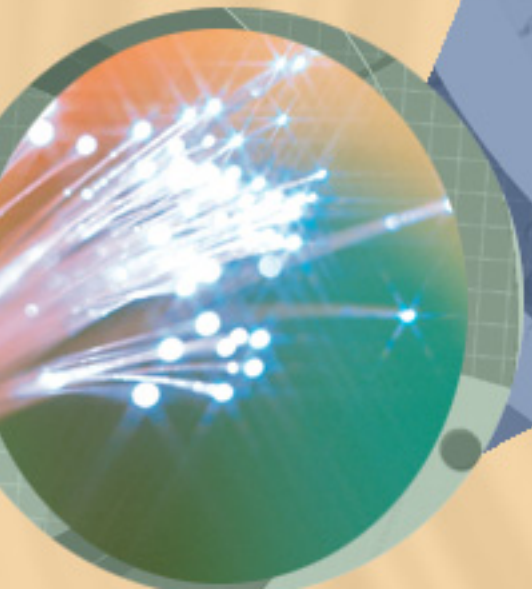
STANDARDS AND TECHNOLOGY ANNUAL REPORT

2003



TR-8 Mobile and Personal Private Radio Standards

Committee TR-8 develops and maintains standards for private radio communications systems and equipment for both voice and data applications. TR-8 addresses all technical matters for systems and services, including definitions, interoperability, compatibility and compliance requirements. The types of systems addressed by these standards include business and industrial dispatch applications, as well as public safety (police, ambulance, fire fighting, etc.) applications.

Committee TR-8 is the standards formulation committee for Private Land Mobile Radio Systems. Traditionally, the technology that has been deployed has been analog frequency modulated (FM) technology. More recently, the committee has concerned itself with more sophisticated radio systems involving digital modulation technologies, wideband data systems and communications network infrastructure. The committee has also become increasingly active in other areas including radio propagation and interference issues, as well as Radio Frequency (RF) exposure limit verification and reporting. In addition, there has been a renewed interest in antennas and antenna system components.

Photo courtesy of Motorola Inc.

Reliability and interoperability are of prime importance to many of the users of Public Safety. Officers from various agencies find the need to communicate among themselves more frequently. Also, the critical nature of these communications also requires a high level of reliability and freedom from interference. All these aspects have caused TR-8 to take on a wider scope of responsibility. TR-8 has seen increasing interest and participation, on the part of not only manufacturers, but also of the user community. The committee added new work projects and a new subcommittee during the year. The activity of the committee continued at a high level throughout the year.

2003 Activities

As a result of the need to complete several key projects in a timely manner, there has been a continued high level of activity within TR-8 and some of its subcommittees. One project of importance was the completion of the standards defining interoperability for wideband data systems for the 700 MHz frequency band. This project resulted from a request from the National Coordination Committee (NCC), an advisory committee to the Federal Communications Commission (FCC) on issues concerning deployment of the 700 MHz frequency band. Because the NCC charter expired in July, 2003, it was important that the standards defining interoperability be completed prior to that date. This, as well as other critical projects, required the subcommittees to work expeditiously.

TR-8 and its subcommittees met five times during the year. The meetings were held in conjunction with the APCO/NASTD/FED Project 25 meetings. (APCO/NASTD/FED is a collective group of the Association of Public Safety Communications Officials International Inc. [APCO]; the National Association of State Telecommunications Directors [NASTD]; and federal government agencies). In addition face-to-face meetings, many

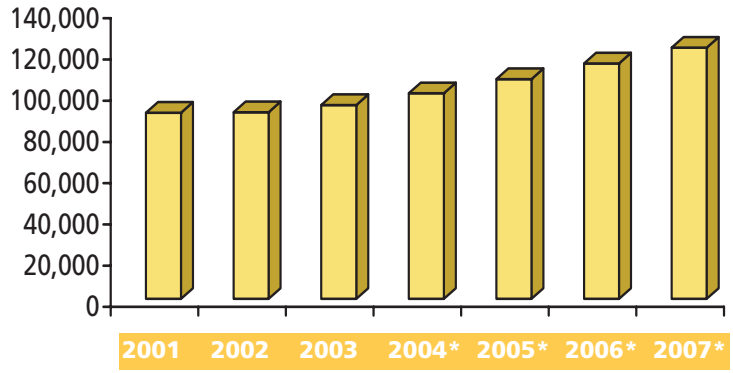
John Oblak
Chair, TR-8
Chief Engineer
E.F. Johnson

Vice Chair: Alan Wilson
Motorola Inc.

of the subcommittees and working groups advanced their work by meeting through teleconferences and using improved working methods, including email and the distribution of documents through a local area network at the meetings.

Many of the TR-8 subcommittees continued to work on Project 25 digital private radio standards. This suite of standards consists of 36 published documents plus addenda to eight documents. The majority of work consisted of refining the standards suite by upgrading some of the Telecommunications Systems Bulletins (TSBs) to TIA and TIA American National Standards (ANSs). Some of the existing TIA standards were also revised and upgraded. Within the year, three documents were upgraded by addenda, one document was upgraded from a TSB to a TIA standard and two TIA ANSs were revised and re-issued. In addition, a new TIA standard was published. The work of revising the Project 25 suite of standards is continuing, with over eleven documents currently in a state of being balloted or published.

U.S. Spending on Voice/Data Equipment ($ Millions)



Source: *TIA's 2004 Telecommunications Market Review and Forecast*
* Projected

Subcommittee TR-8.11, Antennas, has published a revision to its base station antenna standard, TIA-329-C, *Minimum Standard for Communications Antennas, Base Station Antennas*. Work is continuing on a revision to the vehicular antenna, to be published as TIA-2329. In addition, an addendum to the document *Terrestrial Land Mobile Radio – Antenna Systems – Standard Format for Digitized Antenna Patterns* was published as TIA/IS-804-1. As a result of an expanded scope for the subcommittee that includes antenna system components, a new document, TIA-929 *Standard Format for Digitized Filter Specifications*, has been published.

The establishment of the 700 MHz frequency band and the request of the NCC for TR-8 to develop interoperability standards for wideband data systems necessitated a project to develop standards for such systems. In order to meet the NCC time schedule of July 2003, **Subcommittee TR-8.5, Signaling and Data Transmission,** expedited its work program. The standards that define interoperability were completed in the required time. This included the publication of six TIA standards and the revision and upgrade of two additional TIA standards to TIA ANSs.

Subcommittee TR-8.17, Radio Frequency (RF) Exposure, has continued its work toward the development of guideline documents for compliance with FCC-mandated RF exposure limits for mobile, portable and base station equipment. A document that provides a template for product labeling and user training for mobile and portable equipment,

TIA-133, *Private Land Mobile Radio (FCC Part 90) Two Way Mobile and Portable Equipment RF Exposure (EME) Labeling, Product Manual, User Awareness, and Control Information to Meet FCC MPE/SAR Guidelines* has been published. Additional work is being done on a template document for reporting Specific Absorption Rate (SAR) measurements. The document, to be published as TSB-150, will provide a consistent format for FCC reports of SAR measurements.

Work is continuing within **Subcommittee TR-8.18, Wireless Interference and Coverage,** on issues of interference prediction and spectrum compatibility. TSB-88, *Wireless Communications Systems – Performance in Noise and Interference Limited Situations – Recommended Methods for Technology-Independent Modeling, Simulation, and Verification*, is undergoing revision. One of the issues addressed in the document upgrade is the interference potential between systems incorporating some of the newest digital technologies. The subcommittee continues to provide input on interference and radio coverage issues that impact public safety users.

There has been much interest in the work of the TR-8 committee this year. Participation by manufacturers that have recently joined the process has expanded the committee's capabilities and added to the level of interest. In addition, there is increasing interest by the user community at all levels. The public safety community's needs for reliable, interoperable communications systems, the finalization of the NCC-requested work, and advances in technology have caused a high level of activity. TR-8 anticipates the coming year to be one of continuing challenges and opportunities as the work scope continues to broaden with increasingly sophisticated technology.

SUBCOMMITTEES

TR-8.1 Equipment Measurement Procedures
Chair: John Oblak
E.F. Johnson

TR-8.3 Encryption
Chair: Richard Brockway
Etherstack

TR-8.4 Vocoder
Chair: Jim Holthaus
E.F. Johnson

TR-8.5 Signaling and Data Transmission
Chair: Jeff Anderson
Motorola Inc.

TR-8.6 Equipment Performance Recommendations
Chair: Al Wieczorek
Motorola Inc.

TR-8.10 Trunking and Conventional Control
Chair: Jim Holthaus
E.F. Johnson

TR-8.11 Antennas
Chair: Louis Meyer
Decibel Products

TR-8.12 Two-Slot TDMA Systems
Chair: Dominick Arcuri
RCC Consultants

TR-8.15 Common Air Interface
Chair: Alan Wilson
Motorola Inc.

TR-8.17 RF Exposure
Chair: Robert Speidel
M/A-COM

TR-8.18 Wireless Systems Interference and Coverage
Chair: Bernie Olson
Motorola Inc.

TR-8.19 Wireline Systems Interface
Chair: Jerry Drobka
Motorola Inc.

Point-to-Point Communications Systems TR-14

Craig Snyder
Chair, TR-14
President
Sioux Falls Tower & Communications

TR-14 is responsible for standards and recommended practices relating to terrestrial fixed point-to-point radio communications equipment and systems (microwave radio), primarily in the frequency bands above 960 MHz.

