

# Cellular Networking Perspectives

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An update on the latest status of standards to support TDMA digital cellular.

## Standards Updates: Number Portability, LAES and E9-1-1

Ballot, rebalot and publication is the tale for the three major US government mandates being standardized by TIA standards subcommittee TR-45.2. The first phase of a standard for wireless number portability (PN-3980) was approved for ballot in August. This contains only specifies a query message to a Number Portability database to determine whether a number has been ported and, if it has, what the Location Routing Number (LRN) is. The LRN will be used to route the call to the correct switch for the ported number. A second phase will likely be necessary to optimize the IS-41 protocol to minimize the number of number portability queries that are required.

The controversial Lawfully Authorized Electronic Surveillance document (SP-3580) has been submitted for a second TIA/ANSI ballot, with responses due by October 28, 1997. Many of the comments made by participants in the first ballot have been incorporated. Ballot as an interim standard may prevent most law enforcement agencies from voting.

The Enhanced Wireless 9-1-1 standard (PN-3581) has been approved for publication. It provides compliance with Phase I of the FCC rules, by identifying the mobile and the cell/sector it is calling from, and supporting callback to mobiles. Work on Phase II, more accu-

ate location determination, is underway.

In other TR-45.2 standards news, PN-3769 has been published as IS-725. This standard provides intersystem operations to support over-the-air activation and provisioning of CDMA (IS-95) and TDMA (IS-136) mobiles. PN-3173 has been published as TIA TSB-29 Revision B, covering international applications of TIA wireless standards.

## First Report on TR-45.6

The new TIA TR-45.6 subcommittee has applied for a large list of TIA project numbers, which will result in multi-part interim standard IS-732 and multi-part TSB-87. According to Mark Mun-

son, chair of TR-45.6, these initial projects will simply result in the elevation of the existing CDPD "packet data over cellular" speci-

fication to a formal standard. Discussions are ongoing regarding enhancements to the standard that could be included in a future revision.

## TIA now the ESN Allocation Authority

As of September 1997, the TIA will allocate ESN manufacturer codes instead of the FCC. The ESN ad hoc group is considering an expanded (48-56 bit) ESN format for use when the existing pool of around 250 codes is exhausted.

See us at PCS'97

Booth 10261.

September 10-12, 1997 at the  
Dallas Convention Center.

Next issue: October 1, 1997

# Features & Capabilities for the TIA “AMPS” Family of Wireless Standards

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*first publication*

Category	Feature/Capability	Standards	
		Network	Air Interfaces
Access Control	Priority Access & Channel Assignment (PACA)	IS-53-A/IS-41-C	
	PSID/RSID	IS-730	IS-136 (TDMA)
Billing	Near real-time call record/billing record exchange	IS-124-0	
	Billing grade	IS-124-A	
Call Delivery	Voice call delivery	IS-53-A/IS-41-A	
	Border cell problem resolution	TSB-65/IS-41-C	
	Data call delivery	PN-3770	IS-95/IS-136
Call Forwarding	Immediate	IS-53-0/IS-41-A	
	Busy	IS-53-0/IS-41-A	
	No-Answer	IS-53-0/IS-41-A	
	Voice Mail (busy and no-answer)	IS-53-A/IS-41-C	
Caller ID	Calling Number presentation/restriction	IS-53-A/IS-41-C	
	Calling Name presentation/restriction	PN-pending	
Data	Asynchronous Data/Fax	PN-3770	
	Point-to-point SMS	IS-53-A/IS-41-C	
	Broadcast SMS	PN-pending	
	Packet data	<i>future</i>	
Emergency Services	Basic 9-1-1 calling	<i>none required</i>	
	Phase I (callback, cell/sector identity)	PN-3581	
	Phase II (125 meter location accuracy)	PN-3890	
Fraud Management	Basic Authentication	TSB-51	
	Full authentication support	IS-41-C	
	Strengthened authentication	PN-pending	
	Personal Identification Number (SPINI, SPINA)	IS-53-A/IS-41-C	
Group Calling	Flexible Alerting	IS-53-A/IS-41-C	
	Mobile Access Hunting	IS-53-A/IS-41-C	
	User Groups	IS-730	IS-136 (TDMA)
Handoff	Intersystem handoff forward	IS-41-0	
	Intersystem handoff back	IS-41-0	
	Handoff to third (path minimization)	IS-41-B	
	TDMA mobiles	IS-41-B	IS-54/IS-136
	CDMA mobiles	TSB-64/IS-41-C	IS-95
	NAMPS Mobiles	TSB-76	IS-88/IS-91
	PCS band mobiles	TSB-76	IS-136/J-STD-008
	Data	PN-3770	IS-95/IS-136

