING:

As a preview for further reading, the following reference has been provided from the pages of the book below:

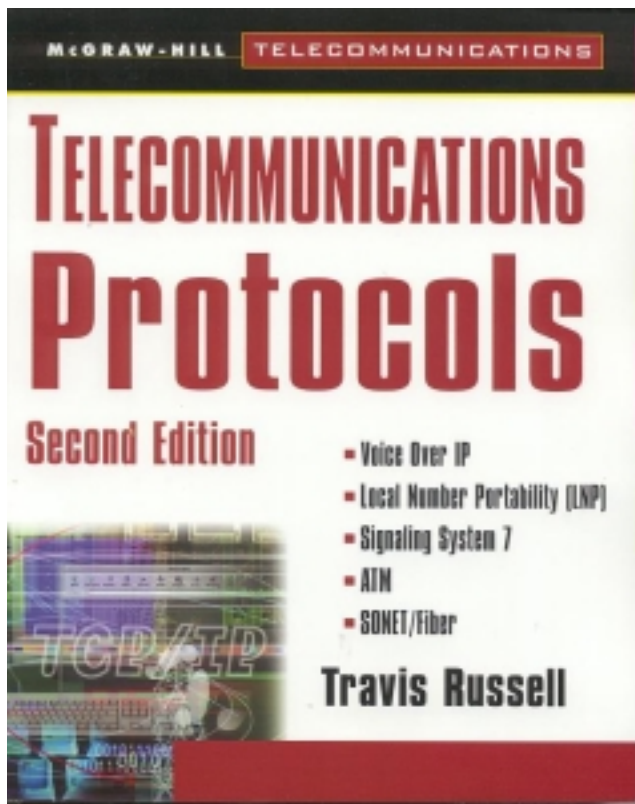
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many) and then must vote on whether to accept or reject the various contributions.

The contributions hardly ever encompass an entire solution, but only a small area of the working group's interest. At regular meetings, they may have to vote on many different contributions, rejecting many and accepting few. Those that get accepted usually need reworking.

Most organizations require a unanimous vote before a contribution can be accepted. Some (such as the Asynchronous Transfer Mode, or ATM, Forum) have changed this rule, allowing a majority vote. This in theory should accelerate the standards process, although this has not necessarily been the case.

Once a working group has completed a particular part of a standard, it is presented to the General Counsel, which then gives final approval. The proposed standards are voted on once again and, if successful, are published as standards.

Some organizations (such as the International Telecommunication Union, or ITU) only publish standards at certain intervals. The ITU used to publish their standards every 4 years, lengthening the time that technology got to market. This has now been changed since the ITU recognized to the need to move more quickly. Their standards are now published after voting has been completed.

## 1.2.2. Organizations Here and Abroad

There are many different organizations responsible for the development and publishing of standards. Some standards organizations simply vote on standards developed by other organizations and endorse them for publication under their organization's charter. For example, ANSI publishes standards endorsed for use within the United States, even though they may not have developed the standard. Following are the standards organizations most involved with telecommunications.

**1.2.2.1. International Telecommunications Union** This was formerly known as the CCITT. They changed their name in 1992. The standards group responsible for telecommunications is called the Telecommunications Standardized Sectorization (ITU-TSS). Their members are usually government agencies from various countries represented in the United Nations (ITU is a UN treaty organization). The United States is represented by the Department of State, as well as by ANSI and the Institute of Electrical and Electronics Engineers (IEEE).

There are 15 working groups in the ITU-TSS. Each is responsible for a specific area, much the same as ANSI. Their contributions are then submitted to the General Counsel for election as a standard. Once approved, the standard is published.

This process used to take place every 4 years. The working committees would meet on regular intervals, and the General Counsel would vote on contributions every 4 years. Their publications were color coded, a different color representing each 4-year interval. The following list identifies the year of publication for the various standards (published as “books”):

- 1960—Red Book
- 1964—Blue Book
- 1968—White Book
- 1972—Orange/Green Book
- 1976—Orange Book
- 1980—Yellow Book
- 1984—Red Book
- 1986—Blue Book
- 1992—White Book

This process proved to be inefficient and delayed many technologies from reaching market in a timely manner. The ITU has since changed this policy and now meets at regular intervals, approving and publishing standards as they are completed. It is hoped that this new change will accelerate the standards process.

The ITU standards are used by countries who want to interconnect their networks with other countries. Each nation then has its own national standard for use within that country. For example, the United States uses ITU standards for connecting to the international telephone network, but within the United States, we use the ANSI standards.

**1.2.2.2. International Organization for Standards (ISO)** ISO is a voluntary organization, founded in 1946. Its members are standard organizations from all over the world. Its charter is to endorse standards for use in international networks and to promote interconnectivity between international boundaries.

The United States is represented by ANSI, which is responsible for endorsing and publishing standards for use here in the United States.

There are more than 5000 standards published by the ISO, including the Open System Interconnection (OSI) model, used by all in the indus-

try. The Technical Committee 97 (TC97) is responsible for data communications standards. Perhaps the standard that has had the largest impact on the industry has been the ISO 9000 quality standard.