Within the TR-14 committee structure, only **TR-14.7, Structural Standards for Steel Antenna Towers and Antenna Supporting Structures,** was active in 2003. The subcommittee is completing editorial revisions of the updated standard for the tower industry: ANSI/TIA/EIA-222, *Structural Standards for Steel Antenna Towers and Antenna Support Structures*. The current standard is the sixth incarnation of ANSI/TIA/EIA-222, 1996 version F, which was reaffirmed in 2001 to preserve the cycle and to allow additional time for the completion of its successor. TR-14.7 is close to unveiling a major expanded revision of this structural standard for towers and antenna support.

It is anticipated that Version G of ANSI/TIA/EIA-222 will be submitted for balloting and comment in 2004. Final adoption is forecast for late in the third quarter of 2004.

Version G will contain new material and expanded content. Comprised of 16 chapters, it has been prepared by eight different task groups, covering technical issues such as wind and ice loading, seismic loading, design stresses, safety and climbing, and geotechnical requirements.

For sheer volume of information, the 222-G standard will surpass its predecessors by three or four times, including more than 150 pages devoted to state-by-state map graphics illustrating wind, ice, frost and seismic factors. The large amount of material contained in this version will require electronic versions to also be made available. All new tower construction and major renovations of existing structures must conform to 222-G after its adoption. Existing towers will not be affected unless physical alterations are made or antenna loading exceeds the original approved design. Which standard applies is usually a decision of the engineer of record.

As an example of changes in the new standard, there are revisions in geotechnical definitions, such as "normal soil," for determining lateral load capacities, bearing load capacities and resistance to pull-out. "Normal soil" is defined at this time as a set of parameters always intended for bidding purposes. Over the years, it became practice, and in some instances foundations were actually installed for it. The committee has eliminated the term and will give values that are representative of soil types similar to those used in building codes (e.g., values representative of sand, clay, etc.). The committee's aim is to determine real-world, conservative values. The intent is to drive purchasers toward the use of a geotechnical report to solve all initial installation problems and economics.

Version G will be the most sweeping change in the 222 standard since Version D was implemented nearly 20 years ago. The committee's intent is to create an internationally recognized and acceptable standard that can be

implemented beyond the North American market. The committee believes the standard will eclipse the state of the art of any other standard in the world. The standard is incorporated by reference in the International Building Code, which means that by default it becomes the most widely recognized tower standard of most countries, states and municipalities for their building codes, although there is often a lag of two to three years for the local level to catch up.

The committee also voted to approve the new gin pole standard at a meeting held in St. Louis in May 2003. The new standard, known as *Structural Standards for Steel Gin Poles Used for the Installation of Antenna Towers and Antenna Supporting Structures — PN 4860*, went through the ballot process in the fall and was submitted for publication in late December. Gin poles are used in tower erection, and this standard will allow tower erectors and designers to merge these technologies and ensure efficiency and safety.

Subcommittees

TR-14.3 Station Grounding
Inactive

TR-14.6 Standard Microwave Transmission Systems
Inactive

TR-14.7 Structural Standards for Steel Antenna Towers and Antenna Supporting Structures
Chair: Craig Snyder
Sioux Falls Tower & Communications

TR-14.10 Electrical Performance Standards for Television Relay Facilities
Inactive

TR-14.11 Interference Criteria for Microwave Systems in the Safety and Special Radio Services
Inactive

TR-14.12 Waveguide Components
Inactive

Multimedia Access, Protocols and Interfaces TR-30

Committee TR-30 is responsible for access, protocol and interface standards for modems, facsimile systems and multimedia platforms pertaining to wired telecommunications networks. Standards include those for functional characteristics, interfaces, interworking (including protocols), electrical and mechanical characteristics, network models and evaluation procedures. The committee is also responsible for the development of proposed U.S. contributions, relating to this work, to international standards fora. In addition, it provides a venue for discussion of company contributions to these fora.

Fred Lucas
Chair, TR-30
FAL Associates

2003 Activities

In 2003, as in previous years, TR-30 focused a good deal of its attention on developing contributions to input to the International Telecommunication Union — Telecommunication Standardization Sector (ITU-T) Study Group (SG) 16 "Multimedia Services, Systems and Terminals." Representing the United States, TR-30 continues to be one of the foremost contributors to the ITU SG 16 and is leading the effort to develop international standards for text over IP and voice band data over IP. Also in 2003, TR-30 updated its name from Data Transmission Systems and Equipment to Multimedia Access, Protocols and Interfaces. This new name more accurately reflects the nature of projects addressed in TR-30 and the close relationship that TR-30 has with ITU SG 16. Updated scopes for the committee and for each subcommittee will be prepared in early 2004 and released on the TIA Web site.

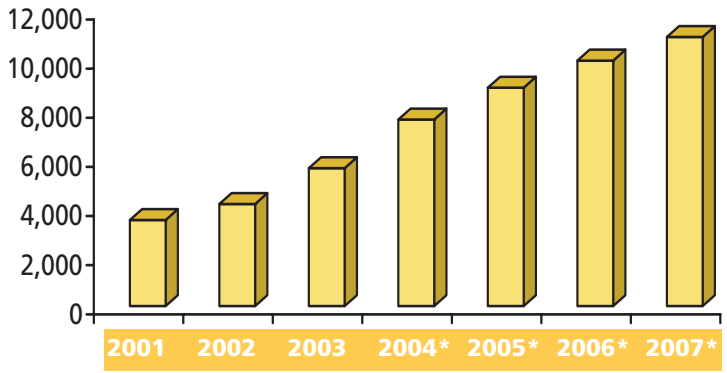
Particular emphasis was placed on contributions to the development of new ITU-T Recommendations for Text over IP (V.ToIP) and Voice Band Data over IP (V.VBD). TR-30 has had a long-standing relationship with the various rapporteurs' experts groups in ITU-T SG 16 and continued to foster this relationship in 2003 so that the work on V.ToIP and V.VBD progressed seamlessly between meetings of TR-30.1, Modems, and the rapporteur of Question 11 "Evaluation" in SG 16. Extending this relationship, which began in 2003, TR-30.5 has invited the experts of Question 14 "Facsimile Terminals (Group 3 and Group 4) in SG 16 to work together in progressing V.34 fax and Real-Time Transport Protocol (RTP) transport capabilities in Recommendation T.38 "Procedures for Real-Time Group 3 Facsimile Communication over IP Networks."

Subcommittee TR-30.1, Modems, has used its experience from the development of ITU-T Recommendation V.150.1 (V.MoIP, Modem over Packet Networks Technology), to address the recently identified issues on Text Telephony (Telecommunications Device for the Deaf [TDD] and teletypewriter [TTY]) over VoIP networks. This technology uses the

acronym ToIP (Text over IP). TR-30.1 has begun this process by defining a TIA standard (to be called TIA-1001) that supports the dependable transport of *A Frequency Shift Keyed Modem for Use on the Public Switched Telephone Network* (TIA/EIA-825) over IP networks in the United States. The difficulties experienced with TDDs over IP concern IP networks that have different levels of Quality of Service. The loss of packets in IP networks and voice compression algorithms has also been seen to limit proper operation of TDDs.

Subcommittee TR-30.1 made significant progress in advancing the work on the new ITU-T Recommendations for Legacy Text Telephony over IP (ToIP) (V.ToIP) and Voice Band Data-over-IP (VBD) (V.VBD) by focusing on its close working arrangement with ITU-T SG 16 and the work already completed on SG 16 Question 11 "Evaluation." Numerous contributions were developed and approved by TR-30.1/TR-30 to the ITU-T process to advance the work for V.ToIP and V.VBD. Work also continued to prepare sustaining amendments to the V.150 family of Recommendations. In addition, TR-30.1 continues to be the major contributor to refining ITU-T Recommendations V.44, "Data Compression Procedures," V.59, "Managed Objects for Diagnostic Information of Public Switched Telephone Network Connected V Series Modem DCE's" and the V.9x series (related to digital modems).

U.S. Spending on DSL Services ($ Millions)



Source: *TIA's 2004 Telecommunications Market Review and Forecast*
* Projected

Subcommittee TR-30.2, DTE-DCE Interfaces and Protocols, revised TSB-54-B, DTE/DCE Interface Selection Guide

In addition, the following standards were reaffirmed during 2003:

- TIA-485-A, *Electrical Characteristics of Generators and Receivers for Use in Balanced Digital Multipoint Systems*
- TIA-688, *DTE/DCE Interface for Digital Cellular Equipment*
- TIA-723, *High Speed 232 Type DTE/DCE Interface*
- TIA-530-A, *High Speed 25-Position Interface for Data Terminal Equipment and Data Circuit-Terminating Equipment, Including Alternative 26-Position Connector*
- TIA-561, *Simple 8-Position Non-Synchronous Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange*
- TIA-562, *Electrical Characteristics for an Unbalanced Digital Interface*

- TIA-574, *9-Position Non-Synchronous Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange*

Subcommittee TR-30.3, Data Communications Equipment Evaluation, which has traditionally focused on network models and procedures for evaluating performance and compliance of devices that connect to the Public Switched Telephone Network (PSTN) and Digital Subscriber Lines (DSL), expanded its work to include Packet Switched Data Networks (PSDN).

Formal liaisons to develop international versions of TIA-876, *Network Access Transmission Model for Evaluating xDSL Modem Performance* were continued with Digital Subscriber Line Forum (DSLF), ITU-T SG15/Q4 (Question 4) and European Telecommunications Standards Institute (ETSI) TM6, Digital Subscriber Loop. Service providers, venders and users can use this statistically accurate portrait of the access network and the Network Model Coverage (NMC) methodology to compare the performance of different models or manufacturers of Digital Subscriber Line (DSL) systems (DSLAMs [Digital Subscriber Line Access Multiplexer] and Modems) or different technologies.

