



Cellular Networking Perspectives

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Our Swan Song

David Crowe
Editor and Publisher

I have made the difficult decision to suspend publication of both *Cellular Networking Perspectives* and *Wireless Security Perspectives* with our December 2004 issue, after more than a decade of publication of the former and five years of the latter.

Subscriptions to the newsletters have not recovered from the telecom crash of a few years ago, and other commitments, such as my consulting engagement with Qualcomm, IRM and SID management responsibilities in IFAST and my chairmanship of TIA sub-committee TR-45.2, have made it more difficult to produce the newsletters.

The publication of a monthly newsletter has been a wonderful experience for me, and for those who have worked with me. I am very proud of what I have produced along with Les Owens, editor of *Wireless Security Perspectives* and with Doug Scofield's desktop publishing talents, Tim Kridel's writing and article sourcing expertise, and the invoicing and accounting assistance of Debbie Brandelli and Evelyn Goreham. Earlier in the production of the newsletters, Jordene Fletcher and Muneerah Vasanthi also provided valuable assistance.

Back in 1992 when I first started *Cellular Networking Perspectives* I did not consider myself a writer, and still do not know where I found the confidence to offer my amateur writings publicly. I have concluded that one of the secrets of writing is practice (another is to always critically review your own writing at least twice), and with over two hundred newsletter issues under my belt, I certainly have had a lot of that! Only a couple of years after starting my newsletters, I found myself writing for an industry magazine (*Cellular Marketing*). Then *Cellular Business* actually wanted to pay me to write columns. All of this came as a great shock. Like riding a bicycle for the first time, suddenly you realize that it's really happening, although you do not quite understand how and are scared to think about it in case the magic comes undone.

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I hope I do not sound too much like a defeated politician, but now it is time for me to move on to other challenges. Memories will not fade – the favorite issues, the struggle to fill in for promised articles that never materialized, and the joy of publishing something professional that only a short time before was a messy draft. In fact, with age, the memories may even improve!

Most of all I would like to thank you, our loyal readers, who inspired and encouraged me for so many years. I count many of you among my friends and colleagues, and appreciate the praise and encouragement that you gave us over the years (yes, and your occasional criticisms as well). Feel free to continue to contact me at David.Crowe@cnp-wireless.com.

As a parting offer, and to help to clear out our closets, we would like to offer you our remaining company golf shirts at \$20 (\$25 for shipment outside North America) each, including shipping. Please contact us at cnpsales@cnp-wireless.com to make a purchase before it is too late!

Refunds to our subscribers will be processed in January, 2005.

Cell Broadcast and Emergency Alert Service: A Marriage Made in Heaven?

The Emergency Alert Service is a US program for disseminating messages about weather, war, terrorism, toxic discharges and child abductions to the population, currently through radio and television stations.

This service has significant limitations, and the FCC is currently investigating improvements. The service is unable to warn people who are out of the reach of participating radio and television stations and those not currently listening to radio or watching television. The system has paltry funding, relies upon an unreliable network and stations participate voluntarily (except for presidential alerts, a capability which has never been used).

For all its limitations, the service is still extremely useful, mostly for severe weather warnings, such as tornado or hurricane alerts. Another source of this information is the **National Weather Service radio network**, which includes all types of alerts, not just those that are weather related. Thus, these two systems are complementary.

Emergency alert messages are generally one to two minutes of audio, which may be shown as a text ‘crawl’ on television stations (rather than blanking the screen). Alerts are supposed to provide critical information, including the affected area and time,

the official basis for the report, the level of uncertainty, and where people can turn for more information.

One of the criticisms of the program is that alerts are sometimes given for situations that are not critical, such as thunderstorm warnings, and they may be received by people well outside the emergency zone. This introduces a ‘yawn’ factor, where people stop paying attention to the alerts.

As Jennifer and Melissa Brookstone eloquently stated in a submission to the FCC “Last night I’m watching a good show on Comcast cable, when suddenly the screen goes black and a EBS message starts beeping, something about a missing child alert somewhere in Colorado! What am I supposed to do about it?! I’m sitting in my bedroom at 1:30 am *trying* to enjoy a show before going to sleep! Should I run from my home with a flashlight and some hound dogs and start searching the neighborhood for said missing child? I don’t even recall them saying where the child went missing!”

Where Cellular Fits In

Some people have eyed the text messaging capability of cell phones, particularly cell broadcast, as another way to distribute emergency alerts. These include Douglas Weiser, inventor of **US patent 6,112,075** and the Cellular Emergency Alert Systems Association (**CEASA-INT**), to which Weiser is an advisor.

This enthusiasm seems laudable ...until you think about implementation of the idea. Then a number of problems arise.

The use of normal text messaging (Short Message Service) can be quickly dismissed. SMS is a roaming service, not a geographical service, and messages must normally be submitted to the home system. This would make it difficult to avoid sending messages to people subscribed to a system in the emergency area, but currently roaming elsewhere. Roamers in the emergency area that have a home system far away, possibly in another country, would also be difficult to detect and reach with a warning. SMS also requires an individual message for each mobile, and the sudden burst of messages could exacerbate the radio interface congestion that often occurs at the time of an emergency.

Cell broadcast seems like an ideal alternative to point-to-point SMS. This service was designed to send information (e.g. news or sports) to mobiles more efficiently. Using this service, a single message can be sent to (almost) all mobiles in a cell.

This was recently demonstrated by Airadigm (‘Einstein PCS’) in September 2004 on a GSM system. Limited information on the trial is available from **CEASA-INT**.

It does appear that cell broadcast is an efficient means of transmitting emergency alerts because an *emergency alert* can be sent in *one message* to *all mobiles* in cells in the *geographic area of the emergency* and *not to mobiles outside this area*. But, appearances can be deceiving!

...emergency alert? Cell broadcast messages are restricted in size. At a normal speaking rate of 200 words per minute and about 6 characters per word (including one space), a two minute emergency alert would require about 2,400 characters.

CDMA cell broadcast messages can only be up to 256 in length, only about one-tenth of the required length. GSM allows maximum-sized messages of 1,395 characters, which is long enough for messages up to about one minute, but at the maximum size they are spread out over more than 30 seconds.

...one message? Cell broadcasts are not actually transmitted as single messages. Because there is no acknowledgement, it is impossible to determine which mobiles received the message. Consequently, messages must be repeated at intervals in order to maximize the chance of all mobiles receiving the message. Mobiles can recognize duplicates and will ignore messages they have already received.

...all mobiles? Cell broadcast sends one message that is picked up by all idle mobiles in a cell. However, it is not heard by mobiles that are currently transmitting voice or data, nor by mobiles that are turned off.