## Features & Capabilities, continued

Category	Feature/Capability	Standards	
		Network	Air Interfaces
Interconnection	Basic (equiv. to Bellcore TR-145)	IS-93-0	
	Including emergency services	IS-93-A/PN-3295	
	Including local number portability	<i>future</i>	
International	Support for ITU SS7 (C7)	TSB-29-B/ANSI-41	
	MIN/SID allocations & conflicts	TSB-29-B	
	International Mobile Station Identity (IMSI)	PN-3892	
	Support for international global title	<i>future</i>	
Lawfully Authorized Electronic Surveillance (LAES)		SP-3580	
Multi-Party	Call Waiting	IS-53-0/IS-41-B	
	Three-way Calls	IS-53-0/IS-41-B	
	Conference Calls	IS-53-A/IS-41-C	
	Call Transfer	IS-53-A/IS-41-C	
Over-the-air Service Provisioning (OTASP)		IS-725	IS-136.1-A, IS-683(CDMA)
Portability	Wireless Local Number Portability Query	PN-3980	
	IS-41 Optimizations	PN-pending	
Screening	Password Call Acceptance (PCA)	IS-53-A/IS-41-C	
	Selective Call Acceptance (SCA)	IS-53-A/IS-41-C	
	Do Not Disturb	IS-53-A/IS-41-A	
	Advanced capabilities	PN-3661 (WIN)	
Voice Mail	Call Forward Voice Mail	IS-53-A/IS-41-C	
	Voice Mail Access	IS-53-A/IS-41-C	
	Message Waiting Notification	IS-53-A/IS-41-C	
Voice Services	Preferred Language	IS-53-A/IS-41-C	
	Voice Privacy	IS-53-A/IS-41-C	IS-54,IS-95,IS-136
	Voice Controlled Services	PN-3661 (WIN)	

- Notes: Category            An unofficial grouping of related features and capabilities.
- Feature/Capability        A description of each feature and capabilities, listed in approximate order of publication within each category.
- Network Standards        Standards, or other documents, created by the TIA TR-45.2 subcommittee. Terms used include:
- future*        No development is ongoing at present, but is likely in the future.
  - IS-            TIA Interim Standard (may later progress to a full ANSI/TIA/EIA standard with the same or different identifying number). IS-53 provides a user-level description of features and some capabilities, IS-41 defines an inter-system protocol for the implementation of features and capabilities. Many of the other interim standards and TSB's augment IS-41.
  - PN-            Project number for publication of an IS- or TSB-.
  - SP-            Standards proposal project number for development of an ANSI standard.
  - TSB-          Telecommunications Systems Bulletin (often used as an appendix to an existing standard or to publish guidelines without the weight of a full standard).
- Air Interfaces             Standards, or other documents, created by the TIA TR-45.1 (analog) subcommittee, TR-45.3 (TDMA) or TR-45.5 (CDMA). If no air interface standards are listed, the feature or capability is either air interface independent (e.g. call forwarding) or applies to at least some revisions of all major standards (e.g. authentication).