Work on PN-3-0062 (TIA/EIA-921), *Network Model for Evaluating Multimedia Transmission Performance Over Internet Protocol* continued. This standard will define statistically-based network models and scenarios for evaluating and comparing communications equipment connected over converged wide-area networks. Test scenarios include: PSTN to PSTN connections through a managed IP network, PSTN to IP connections and IP to IP connections. Operating companies, service providers, manufacturers, design engineers, test houses, magazines and product reviewers can use this network model to evaluate the performance of IP network devices such as: VoIP gateways, IP telephones, T.38 facsimile devices/gateways, V.150.1/voiceband data (VBD) modem-over-IP gateways, TIA-1001/V.ToIP textphone-over-IP gateways. In conjunction with this work, formal liaisons are being established with TIA TR-41.4, "IP Telephony Infrastructures," Internet Engineering Task Force (IETF) and ITU-T Study Groups 11, Signaling requirements and protocols, 12, End-to-end transmission performance of network terminals, 13, Multiprotocol and other transport networks, 15, Optical and other transport networks, and 16, Multimedia services, systems and terminals.

TR-30 was saddened by the loss of our TR-30.5 Chair, Mr. Tom Geary, who was killed in an automobile accident while on his way to attend the

Subcommittees

TR-30.1 Modems
Chair: Keith Chu
Mindspeed Technologies Inc.

TR-30.2 DTE-DCE Interfaces and Protocols
Chair: Fred Lucas
FAL Associates

TR-30.3 Data Communications Equipment Evaluation and Network Interfaces
Chair: Jack Douglass
Spirent Communications

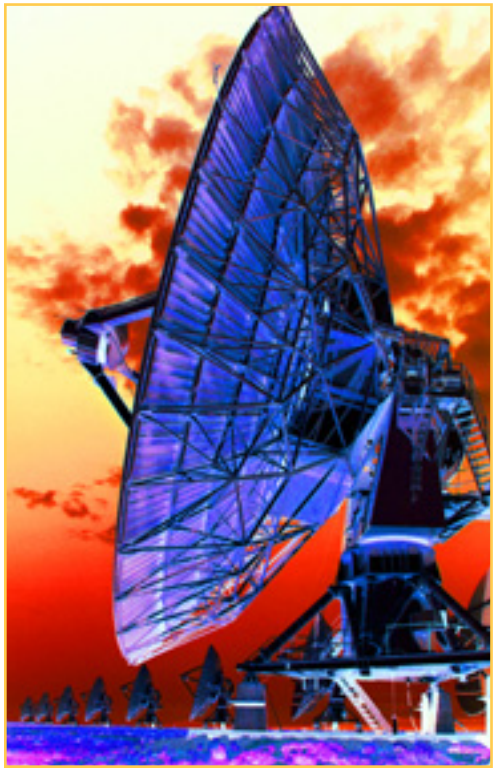
TR-30.5 Facsimile Terminal Equipment and Systems
Held by the late Tom Geary of Mindspeed Technologies Inc. until December 2003

TR-30 December meeting. Under the late Mr. Geary's guidance in 2003 and until his sudden death, **Subcommittee TR-30.5, Facsimile Terminal Equipment and Systems,** once again focused on the ITU-T Recommendation T.38, Procedures for Real-time Group 3 Facsimile Communication over IP Networks. The primary focus has been to add V.34 fax capability to the T.38. Other methods for enhancing T.38 are being considered. (e.g., use of improved packet network transport layer protocols, secure facsimile, interoperability with V.150.1 [V.MoIP]). A number of contributions to ITU-T SG 16 in support of this effort were approved through the TR-30.5/TR-30 process.

During 2003 TR-30.5 reaffirmed TSB-43, *Recommendations for DTE Compatibility With TIA/EIA-578 DCEs and Corrections to Example Sessions* In addition, TR-30.5 withdrew TSB-85, TIA/EIA-465-A and TIA/EIA-466-A *Conformity Test Standard.*

Satellite Equipment and Systems TR-34

Committee TR-34 is responsible for standards and studies related to satellite communications systems, including both the space and earth segments. The committee focuses on standards for space-borne and terrestrial hardware; interfaces between satellite and terrestrial systems; and the efficient use of spectrum and orbital resources, including sharing between satellite and terrestrial services. Active projects range from studies on how best to accomplish interservice spectrum sharing to developing standards for achieving interoperability between satellite systems, as well as among satellite and terrestrial systems, networks and services.



In addition to developing industry standards specifically for satellite communications equipment, Committee TR-34 has been working with other Standards Development Organizations (SDOs) to ensure that the standards it produces are acceptable for satellite services. In particular, **Subcommittee TR-34.1, Communications and Interoperability,** has been working closely with the ATM (Asynchronous Transfer Mode) Forum and the Internet Engineering Task Force (IETF) to ensure the standards developed by these bodies take into consideration the special requirements of satellite communications.

Jeffrey Binckes
Chair, TR-34
Director, Spectrum Engineering North America
ICO-Teledesic Global, Ltd.

2003 Activities

As in the previous several years, Committee TR-34's activities were concentrated in two major areas — developing standards for satellite communications systems, with a major focus on the Internet, ATM, Global System for Mobile Communications (GSM) and their seamless operation over satellite; and developing interference criteria and interservice frequency-sharing methodologies. This work is accomplished in two subcommittees -- TR-34.1, Communications and Interoperability, and TR-34.2, Spectrum and Orbit Utilization.

Subcommittee TR-34.1 accomplishes its tasks through five ad hoc working groups (WGs), all of which address issues related to the interoperability of the satellite and terrestrial components of communications systems, centered primarily on existing and future standards development - including Internet, ATM and GSM; and their seamless operations over satellite transmissions paths and the detail common air interfaces. The TR-34.1 Ad Hoc Working Groups are:

- Internet Protocols over Satellite
- Common Air Interface for Processing Satellites
- IP Multicast over Satellite

- Common Air Interface for Satellite Systems for Residential Market
- TCP Protocol for the IPSEC Environment

The output of TR-34.1 generally consists of TIA Telecommunications Systems Bulletins (TSBs), Interim Standards (ISs), and American National Standards (ANSs). Working groups collaborate, when delegated, with appropriate national or international standards bodies.

The Working Group on Internet Protocols Over Satellite continued its liaison with the IETF Transmission Control Protocol-Satellite (TCP-Sat) Working Group, with the goal of ensuring that Internet protocols (IPs) will not preclude the use of satellites for Internet access. The TCP over Satellite WG's remaining work has been rolled into the Performance Implications of Link Characteristics (IPLC) WG, which has developed a draft IETF submission on the risks and impacts of TCP spoofing. Other TR-34.1 Working Groups' closely coordinated work with ETSI and the ITU — Telecommunication Standardization Sector (ITU-T) resulted in the publication of TIA-1008 Internet Protocol (IP) Over Satellite in October 2003. This standard is also being adopting by ETSI and is under consideration as a basis for a Recommendation in ITU-T Study Group 6, Broadcasting services (terrestrial and satellite).

TIA-1008 contains the procedures used by remote terminals and the hub for delivery of traditional IP services in a star satellite access network. Remote terminals built to the parameters and procedures specified in this document can be used to create satellite access networks using commercial Ku-band geostationary, non-processing transponders with footprints within the United States or any other part of the world.

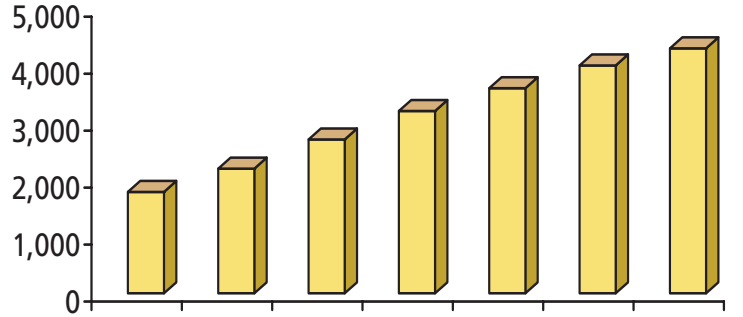
The purpose of this standard is to assemble the parameters and procedures permitting remote terminals from a variety of manufacturers to be compatible and to obtain services from satellite access networks conforming to TIA-1008. To ensure this compatibility, the document defines the essential parameters, formats and procedures to a level that creates the same response from the remote terminals without constraining the particular implementation. Enhanced capabilities such as performance enhancing proxies are not defined in this version of the standard.

SUBCOMMITTEES

TR-34.1 Communications and Interoperability
Chair: Prakash Chitre
Lockheed Martin Global Telecommunications

TR-34.2 Spectrum and Orbit Utilization
Chair: Jeffrey B. Binckes
ICO-Teledesic Global, Ltd.

Global Mobile Satellite Services Revenues ($ Millions)



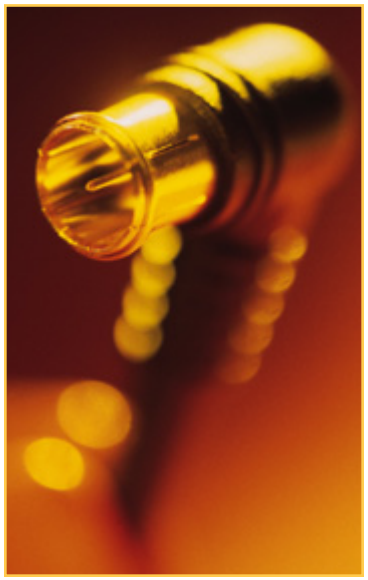
Source: *TIA's 2004 Telecommunications Market Review and Forecast*
* Projected

User Premises Telecommunications Requirements TR-41

Stephen R. Whitesell
Chair, TR-41
Senior Technical Consultant - Standards
VTech Communications

Vice Chair:
Roger Britt
Nortel Networks

Committee TR-41 addresses voluntary standards for telecommunications terminal equipment and systems, specifically those used for voice service, integrated voice and data service and Internet protocol (IP) applications. The work involves developing performance and interface criteria for equipment, systems and private networks, as well as the information necessary to ensure their proper interworking with each other, with public networks, with IP telephony infrastructures and with carrier-provided private-line services. It also includes providing input on product safety issues, identifying environmental considerations for user premises equipment and addressing the administrative aspects of product approval processes. In addition, TR-41 develops criteria for preventing harm to the telephone network, which become mandatory when adopted by the Administrative Council for Terminal Attachments (ACTA).



