

# Cellular Networking Perspectives

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**Next Issue: November 15<sup>th</sup>, 2004**

## Water Water Everywhere but not an IMSI in Sight!

IMSI, the International Mobile Subscription Identifier, seems like one numbering resource that cannot be exhausted. After all, each block of IMSIs allows a carrier to assign one billion (!) numbers. And there are one million of these blocks!

Given that the Mobile Country Code (MCC) is 3 digits long and there are less than 300 countries in the world, it is unlikely that this part of IMSI can be exhausted, nor the last 9 digits, the **MSIN**.

All the troubles seem to revolve around the second group of 3 digits, the Mobile Network Code (MNC). It might seem unlikely that any country would need anything close to this many codes, but there are at least three problems with this portion:

- Although many people consider the MNC to be a carrier identifier, it should actually be assigned to the smallest tradeable portion of a service area. In the United States, counting the **MSAs** and **RSAs** assigned to cellular and the **MTAs** and **BTAs** assigned to PCS, there are about 2,500 distinct license areas. If done this way, then no re-programming of phones would be required when a license area was sold or traded between carriers (as they often are, as carriers rationalize the territory they cover). Luckily the United States has 7 MCCs assigned to it and no other country comes even close to 100 distinct licenses. However...
- GSM and CDMA only support a 2-digit MNC. Although there was an agreement several years ago for GSM carriers in the United States to migrate to 3 digits, the overall GSM carrier does not want this change, and CDMA systems also have the same restriction.
- The ITU-T E.214 recommendation is used for SS7 routing. Basically, this allows an E.212 IMSI to be converted into a pseudo E.164 directory number. This allows existing E.164 global title translations to be used on the SS7 networks, as true E.212 global title translation is rarely available. This worked well in Europe where most countries have one MCC and one E.164 country code. However, in North America, over 20 MCCs map onto one E.164 country code (“1”). The E.214 specification states that the MCC should be translated into a country code separately from the MNC, which means that ambiguous addresses would be created unless

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all MNCs for North America were coordinated. Luckily, a simple solution exists for this problem: ignore E.214 and convert the MCC+MNC into 1+Area Code (plus a portion of the exchange code if necessary).

Of these three problems, the first is an annoyance, the third is solved, but the second is very much still an issue.

On October 4<sup>th</sup> 2004 the GSM Association protested some true 3-digit MNC assignments being made by countries, stating that:

“The GSMA is now aware of countries where multiple 3-digit MNCs have been issued by regulators where the first two digits are exactly the same. Although according to the specifications this is acceptable it is a problem for many operators whose systems are only set up to accept 2-digit MNCs. Enlarging the length of the MNC to accommodate 3-digit MNCs (filename length, field and record length) is a major change to the entire systems such as the rating engine, the TAP engine, the billing system and the data warehouse.”

The GSM reported dire consequences if these countries do not stop this type of assignment (everything except famine and pestilence). This indicates they are unlikely to ever transition to 3-digit MNCs because the use of 2-digit MNCs is so embedded in GSM (and presumably in UMTS as well). They are unlikely to find much pressure, because CDMA is currently in the same position.

The GSM Association did not mention that the ‘extra’ MNC digit is actually already in SIM cards, in the form of an unused BCD Digit (four bits out of a byte). This is because MCC+MNC is only 5 digits with a 2-digit MNC, and storage is in an even number of octets, leaving space for the third MNC digit. So a backwards compatible method might work in practice; the hurdles might just be theoretical.

The consequence of all these troubles with IMSI (well, with MNC, actually) is that multiple license areas are going to remain within a single MNC in the United States, making it likely that phone reprogramming or SIM replacement will be necessary if a license is transferred between carriers.

