

Cellular Networking Perspectives

Editor: David Crowe • Phone +1-403-289-6609 • Fax +1-403-289-6658

Vol. 8, No. 4 March, 1999

In This Issue...

Dr. Jon's Wireless Security Bulletin p. 1

A new, optional, addition to *Cellular Networking Perspectives* — free to our subscribers for March and April, 1999.

Wireless Local Number Portability: Down for the Count, But Not Out! p. 1

The FCC has given the wireless industry partial forbearance on number portability.

Update: Amputating AMPS in Australia p. 2

Australia is still heading for AMPS elimination by the end of the year. Can GSM and CDMA fill the void?

TTY: A New Approach p. 2

A breakthrough in wireless TTY communications.

Understanding the ANSI TIA/EIA-136 Structure p. 2

Emergency Alert Service: New TR-45.2 Project p. 2

Status of IS-41 Rev. C & TIA/EIA-41-D Implementations p. 3

TIA TR-45.3 TDMA Digital Air Interface Standards p. 4

Dr. Jon's Wireless Security Bulletin

This issue is extended by a welcome new addition, a separate bulletin on wireless security issues by Dr. Jon Hamilton, a knowledgeable and experienced cryptographer, and the secretary of the TIA AHAG (Ad Hoc Authentication Group). This addition to our newsletter will contain a high level summary of information related to wireless security — authentication, voice and data encryption, as well as more general security issues of interest to wireless carriers or equipment vendors. Information that is restricted by TIA rules or various government regulations will not be included.

Dr. Jon's Wireless Security will be free for the first two months, and then will be

available at a 50% premium over your current *Cellular Networking Perspectives* subscription price (e.g. an additional \$150/year for our standard 10 copy subscription rate of \$300/year). Dr. Jon Hamilton also will be preparing more in-depth reports. Contact us at 1-800-633-5514 (+1-403-274-4749) or cnpsales@cnp-wireless.com for more information on prices and availability.

Wireless Local Number Portability: Down for the Count, But Not Out!

The US FCC has delayed the implementation of wireless local number portability yet again, until November 24, 2002 this time. This delay is to allow the PCS build-out to be completed. This is not the wireless industry's dream of a complete halt, followed by reconsideration of the need for local number portability in wireless, based on an analysis of wireless competition at that time. It also does not relieve wireless carriers from the need to upgrade equipment to be able to route calls from wireless phones to ported wireline numbers. Standards work in TIA subcommittee TR-45.2 will therefore continue, but at a slower pace.

One clear victory for the wireless industry was the FCC's rejection of a TRA (Telecom Resellers Association) proposal to abandon the current wireless industry approach that requires MIN/MDN separation. TRA proposed an alternate methodology based on global title translation of the MIN to identify

Quote of the Month

"Let's talk about ways that we can use regulation to accelerate competition. I've had some very interesting conversations recently with my counterparts in Europe, and believe that it is time for us to find a way to implement a Calling Party Pays system in this country.

Only five percent of phone calls are now made on mobile phones. I think that number would increase dramatically with a Calling Party Pays system."

William Kennard
Chairman, US FCC
Addressing CTIA Wireless '99
February 9, 1999

Next Issue: April 6, 1999

Cellular Networking Perspectives (issn 1195-3233) is published monthly by Cellular Networking Perspectives Ltd., 2636 Toronto Cresc. NW, Calgary AB, T2N 3W1, Canada.

Contact Information: Phone: 1-800-633-5514 (+1-403-274-4749) Fax: +1-403-289-6658 Email: cnpsales@cnp-wireless.com Web: <http://www.cnp-wireless.com/>

Subscriptions: CDN\$300 in Canada (incl. GST), US\$300 in the USA and US\$400 elsewhere. Payment by cheque, bank transfer, American Express, MasterCard or Visa.