Furthermore, cell broadcast is only supported by some technologies. Analog systems (AMPS and N-AMPS) do not support cell broadcast and TDMA only defined it late in its lifespan (1999) in TIA-136-630 BATS. Consequently, it appears that it has never been implemented. 3GPP has withdrawn a UMTS (Wideband-CDMA) version of the cell broadcast feature, indicating that the service only applies to GSM.

Relatively few CDMA phone models support CDMA cell broadcast, except in Korea which has a government mandate to include this capability in all phones. However, there has been little spillover, with few models designed by Korean manufacturers for export supporting cell broadcast. David Whipple, an employee of the test equipment manufacturer Agilent, noted that the capability had proven difficult to test due to the small number of phone models that supported it.

GSM phones have the best support for cell broadcast, with most models supporting the technology, and even providing a user interface to determine which information streams to monitor. However, these implementations illustrate some additional problems because the service was designed for general interest information distribution and not for emergency use.

Cell broadcast requires mobiles to monitor and decode control channels more frequently. This impacts battery life enough that some phones allow the capability to be turned off completely. Some manufacturers warn of the reduced battery life, implicitly encouraging users to turn the service off.

Additionally, the phone determines which broadcast streams to display or ignore based on numeric identifiers. There are no standardized values for emergency alert service, meaning that phones might display emergency alerts at home identified with one number, but not while roaming because they are identified by another number.

The default display of a cell broadcast information stream is most likely 'no display', otherwise any new streams added by carriers (with identifiers not known to the phone) would be automatically displayed. Consequently, existing phones would probably not display emergency alerts until its stream was added to the list to monitor. It is certainly possible to ensure that the emergency broadcast stream is activated in the future, but little can be done for existing mobiles. Furthermore, there is no point doing this until a universally standardized number for the emergency stream is decided upon.

It is not clear that cell broadcast is actually implemented by carriers for commercial information services in GSM, even though most phones support it, probably because there is no way to charge for it. It is impossible for the carrier to determine which mobiles are monitoring each of the information channels. Consequently, carriers prefer to rely on point-to-point short messaging, which allows billing as well as allowing delivery while mobiles are roaming. Point-to-point SMS also encourages more customization (as there is no reduction in air interface utilization by sending the same message to multiple mobiles) which is better for consumers.

not to mobiles outside this area? It is not only important to deliver alerts to all mobiles within an area, but also to deliver them as little as possible to mobiles outside the geographic area.

The National Weather Service divides the United States into **SAME** areas. These are counties, portions of counties, or special areas such as the region around a nuclear power plant. Unfortunately, the **SAME** areas do not map onto cell coverage areas.

To deliver emergency alerts, it would be necessary to map the list of **SAME** areas for the message onto a list of cells that should receive it. This would still result in a considerable number of mobiles outside the emergency area receiving the alerts, because of transmission to cells that cover only a small portion of an affected **SAME** area.

The coverage area of cells is proprietary information, and consequently unlikely to be shared with the emergency alert providers. Consequently, carriers will have to provide a gateway within their network to map SAME areas onto radio coverage areas. The database used by this network element must be continually updated with changing coverage areas, and the addition of new cells. Even with this, it will never be completely accurate, and some alerts will fail to be broadcast in cells within the zone of emergencies.

This new network element would only be used for distributing emergency alerts. There would be no commercial use for it. Consequently, it would be difficult for carriers to recover their investment and operational costs.

Another problem is that alerts may be delivered to a phone at one time, but viewed at a later time. Imagine, for example, a phone left on the kitchen table while a family runs for shelter from a tornado. The family should not emerge to find their phone reporting the alert, as it may be mistaken for a second tornado and send them into an unnecessary panic. Consequently, the deletion of emergency alerts must be under the control of the network, not the user of the phone. Such sophisticated software does not exist in current phones that provide a cell broadcast capability designed for low volume, low reliability consumer applications.

What is Needed?

If it was decided that cellular phones were the best means for disseminating emergency broadcasts, a completely new service would have to be defined. Some of its characteristics would have to include:

- ‘Always On’. Even when a phone is powered off, it should still be monitoring the emergency broadcast channel.
- The display of emergency alerts and associated audible alerting must be outside the control of users (i.e. it should not be possible to prevent their display or turn off the audible alert).
- Emergency alerts must be immediately displayed on phones, not just added to the end of the list of incoming short messages.
- Messages may need to be rewritten for use on wireless devices to ensure that they will fit within the smallest size available while still including the critical information.
- Incorporation of cell broadcast must be made mandatory by manufacturers of phones.
- The method used in the United States should be coordinated internationally so that other countries can implement this service and provide it to roamers.

The very need to make significant changes to the cell broadcast service to make it suitable for emergency alerts undermines one of its most desirable characteristics emphasized by proponents – the fact that it exists today.

Disclosure. David Crowe prepared a report on the Emergency Alert Service for the Rural Cellular Association that was submitted as part of their October 29th 2004 FCC filing. Contact David for a copy of his full report which contains more detail.

3GPP TSG Radio Access Network (RAN) Update

3GPP TSG Radio Access Network (TSG RAN) defines the functions, requirements and interfaces of the UTRA network in both modes, FDD and TDD. This includes radio performance, physical layer, layer 2 and layer 3 RR specification in UTRAN, specification of the access network interfaces (Iu, Iub and Iur), definition of the OA&M requirements in UTRAN and conformance testing for Base Stations.

Two TSG RAN meetings (#24 and #25) were held since the last publication of this update. Highlights of RAN #24 include:

- The analysis on OFDM for UTRAN evolution was finished and the Study Item closed. The objectives of the study were fulfilled, and further work is postponed until other, more important, Rel 6 work items are completed.
- Rel 5 ASN.1 in TS 23.331 is frozen (i.e. no more changes will be accepted, except bug fixes).
- RAN4 had agreed on a requirement for UE Power Back-off when the High Speed-Dedicated Physical Control Channel (HS-DPCCH) is being transmitted. The Rel 5 CR was approved, but many companies objected to this requirement for Rel 6.
- The work item on “Network Assisted Cell Change” (NACC) is complete. All CRs against existing specifications and the new TR 25.901 were approved.
- The work item on “Trace Support in UTRAN” is complete. All CRs against existing specifications TS 25.413, TS 25.420 and TS 25.423 were approved.
- The work item on “Iu Enhancements for IMS support in RAN” was closed. Progress in the future is unlikely, given the recent lack of interest.
- The work item on “UE Positioning Enhancements – other methods” was closed for being too general. Interested companies want to see a precise work item with dedicated objectives.
- The study item on “Wideband Distribution Systems” was closed due to lack of interest.