## 3GPP TSG CN Update – Core Network

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3GPP TSG CN (Core Network) specifies internal network signaling and operation for 3GPP systems (an evolution from the GSM Core Network). This includes UE – CN layer 3 radio protocols (Call Control, Session Management and Mobility Management), signalling between the core network nodes, interconnection with external networks, core network aspects of the Iu interface, O&M requirements and Packet-related matters such as mapping of QoS. Two TSG CN meetings (#24 and #25) have been held since our last update. Some of the highlights of these meetings include:

- CN4 took responsibility for Generic User Profile specifications [TS 23.241](#) and [TS 24.241](#) from T2. TS 24.241 may be renumbered as TS 27.241.
- A working arrangement has also been established between the [Liberty Alliance](#) Project and 3GPP to allow 3GPP delegates access to their specifications, which relate to digital identity and web services.
- CN2 (CAMEL) was terminated and its responsibilities transferred to CN4.
- Releases prior to Rel 6 have had very few CRs. There were some minor SIP Corrections in IMS, Go Interface corrections, enhancement on the Cx interface and some cleanup of CAMEL 4.
- Rel 6 still has many dependencies on the IETF and OMA. Many work items will be completed in 2005, which is past the initial Rel 6 functional freeze date of December 2004. The TSG CN chair has asked for these overdue work items to still be included in Rel 6. The final decision will be made at the December 2004 TSG SA meeting.
- For Rel 7, four new work items were recently approved. Details are given under the individual working group discussions.
- TSG CN has agreed to take responsibility for Open Service Access (OSA) Stage 2 specification development. CN5 will create a new Stage 2 OSA specification ([TS 23.198](#)) for Rel 6. CN5, on the other hand, will not take responsibility for the [TS 23.127](#) (OSA and Virtual Home Environment) Stage 2 specification. It will just provide CRs to SA2 instead.

### TSG CN Working Group 1 (MM/CC/SM)

3GPP TSG CN WG1 (CN1) defines the UE – Core network Layer 3 radio protocols (Call Control, Session Management, Mobility Management and SMS). This includes SIP Call Control and SDP protocols for the IMS (‘All IP’) subsystem.

At their recent meetings:

- CN1 elected a new vice-chairman, Atle Monrad from Ericsson and has a new secretary, Andrijana Jurisic.
- Rel 99 CRs to correct the notification procedures of voice group call and voice broadcast call were approved.
- Rel 4 CRs to correct Subnetwork Dependent Convergence Protocol (SNDCP) compression negotiation were approved.
- Many Rel 5 CRs were approved at TSG CN#25, most notably:
  - » Correction to IMS Stage 3 [TS 23.228](#) and [TS 23.229](#).
  - » Correction to the handling of network-initiated de-registration.
  - » Correction to the criteria to remove the P-Access-Network-Info header.

Most of the work in CN1 related to Rel 6:

- The Presence work item has several CRs addressing editorial and readability issues, in addition to enhancement of the publication procedure.
- Multimedia Broadcast and Multicast Service information were extracted from [TR 29.846](#) and inserted into the existing [TS 24.007](#), [TS 24.008](#) and [TS 44.065](#). TR 29.846 is not needed any more.
- Wireless LAN and cellular interworking [TS 24.234](#) was submitted for information at TSG CN#22. It is estimated that the work will be completed by December 2004.
- The completion of Subscriber Certificate work has slipped from September to December 2004.
- Three work items – IMS Emergency Call, Local Service and SIP Enhancements for Trace – are unlikely to meet the Rel 6 functional freeze date of December 2004, with completion of these items now estimated in June 2005.
- The IMS Emergency Call work item has no contributions in CN1 meetings and will be deleted if there are insufficient supporting companies.