Committee TR-41 develops standards for wireline and IP telephony terminal equipment ranging from individual consumer telephones to large enterprise systems. TR-41 held four weeklong meetings during the year with its six subcommittees and their working groups. A decision was made at year-end to consolidate two subcommittees (TR-41.9 and TR-41.11), which both address regulatory issues, into one subcommittee (TR-41.9).

The consolidation was done in conjunction with leadership elections and resulted in one of the subcommittee chairs being elected chair and the other vice chair for the coming two-year term. Other leadership positions remained stable with re-election of the incumbents for TR-41 and its odd-numbered subcommittees. In addition, one open vice-chair position was filled.

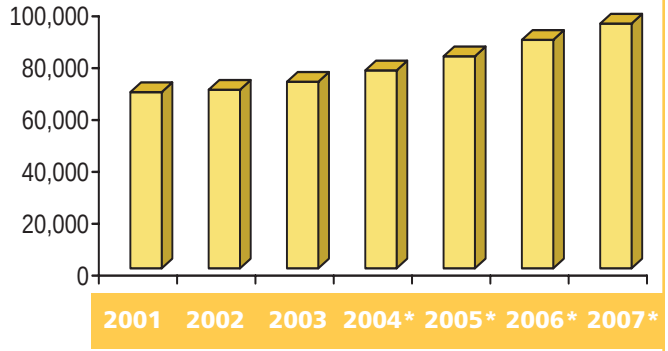
TR-41 maintains liaison relationships with a number of standards bodies, consortia, and councils. It collocates two meetings each year with Technical Subcommittee T1E1, Interfaces, Power & Protection for Networks, one with TR-30, Multi-media Access, Protocols and Interfaces, and one or two with the Institute of Electrical and Electronics Engineers (IEEE) Subcommittee on Telephone Instrument Testing (STIT). During 2003, TR-41 established new liaison relationships with the IEEE 802.11 Wireless Local Area Network (W-LAN) Working Group for exchanging information related to IP telephony and with the IEEE 802.19 Coexistence Technical Advisory Group (TAG) to discuss issues related to the sharing of Radio Frequency (RF) spectrum, since TR-41 develops standards for cordless phones.

TR-41 takes a leadership role in providing support to the Administrative Council for Terminal Attachments (ACTA), both in terms of submitting technical criteria for ACTA adoption and by providing input on administrative matters. It also maintains liaison with Industry Canada's Terminal Attachment Program Advisory Committee (TAPAC), the European Telecommunications Standards Institute's Speech Transmission

Quality (ETSI STQ) Technical Committee, the Internet Engineering Task Force (IETF), and the Telecommunication Certification Body (TCB) Council. In addition, TR-41 provides input to Underwriters Laboratories (UL), the Canadian Standards Association (CSA), and International Telecommunication Union — Telecommunication Standardization Sector (ITU-T) Study Group 12, End-to-End Transmission Performance of Networks and Terminals.

Subcommittee TR-41.1, Multiline Terminal Systems, completed its revision and published TIA-689-A, *PBX and KTS Support of Enhanced 9-1-1 Emergency Calling Service*. It also reaffirmed TSB-32-A, *Overall Transmission Plan Aspects for Telephony in a Private Network*. An addendum to TIA-464-C, *Requirements for PBX Switching Equipment*, was completed, but publication of the document is being delayed pending completion of some fundamental work on receive measurements in TR-41.3 that may affect its loss plan numbers. In addition, TR-41.1 revised TIA-594-A, *Synchronization Methods and Technical Requirements for Private Integrated Services Networks*, and initiated a joint project with ETSI STQ to provide a comparison between the transmission requirements in TIA-464-C and ETSI ES 201 168, *Transmission Characteristics of Digital Private Branch Exchanges (PBXs) for Interconnection to Private Networks, to the Public Switched Network or to IP Gateways*. Both documents were submitted for ballot at the end of 2003 and should be published early in 2004.

U.S. Spending on Data Communications and Internetworking Equipment ($ Millions)



Source: *TIA's 2004 Telecommunications Market Review and Forecast*
* Projected

Subcommittee TR-41.3, Analog and Digital Wireline Terminals, completed its revision and published TIA-777-A, *Caller Identity and Visual Message Waiting Indicator Equipment Performance Requirements*, early in the year. Working group **TR-41.3.1, Caller ID**, which developed the document, was then dissolved. The major TR-41.3 effort, to revise TIA-470-B, *Performance and Compatibility Requirements for Telephone Sets with Loop Signalling*, led to the publication of the first part of the new document, TIA-470.310-C, *Cordless Telephone Range Measurement Procedures*, developed by **TR-41.3.9, Cordless Telephones**. The overall outline document for the series, TIA-470.000-C, *Specifications Overview and Document Structure for Analog Wireline Telephones*, was also published.

Work on the other documents in the TIA-470-C series has led to several ballots, with three of the documents expected to be published early in 2004. **TR-41.3.5, Acoustics,** has been involved in a fundamental effort to identify appropriate test conditions and requirements for measuring the receive performance of modern telephone handsets using Head and Torso Simulators (HATS) with artificial ears that simulate the human pinna. The goal is to provide realistic and repeatable measurements on modern handsets that cannot be tested using traditional artificial ears, while preserving continuity of results for conventional handsets with circular ear cap geometries. Considerable input on this effort has been received from the IEEE STIT and members of ITU-T Study Group 12. The TR-41.3.9 working group, which

completed TIA-470.310-C, has undertaken a new project to develop requirements for features unique to cordless telephones. A project to develop hands-free telephone requirements has also been initiated and will be assigned to a new working group.

Subcommittee TR-41.4, VoIP Systems - IP Telephony Infrastructure and Endpoints, completed work on a new document addressing support for E-911 by Voice over Internet Protocol (VoIP) equipment in an enterprise environment and published it as TSB-146, *IP Telephony Support for Emergency Calling Service*. A revision of TIA-912, *Voice Gateway Transmission Requirements*, was also completed, but publication of the document is being delayed until completion of the fundamental work on receive measurements in TR-41.3.

Two new projects involving VoIP via W-LAN were begun; one deals with IP telephony subsystems and the other with requirements for the features supported by endpoint devices. Liaison has been established with the IEEE 802.11 Wireless Next Generation Standing Committee (WNG SC) to keep them informed about these projects and to provide a conduit for incorporating 802.11 work on Quality of Service (QoS) provisions, security issues, fast handoffs during roaming, etc., into the documents.

Other new IP telephony projects in TR-41.4 include development of a TSB defining functionality classes that identify the VoIP capabilities of residential gateways and creating a standard for endpoint fault and performance metrics that can be relayed to management systems for network administration. Additional progress was made on a new TSB describing an IP telephony security framework, and work was initiated to revise the TSB-146 document. A new editor took over the revision of TIA/IS-811, *Performance and Interoperability Requirements for Voice-over-IP (VoIP) Feature Telephones*, and significant progress was made toward upgrading this document from an Interim Standard to an American National Standard (ANS). TR-41.4.4 VoIP Terminals was assigned the revision of TIA/IS-811, but the lack of a working group chair led TR-41 to make a decision mid-year to fold the effort back into TR-41.4.

Subcommittee TR-41.7, Environmental and Safety Considerations, has created a new working group, **TR-41.7.5, Overcurrent Protection**

Subcommittees

TR-41.1 Multiline Terminal Systems
Chair: Tailey Tung
Siemens Information and Communications Networks Inc.
Vice Chair: François Pinier
Alcatel

TR-41.3 Analog & Digital Wireline Terminals
Chair: James Bress
AST Technology Labs Inc.
Vice Chair: Harry Van Zandt
ECS Technologies Inc.

TR-41.4 VoIP Systems - IP Telephony Infrastructure and Endpoints
Chair: Bob Bell
Cisco Systems Inc.
Vice-chair: Joanne McMillen
Avaya Inc.

TR-41.7 Environmental & Safety Considerations
Chair: Randy Ivans
Underwriters Laboratories
Vice Chair: Phillip Havens
Teccor Electronics/Littelfuse

TR-41.9 Technical Regulatory Considerations
Chair: Greg Slingerland
Mitel Networks
Vice Chair: Phillip Havens
Teccor Electronics/Littelfuse

Devices, to develop a draft document on overcurrent protectors used in telecom networks. When completed, this document will be submitted to UL and CSA for their consideration in creating a safety standard for these components. Since overcurrent protectors in both customer and network equipment are being considered, this project is being jointly undertaken with the T1E1.7 working group on network electrical protection.

The effort in **TR-41.7.4, Environmental Considerations,** to revise TIA-571-A, *Environmental Considerations*, was delayed at the beginning of the year, but progress accelerated by year end.

TR-41.7.1, Harmonization of International Safety Standards, provides inputs to UL, CSA and the IEC in an effort to align the requirements in their safety standards. Its main efforts this year were focused on requirements for power contact with telecommunications circuits and receive acoustic limiting. TR-41.7 also sponsored a presentation from UL on the development and use of hazard-based safety standards. Such standards are oriented more towards proscribing the hazards to be avoided than towards prescribing specific means of avoiding them.