Highlights of TSG RAN #25 include:

- The Network Sharing Work Item is mandatory for Rel 6. Therefore, RAN2 will be expected to complete it within the Rel 6 timeline.
- If the proposal to close TSG T is accepted by the PCG, TSG T1 will be moved to TSG RAN, and TSG T2 to CN, which will be renamed as *Core Network and Terminal*. TSG T3 will be moved to TSG SA.
- The number Rel 99 and Rel 4 CRs remains low.
- Release 5 is stabilizing for RAN1, RAN3 and RAN4. RAN2 still has more work to do.
- A workshop on the Long Term Evolution of UMT Radio was scheduled for November 2 – 3th 2004 in Toronto, Canada.

TSG RAN WG1 (Radio Layer 1)

3GPP TSG RAN Working Group 1 (RAN 1) specifies the physical layer of the radio interface for UE and UTRAN, including the physical channel structure, the mapping of transport channels to physical channels, spreading, modulation, physical layer multiplexing, channel coding, error detection, physical layer procedures and the measurements provided to upper layers. Much of its work is done by email discussions, but occasional special meetings are held as well.

Highlights of recent RAN1 meetings include:

- The WI on the FDD Enhanced Uplink is planned to complete in December 2004. The latest draft version of TR is 25.808 v0.1.0.
- It was agreed that:
 - » Both 10 ms and 2 ms TTI (Transmission Timing Interval) will be supported, with 10 ms being mandatory.

- » The Code Composite Transport Channel (CCTrCH) of Dedicated Channel (DCH) type and CCTrCH of Enhanced DCH type will be mapped to different physical channels.
- » The first Hybrid Automatic Repeat Request (HARQ) transmission shall be self decodable.
- The WI on Uplink Enhancements for UTRA TDD is expected to be complete in December 2004. The list of open issues on this Work Item are:
 - » Compatibility of some of the enhancements with existing systems.
 - » Interaction of some of the enhancement techniques.
 - » Complexity analysis of some of the enhancements.
 - » Impacts on higher layers.
 - » Completion of the feasibility study and recommendations for work items.
- For the MIMO (Multiple Input Multiple Out) WI, RAN1 has agreed on the system level evaluation methodology and documented them in TR 25.876.
- TR 25.899 has been updated to incorporate decisions on coverage gains and complexity of Pre/Post ACK/NACK.
- For the Multimedia Broadcast/Multicast Service (MBMS) WI, the approach for describing the MBMS Notification Indication Channel (MICH) was agreed, but no agreements were reached on:
 - » Whether soft combining should be mandatory or optional.
 - » User Equipment memory requirements and the set of combinations of bit rate, number of radio links, and Transmission Timing Interval (TTI) length that must be supported.

Table 1: 3GPP TSG RAN Working Group 1 (Radio Layer 1) Specification Update

Document	Title	Status
tbd	HS-DPCCH ACK/NACK Enhancement	New Rel 6 work item, to be completed by June 2005.
tbd	Optimization of Downlink Channelization Code Utilization	WI description updated.
TS 25.211	Physical Channels and Mapping of Transport Channels onto Physical Channels (TDD)	Rel 5 and Rel 6 being revised.
TS 25.222	Multiplexing and Channel Coding (TDD)	Rel 4, Rel 5 and Rel 6 being revised.
TS 25.224	Physical layer procedures (TDD)	
TS 25.331	Radio Resource Control (RRC) Protocol Specification	
TR 25.892	Feasibility Study for OFDM for UTRAN Enhancement	Rel 6 available.
TR 25.895	Analysis of Higher Chip Rates for UTRA TDD Evolution	
TR 25.899	High Speed Download Packet Access (HSDPA) Enhancements	Rel 6 being revised.

TSG RAN Working Group 2 (Radio Layer 2 and Radio Layer 3 RR)

3GPP TSG RAN Working Group 2 (RAN2) defines the Radio Interface architecture and protocols (MAC, RLC, PDCP), the Radio Resource Control protocol, strategies of Radio Resource Management and the services provided by the physical layer to the upper layers.

Recent activities of RAN2 include:

- There are now very few Rel 99 and Rel 4 CRs coming in, although a number of Rel 5 and Rel 6 CRs are having impacts that ripple back to these earlier releases.
- There were several corrections to Rel 5 High Speed Data Packet Access (HSDPA).
- Future meetings will focus on Pre-Rel 6 corrections, MBMS, High Speed Uplink Packet Access (e.g. Enhanced Uplink) IMS support and other Rel 6 work items.
- Stage 3 work has started on Multimedia Broadcast/Multicast Service (MBMS), with Stage 2 finalized in October 2004 based on the SA2 architecture input.
- The Radio Access Bearer Support Enhancement WI will incorporate the following principles:
 - » No Unequal Error Protection in Rel 6.
 - » No specific release 6 optimization for RTCP (which is assumed not to be presented in the VoIP Stream).
- The FDD Enhanced Uplink WI, a joint effort between RAN1 and RAN2, made the following decisions:
 - » MAC-d (Medium Access Control-dedicated) multiplexing is supported.
 - » The Enhanced-dedicated channel multiplexing architecture shall support the usage of multiple MAC-d flows for one UE.
 - » Quality of Service Characteristics can be associated with a MAC-d Flow.
- The WI on *Enhancements of Support for Network Sharing in the UTRAN* is expected to be completed by December 2004, within the Rel 6 time frame.

Table 2: 3GPP TSG RAN Working Group 2 (Radio Layers 2 and 3 RR) Specification Update

Document	Title	Status
tdb	Inclusion of Uplink TDOA UE positioning method in the UTRAN specifications	New work item for completion by June 2005.
TS 25.301	Radio Interface Protocol Architecture	Rel 5 being revised.
TS 25.303	Interlayer Procedures in Connected Mode	Rel 6 being revised.
TS 25.304	UE Procedures in Idle Mode and Procedures for Cell Reselection in Connected Mode	Rel 5 and Rel 6 being revised.
TS 25.305	Stage 2 Functional Specification of User Equipment (UE) Positioning in UTRAN	
TS 25.306	UE Radio Access Capabilities	
TS 25.307	Requirements on UEs Supporting a Release Independent Frequency Band	Rel 99, Rel 4 and Rel 5 being revised.
TS 25.309	FDD Enhanced Uplink; Overall Description; Stage 2	Rel 6 available.
TS 25.321	MAC Protocol Specification	Rel 99, Rel 4, Rel 5 and Rel 6 being revised.
TS 25.322	Radio Link Control (RLC) Protocol Specification	Rel 99 and Rel 4 being revised.
TS 25.324	Broadcast/Multicast Control (BMC)	Rel 99, Rel 4, Rel 5 and Rel 6 being revised.
TS 25.331	RRC Protocol Specification	
TS 25.346	Introduction of Multimedia Broadcast Multicast Service (MBMS) in the Radio Access Network (RAN); Stage 2	Rel 6 being revised.