**Table 1: 3GPP TSG CN Working Group 1 (MM/CC/SM) Specification Update**

Document	Title	Status
<a href="#">tbd</a>	Enhancement of Voice Group Call Service (VGCS) in Public Networks for Communication of Public Authority Officials	New Rel 7 Work Item
<a href="#">tbd</a>	Protocol Impact from Providing IMS Service via Fixed Broadband	
<a href="#">tbd</a>	Revised MBMS Work Item	Updated Work Item Description, including security aspects.
<a href="#">tbd</a>	Revised Network Sharing Stage 3	Updated Work Item Description.
<a href="#">TS 03.68</a>	Voice Group Call Service (VGCS); Stage 2	Rel 99 being revised.
<a href="#">TS 03.69</a>	Voice Broadcast Service (VBS); Stage 2	
<a href="#">TS 23.122</a>	NAS Functions Related to Mobile Station (MS) in Idle Mode	Rel 6 being revised.
<a href="#">TS 23.218</a>	IP Multimedia (IM) Session Handling; IP Multimedia (IM) Call Model; Stage 2	
<a href="#">TS 24.007</a>	Mobile Radio Interface Signalling Layer 3; General Aspects	
<a href="#">TS 24.008</a>	Mobile Radio Interface Layer 3 Specification; Core Network Protocols; Stage 3	
<a href="#">TS 24.109</a>	Bootstrapping Interface (Ub) and Network Application Function (Ua); Protocol Details	Rel 6 available.
<a href="#">TS 24.141</a>	Presence Service using the IP Multimedia (IM) Core Network (CN) Subsystem; Stage 3	Rel 6 being revised.
<a href="#">TS 24.147</a>	Conferencing using the IP Multimedia (IM) Core Network (CN) Subsystem; Stage 3	Rel 6 available.
<a href="#">TS 24.228</a>	Signalling Flows for the IP Multimedia Call Control Based on SIP and SDP; Stage 3	Rel 5 being revised.
<a href="#">TS 24.229</a>	IP Multimedia Call Control Protocol Based on SIP and SDP; Stage 3	Rel 5 and Rel 6 being revised.
<a href="#">TS 24.234</a>	3GPP System to Wireless Local Area Network (WLAN) Interworking; User Equipment (UE) to Network Protocols; Stage 3	Rel 6 available.
<a href="#">TS 24.247</a>	Messaging Service using the IP Multimedia (IM) Core Network (CN) Subsystem; Stage 3	

**Table 1: 3GPP TSG CN Working Group 1 (MM/CC/SM) Specification Update - cont.**

Document	Title	Status
TS 29.018	General Packet Radio Service (GPRS); Serving GPRS Support Node (SGSN) – Visitors Location Register (VLR) Gs Interface Layer 3 Specification	Rel 6 being revised.
TR 29.846	Multimedia Broadcast/Multicast Service (MBMS); CN1 Procedure Description	Rel 6 available.
TR 29.847	Conferencing Based on SIP, SDP and other Protocols; Functional Models, Information Flows and Protocol Details	
TR 29.994	Recommended Infrastructure Measures to Overcome Specific Mobile Station (MS) Faults	
TS 43.068	Voice Group Call Service (VGCS); Stage 2	Rel 4, Rel 5 and Rel 6 being revised.
TS 44.065	Mobile Station (MS) – Serving GPRS Support Node (SGSN); Subnetwork Dependent Convergence Protocol (SNDCP)	

### TSG CN Working Group 3: Interworking with External Networks

3GPP TSG CN WG3 (CN3) specifies the bearer capabilities for circuit – and packet-switched data services, the interworking functions towards both the UE (e.g. cellular phones) in the UMTS PLMN and the terminal equipment (e.g. fixed phones or computers) in the external network and End-to-End QoS for the UMTS core network, starting with Rel 5.

For both Rel 5 and Rel 6, CN3 has recently approved CRs for End-to-End Quality of Service over the Go interface. The changes will be included in TS 29.207.

The remaining work related only to Rel 6:

- Interworking between the IMS and IP Network is being defined in TS 29.162 and has progressed based on recent Stage 2 input, including IPv4/IPv6 interworking. CN3 plans to complete this work item in December 2004.
- Change Requests on Interworking between IMS and CS network TS 29.163 were accepted.
- End-to-End Quality of Service relies on the Gq interface for service-based policy set-up information exchange between the Policy Decision Function (PDF) and the Application Function (AF), e.g. the P-CSCF. CN3 is continuing to incorporate minor updates to the Stage 2 in TS 29.008.
- Work on the MBMS, Gmb interface is expected to be complete by December 2004.
- CN3 has not made any progress on the support of Presence Capability due to lack of contributions.
- The Rel 6 version of the Wireless LAN interworking work item, in TS 29.161, was approved.