Delivery: Email or 1st class mail. **Back Issues:** Available individually for \$35 in the US and Canada and \$40 elsewhere, or in bulk at reduced rates. **Discounts:** Educational and small business discount: 25% off any order. **Copies:** Each subscriber is licensed to make up to 10 copies of each issue or back issue. Call or email for rates that allow more copies.

each mobile's HLR. This solution would require considerably more network traffic and database queries to handle messages, such as registrations, that are routed based on MIN (increasing the costs of messages that have no direct revenue benefit). Furthermore, a victory by TRA would have been illusory, because the wireless industry has other reasons to want to separate MIN's and directory numbers, which would have nullified their solution.

Due to the lower priority of number portability, and a flood of other items that need publication, our series on number portability will not be published this month, but will resume in April.

Update: Amputating AMPS in Australia

Telstra, the analog cellular carrier in Australia, recently reiterated that they will be terminating analog coverage in many areas in Australia by December 31, 1999, as Australian law requires. Telstra has promised that it "will introduce its new CDMA (Code Divisional Multiple Access) network into these affected areas prior to the analogue closure to ensure continuity of service."

Obviously, this will be cold comfort to the many Australians who currently have AMPS-only analog phones. Worse yet, even buying a new phone is not a guarantee of coverage. Although digital systems can provide more channels than analog in dense urban areas, rural areas do not have capacity problems, but require large cellsites to make the systems cost effective. It is quite clear that existing GSM cellsites cannot come even close to duplicating the analog coverage (and other TDMA systems, such as D-AMPS, will have a similar problem), and it has not yet been proven that CDMA can either. In fact, one industry insider who wished to remain anonymous calls this the "CDMA" problem — Can Digital Match Analog? There are many Australians (including the government) hoping that the answer is DCMA — Digital Can Match Analog.

TTY: A New Approach

Lucent Technologies described a new approach to the TTY problem (see page 3 of our May 1998 issue) at a January 1999 TIA TR-45.5 standards committee meeting. Current digital phone voice coders do not allow deaf or hearing-impaired people to connect a TTY device (45.45 bps text communications device) to their phone, when they need to communicate an emergency situation to a PSAP. Previous solutions have been either to limit TTY users to purchasing analog phones, or to provide a special cable interface to a digital phone that would automatically go into data mode (i.e. turn the voice coders off). However,

Coming in the April 1999 Issue...

Capacity Comparison of Wireless Technologies: Analog, D-AMPS, GSM and CDMA.

since most carriers have not implemented data in their base stations, it is a more expensive solution than it seems.

The Lucent approach requires relatively minor modifications to the CDMA EVRC voice coder, and is claimed to be adaptable to TDMA voice coders as well. If both the mobile connected to the TTY and the base station are using the enhanced voice coder, the character error rate is effectively zero. The solution works by encoding TTY tones in both the normal fashion as digitized analog tones (for backwards compatibility, although with a character error rate that may be as high as 10%), and as a digital character in the *pitch lag* bits, which the encoder can arrange to be unused by an unmodified decoder. An unmodified decoder will interpret the digitized tones and ignore the digital characters, while a modified decoder can recognize the presence of error-free digital characters in the *pitch lag* bits.

The big advantage of this solution is that it is backward compatible with unenhanced versions of EVRC. Also, because of the small modifications required to the voice coder software, it may well be possible to load new software into existing phones and, more importantly, base stations.

Understanding the ANSI TIA/EIA-136 Structure

In this issue we present an updated list of TIA TR-45.3 standards subcommittee projects related to TDMA/D-AMPS radio interfaces. The major standard was first published as TIA interim standard IS-136, but now is being published as American National Standard ANSI TIA/EIA-136. This is not the only change, the document has been divided into many different parts, each of which may have a different revision level.

The first ANSI version (currently in press) is composed entirely of parts with revision level 0, but the second version (currently being balloted) will contain some modified parts (Revision A), some parts retained unchanged from the first version (Revision 0) and some new parts (also Revision 0). The third version will be even more mixed up.

Another confusing factor is that, breaking with TIA tradition, the same project number (PN-4027/SP-4027) will be used for multiple revisions of the standard.