TSG RAN WG3 (UTRAN Architecture)

3GPP TSG RAN Working Group 3 (RAN3) defines the overall UTRAN architecture and the protocols for the Iu, Iur and Iub interfaces, including the use of IP for the UTRAN transport layer.

RAN3 has made progress on the *Remote Control of Electrical Tilting Antennas* WI. TR 25.802 has been

published. One CR was accepted for TS 25.401 concerning the UTRAN architecture impact.

For Release 99, RAN3 has not yet agreed which of two interpretations of the encoding of System Information (SI) over Node B Application Part (NBAP) is correct:

- Option 1: Radio Resource Control (RRC) encoded in Radio Network Controller (RNC) as a bit string of variable or fixed size.
- Option 2: RRC encoding partially in Node B.

RAN3 is studying a Rel 99 issue on the limitation on the Radio Link Addition Procedure for Intra-Node B Inter-Frequency Hard Handover in UTRAN.

For Rel 5, RAN3 reported the following:

- Several CRs were accepted for the Radio Access Network Application Part (RANAP) specification:
 - » Data Volume reporting alignment with SA5.
 - » Correction of the security mode command procedure.
 - » Correction of the service handover specification.
- Two CRs were accepted for HSDPA:
 - » Rewording of the intra Node B serving High Speed – Downlink Shared Channel (HS-DSCH) Radio Link Change in the Prepared Radio Link Reconfiguration Procedure.
 - » Correction of HSDPA Information Element.

- No progress was made on the *Uplink Enhancements for UTRA TDD* Study Item, due to a lack of contributions.
- The study item on the *Evolution of UTRAN Architecture* in RAN3 is on hold until MBMS is finished.
- Three CRs were accepted ‘in principle’ for the Support of the Network Sharing in UTRAN WI. A final decision depends on System and Architecture decisions to be made in TSG SA.
- RAN3 is preparing its portion of the work on the *FDD Enhanced Uplink* WI that is being worked by all RAN WGs. For RAN3, a draft version of a new internal report (R3.015) entitled *FDD Enhanced Uplink: UTRAN Iub/Iur protocol aspects* has been accepted. Discussions are centering on three topics:
 - » Handling of traffic with Guaranteed Bit Rate requirements.
 - » Congestion control.
 - » Iub/Iur frame protocol aspects.
- Discussions on Multimedia Broadcast and Multicast Service (MBMS) resulted in a CR proposal for **TS 25.346** which is controlled by RAN2.

Table 3: 3GPP TSG RAN Working Group 3 (UTRAN Architecture) Specification Update

Document	Title	Status
TR 25.802	Remote Control of Electrical Tilting Antennas	Rel 6 available.
TR 25.901	Network Assisted Cell Change (NACC) from UTRAN to GERAN; Network Side Aspects	Rel 6 being revised.
TS 25.410	UTRAN Iu Interface: General Aspects and Principles	Rel 6 being revised.
TS 25.411	UTRAN Iu Interface Layer 1	Rel 5 and Rel 6 being revised.
TS 25.413	UTRAN Iu Interface RANAP Signalling	
TS 25.414	UTRAN Iu Interface Data Transport and Transport Signalling	
TS 25.415	UTRAN Iu Interface User Plane Protocols	
TS 25.420	UTRAN Iur interface General Aspects and Principles	Rel 6 being revised.
TS 25.423	UTRAN Iur Interface RNSAP Signalling	Rel 5 and Rel 6 being revised.
TS 25.430	UTRAN Iub Interface: General Aspects and Principles	Rel 6 being revised.
TS 25.453	UTRAN Iupe Interface Positioning Calculation Application Part (PCAP) Signalling	
TS 25.460	UTRAN Iuant Interface: General Aspects and Principle	Rel 6 available.
TS 25.461	UTRAN Iuant Interface: Layer 1	
TS 25.462	UTRAN Iuant Interface: Signalling Transport	
TS 25.463	UTRAN Iuant Interface: Remote Electrical Tilting (RET) Antennas Application Part (RETAP) Signalling	
TS 29.108	Application of the Radio Access Network Application Part (RANAP) on the E-interface	Rel 5 and Rel 6 being revised.

TSG RAN WG4 (Radio Performance and Protocol)

3GPP TSG RAN Working Group 4 (RAN4) specifies the RF aspects of UTRAN. This includes simulations of diverse RF system scenarios, derivation of the minimum requirements for transmission and reception parameters, and for channel demodulation. From these requirements the group defines test procedures to verify them. Requirements for other radio elements, such as repeaters, are also specified in RAN4.

At TSG RAN meeting #24, RAN4 was asked to produce requirements for the particular combination of channels and parameters that MBMS uses, even though the existing MBMS Work Item description and schedule does not take this into account.

Highlights from TSG RAN meeting #25 are:

- The WI on *FDD Enhanced Uplink: RF Radio Transmission/Reception, Systems Performance Requirements and Conformance Testing* is in the early stages, and is planned to complete in June 2005.
- Development of the WI on *Multiple Input Multiple Output Antenna – RF Radio Transmission/Reception, System Performance Requirements and Conformance Testing* has only just begun, but it is planned to complete in March 2005.
- The *A-GPS Minimum Performance Specification* WI has been completed and documented in **TS 25.171**.
- The Work Items on *Improved Receiver Performance Requirements for HSDPA* and *Performance Requirements of Receive Diversity for HSDPA* are complete.

Table 4: 3GPP TSG RAN WG 4 (Radio Performance and Protocol) Specification Update

Document	Title	Status
tbd	Improved Minimum Performance Requirements for HSDPA UE Categories 7 and 8	New Work Items under consideration.
tbd	MBMS Performance Requirements	
tbd	UMTS 2600	New Work Item agreed to in principle, but RAN4 is to review the actual decision in the European Radiocommunications Office's Electronic Communication Committee (ERO ECC) before proceeding.
TS 25.104	UTRA (BS) FDD; Radio Transmission and Reception	Rel 5 and Rel 6 being revised.
TS 25.105	Base Station (BS) Radio Transmission and Reception (TDD)	Rel 4, Rel 5 and Rel 6 being revised.
TS 25.106	UTRA Repeater Radio Transmission and Reception	
TS 25.123	Requirements for Support of Radio Resource Management (TDD)	Rel 5 and Rel 6 being revised.
TS 25.141	Base Station Conformance Testing (FDD)	Rel 4, Rel 5 and Rel 6 being revised.
TS 25.142	Base Station (BS) Conformance Testing (TDD)	
TS 25.143	UTRA Repeater Conformance Testing	
TS 25.171	Requirements for support of A-GPS (FDD)	Rel 6 available.