# TIA TR-45.6 Cellular Digital Packet Data (CDPD) Standards

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*first publication*

### Active TR-45.6 Projects - CDPD Interim Standards

<b>PN/SP</b>	<b>Standard</b>	<b>Description</b>
PN-4033	IS-732	Standard and System Specification Overview
PN-4034	IS-732-300	Communications Architecture
PN-4035	IS-732-301	Subprofile Concepts
PN-4036	IS-732-310	Application Subprofiles
PN-4037	IS-732-311	Lower Layer Subprofiles
PN-4038	IS-732-312	Subnetwork Subprofiles
PN-4039	IS-732-400	Overview of Airlink
PN-4040	IS-732-401	Airlink Physical Layer
PN-4041	IS-732-402	Medium Access Control
PN-4042	IS-732-403	Mobile Data Link Protocol
PN-4043	IS-732-404	Subnetwork Dependent Convergence Protocol
PN-4044	IS-732-405	Radio Resource Management
PN-4045	IS-732-406	Airlink Security
PN-4046	IS-732-408	Minimum Performance Standards for CDPD Mobile Base Stations
PN-4047	IS-732-409	Minimum Performance Standards for CDPD Mobile End Systems
PN-4048	IS-732-500	Mobility Management
PN-4049	IS-732-501	Mobile Network Location Protocol
PN-4050	IS-732-507	Mobile Network Registration Protocol
PN-4051	IS-732-600	Network Support Services
PN-4052	IS-732-620	Message Handling Service
PN-4053	IS-732-630	Accounting Service and Protocol
PN-4054	IS-732-700	Network Management
PN-4055	IS-732-731	MD-IS and MDBS Management Ensemble
PN-4056	IS-732-732	Inter-Domain Management Ensemble
PN-4057	IS-732-733	Accounting Management Ensemble
PN-4058	IS-732-734	Generic Equipment Management Ensemble
PN-4059	IS-732-750	Management Information Library
PN-4060	IS-732-751	Managed Objects Conformance Statements
PN-4061	IS-732-800	Overview of Supplementary Protocol Information
PN-4062	IS-732-820	State Transition Table for CDPD MAC Procedures
PN-4063	IS-732-821	MAC PICS Proforma
PN-4064	IS-732-830	State Transition Tables for Mobile Data Link Protocol
PN-4065	IS-732-831	MDLP PICS Proforma
PN-4066	IS-732-841	SNDP PICS Proforma

# TIA TR-45.6

## Cellular Digital Packet Data (CDPD) Standards, cont'd

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### Active TR-45.6 Projects - CDPD Interim Standards (cont'd)

PN/SP	Standard	Description
PN-4067	IS-732-870	State Transition Table for Mobile Network Registration Protocol
PN-4068	IS-732-880	State Transition Table for Mobile Network Location Protocol
PN-4069	IS-732-881	MNLP PICS Proforma
PN-4070	IS-732-900	Protocol Testing Overview
PN-4071	IS-732-920	MAC Abstract Test Suite
PN-4072	IS-732-930	MDLP Abstract Test Suite
PN-4073	IS-732-1023	Accounting Summary and Settlement
PN-4074	IS-732-1024	Circuit-Switched - Cellular Digital Packet Data
PN-4075	IS-732-1025	CS CDPD Modem Bank Management Protocol (MBMP)
PN-4076	IS-732-1026	CS CDPD Accounting Service and Protocol

### Active TR-45.6 Projects - CDPD TSBs

PN/SP	Standard	Description
PN-4001	TSB-87	Overview of Implementor Guidelines
PN-4002	TSB-87-1010	Intermediate System
PN-4003	TSB-87-1012	Network Support Services
PN-4004	TSB-87-1013	Directory Services
PN-4005	TSB-87-1014	Application-Entity Look-up Directory Profile
PN-4006	TSB-87-1015	Subscriber Directory Profile
PN-4007	TSB-87-1018	Authentication Services
PN-4008	TSB-87-1020	Domain Name System
PN-4009	TSB-87-1021	Service Provider Interoperability Test Plan Overview
PN-4010	TSB-87-1022	Parameter Configuration Guidelines
PN-4011	TSB-87-2010	Mobile End System
PN-4012	TSB-87-2011	Mobile Data Base Station
PN-4013	TSB-87-2012	Mobile Data Intermediate System (MDIS)
PN-4014	TSB-87-2013	External Interfaces
PN-4015	TSB-87-2015	Subscriber Identity Module Functional Characteristics
PN-4016	TSB-87-2016	Multicast Perspectives
PN-4017	TSB-87-2018	M-ES EID Assignment
PN-4018	TSB-87-3010	Unique Identifiers Name and Number Plan
PN-4019	TSB-87-3011	Administration of Unique Identifiers Name and Numbering Plan
PN-4020	TSB-87-3012	IP and CLNP Routing Architecture and Addressing Plan

- Note:
1. IS- TIA Interim Standard, PN- TIA Project Number, TSB- TIA Telecommunications Systems Bulletin.
  2. Thanks to Mark Munson, GTE Mobile Communications (chair of TIA TR-45.6) for supplying the information in this report.