The secret to determining the revision level is to look at the first part in the standard (part number 000). It will be revised with each revision of the standard, and thus will reflect the overall document's revision level.

Emergency Alert Service: New TR-45.2 Project

The CTIA is under pressure to arrange for broadcast emergency alerts to be sent to wireless phones that support broadcast Short Message Service (SMS), just as many TV and radio stations can. To support this, the TIA ad hoc group on wireless emergency services has agreed to initiate a project to define a standard protocol. Currently, however, wireless carriers in the US (and elsewhere) are not under a mandate to provide this service, but may do so voluntarily.

Status of IS-41 Rev. C & TIA/EIA-41-D Implementations

Cellular Networking Perspectives

Editor: David Crowe • Phone +1-403-289-6609 • Fax +1-403-289-6658

Last published November, 1998

Vendor and Radio Technology														
Intersystem Operations Capability	Alcatel			Ericsson		GTE	Lucent			Motorola		Nortel		
	Analog	CDMA	TDMA	Analog	TDMA	all	Analog	CDMA	TDMA	Analog	CDMA	Analog	CDMA	TDMA
Authentication	4	4	4	4	4	4	4	4	4	4	4	4	4	4
IS-778 Auth'n Enhancements														
CNAP/CNAR		4Q'98	4Q'98			4								
CNIP/CNIR	4	4		4	4	4	4	4	4	4	4	4	4	4
Data (IS-737)					4									
Inter-MSC handoff: Analog to...	4		4	4	4		4		4	4		4		4
Inter-MSC handoff: CDMA to...	4	4					4	4		4	4	4	3Q'99	
Inter-MSC handoff: TDMA to...	4		4	4	4		4		4	4		4		4
IMSI (IS-751)														
Hyperband handoff (TSB-76)			4		4			4	4		4		4	4
LNP Phase I (IS-756)	4Q'98	4Q'98	4Q'98	4	4		4	4	4			4	4	4
LNP Phase II (IS-756-A)														
MWN	4	4		4	4	4	4	4				4	4	4
Origination Triggers	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Over-the-air Activation (IS-725)								4						
SMS Origination		4Q'98	4Q'98		4	4							4	4
SMS Termination	4	4			4	4		4	4	4	4	4	4	4
Termination Triggers						4	4	4	4	4	4	4	4	4
Voice Privacy			4		4			4	4					
WIN Phase I (IS-771)														

Terms: See <http://www.cnp-wireless.com/glossary.html>.

Symbols: 4 In field trial or commercial service.

XQ'9X Specifies the quarter during which commercial availability is expected (e.g. 4Q'98).

In lab trial.

Under Development

Indicates a capability that is not technically feasible at present, or for which no standard yet exists.

Bold type Company names in bold type have indicated a change in status since the last report.

Updates: Please contact the editor by email at crowed@cnp-wireless.com, by phone at +1-403-289-6609 or by fax at +1-403-289-6658.

TIA TR-45.3 TDMA Digital Air Interface Standards

Cellular Networking Perspectives

Editor: David Crowe • Phone +1-403-289-6609 • Fax +1-403-289-6658

Last published September, 1998

First Generation - IS-54

TIA Standard ANSI	Description	Status
IS-54-B	TIA/EIA-627 Original TDMA Dual-Mode Air Interface Standard	ANSI pub. 06/96
	TIA/EIA-627-1 Addendum to TIA/EIA-627	Published 04/98
IS-55	TIA/EIA-628 TDMA mobile station minimum performance standards	ANSI pub. 06/96
IS-56	TIA/EIA-629 TDMA base station minimum performance standards	ANSI pub. 06/96
IS-85	TIA/EIA-635 TDMA full-rate voice coder (3:1)	ANSI pub. 06/96
TSB-46	Verification of Authentication for IS-54-B Mobiles (replaced by IS-137-A)	Published 03/93
TSB-47	IS-54 Implementation Issues (replaced by TIA/EIA-627)	Published 05/94
TSB-50	User Interface for Authentication Key Entry	Published 03/93