Subcommittee TR-41.9, Technical Regulatory Considerations, continued with its Federal Communications Commission (FCC) Part 68-related work of creating updates for the technical criteria for preventing harm to the network and submitting the documents to ACTA. TIA-968-A, *Technical Requirements for Connection of Terminal Equipment to the Telephone Network*, was adopted by ACTA in January 2003. Two addenda to this document were created during the year. TIA-968, Addendum 1, was adopted by ACTA, and TIA-968, Addendum 2, was approved by the subcommittee and submitted to ACTA for adoption at year-end.

Work continued in **TR-41.9.2, Rationale and Measurement Guidelines** on revising TSB-31-B, *Part 68 Rationale and Measurement Guidelines*. The updated document will reflect the transfer of most of the Part 68 technical criteria from federal regulation to industry standards, as well as including suggested measurement methods for demonstrating compliance with several new and modified criteria. TR-41.9 also provides responses to questions about Part 68 and TIA-968. A dialog is continuing with members of TR-41.2 about an issue with some 6-pin modular plugs causing damage when inserted into 8-position jacks.

Subcommittee TR-41.11, Administrative Regulatory Considerations, revised and published TSB-168-A, *Labeling Requirements*, and submitted it to ACTA, which agreed to adopt the changes. TR-41.11 also created and published an addendum to TSB-129-A, *U.S. Network Connections Regulatory Approval Guide*, which is intended to guide the regulatory engineer through the FCC/ACTA product approval process.

A decision to merge the responsibilities of TR-41.9 and TR-41.11 into one subcommittee was implemented at the end of the year. The new subcommittee will be identified as **TR-41.9, Technical and Administrative Regulatory Considerations**. Greg Slingerland, the former TR-41.11 chair, was elected as its new chair, and Phillip Havens, the former TR-41.9 chair, was elected as vice-chair. Havens was also elected to fill the vacant vice-chair position in TR-41.7.

User Premises Telecommunications Infrastructure TR-42

Bob Jensen
Chair, TR-42
Fluke Networks

Vice Chair:
Paul Kish
NORDX/CDT

Committee TR-42 develops voluntary standards for telecommunications infrastructure (cabling and its pathways and spaces), specifically those used for, but not limited to, voice, video and data networking. The Committee's standards work covers telecommunications cabling including component requirements, field-test and installation requirements, cabling distances, telecommunications outlet configurations, and recommended topologies for commercial buildings, residential, data centers, industrial environments and between buildings in a campus environment.

TR-42's work addresses the requirements for the design and construction of telecommunications infrastructure for commercial buildings, single-family and multi-dwelling residential, data centers and industrial environments, including customer-owned outside plant. Telecommunications infrastructure includes the pathways into which telecommunications cabling is placed, as well as the rooms and areas associated with buildings and outside plant structures used to terminate cables and to install telecommunications equipment. The standards work also applies to mobile homes, marine construction and other buildings to the extent practicable. TR-42 additionally formulates positions and proposals for harmonization with international standards bodies and maintains an ongoing liaison with application developers, such as the Institute of Electrical and Electronics Engineers (IEEE), and building cabling designers, such as BICSI.

The gigabit era has introduced many new challenges for cabling, such as lower loss limits for optical fiber cabling and increasing frequency requirements for copper cabling. The world is in a period of change, and the documentation from TR-42, its subcommittees and working groups is evolving to meet the increased bandwidth demands of future applications. For the end user, it is important to keep abreast of these changes in technology to ensure making the right cabling infrastructure decisions.

2003 Activities

The TR-42 Engineering Committee is organized into nine subcommittees and three working groups, each responsible for a specific area of premises telecommunications cabling needs.

TR-42's efforts covered a broad range of activities during 2003, including several additional publications to the TIA/EIA-568-B, *Commercial Building Telecommunications Cabling Standard,* series of standards: TIA-568-B.1,

Commercial Building Telecommunications Cabling Standard; Part 1 General Requirements, specifies general requirements for telecommunications cabling in commercial buildings; TIA-568-B.2, *Commercial Building Telecommunications Cabling Standard; Part 2 Balanced Twisted-pair Cabling Components*, specifies detailed requirements for copper cabling; and TIA-568-B.3, *Optical Fiber Cabling Components Standard*, specifies detailed requirements for optical fiber cabling.

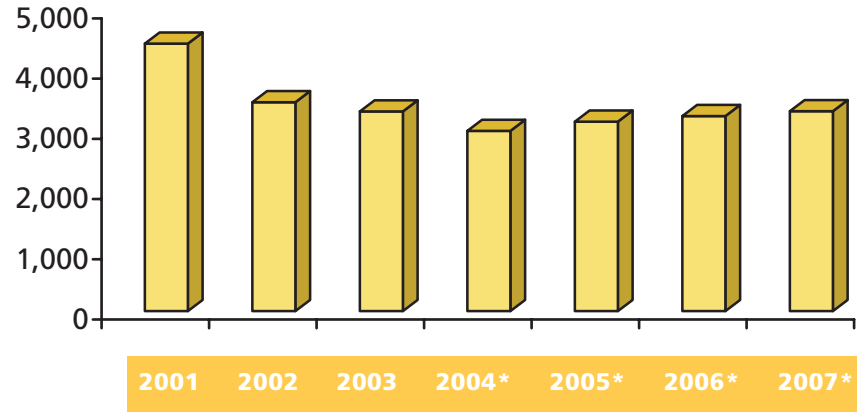
The TIA/EIA-568-B series of standards continues to recognize balanced twisted-pair copper and optical fiber cabling and provides guidelines on cable selection and distance limits. Optical fiber is used principally for backbone cabling between buildings on a campus or between networking equipment on different floors of a building in addition to gaining interest and popularity for horizontal cabling. A new laser-optimized fiber has been added to the optical fiber choice selections, which supports 10 Gb/s data transmission rates for distances up to 300 meters using serial data transmission and cost-effective Vertical Cavity Surface Emitting Lasers (VCSELs).

Balanced twisted-pair copper is used primarily for horizontal distribution between networking equipment in a telecommunications room or telecommunications enclosure and work area equipment, such as between a switch and a personal computer or telephone. Category 6 cabling, which became a standard in June 2002, has had additional requirements approved as an addendum to ANSI/TIA/EIA-568-B.2. It continues to extend the bandwidth of copper balanced twisted-pair to 200 MHz and is envisioned to be the leader in media choice so users can keep up with the growing demands of bandwidth intensive networking. Significant work is also being realized with end-point and mid-span insertion of power for data terminal equipment, which will allow devices to be remotely powered without needing to be plugged into an electrical outlet.

ANSI/TIA/EIA 570-B, the *Residential Telecommunications Infrastructure Standard*, is nearing completion by the TR-42.2 Subcommittee. This technical work has taken on growing importance as more homeowners take advantage of the benefits that can be realized in the home, including home entertainment, home control systems, networking and telecommuting. The new TIA/EIA-570-B standard will complete the missing pieces for total home networking solutions. For example, homeowners will be able to adjust the lighting and bring up their favorite movie while turning down the home audio within the room and adjusting the temperature, all from the comfort of their living room chairs.

Subcommittee TR-42.3 is nearing completion of ANSI/TIA/EIA 569-B, *Commercial Building Standards for Telecommunications Pathways and Spaces*.

U.S. Spending on Consumer Telecommunications Equipment ($ Millions)



Source: *TIA's 2004 Telecommunications Market Review and Forecast*
* Projected

This next edition of the standard will incorporate seven addenda that have been published, including the criteria developed for multi-tenant buildings. Additionally, it will specify a new space called the telecommunications enclosure which, when implemented in a network, could reduce owners' cost of cabling. Architects, engineers and designers will use this standard as new and renovated buildings are being planned for construction.

In addition to the work on laser-optimized 50/125 m optical fiber, Subcommittee TR 42.8 is working on TIA TSB140, *Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems*. This TSB provides information to the reader of how to correctly test their optical fiber cabling as the loss budgets have continued to be reduced by application standards such as Gigabit Ethernet.

TR-42 will continue to grow in scope and diversity with a focus on developing standards that can be used globally. At the subcommittee and working group level, there is an ongoing technical exchange and dialogue with international experts in the field of cable, connector and system performance and testing from the International Electrotechnical Committee (IEC) Technical Committee 46 "Cables, wires, waveguides, R.F. connectors, and accessories for communication and signalling" and Technical Committee 86 "Fibre optics." TR-42 has also been very active in providing input to the Joint Technical Committee (JTC)-1, Subcommittee 25, "Interconnection of information technology equipment," WG3, "Customer premises cabling." The intent is to ensure that the TIA cabling standards are a technically compatible subset and fully harmonized with international standards.

Several new standards are under development:

- a new cabling standard for industrial buildings
- a new standard for data centers.