# TIA TR-45.3 TDMA Digital Air Interface Standards

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### TDMA Digital Air Interface Standards - First Generation

IS/TSB	ANSI	Description	Comment
IS-54-B	TIA/EIA-627	Original TDMA Dual-Mode Air Interface Standard	ANSI pub. 09/96
IS-55/56	TIA/EIA-628/629	TDMA mobile/base station minimum performance standards	ANSI pub. 09/96
IS-85	TIA/EIA-635	TDMA full-rate voice coder (3:1)	ANSI pub. 09/96
TSB-46		Verification of Authentication for IS-54-B Mobiles	Published 03/93
TSB-47		IS-54 Implementation Issues	Published 05/94
TSB-50		User Interface for Authentication Key Entry	Published 03/93

### TDMA Digital Air Interface Standards - Second Generation

Standard	PN/SP	Description	Comment
IS-130-0		Data services radio link protocol	Published 04/95
IS-135-0		Asynchronous data and fax services	Published 04/95
IS-136.1 Rev. 0		Digital Control Channel (DCCH)	Published 12/94
IS-136.1/2-1		Addendum to IS-136 Rev. 0	Published 12/94
IS-136.2 Rev. 0		FSK control channel, analog voice channel, TDMA traffic channel	Published 12/94
IS-137-0		TDMA/analog mobile minimum performance standards	Published 12/94
IS-138-0		TDMA/analog base station minimum performance standards	Published 12/94

### TDMA Digital Air Interface Standards - Third Generation

Standard	PN/SP	Description	Comment
<b>IS-130-A</b>	<b>PN-3795</b>	<b>Data Services Radio Link Protocol</b>	<b>In press</b>
<b>IS-135-A</b>	<b>PN-3794</b>	<b>Asynchronous data and fax services</b>	<b>Development</b>
IS-136.1-A		Enhanced digital control channel (9-1-1, OTA, Calling Name ID, One-button Callback, Private Networks (enhanced), PACA)	Published 10/96
IS-136.1-A-1		IS-136 Rev. A, first addendum: section 1 corrections	Published 11/96
IS-136.1/2-A-2	PN-xxxx	IS-136 Rev. A, second addendum: section 1 and 2 corrections	In press
IS-136.2-A		FSK control channel, analog voice channel, TDMA traffic channel	Published 10/96
<b>IS-137-A</b>	<b>PN-3605</b>	<b>Mobile minimum performance standards for IS-136-A</b>	<b>Published 07/96</b>
<b>IS-137-A-1</b>		<b>Revised transmission tests for IS-137-A</b>	<b>Published 08/97</b>
<b>IS-138-A</b>	<b>PN-3606</b>	<b>Base station minimum performance standards for IS-136-A</b>	<b>Published 07/96</b>
IS-641		Enhanced full-rate voice coder	Published 05/96
<b>IS-669</b>	<b>PN-3616</b>	<b>STU-III support for TDMA systems</b>	<b>Development</b>
IS-684		Isochronous radio link protocol for data (for STU-III)	Published 08/96
IS-686		Enhanced full rate voice coder performance standards	Published 01/97

### TDMA Digital Air Interface Standards - Fourth Generation

Standard	PN-/SP-	Description	Comment
IS-136-B		Long message transport, broadcast SMS, originating SMS on traffic channel, double/triple rate channels (symmetrical and asymmetrical), stronger voice privacy, charge rate indicator	Development
<b>IS-641-A</b>	<b>PN-3969</b>	<b>Enhanced full-rate voice coder, Revision A</b>	<b>Ballot</b>
<b>IS-686-A</b>	<b>PN-3970</b>	<b>Minimum performance standards for IS-641-A</b>	<b>Ballot</b>
<b>IS-xxx</b>	<b>PN-xxxx</b>	<b>Packet Data Services</b>	<b>Development</b>

- Note:
1. IS- Interim Standard, TSB- Telecommunications Systems Bulletins, PN- Project Number, SP- ANSI Standards Proposal.
  2. **Bold Type** indicates modification since previous publication.
  3. Published TIA standards can be obtained from Global Engineering Documents at 1-800-854-7179.

Thanks to Al Sacuta (Next Generation) and John Diachina (Ericsson) for their assistance compiling the information in this table.