Second Generation - IS-136 Revision 0 (Digital Control Channel)

TIA Standard	Description	Status
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-136.1-1	Addendum to IS-136.1 Rev. 0 (DCCH)	Published 12/94
IS-136.2 Rev. 0	FSK control channel, analog voice channel, TDMA traffic channel	Published 12/94
IS-136.2-1	Addendum to IS-136.2 Rev. 0 (Analog voice channel and FSK control 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

Third Generation - IS-136 Revision A (ACELP Voice Coder)

TIA Standard	Description	Status
IS-130-A	Radio Link Protocol 1 (data services)	Published 07/97
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 (DCCH)	Published 11/96
IS-136.1-A-2	IS-136 Rev. A, second addendum: section 1 corrections (DCCH)	Published 12/97
IS-136.2-A	FSK control channel, analog voice channel, TDMA traffic channel	Published 10/96
IS-136.2-A-2	IS-136 Rev. A, second addendum: section 2 corrections	Published 12/97
IS-137-A	Mobile minimum performance standards for IS-136-A	Published 07/96
IS-137-A-1	Revised transmission tests for IS-137-A	Published 08/97
IS-138-A	Base station minimum performance standards for IS-136-A	Published 07/96
IS-641-A	Enhanced full-rate voice coder (ACELP)	Published 05/96
IS-684	Radio Link Protocol 2 (for STU-III)	Published 07/96
IS-686	Enhanced full rate voice coder (ACELP) performance standards	Published 12/96
IS-727	Discontinuous transmission (DTX) with ACELP (IS-641) voice coder, including generation of comfort noise	Published 06/98
TSB-73	IS-136 Rev. 0/Rev. A compatibility issues	Published 07/96
TSB-77	IS-641 implementation issues	Published 12/96

Fourth Generation - TIA/EIA-136 Revision 0

TIA Standard	Description	Status
TIA/EIA-136-000	Introduction and list of document parts	In press
TIA/EIA-136-010	Optional mobile station facilities	In press
TIA/EIA-136-020	SOC, BSMC and carrier specific HLPI assignments	In press
TIA/EIA-136-100	Introduction to channels	In press
TIA/EIA-136-110	RF channel assignments	In press
TIA/EIA-136-121	Digital control channel (DCCH) layer 1	In press
TIA/EIA-136-122	DCCH layer 2	In press
TIA/EIA-136-123	DCCH layer 3	In press
TIA/EIA-136-131	Digital traffic channel (DTC) layer 1	In press
TIA/EIA-136-132	DTC layer 2	In press
TIA/EIA-136-133	DTC layer 3	In press
TIA/EIA-136-140	Analog control channel	In press
TIA/EIA-136-150	Analog voice channel	In press
TIA/EIA-136-210	ACELP voice coder minimum performance requirements	In press
TIA/EIA-136-220	VSELP voice coder minimum performance requirements	In press
TIA/EIA-136-270	Mobile station minimum performance requirements	In press
TIA/EIA-136-280	Base station minimum performance requirements	In press
TIA/EIA-136-420	VSELP voice coder	In press
TIA/EIA-136-510	Authentication and encryption of signaling information, user data and voice	In press
TIA/EIA-136-511	List of messages subject to encryption	In press
TIA/EIA-136-700	Introduction to teleservices	In press
TIA/EIA-136-710	Short message service (text/numeric messaging teleservice)	In press
TIA/EIA-136-720	Over-the-Air Activation teleservice (OATS)	In press
TIA/EIA-136-730	Over-the-Air Programming teleservice to support intelligent roaming (OPTS)	In press
TIA/EIA-136-910	Informative information	In press