Meeting Schedule

TSG RAN held its most recent meeting from September 8th – 10th 2004 in Palm Springs, USA. Future meetings are scheduled for:

- December 8th – 10th 2004 in Athens, Greece.
- March 9th – 11th 2005 in Tokyo, Japan.
- June 1st – 3rd 2005 in Quebec, Canada.
- September 7th – 9th 2005 in Tallin, Estonia.
- November 30th – December 2th 2005 in Europe.

RAN1 meetings. November 15th – 19th 2004 in Shin Yokohama, Japan; February 14th – 18th 2005 in Scottsdale, Arizona; April 4th – 8th 2005 in China; May 9th – 13th 2005 in Europe; August 29th –

September 2th 2005 in Europe; and November 7th – 11th 2005 in Korea.

RAN2 meetings. November 15th – 19th 2004 in Shin Yokohama, Japan; January 10th – 14th 2005 in Sophia Antipolis, France; February 14th – 18th 2005 in Scottsdale, Arizona; April 4th – 8th 2005 in China; May 9th – 13th 2005 in Europe; August 29th – September 2nd 2005 in Europe; and November 7th – 11th 2005 in Korea.

RAN3 and RAN4 meetings. November 15th – 19th 2004 in Shin Yokohama, Japan; February 14th – 18th 2005 in Scottsdale, Arizona; May 9th – 13th 2005 in Europe; August 29th – September 2th 2005 in Europe; November 7th – 11th 2005 in Korea.

3GPP2 TSG-C/ TIA TR-45.5 cdma2000 Standards

Cellular Networking Perspectives

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- Note:
1. IS- Interim Standard, TSB- Telecommunications Systems Bulletin, PN- Project Number, SP- ANSI Standards Proposal.
 2. TSG-C standards are identified as C.[PRIS]ddd-[0|A..Z] vX.Y where P=Project, R=Report, S=Specification, ddd=Document number, 0,A,Z is the revision number (0 sometimes omitted), X is the publication number (0 for pre-publication) and Y the internal editing revision (which we omit).
 3. Published TIA standards can be obtained from Global Engineering Documents at 1-800-854-7179.
 4. **Bold Type** indicates a modification since the previous publication of this information.
- Thanks to Lisa Collichio (Qualcomm) for her assistance compiling the information in this table.

TSG-C Specification Cross-Reference

Specification	Description	Status
C.R1000-0	Requirements Mapping for CDMA2000	See TSB2000
C.R1001-0	Parameter value assignments	See TSB58-B
C.R1001-A	Parameter value assignments	See TSB58-C
C.R1001-B	Parameter value assignments	See TSB58-D
C.R1001-C	Parameter value assignments	See TSB58-E
C.R1001-D	Parameter value assignments	See TSB58-F
C.S0001-0	cdma2000 Air Interface: Introduction	See IS-2000.1
C.S0002-0	cdma2000 Air Interface: Physical Layer	See IS-2000.2
C.S0003-0	cdma2000 Air Interface: Medium Access Control (MAC)	See IS-2000.3
C.S0004-0	cdma2000 Air Interface: Signaling Link Access Control (LAC)	See IS-2000.4
C.S0005-0	cdma2000 Air Interface: Upper Layer (Layer 3) Signaling	See IS-2000.5
C.S0006-0	cdma2000 Air Interface: Analog	See IS-2000.6
C.S000X-1	cdma2000 Revision A (X=1-6)	See IS-2000.X-A
C.S0007-0	Direct Spread Spectrum on ANSI-41 (DS-41)	See IS-834
C.S0008-0	Multi-carrier Specification for cdma2000 Air Interface using GSM MAP (MC-MAP)	See IS-833
C.S0009-0	Speech Service Option	See TIA/EIA-96-C
C.S000X-C	cdma2000 Release C. Supports DV F-PDCH, AKA, new PLCM, Fast call setup.	Published 08/04
C.S000X-D	cdma2000 Release D. Supports DV reverse packet channel, smaller forward link packets, QoS, BCMCS, MEID, fast call setup.	Published 03/04
C.S0010-0	Base Station Minimum Performance	See TIA/EIA-97-C
C.S0010-A	Base Station Minimum Performance	See TIA/EIA-97-D
C.S0010-B	Base Station Minimum Performance	See TIA/EIA-97-E
C.S0011-0	Mobile Station Minimum Performance	See TIA/EIA-98-C
C.S0011-A	Mobile Station Minimum Performance	See TIA/EIA-98-D
C.S0011-B	Mobile Station Minimum Performance	See TIA-98-E

C.S0012-0	Minimum Performance for Speech Service Option 1	See TIA/EIA-125-A
C.S0013-0	MS Loopback Test	See TIA/EIA-126-C
C.S0013-A	MS Loopback Service Option	See TIA/EIA-126-D
C.S0014-0	Enhanced Variable Rate Voice Coder (EVRC)	See IS-127
C.S0014-0-1	EVRC Addendum to Remove 'bit exact'	See IS-127-1
C.S0014-0-2	EVRC Addendum to Add TTY/TDD Symbol Support	See IS-127-2
C.S0014-0-3	EVRC Addendum 3	See IS-127-3
C.S0014-A	Enhanced Variable Rate Voice Coder (EVRC)	Published 05/04
C.S0015-0	Short Message Service (SMS)	See IS-637-A
C.S0015-A	Short Message Service (SMS)	See TIA-637-B
C.S0015-B	Short Message Service (SMS)	Published 06/04
C.S0016-0	Over the Air Service Provisioning (OTASP)	See IS-683-A
C.S0016-A	Over the Air Service Provisioning (OTASP)	See IS-683-B
C.S0016-B	Over the Air Service Provisioning (OTASP)	See IS-683-C
C.S0016-C	Over the Air Service Provisioning (OTASP)	Published 11/04
C.S0017-0	14.4 Kbps Data, without STU-III	See IS-707-A
C.S0017-0-1	Radio Link Protocol (RLP) Modifications and Additional Packet Data Support	See IS-707-A-1
C.S0017-0-2	64 Kbps Data with TTY/TDD Support	See IS-707-A-2
C.S0017-0-3	Addendum 3 for IS-707 (High Speed Packet Data Service Option 33)	See IS-707-3
C.S0017-A	Data Service Options for CDMA (Parts 1, 3, 4, 5, 7, 9, 10, 11 and 12 revised)	Published 07/04
C.S0018-0	Minimum Performance for EVRC	See IS-718
C.S0019-0	Bit Exact Specification for EVRC	See IS-719
C.S0020-0	High Rate (13 Kbps) Speech Coder	See IS-733
C.S0020-0-1	TTY/TDD Support for High Rate Speech Coder	See IS-733-1
C.S0020-0-2	TTY/TDD Support for High Rate Speech Coder	See IS-733-2
C.S0020-A	High Rate (13 Kbps) Speech Coder	Published 05/04
C.S0021-0	Minimum Performance for High Rate Speech coder	See IS-736-A
C.S0022-0	Location Services	See IS-801
C.S0022-0-1	Location Services Addendum	See IS-801-1
C.S0023-0	Removable User Identity Module (R-UIM)	See IS-820
C.S0023-0-1	Removable User Identity Module (R-UIM)	See IS-820-1
C.S0023-A	Removable User Identity Module (R-UIM)	See IS-820-A
C.S0023-B	Removable User Identity Module (R-UIM)	Published 04/04
C.S0024-0	High Rate Packet Data Air Interface	See IS-856
C.S0024-0-1	High Rate Packet Data Air Interface (Addendum 1)	See IS-856-1
C.S0024-0-2	High Rate Packet Data Air Interface (Addendum 2)	See IS-856-2
C.S0024-A	High Rate Packet Data (HRPD) Air Interface	See IS-856-A
C.S0025-0	Markov Service Option (MSO) for Determining Frame Error Rates	See IS-871
C.S0026-0	Test Data Service Option (TDSO)	See IS-870
C.S0026-0-1	Test Data Service Option (TDSO)	See IS-807-1