Subcommittees

TR-42.1 Commercial Building Telecommunications Cabling
Chair: Herb Congdon
Tyco Electronics
Vice Chair: Julie Roy
NORDX/CDT

TR-42.2 Residential Telecommunications Infrastructure
Chair: Bob Jensen
Fluke Networks
Vice Chair: John Pryma
Genesis Cable

TR-42.3 Commercial Building Telecommunications Pathways and Spaces
Chair: Steve Huffaker
BankOne
Vice Chair: Glenn Sexton
Northwest Information Services

TR-42.4 Outside Plant Telecommunications Infrastructure
Chair: Donna Ballast
BICSI
Vice Chair: Henry Franc
Bell Canada

TR-42.5 Telecommunications Infrastructure Terms
Chair: Peter Sharp
Giffels Associates
Vice Chair: Steve Huffaker
BankOne

TR-42.6 Telecommunications Infrastructure Administration
Chair: Tom Rauscher
Archi-Technology

TR-42.7 Telecommunications Copper Cabling Systems
Chair: Paul Vaanderlaan
Belden Wire and Cable
Vice Chair: Valerie Rybinski
Hitachi Cable Manchester

TR-42.8 Telecommunications Optical Fiber Cabling Systems
Chair: Herb Congdon
Tyco Electronics

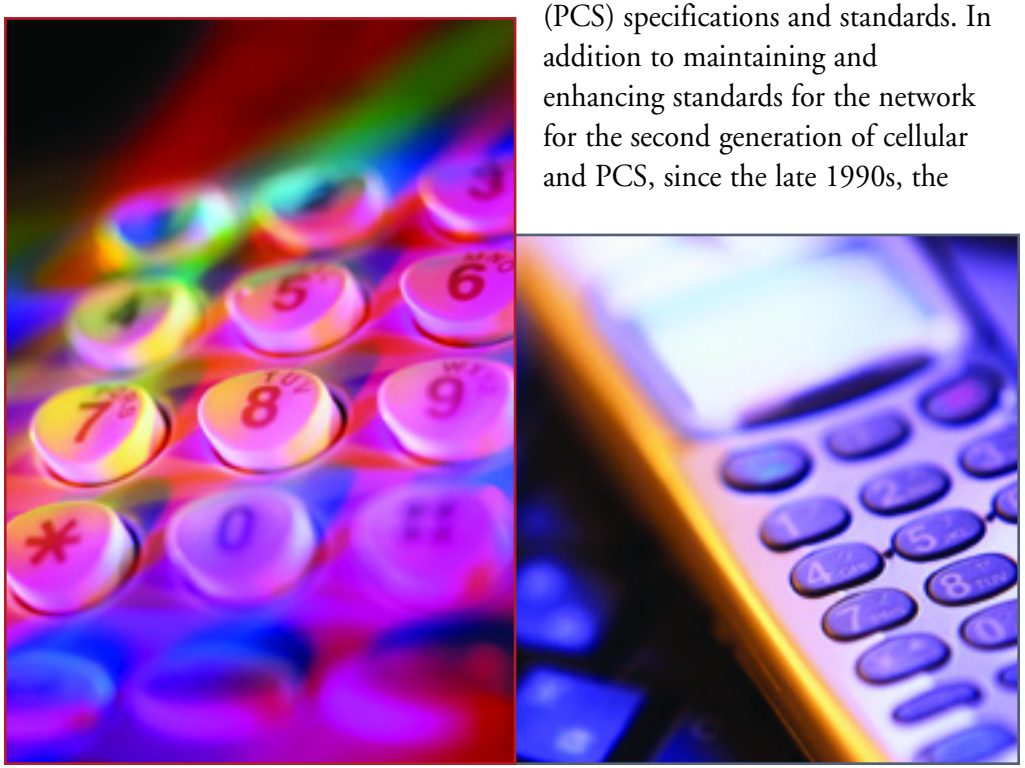
TR-42.9 Industrial Telecommunications Infrastructure
Chair: Shadi AbuGhazaleh
Hubbell Premise Wiring
Vice Chair: Bob Lounsbury
ODVA Rockwell

TR-45 Mobile and Personal Communications Systems

Committee TR-45 develops performance, compatibility, interoperability and service standards for wireless mobile and personal communications systems. These standards pertain to, but are not restricted to, features and services capabilities, wireless terminal equipment, wireless base station equipment, wireless switching office equipment, ancillary apparatus, auxiliary applications, inter-network and intersystem operations, interfaces, and wireless data services.

2003 Activities

TR-45 is comprised of six subcommittees and a number of standing ad hoc groups that focus on various aspects of wireless mobile and Personal Communications Systems (PCS) specifications and standards. In addition to maintaining and enhancing standards for the network for the second generation of cellular and PCS, since the late 1990s, the committee has also been responsive to the requests of the International Telecommunication Union (ITU) for input to the International Mobile Telecommunications (IMT)-2000 Recommendations that form the basis of Third Generation (3G) services for wireless worldwide. The initial goal of IMT-2000 was high conformity in global design, compatibility of various services within the "family" of IMT-2000 and between IMT-2000 and fixed networks, high quality, use of small terminals, capability of global roaming, ability to provide multi-media applications, diversified services and a variety of terminals.

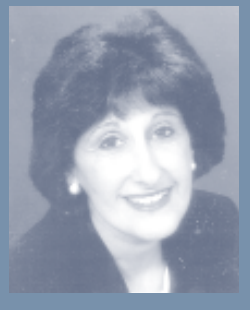


Committee TR-45 and its subcommittees were instrumental in the publication of many standards and Telecommunications Systems Bulletins (TSBs). TR-45 initiated 32 new projects, issued 94 documents for ballot (including default ballots, re-ballots, and rescissions ballots), resulting in the publication of 38 standards — a combination of TIA standards and American National Standards (ANSs). Highlights of the numerous projects, publications, and activities of the subcommittees and ad hoc groups as described below.

Subcommittee TR-45.1, Analog Technology, focused much of its attention on the completion of Revision 1 of TSB-121, *2.5 mm Audio TTY Interface for Mobile Stations*. Revision 1 of this document was completed for publication as TIA/EIA/TSB-121-RV1. Another project under development in TR-45.1 was the upgrade of TIA/EIA/IS-89 to an ANS. Revision B of TIA/EIA/TSB-70, *FSK Air Interface Common Message Protocol Cross-Reference*, was also published. With the evolution of the mobile wireless industry and a focus on digital and data technologies, a decision was reached by Committee TR-45 to render TR-45.1 dormant.

Cheryl J. Blum
Chair, TR-45
Lucent Technologies Inc.

Vice Chair:
Gerry Glynn
Verizon Wireless



Analog technology-related projects will be addressed at the TR-45 committee level as necessary.

Subcommittee TR-45.2, Wireless Intersystem Technology, addressed such timely topics as multimedia and data messaging, mobile identification, location services, and wireless number portability. TR-45.2 tops the TR-45 list with over a dozen standards published. Some of the published standards, which addressed immediate industry needs, include

- TIA-935, *Circuit Switched Call Precedence over CDMA Packet Data Session*
- TIA-937, *Open Service Access (OSA): Application Programming Interface (API)*
- TIA-756-A-1, *TIA/EIA-41-D Enhancements for Wireless Number Portability*
- TIA-934-xxx*, *3GPP2 Multimedia Message Services (MMS)* (*multiple parts)

With heightened attention on national and international security, TR-45.2 progressed and published work on projects associated with *Support for Wireless Priority Service* for TIA/EIA-41-D (TIA-917) as well as *Authentication/Privacy/Security and Enhancements* (TIA-881), ANS-41 *Enhanced Security Services* (ANS/TIA-664-804) and *Enhancements for Secure Mode OTASP and OTAPA* (TIA-928.)

TR-45.2 continued to work closely with the re-organized Third Generation Partnership Project 2 (3GPP2) Technical Specification Group (TSG)-X (Core Networks) to develop specifications for standardization related to the cdma2000®* technology. Convergence with Third Generation Partnership Project (3GPP) specifications relative to intersystem operations continues to be at the forefront of the new and ongoing projects with work, for example, continuing on the many parts of the Internet Protocol (IP) Multimedia Subsystem (IMS) specifications.

New projects under consideration for the coming year in Subcommittee TR-45.2 include, but are not limited to, IP-based Location Services (LCS), Transcoder Free Operations (TrFO), Step 2 of the Legacy Mobile Stations Domain, and Network Inter-working between Global System for Mobile Communications (GSM) Mobile Application Part (GSM MAP) and TIA-41 MAP.

Subcommittee TR-45.3, Time Division Digital Technology, completed publication of 10 documents to wrap up revision E of *TDMA Third Generation Wireless Standards* (TIA/EIA-136). Revision E incorporates support for a globally harmonized Mobile Equipment Identifier (MEID), thereby safeguarding the users of TDMA systems from the impending exhaustion of Mobile Identification Number (MIN). Among the parts published were: TIA/EIA-136-123 E, *TDMA Third Generation Wireless — Digital Control Channel Layer 3*, and TIA/EIA-136-133 E, *TDMA Third Generation Wireless -- Digital Traffic Channel Layer 3*.

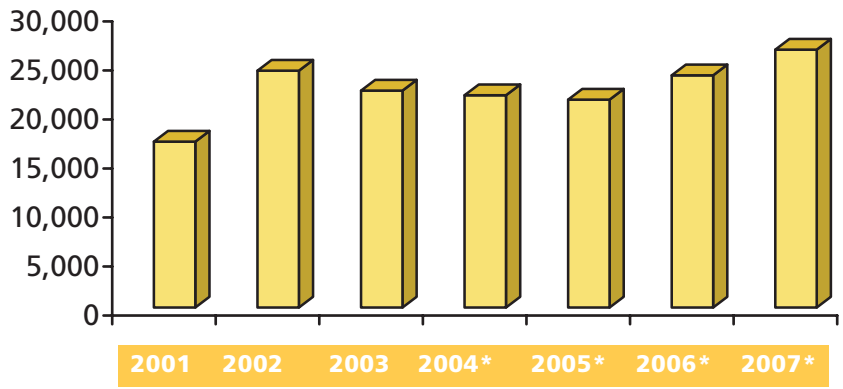
Working with Committee T1, TR 45.3 submitted updates to the International Telecommunication Union — Radiocommunication Sector (ITU-R) Working Party 8F "IMT-2000 and systems beyond IMT-2000"

*cdma2000® is the trademark for the technical nomenclature for certain specifications and standards of the Organizational Partners (OPs) of 3GPP2. When applied to goods and services, the cdma2000® mark certifies their compliance with cdma2000® standards. Geographically (and as of the date of publication), cdma2000® is a registered trademark of the Telecommunications Industry Association (TIA-USA) in the United States.

that were incorporated into Revision 4 of ITU R M.1457, *Detailed Specifications of the Radio Interfaces of IMT-2000*. In addition to the enhancement of TIA-136-E, the M.1457 update includes a number of Committee T1 published standards that incorporate a GSM circuit-switched component into the TDMA-Single Carrier (SC) IMT-2000 3G technology, providing a migration path for both GSM and TDMA systems to third generation.