**Table 2: 3GPP TSG CN Working Group 3(Interworking) Specification Update**

Document	Title	Status
tbd	DIAMETER on the PDG Wi Interface	New Rel 7 Work Item
tbd	DIAMETER on the GGSN Gi Interface	
tbd	Rx Reference Point Specification for Flow Based Charging	New Rel 6 Work Item
tbd	Gx Interface Specification for Flow Based Charging	
TS 23.172	Technical Realization of Circuit Switched (CS) Multimedia Service UDI/RDI Fallback and Service Modification; Stage 2	Rel 6 available.
TS 29.061	Interworking between the Public Land Mobile Network (PLMN) Packet Based Services and Packet Data Networks (PDN)	Rel 6 being revised.
TS 29.161	Interworking between the Public Land Mobile Network (PLMN) Supporting Packet Based Services with Wireless Local Area Network (WLAN) Access and Packet Data Network (PDN)	Rel 6 available.
TS 29.163	Interworking between the IP Multimedia (IM) Core Network (CN)	Version 6.4 (Rel 6) being revised.
TS 29.207	Policy Control over Go Interface	Rel 5 and Rel 6 being revised.
TS 29.209	Policy Control over Gq Interface	Rel 6 available.

## TSG CN Working Group 4: MAP, GTP, BCH and SS

3GPP TSG CN WG4 (CN4) standardizes Stage 2 message flows for the Core Network, focusing on Mobility Management within the Core Network (e.g. using MAP – Mobile Application Part), Basic Call Handling (BCH), Supplementary Services (SS), GPRS Tunneling, and the Bearer Independent Architecture. CN4 also defines mobile-specific protocols within the core network.

The Wireless LAN Interworking architecture has had the Server Locator Function (SLF) added. A CR to **TS 23.003** introduced a description of temporary identities and described the format of Decorated Network Access Indicator (an NAI with additional information influencing the routing choice).

Presence for Rel 6 is complete. At TSG CN#23, CN4 reported that the Presence Network agent will use the same national subsystem number as gsmSCF (MAP) and CAMEL Application Server (IM-SSF) for the Ph, Pc, and Pg reference points between the Presence Network agent, the HSS/HLR, the MSC/VLR and the SGSN.

The Rel 6 GUP interface will be defined by referencing Liberty Alliance specifications, with 3GPP GUP enhancements when needed. CN3 took over GUP (**TS 23.241**) from the now defunct T2 and is now planning to complete the stage 3 specification (**TS 29.240**) by March 2005.

Subscriber Certificates work for Rel 6 is considered stable. **TS 29.109** was approved with only a few outstanding issues.

**Table 3: 3GPP TSG CN Working Group 4 (MAP, GTP, BCH and SS) Specification Update**

Document	Title	Status
tbd	Trace Management, Stage 3, network	Updated Work Item Description
<b>TS 23.003</b>	Numbering, Addressing and Identification	Rel 6 being revised.
<b>TS 23.007</b>	Restoration Procedures	
<b>TS 23.008</b>	Organization of Subscriber Data	
<b>TS 23.012</b>	Location Management Procedures	
<b>TS 23.018</b>	Basic Call Handling; Technical Realization	
<b>TS 23.278</b>	Customized Applications for Mobile network Enhanced Logic (CAMEL) Phase 4 – Stage 2; IM CN Interworking	Transferred from CN2 to CN4. Rel 5 being revised.
<b>TS 29.002</b>	Mobile Application Part (MAP) Specification	Rel 6 being revised.
<b>TS 29.010</b>	Information Element Mapping between Mobile Station – Base Station System (MS – BSS) and Base Station System – Mobile-services Switching Centre (BSS – MSC); Signalling Procedures and the Mobile Application Part (MAP)	Rel 5 and Rel 6 being revised.
<b>TS 29.060</b>	General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) Across the Gn and Gp Interface	Rel4, Rel5 and Rel 6 being revised.
<b>TS 29.078</b>	Customized Applications for Mobile network Enhanced Logic (CAMEL) Phase 4; CAMEL Application Part (CAP) Specification	Rel 5 and Rel 6 being revised.
<b>TS 29.278</b>	Customized Applications for Mobile network Enhanced Logic (CAMEL) Phase 4; CAMEL Application Part (CAP) Specification for IP Multimedia Subsystem (IMS)	Version 5.3 (Rel 5) being revised.
<b>TS 29.109</b>	Generic Authentication Architecture (GAA); Zh and Zn Interface based on the Diameter Protocol; Stage 3	Version 6.0 (Rel 6) being published.
<b>TS 29.228</b>	IP Multimedia (IM) Subsystem Cx and Dx Interfaces; Signalling Flows and Message Contents	Versions 5.9 (Rel 5), 6.4 (Rel 6) being revised.
<b>TS 29.229</b>	Cx and Dx Interface based on the Diameter Protocol; Protocol Details	Versions 5.8 (Rel 5) and 6.2 (Rel 6) being revised.
<b>TS 29.230</b>	Diameter Applications; 3GPP Specific Codes and Identifiers	Version 6.1 (Rel 6) being revised.