C.S0028-0	TTY/TDD Minimum Performance Specification	See IS-889
C.S0029-0	Test Application Specification for High Rate Packet Data Air Interface (HRPD)	See IS-890
C.S0029-0-1	Test Application Specification for High Rate Packet Data Air Interface	See IS-890-1
C.S0030-0	Selectable Mode Voice Coder	See IS-893
C.S0031-0	Signaling Conformance Tests	See IS-898
C.S0032-0	Minimum Performance Standards for cdma2000 HRPD	See TIA-864
C.S0033-0	Minimum Performance for cdma2000 HRPD Access Terminal	See TIA-866
C.S0034	Selectable Mode Voice Coder Minimum Performance	See IS-894
C.S0035-0	cdma2000 Card Application Toolkit	See TIA-915
C.S0036-0	Minimum Performance Standards for GPS Equipped cdma2000 Mobiles	See TIA-98-E
C.S0037-0	Signaling Conformance for cdma2000 Wireless IP Networks	See TIA-918
C.S0038	Signaling Conformance for HRPD Air Interface	Published 02/04
C.S0039-0	Enhanced Subscriber Privacy for cdma2000 High Rate Packet Data	Published 09/02
C.S0040	IP-based Over-the-Air Handset Configuration Management	Published 08/03
C.S0042-0	Circuit-Switched Video Conferencing Services	Published 08/02
C.S0043	Signaling Conformance for 1x Rev. A	Published 10/04
C.S0044	Interoperability Specification for 1x Rev. A, DO Rev. 0, SMS, OTA, Positioning and TIA-707	Published 10/04
C.S0045	MMS Media Format and Codecs for CDMA	Published 01/04
C.S0045 v2	MMS Media Format and Codecs for CDMA	Published 10/04
C.S0047	Link Layer Assisted Robust Header Compression Service Option for Voice	Published 04/03
C.S0048	ME (Mobile Equipment) Conformance Testing	Published 11/03
C.S0049	R-UIM Conformance to TIA-820-A-1, GSM 11.11, GSM 11.12, GSM 11.17 and GSM 11.18	Published 04/04
C.S0050	File Formats for Multimedia Services	Published 01/04
C.S0052	Algorithm Description Specification for CDMA Wideband Codec (VMR-WB), Service Option 62	Published 07/04
C.S0053	Minimum performance specification for CDMA wideband codec (VMR-WB) - Speech Option 62	Published 10/04
C.S0054	HRPD (High Rate Packet Data) BCMCS (Broadcast/Multicast)	Published 03/04
C.S0057	CDMA Band Classes	See TIA-1030
C.S0066	MEID support for OTASP	Published 09/04
C.S0066	Over-the-Air Service Provisioning for MEID-Equipped CDMA Mobiles	Published 09/04

First Wave - Cellular

Standard	Description	Status
IS-95	Dual-Mode Air Interface Standard (Authentication Appendix Nov. 1992)	Published 07/93
IS-96	CDMA Option 1: Voice Coder (Speech Service Option)	Published 04/94
IS-97	Base Station Minimum Performance Standards for IS-95-A	Published 12/94
IS-98	Mobile Station (MS) Minimum Performance Standards	Published 12/94
IS-126	Service Option 2: Loopback	Published 12/94 Rescinded 08/98

Second Wave - Cellular and PCS

Standard	Description	Status
J-STD-008	IS-95 Adapted for 1.8-2.0 Ghz Frequency Band	Published 07/96 Rescinded 11/99
J-STD-018	Mobile Minimum Performance Standards (for J-STD-008)	Published 07/96 Rescinded 02/01
J-STD-019	Base Station Minimum Performance Standards	Published 07/96 Rescinded 02/01
IS-95-A	IS-95 Revised (Authentication Appendix "A" Nov. 1994)	Published 05/95
IS-96-A	CDMA Voice Coder	Published 05/95
IS-97-A	Base Station Minimum Performance Standards for IS-95-A	Published 07/96
IS-98-A	Mobile Minimum Performance Standards for IS-95-A	Published 07/96
IS-98-A-1	Additional Tests for IS-95 Mobile Stations	Published 09/97
IS-99	Data Services (9.6 Kbps Fax and Circuit Switched Data)	Published 07/95 Rescinded 10/00
IS-125	Voice Coder Minimum Performance Standards	Published 05/95 Rescinded 10/00
IS-126-A	Mobile Station Loopback Service Option	Published 07/96 Rescinded 08/98
IS-637	Short Message Service (Rate Set 1)	Published 12/95
TSB-58	Parameter Value Assignments	Published 12/95

Third Wave - Integrated Cellular and PCS

Standard	Project	Description	Status
TIA/EIA-95-B	SP-3693	IS-95 for 800 MHz and 1800 MHz Frequencies (Including J-STD-008)	Published 03/99
TIA/EIA-96-C	SP-4138	CDMA Voice Coder (8 Kbps)	Published 08/98
TIA/EIA-97-B	SP-3814	Minimum Performance Standards for Base Stations	Published 08/98
TIA/EIA-97-C	SP-4384	Minimum Performance Standards for Base Stations (Merges TIA/EIA-97-B and J-STD-019)	Published 09/99
TIA/EIA-98-B	SP-3815	MS Minimum Performance Standards	Published 08/98
TIA/EIA-98-C	SP-4383	Merges TIA/EIA-98-B and J-STD-018	Published 11/99
TIA/EIA-125-A	SP-4682	Correction of Errors in Speech Service Option 1	Published 08/00
TIA/EIA-126-B	SP-4136	ANSI Version of IS-126 (MS Loopback Option)	Published 08/98
TIA/EIA-126-C	SP-4578	Mobile Station Loopback Test	Published 08/00
TIA/EIA-637-A	SP-4391	Short Message Service (Including Service Negotiation, 14.4 Kbps Transmission, PCS and TIA/EIA-95 Support)	Published 09/99
IS-96-B		CDMA Voice Coder (8 kbps)	Published 07/96
IS-127		Option 3: Enhanced Variable Rate Voice Coder (EVRC)	Published 01/97
IS-127-1	PN-4146	Addendum #1 to IS-127	Published 08/98
IS-127-2		Addendum #2 to IS-127: TTY/TDD Capabilities	Published 09/99
IS-127-3	PN-3292-AD3	Addendum #3 to IS-127	Published 09/01