Subcommittee TR-45.4, Radio to Switching Technology, published a series of documents commonly referred to as Interoperability Specifications (IOS) Version 4.3. The documents were published as *Interoperability Specifications (IOS) for cdma2000® Access Network Interfaces* (TIA-20001.1-C through TIA-2001.7-C). In addition, it is significant to note that there were two radio access network architecture documents completed, related to 1x Enhanced Voice-Data Only (EV-DO), namely, TIA-878 — one revision, *Interoperability Specification (IOS) for High Rate Packet Data (HRPD) Access Network Interfaces — Phase 1* and TIA-1878, *Interoperability Specification (IOS) for High Rate Packet Data (HRPD) Access Network Interfaces — Alternate Architecture*. Subcommittee TR-45.4 continues to co-locate and work closely with 3GPP2 TSG-A, Access Network Interfaces.

U.S. Wireless Communications Equipment Spending ($ Millions)



Source: *TIA's 2004 Telecommunications Market Review and Forecast*
* Projected

Subcommittee TR-45.5, Spread Spectrum Digital Technology, published over a dozen standards associated with Third Generation cdma2000®. Working in conjunction with the 3GPP2 TSG-C, cdma2000®, major work items have been completed associated with Revision D and High Rate Packet Data (HRPD) Revision A. The following list includes some of the standards that were published by TR-45.5 to support Removable User Identity Module (R-UIM), MMS, Isotropic Orthogonal Transform Algorithm (IOTA), HRPD, and more.

- TIA-925, *Enhanced Subscriber Privacy for cdma2000® High Rate Packet Data*
- TIA-97-E, *Recommended Minimum Performance Standards for cdma2000® Spread Spectrum Base Stations*
- TIA-98-E, *Recommended Minimum Performance Standards for cdma2000® Spread Spectrum Mobile Stations*
- TIA-915, *CDMA Card Application Toolkit (CCAT)*
- TIA-923, *Link Layer Assisted Service Options for Voice-Over-IP: Header Removal (SO 60) and Robust Header Compression (SO 61)*
- TIA/IS-707-A-3, *Data Service Options for Spread Spectrum Systems*

- TIA-1010, *IP-Based Over-the-Air Handset Configuration Management*
- TSB-58-F, *Administration of Parameter Value Assignments for cdma2000® Spread Spectrum Standards*

In addition, TR-45.5 completed *Mobile Station and Base Station support for cdma2000® Series TIA-2000 Revision B* and the inclusion of MEID support in TIA-2000 Revision D. Subcommittee TR 45.5 also submitted updates related to the CDMA-Multi-Carrier (MC) IMT-2000 3G technology to the ITU-R WP 8F that were incorporated into Revision 4 of ITU R M.1457.

Subcommittee TR-45.6, Adjunct Wireless Packet Data, published TIA 835-B and TIA-835-C, the cdma2000® Wireless IP Network standard. Revision B and revision C are being maintained concurrently. Revision B upgraded the standard to a TIA standard, while revision C introduced improvements in the efficiency of Voice over IP service with support for Link Layer Assisted Robust Header Compression and Header Removal. Also included are support for Pre-Paid Packet Data Service, enhancements to the "Always-On" service and to Simple IPv6, and overall improvements to resource management and security aspects of cdma2000® packet mode communications. TIA-930, *Legacy Mobile Station Domain (LMSD) — Step 1*, was also published by TR-45.6 in 2003.

A major initiative of TR-45.6 was the development of technical input for the J-STD 025-B, *Lawfully Authorized Electronic Surveillance (LAES)*, standard that was published by the TR-45 LAES Ad-Hoc Group. The standard facilitates lawfully authorized surveillance involving cdma2000® packet mode communications. Along with TR-45.2, TR-45.6 works in conjunction with 3GPP2 TSG-X.

The **TR-45 Ad Hoc Authentication Group (AHAG)** continued to review and provide feedback on a number of security and authentication related issues. The *Enhanced Cryptographic Algorithms was published* as TIA-946, as well as an ANS. The AHAG was instrumental in providing clarification to TR-45 regarding pseudo-ESN derivation from MEID in support of the Subcommittees' MEID standards development. MEID is an alternate for ESN and is being considered as part of a harmonized global standard for identifying mobile equipment. As appropriate, the AHAG reviewed, considered or adopted security standards originated in 3GPP2. Topics addressed included Broadcast Multicast Service (BCMCS) Security Framework, as well as the Enhanced Cryptographic Algorithms. In addition, the AHAG identified potential security issues to discuss with 3GPP including joint control of the Authentication and Key Agreement (AKA) as it relates to Session Initiation Protocol (SIP), the signaling protocol for Internet conferencing, telephony, presence, events notification and instant messaging.

The **TR-45 Universal Identity Module/Equipment Serial Number/Mobile Equipment Identification Ad Hoc Group (UIM/ESN/MEID AHG)** continued to review various standards and industry concerns related to ESNs, UIMs and MEIDs. The Ad Hoc Group provided recommendations to TR-45 on topics such as UIM ID manufacturer codes, UIM administration, ESN reclamation, ESN re-use, ESN administration, MEID global hexadecimal administration, and MEID guidelines. The Ad Hoc Group acts as editor of the *TIA ESN Assignment Guidelines & Procedures.* The group also acts as editor of the *MEID GHA Assignment Guidelines &*

Procedures developed by the group in conjunction with the 3GPP2 Numbering Ad Hoc Group. Going into 2004, the Ad Hoc Group will continue to represent TR-45 relative to global number administration and continue the industry MEID outreach awareness initiatives while assisting in the management of the ESN exhaust timeline.

The **TR-45 Lawfully Authorized Electronic Surveillance (LAES) Ad Hoc Group** made significant progress on the ANS J-STD-025 standards on Lawfully Authorized Electronic Surveillance. The group has been working on refining the packet solution in the J-STD-025 series. J-STD-025-B, which includes high-level requirements for multiple technologies and a detailed solution for the cdma2000® Packet Data Switching Node (PDSN), is ready for publication as a TIA and Committee T1 joint standard, and will be submitted for ANS ballot in early 2004. The TR-45 LAES Ad Hoc Group has also begun work on two new projects. One project is a revision of J-STD-025-B, which will include, among other enhancements, a solution for 3GPP2 Instant Messaging Services (IMS)/xxx (MMD), which is a new platform for the LAES series of standards. The second new project will address additional LAES capabilities needed by service providers and law enforcement that are not presently covered within the scope of the current J-STD-025 series.

The TR-45 LAES ad hoc group developed and is editor of the *Object IDentifier (OID) Administrative Guidelines & Procedures*. The guidelines were adopted by TR-45 for TIA administrator use and industry reference relative to ASN.1 objects assignment under the TIA branch of the OID tree.

The **TR-45 Network Architecture Ad Hoc Group (NAG)** recommended *IP Network Reference Model (NRM) for cdma2000® Spread Spectrum Systems* for publication as TIA/TSB-151. Publication of TSB-151 is anticipated in early 2004. The NAG was instrumental in providing clarification of the TR-45 Network Reference Model (NRM) in Wireless Network Reference Model (TIA/TSB-100-A) in response to the International Telecommunication Union — Telecommunication Sector (ITU-T) Q.1742.1, IMT-2000 references to ANSI-41 evolved core network with cdma2000® access network. Having completed its work and with no new projects requested, the NAG was once again rendered dormant by Committee TR-45 until there is the need for a revision to the TR-45 NRM. All issues related to NAG will be referred to Committee TR-45 until further notice.

Re-activated in 2003, the **TR-45 Ad Hoc Group on Electronic Media Documentation (AHEM)** was charged with investigating and recommending the use of electronic methods to support the work of Committee TR 45. Efforts continue to be made to promote consistent, efficient operation within TR-45 and its subgroups as well as with the TIA Standards Secretariat. TR-45 continues to encourage and promote the use

of electronic methods not only at meetings held internationally, but also at standards meetings held domestically.

TR-45 looks forward to a very productive year in 2004 for the publication of mobile wireless standards. The committee will continue to address standards on topics of importance to the industry such as Next Generation Networks (NGN), which is the convergence of mobile and fixed services. Other topics of interest are Homeland Security, Lawfully Authorized Electronic Surveillance, Emergency Services, Wireless Priority Service, Wireless Number Portability, Mobile Equipment Identification, and more based on the direction of the TIA Technical Committee and the industry.

SUBCOMMITTEES

TR-45.1 Analog Technology
Chair: John Kay
Motorola Inc.

TR-45.2 Wireless Intersystem Technology
Chair: Chuck Ishman
Motorola Inc.

TR-45-3 Time Division Digital Technology
Chair: Peter Musgrove
AT&T Wireless Services

TR-45.4 Radio to Switching Technology
Chair: Dale Baldwin
Sprint PCS

TR-45.5 Spread Spectrum Digital Technology
Chair: Jean Alphonse
Lucent Technologies Inc.