Fifth Generation - TIA/EIA-136 Revision A

TIA Standard	Description	Status
SP-4027-000-A	Introduction, list of document parts, and revision marker	ANSI ballot
SP-4027-005	Introduction, identification and semipermanent memory	ANSI ballot
SP-4027-010-A	Optional mobile station facilities	ANSI ballot
SP-4027-020-A	SOC, BSMC and other code assignments	ANSI ballot
SP-4027-100-A	Introduction to channels	ANSI ballot
SP-4027-121-A	Digital control channel (DCCH) layer 1	ANSI ballot
SP-4027-122-A	DCCH layer 2	ANSI ballot
SP-4027-123-A	DCCH layer 3	ANSI ballot
SP-4027-131-A	Digital traffic channel (DTC) layer 1	ANSI ballot
SP-4027-133-A	DTC layer 3	ANSI ballot
SP-4027-140-A	Analog control channel	ANSI ballot
SP-4027-150-A	Analog voice channel	ANSI ballot
SP-4027-270-A	Mobile station minimum performance requirements	ANSI ballot
SP-4027-280-A	Base station minimum performance requirements	ANSI ballot
SP-4027-310	Radio link protocol 1 (for data services)	ANSI ballot
SP-4027-320	Radio link protocol layer 2 (STU-III)	ANSI ballot
SP-4027-350	Data services control	ANSI ballot
SP-4027-410	ACELP voice coder	ANSI ballot
SP-4027-430	US1 voice coder (GSM compatible)	ANSI ballot
SP-4027-510-A	Authentication and encryption of signaling information, user data and voice	ANSI ballot
SP-4027-511-A	List of messages subject to encryption	ANSI ballot
SP-4027-620	Teleservice allowing segmentation and reassembly (TSAR)	ANSI ballot

TIA Standard	Description	Status
SP-4027-630	Broadcast short message teleservice transport (BATS)	ANSI ballot
SP-4027-700-A	Introduction to teleservices	ANSI ballot
SP-4027-710-A	Short message service (text/numeric messaging teleservice)	ANSI ballot
SP-4027-720-A	Over-the-Air Activation teleservice (OATS)	ANSI ballot
SP-4027-730-A	Over-the-Air Programming teleservice to support intelligent roaming (OPTS)	ANSI ballot
SP-4027-750	General UDP transport service (GUTS)	ANSI ballot
SP-4027-910-A	Informative information	ANSI ballot

Sixth Generation - TIA/EIA-136 Revision B

TIA Standard	Description	Status
SP-4027-000-B	Introduction, list of document parts, and revision marker	Development
SP-4027-005-A	Introduction, identification and semipermanent memory	Development
SP-4027-010-B	Optional mobile station facilities	Development
SP-4027-122-B	DCCH layer 2	Development
SP-4027-123-B	DCCH layer 3	Development
SP-4027-131-B	Digital traffic channel (DTC) layer 1	Development
SP-4027-132-B	DTC layer 2	Development
SP-4027-133-B	DTC layer 3	Development
SP-4027-230	Minimum performance requirements for US1 voice coder (GSM)	Development
SP-4027-270-B	Mobile station minimum performance requirements	Development
SP-4027-280-B	Base station minimum performance requirements	Development
SP-4027-330	Packet data service - overview	Development
SP-4027-331	Packet data service - physical layer	Development
SP-4027-332	Packet data service - medium access control (MAC)	Development
SP-4027-333	Packet data service - logical link control	Development
SP-4027-334	Packet data service - subnetwork dependent convergence protocol	Development
SP-4027-335	Packet data service - radio resource management	Development
SP-4027-336	Packet data service - mobility management	Development
SP-4027-337	Packet data service - tunneling of signaling messages	Development
SP-4027-510-B	Authentication, and encryption of signaling information, user data and voice	Development
SP-4027-700-B	Introduction to teleservices	Development
SP-4027-730-A	Over-the-Air Programming Teleservice	Development
SP-4027-760	Charge-rate indication teleservice (CIT)	Development
SP-4027-932	Packet data services - Stage 2 descriptions	Development
SP-4027-933	Packet data services - Description of MAC layer	Development

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

Thanks to Peter Nurse (Chairman of TR-45.3) and Al Sacuta (Next Generation) for their assistance compiling the information in this table.