IS-127-4	PN-3292-AD4	Addendum #4 to IS-127	Development
IS-657		Packet Data Services (Internet, CDPD)	Published 07/96 Rescinded 10/00
IS-658	PN-4374	Data Services Interworking Function Interface (e.g. modem pool). Transferred to TR-45.4 for Revision A.	Published 07/96
IS-683	PN-3569	Over the air activation (OTA) and Service Provisioning (Authentication Appendix A Published 03/96)	Published 02/97
IS-683-A	PN-3889	OTA update: Roaming System Selection and Programming Lock	Published 06/98
IS-707	PN-3676	14.4 Kbps Data Services (Including Asynchronous Data, Fax, STU-III and Packet Data)	Published 02/98
IS-718	PN-3648	Minimum Performance Standards for EVRC Voice Coder	Published 07/98
IS-733	PN-3972	Speech Service Option 17: High Rate Voice Coder (13 Kbps)	Published 03/98
IS-733-1		Addendum #1 to IS-733: TTY/TDD Capabilities	Published 09/99
IS-733-2	PN-3972-AD2	Addendum #2 to IS-733	Published 09/01
IS-736	PN-3973	Minimum Performance Specification for IS-733 (13 Kbps Voice Coder)	Published 11/98
IS-736-A	PN-4653	Corrections to Testing Procedures in IS-736	Published 08/00
TIA-127-A	PN-3292-UGR	Upgrade EVRC to ANSI	See C.S0014-A
TIA-127-A [SF1]	SP-3292-UGR V.SF1	Software Distribution for TIA-127-A	See C.S0014-A
TIA-733-A	PN-3972-UGR	Upgrade 13 Kbps CDMA Voice Coder to ANSI	See C.S0020-A
TIA-733-A [SF1]	SP-3972-UGR V.SF1	Software Distribution for TIA-733-A	See C.S0020-A
TSB-58-A	PN-4158	Parameter Value Assignments for TIA/EIA-95-B	Published 04/99
TSB-74		14.4 Kbps Radio Link Protocol and Inter-band Operations	Published 12/95 Rescinded 04/99
TSB-79	PN-3823	IS-637 Update for 14.4 Kbps SMS, Service Negotiation and Y2K	Published 02/97

3G Version (cdma2000, IS-2000, 1xRTT, 1xEVDO)

Standard	Project	Description	Status
TIA/EIA-97-D		Minimum Performance Standards for IS-2000 Base Stations	Published 06/01
TIA/EIA-97-E	SP-4384-RV5	Minimum Performance Standards for IS-2000 Base Stations	Published 02/03
TIA/EIA-97-E-1		Minimum Performance Standards for IS-2000 Base Stations (Supplement)	Published 03/04
TIA/EIA-98-D		MS Minimum Performance Standards	Published 06/01
TIA/EIA-98-E	SP-4383-RV5	MS Minimum Performance Standards	Published 02/03
TIA/EIA-126-D	SP-4578-RV4	Mobile Station Loopback Test	Published 06/01
TIA/EIA-637-B	SP-4391-RV2	Short Message Service	Published 01/02
TIA/EIA-637-C	SP-4391-RV3	Short Message Service	Published 08/04
IS-683-B	SP-4742	OTA Update, including Preferred User Zone List	Published 12/01
IS-707-A	PN-4145	Revision to IS-707 to be consistent with TIA/EIA-95 Capabilities	Published 04/99
IS-707-A-1	PN-4541	Adds cdma2000 Radio Link Protocol 3E Support to 14.4 Kbps Data	Published 12/99
IS-707-A-2	PN-4692	Data Support for IS-2000-A	Published 03/01

IS-707-A-3		Addendum 3 for IS-707 (High speed packet data service option 33) chapter 12	Published 02/03
IS-801	PN-4535	Position Determination Services (e.g. for E911 Phase II)	Published 11/99
IS-801-1	PN-4535-AD1	Addendum to Position Determination	Published 03/01
IS-801-A		Position determination services (e.g. for E911 Phase II)	Published 04/04
IS-834	PN-4707	Direct Spread Specification for CDMA on ANSI-41 (DS41) Upper Layers Air Interface	Published 03/00
IS-856	PN-4875	High Rate Packet Data Air Interface Specification (1XEV DO)	Published 11/00
IS-856-1	PN-4875-AD1	Addendum 1 to CDMA2000 High Rate Packet Data Air Interface Specification (1XEV DO/HRPD)	Published 01/02
IS-856-2	PN-4875-AD2	Addendum 2 to cdma2000 HRPD	Published 10/02
IS-870	PN-4877	Test Data Service Option (TDSO) for cdma2000	Published 04/01
IS-870-1	PN-4877-AD1	Test Data Service Option (TDSO)	Published 10/02
IS-870-A	PN-4877-RV1	Test Data Service Option (TDSO)	Ballot 11/04
IS-871	PN-4876	Markov Service Option (MSO) for Determining Frame Error Rates	Published 04/01
IS-889	PN-4905	Minimum Performance Specification for Text Telephone (TTY) Signal Detector and Regenerator	Published 08/02
IS-889-A	PN-4905-RV1	Minimum Performance Specification for Text Telephone (TTY/TDD) Signal Detector and Regenerator	Published 12/03
IS-890	PN-0018	Test Application Specification for HRPD	Published 07/01
IS-890-1	PN-0018-AD1	Test Application Specification for HRPD	Published 10/02
IS-893	PN-4575	Selectable Mode Voice Coder (Speech and Capacity-Sensitive, formerly known as EVRC)	In press
IS-893-1	PN-4575-AD1	Selectable Mode Voice Coder (Speech and Capacity-Sensitive, Formerly known as EVRC)	In press
IS-894	PN-0029	Selectable Mode Voice Coder Minimum Performance	Ballot 01/02
IS-2000.1-0	PN-4427	cdma2000: Introduction and Overview	Published 08/99
IS-2000.2-0	PN-4428	cdma2000: Physical Layer	Published 08/99
IS-2000.3-0	PN-4429	cdma2000: Media Access Control (MAC) layer	Published 08/99
IS-2000.4-0	PN-4430	cdma2000: Signaling Layer 2 Link Access Control (LAC)	Published 08/99
IS-2000.5-0	PN-4431	cdma2000: Signaling Layer 3	Published 08/99
IS-2000.6-0	PN-4432	cdma2000: Analog Operation	Published 08/99
IS-2000.X-0-1	PN-4698-AD2	First addendum for IS-2000. Revises all 6 parts	Published 05/00
IS-2000.X-0-2	PN-4698-AD2	Addendum for IS-2000. Revises all 6 parts	Published 08/01
IS-2000.X-A	PN-4693	cdma2000 (all 6 (X=1-6) parts revised)	Published 03/00
IS-2000.X-A-1	PN-4698-AD1	Addendum for IS-2000-A. Revised parts 2 through 5	Published 11/00
IS-2000.X-A-2		Second addendum for IS-2000-A. Revises all 6 parts.	Published 04/02
IS-2000.X-B		cdma2000. All 6 parts being revised (X=1..6)	Published 05/02
IS-2000.X-C		CDMA2000. All 6 parts being revised (X=1..6)	Published 05/02
IS-2000.X-C-1	PN-4697-RV3-AD1	Addendum to cdma2000 Release C	In Press
TIA-2000.X-D		cdma2000 Release D in 6 parts.	See C.S0001-6-D
TIA-97-F	SP-4384-RV6	Minimum Performance Standards for cdma2000 Base Stations	Ballot 11/04