TR-45.6 Adjunct Wireless Packet Data Technology
Chair: Parviz Yegani
Cisco Systems

TR-45 Ad Hoc Authentication Group (AHAG)
Chair: Chris Carroll
Verizon Wireless

TR-45 Ad-Hoc Group on Lawfully Authorized Electronic Surveillance (LAES)
Chair: Terri Brooks
Nokia

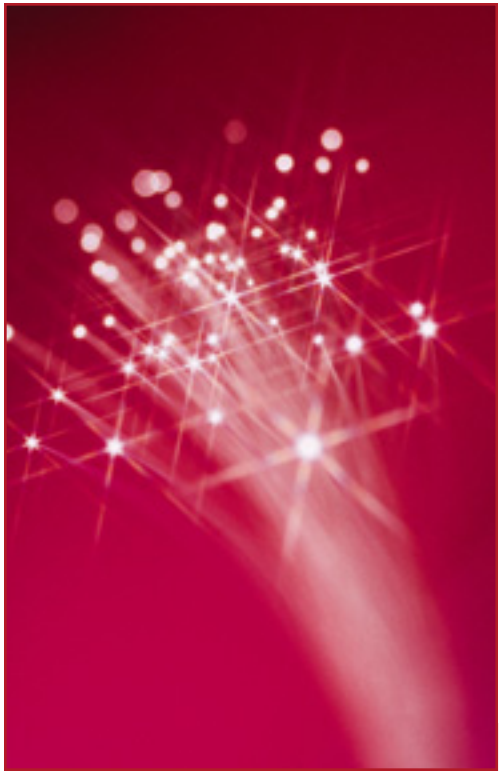
TR-45 Ad-Hoc Group on UIM/ESN/MEID
Chair: Chris Carroll
Verizon Wireless

TR-45 Network Architecture Ad-Hoc Group (NAG)
Chair: Chuck Ishman
Motorola Inc.

TR-45 Ad-Hoc on Electronic Media Documentation (AHEM)
Chair: Peter Nurse
Lucent Technologies Inc.

FO-4 Fiber Optics

The FO-4 Engineering Committee on Fiber Optics is responsible for the development and maintenance of fiber optic component and system technology standards. These standards are intended to be employed by users and suppliers of fiber optic communications technology to promote compatible and interoperable systems used to support a wide variety of voice, data, video and telemetry applications for trade and commerce. To this end, the FO-4 Engineering Committee works closely with other national and international standards development organizations in promoting harmonization and ease of use for worldwide fiber optic technology deployment. The FO 4 Engineering Committee focuses primarily on fiber optics standards for:



- Testing methodologies for passive and active components, subsystems and systems
- Metrology and calibration
- Interface standards
- Component and system specifications
- Performance and reliability
- System design guides
- Terminology and symbology

The FO-4 Engineering Committee is comprised of five subcommittees and eight working groups covering a wide range of fiber optic standardization subjects. The committees' goals include the timely development of high quality standards meeting the needs of manufacturers, end users and applications developers employing fiber optic components and systems throughout North America and the rest of the world.

2003 Overview

The structure of FO-4 was streamlined in 2002, and in September 2003 the FO-4 plenary approved further consolidation from nine subcommittees and 11 working groups to five subcommittees and eight working groups. This new structure allows for maximum participation by the companies in the scheduled three-day time frame of meetings. In addition, this new structure allows a more direct mapping of TIA activities to the international activities in the International Electrotechnical Commission (IEC) Technical Committee (TC) 86, Fibre Optics.

At the two meetings held in 2003, in addition to the regular participants from all subcommittees and working groups, participants attended from IEC TC 86, Fibre Optics. Additionally, the Alliance for Telecommunications Industry Solutions (ATIS) T1X1, Digital Hierarchy & Synchronization, co-located one of its meetings with the FO committees, which allowed a network operator's perspective to be introduced into the standards development activity for fiber optics equipment.

In 2003, as part of FO-4 efforts to expand its base from telecom centric to also encompass data-centric projects, FO-4 invited Aeronautical Radio Inc., (ARINC) to present on the needs of avionics for fiber optics.

Steve Swanson
Chair, FO-4
Manager, Standards Engineering
Corning Inc.

The committee took an active interest in the ongoing activities of both domestic and international standards organizations and continued to establish formal liaisons with organizations having mutual interests. In North America, these included ATIS Committee T1, the Institute of Electrical and Electronics Engineers (IEEE) and the Insulated Cable Engineers Association (ICEA), National Electronics Manufacturing Initiative (NEMI), and the Institute of Interconnecting and Packaging Electronic Circuits (IPC) Optoelectronic Packaging.

Internationally, the committee developed several technical contributions in support of work in the International Telecommunication Union — Telecommunication Standardization Sector (ITU-T). The committee also participated in the relevant Technical Advisory Groups (TAGs) of the International Organization for Standardization (ISO) and the IEC including:

- IEC TC 86 and its subcommittees
  - Subcommittee 86A, Fibre and Cables
  - Subcommittee 86B, Fibre Optic Interconnecting Devices
  - Subcommittee 86C, Fibre Optic Systems and Active Devices
- ISO/IEC Joint Technical Committee 1/SC25 on Interconnection of Information Technology Equipment.

Key Developments in 2003:

TIA and the Insulated Cable Engineers Association (ICEA) signed a Memorandum of Understanding that allows the adoption of ICEA standards by TIA while maintaining the TIA numbering series designation for fiber optic cable standards. This agreement will help prevent the duplication of standards in the industry while still allowing each organization to market and sell the standards under its own name.

TIA plans to adopt the following ICEA Standards as American National Standards:

- ICEA S-596, *Indoor Cable*
- ICEA S-640, *OSP Cable*
- ICEA S-696, *Indoor/Outdoor Cable*
- ICEA S-717, *Drop Cable*

The committee published the following new documents in 2003:

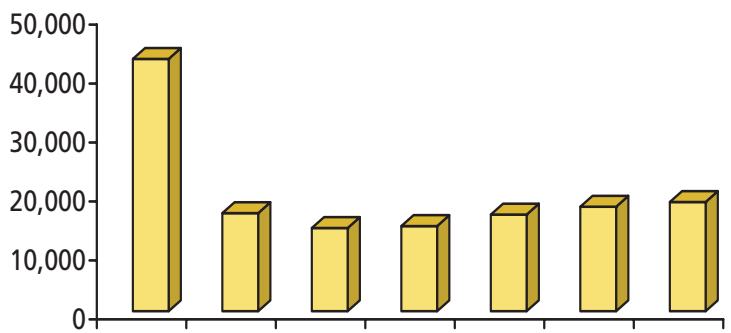
- TIA 604-15, *Fiber Optic Connector Intermatability Standard, Type MF*
- TIA 604-16, *Fiber Optic Connector Intermatability Standard, Type LSH*
- TSB-130, *Generic Guidelines for Connectorized Polarization Maintaining Fiber and Polarizing Fiber Cable Assemblies for Use in Telecommunications Applications*

- TSB-144, *Adhesive Bubbles and Voids in Fiber Optic Components: Guidance, Issues, and Challenges*

The committee revised the following Standards in 2003:

- TIA 492AAAC-A, *Detail Specification for 850 nm Laser Optimized Multimode Optical Fiber*
- TIA-455-220A, *Differential Mode Delay Measurement of Multimode Fiber in the Time Domain*
- TIA 604-2A, *Fiber Optic Connector Intermatability Standard, Type ST*
- TIA-440A, *Fiber Optic Terminology*

Carrier Spending on Fiber ($ Millions)



Source: *TIA's 2004 Telecommunications Market Review and Forecast*
* Projected

In addition, FO-4 is committed to worldwide harmonization of fiber optic standards and continues to adopt IEC published standards nationally where possible. Back-adoption of IEC standards allows manufacturers to use the same standard worldwide to produce product in a uniform method. IEC standards can be adopted nationally without any change or they can be adopted with some regional variation.

In 2003, standards FO-4 back adopted directly from IEC standards to TIA American National Standards were:

- IEC 60793-1-20, *Fibre geometry*, nationally adopted as TIA-455-176A (FOTP-176)
- IEC 60793-1-21, *Coating geometry*, nationally adopted as TIA-455-195A (FOTP-195)
- IEC 60793-1-22, *Length measurement*, nationally adopted as TIA-455-133A (FOTP-133)
- IEC 60793-1-32, *Coating stripability*, nationally adopted as TIA-455-178B (FOTP-178)
- IEC 60793-1-34, *Fibre curl* nationally adopted as TIA-455-111A (FOTP-111)
- IEC 60793-1-42, *Chromatic dispersion*, nationally adopted as TIA-455-175B (FOTP-175)
- IEC 60793-1-43, *Numerical aperture,* nationally adopted as TIA-455-177B (FOTP-177)

- IEC 60793-1-44, *Cut-off wavelength,* nationally adopted as TIA-455-80C (FOTP-80)
- IEC 60793-1-45, *Mode field diameter,* nationally adopted as TIA-455-191B (FOTP-191)
- IEC 60793-1-47, *Macrobending loss,* nationally adopted as TIA-455-62B (FOTP-62)
- IEC 60793-1-51, *Dry heat,* nationally adopted as TIA-455-67A (FOTP-67)
- IEC 60793-1-52, *Change of temperature,* nationally adopted as TIA-455-234 (FOTP-234)
- IEC 60793-1-53, *Water immersion*, nationally adopted as TIA-455-74A (FOTP-74)
- IEC 61315, *Calibration of fiber optic power meter*, nationally adopted as TIA-455-231 (FOTP-231)

Subcommittees

FO-4.1 Fiber Optic Systems
Chair: James Matthews III
Corning Inc.

FO-4.2 Optical Fibers and Cables
Chair: Tom Hanson
Corning Inc.

FO-4.3 Interconnecting Devices and Passive Components
Co-Chairs: Tom Ball, OFS;
Andre Girard, EXFO Electro-Optical Engineering Inc.

FO-4.4 Fiber Optic Amplified Systems, Active Components and Reliability
Chair: Pin Su
Dicon Fiberoptics Inc.

FO-4.5 Fiber Optic Metrology
Chair: Dennis Horwitz
Greenlee, a Textron Co.

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