### **1.2.2.3. European Telecommunication Standards Institute (ETSI)**

Founded in 1988, ETSI establishes standards for use within European countries. They are a member of the ITU, and their members are from within, as well as outside of, Europe (such as telecommunications manufacturers). They were formed to take over the role of the European Conference of Postal and Telecommunications Administrations (CEPT).

Membership to CEPT was previously open only to administrations and public operators. This was later changed to include manufacturers. ETSI has adopted this policy to allow more influence from the public sector into their decisions.

### **1.2.2.4. American National Standards Institute**

The ANSI is responsible for determining which protocol and media standards will be endorsed for use in United States networks. They are a nonprofit organization consisting of members from the industry. Manufacturers and developers who are actively working in the industry submit both personal and company-represented contributions for publication as ANSI standards. The IEEE is one example of membership.

The T1 committee is responsible for establishing telecommunications standards. There are a number of T1 committees, each one responsible for various areas. The T1E1 committee is responsible for carrier-to-customer installation interfaces.

The T1S1 committee is responsible for telecommunications services, architecture of telecommunications networks, and signaling networks (such as SS7) used in telecommunications. This is one of the more active committees in the telecommunications industry.

Transmission standards are under the jurisdiction of the T1X1 committee. Transmission includes T1 facilities, data facilities, and SONET. Performance and quality standards are determined by the T1Q1 committee.

All of these committees must work with one another since many of these standards are related to one another. Some committee members may even belong to more than one committee.

### **1.2.2.5. Bell Communications Research (Bellcore)**

For those who work in the telephone industry, Bellcore standards are the most impor-

tant aspect of their products. All network equipment purchased by the Regional Bell Operating Companies (RBOCs) and used within their networks are required by those companies to meet or exceed Bellcore standards.

Bellcore is a private organization, funded by the seven RBOCs. Their future is questionable because of the complexities of the RBOCs' relationships. In some ways they are family, while in the business sense they are competitors. This is especially true as telephone legislation changes, and the RBOCs begin offering services which cross their geographical boundaries into the sectors of their fellow RBOCs.

Bellcore is also a research firm, providing the research and development previously provided by Bell Laboratories (before divestiture in 1984). The standards they publish are typically the same as the ITU and ANSI standards, with many enhancements. Their primary focus is in the areas of network management and interoperability. In fact, many of the Bellcore standards are almost exactly the same as the ANSI equivalents. The differences are in enhancements made by Bellcore. This often means that Bellcore standard compliance is much more difficult than ANSI compliance.

Their standards are published in several stages. They are first published as a draft and distributed to vendors in the industry for comment. They are then republished as preliminary, which are then distributed again. Final documents are published as Generic Requirements (GRs). These were formerly known as Technical References (TRs).

Bellcore also publishes requirements for equipment interfaces as well as operating requirements for specific device types. Again, they typically concentrate on the areas of interoperability and network management.

**1.2.2.6. Exchange Carriers Standards Association (ECSA)** ECSA was formed in 1983 as an independent organization to define interface standards used by carriers to connect to regional telephone companies. After the divestiture of 1984, AT&T, MCI, and many other long distance carriers became independents not affiliated with the Bell System. This meant they were not represented by Bellcore and needed an organization of their own to define interconnect standards.

The industry recognized the need for an organization to standardize how these carriers would connect to the various networks. The interexchange carriers are the members of this organization. They also sponsor the T1 Committee, which is accredited by ANSI (which means they write standards which are later published as ANSI standards).

**1.2.2.7. Electronics Industries Association (EIA)** This organization is perhaps best known for its contribution to the computer world. The ever-popular RS-232 interface is an EIA standard. In recent years, the EIA has been actively publishing standards for use in the cellular market.

The Interim Standard-41 (IS-41), used in many cellular networks today, is an EIA standard, as are IS-94 and IS-95, both being deployed in new cellular networks. These technologies are explained in greater detail in Chap. 7.

**1.2.2.8. Institute of Electrical and Electronics Engineers** IEEE is the largest professional society in the industry. Its members are working professionals in the industry, primarily engineers and developers. There are over 275,000 members to date worldwide.

The 802 standards are probably the most familiar standards in the data communications industry. They include Ethernet and Token Ring standards, as well as the Fiber Distributed Data Interface (FDDI). The following list are some of the more well-known standards:

- 802.1—Higher-layer protocol interface standard
- 802.2—Logical link control (LLC)
- 802.3—CSMA/CD LAN (Ethernet)
- 802.4—Token Bus (ARCNET)
- 802.5—Token Ring
- 802.6—DQDB Metropolitan Area Network (SMDS)
- 802.7—Broadband
- 802.8—Optical fiber
- 802.9—Integrated voice and data Local Area Network (LAN) interfaces

**1.2.2.9. Federal Communications Commission** The FCC is a regulatory agency which was established in 1934 as a result of the Communications Act of 1934. Their charter is to regulate the radio and all wire communications within the United States. They play an active role in all of the telecommunications and cellular networks.

There are seven commissioners appointed by the president of the United States to reside over the FCC. Their decisions are far-reaching and affect everyone who uses the services of the telephone companies, radio broadcasters, television broadcasters, and even corporate networks.

**1.2.2.10. Network Reliability Council (NRC)** Chartered by the FCC, the NRC monitors all public telecommunications networks, reporting