TIA-98-F	SP-4383-RV6	MS Minimum Performance Standards	Ballot 11/04
TIA-683-C		Over-the-Air Service Provisioning (OTASP) for cdma2000	Published 03/03
TIA-856-2		High Rate Packet Data (HRPD) Air Interface Specification (1XEV DO) Addendum 2	Published 03/04
TIA-856-A		High Rate Packet Data Air Interface Specification (1XEV DO)	Published 04/04
TIA-864	PN-4913	Minimum Performance Standards for cdma2000 HRPD Base Station	Published 02/02
TIA-864-1	PN-4913	Addendum 1 of TIA-864	Published 01/04
TIA-866	PN-4916	Minimum performance for HRPD Terminal	Published 02/02
TIA-866-1	PN-4916	Addendum 1 for TIA-866	Published 01/04
TIA-870-1		Test Data Service Option (TDSO) for cdma2000	Published 01/04
TIA-889-A [SF1]	PN-4905-RV1. SF1	Software Distribution for TIA-889-A	Ballot 11/04
TIA-890-1		Test Application Specification for High Rate Packet Data (HRPD) Air Interface	Published 01/04
TIA-893-1 [SF1]	PN-4575-AD1. SF1	Software Distribution for TIA-893	Ballot 11/04
TIA-898	PN-0031	Signaling Conformance Tests for cdma2000	Published 12/01
TIA-907	PN-0046	Video Streaming	Development
TIA-916	PN-0058	Minimum Performance Recommendations for IS-801-1 (GPS) Mobiles (e.g. Test Specifications)	Published 04/02
TIA-918	PN-0056	Signaling Conformance Tests for cdma2000 Wireless IP Networks	Published 05/02
TIA-919	PN-0057	Signaling conformance for HRPD	Published 05/02
TIA-923	PN-0069	Link Layer Assisted Robust Header Compression Service Option for Voice	Published 05/03
TIA-924	PN-0070	Packet Based Video Conferencing	Development
TIA-925	PN-0071	Enhanced Subscriber Privacy for HRPD	Published 09/02
TIA-926	PN-0072	Circuit Switched Video Conferencing Services	Published 12/02
TIA-1010	PN-0111	IP-based Over-the-Air Handset Configuration Management (IOTA-HCM)	Published 08/03
TIA-1011	PN-0112	MMS Media Format and Codecs for cdma2000	Published 12/03
TIA-1011-1	PN-0112-AD1	MMS Media Format and Codecs for cdma2000	Ballot 08/04
TIA-1013	PN-0114	Mobile Equipment (ME) Conformance Testing for cdma2000	Published 12/03
TIA-1015	PN-0116	3GPP2 File Formats for Multimedia Services	Published 12/03
TIA-1016		Wideband Codec Algorithm	Published 11/04
TIA-1016 [SF1]	PN-0117.SF1	Software Distribution for TIA-1016	Ballot 11/04
TIA-1017	PN-0118	Minimum performance specification for CDMA wideband codec (VMR-WB) - Speech Option 62	Ballot 08/04
TIA-1017 [SF1]	PN-0118.SF1	Software Distribution for TIA-1017	Ballot 11/04
TIA-1030		CDMA Band Classes	Published 03/04
TIA-1035		Signaling Conformance for 1x Rev. A	See C.S0043
TIA-1036		Interoperability Specification for 1x Rev. A, DO Rev. 0, SMS, OTA, Positioning and TIA-707	See C.S0044

TIA-1054	PN-0181	HRPD Supplemental Packet Data Service	Ballot 09/04
TIA-893 [SF1]	PN-4575.SF1	Software Distribution for TIA-893	Ballot 11/04
TIA-894 [SF1]	PN-0029.SF1	Software Distribution for TIA-894	Ballot 11/04
TSB-58-B	PN-4691	Parameter Value Assignments for IS-2000	Published 12/99
TSB-58-C		Parameter Value Assignments for IS-2000-A	Published 05/00
TSB-58-D	PN-4691-RV4	Parameter Value Assignments for IS-2000-B	Published 05/01
TSB-58-E	PN-4619-RV5	Parameter Value Assignments for IS-2000-C	Published 01/02
TSB-58-F	PN-4691-RV6	Parameter Value Assignments	Published 12/03
TSB-2000	PN-4534	Capabilities Requirements Mapping for cdma2000 Standards	Published 09/99

GSM MAP and Smart Card Support

Standard	Project	Description	Status
IS-820	PN-4690	R-UIM (Removable "Smart Card")	Published 05/00
IS-820-1	PN-4690-AD1	CDMA Removable UIM Addendum 1	Published 06/01
IS-833	PN-4706	Multi-carrier specification for CDMA systems on GSM MAP (MC-MAP) lower layers air interface	Published 03/00
TIA-820-A	PN-4690-RV1	R-UIM (Removable "Smart Card")	Published 09/02
TIA-820-A-2	PN-4690-RV1-AD2	R-UIM (Removable "Smart Card")	Ballot 10/04
TIA-820-B		R-UIM (Removable "Smart Card") for compatibility with TIA-41, IS-95-A and TIA-95-C	See C.S0023-B
TIA-915	PN-0051	CDMA Card Application Toolkit	Published 02/03
TIA-1014	PN-0115	R-UIM Conformance for cdma2000	See C.S0049