**Table 3: 3GPP TSG CN Working Group 4 (MAP, GTP, BCH and SS) Specification Update - cont.**

Document	Title	Status
TS 29.232	Media Gateway Controller (MGC) – Media Gateway (MGW) Interface; Stage 3	Versions 4.9 (Rel 4) and 5.8 (Rel 5) being revised.
TS 29.234	3GPP System to Wireless Local Area Network (WLAN) Interworking; Stage 3	Version 6.0 (Rel 6) being published.
TS 29.328	IP Multimedia (IM) Subsystem Sh Interface; Signalling Flows and Message Content	Version 6.3 (Rel 6) being revised.
TS 29.329	Sh Interface based on the Diameter Protocol; Protocol Details	Versions 5.7 (Rel 5), 6.2 (Rel 6) being revised.
TS 29.332	Media Gateway Control Function (MGCF) – IM Media Gateway Mn Interface	Version 6.0 (Rel 6) being published.

### TSG CN Working Group 5 (OSA)

3GPP TSG CN WG 5 (CN5) defines the interfaces specific to the UMTS Open Service Access (OSA), including Application Programming Interfaces (APIs). The UMTS network provides these interfaces to facilitate service implementations. CN5 bases its work on the Service Requirements from SA1 and Architecture from SA2.

CN5 continues to only bring Change Requests (CRs) to the TSG meeting every 6 months, to stay synchronized with the Parlay specifications.

Several essential Rel 4 and Rel 5 corrections concerning addressing errors from the recent Java realization of OSA APIs were approved.

For Rel 6, CN5 is working on the OSA Stage 3, as well as undertaking its new responsibility to also define OSA stage 2.

### Meeting Schedules

TSG CN held its most recent plenary meeting on September 8<sup>th</sup> – 10<sup>th</sup> 2004 in Palm Springs, Arizona. Future meetings are scheduled for:

- December 8<sup>th</sup> - 10<sup>th</sup> 2004 in Athens, Greece
- March 9<sup>th</sup> - 11<sup>th</sup> 2005 in Tokyo, Japan
- June 1<sup>st</sup> - 3<sup>rd</sup> 2005 in North America
- September 7<sup>th</sup> - 9<sup>th</sup> 2005 in Tallin, Estonia
- November 30<sup>th</sup> - December 2<sup>nd</sup> 2005 in Europe.

**CN1, CN3 and CN4 meetings.** November 15<sup>th</sup> - 19<sup>th</sup> 2004 in Seoul, Korea; February 14<sup>th</sup> - 18<sup>th</sup> 2005 in Sidney Australia; April 25<sup>th</sup> - 29<sup>th</sup> 2005 in North America; August 29<sup>th</sup> - September 2<sup>nd</sup> 2005 in Europe; and October 31<sup>st</sup> - November 4<sup>th</sup> 2005 in Europe.

**CN5 meetings.** November 1<sup>st</sup> - 5<sup>th</sup> 2004 in Barcelona, Spain; February 14<sup>th</sup> - 18<sup>th</sup> 2005 in Sidney, Australia; April 4<sup>th</sup> - 8<sup>th</sup> 2005 (location tbd); August 29<sup>th</sup> - September 2<sup>nd</sup> 2005 (location tbd); and October 10<sup>th</sup> - 14<sup>th</sup>, 2005 (location tbd).

**Table 4: 3GPP TSG CN Working Group 5 (OSA) Specification Update**

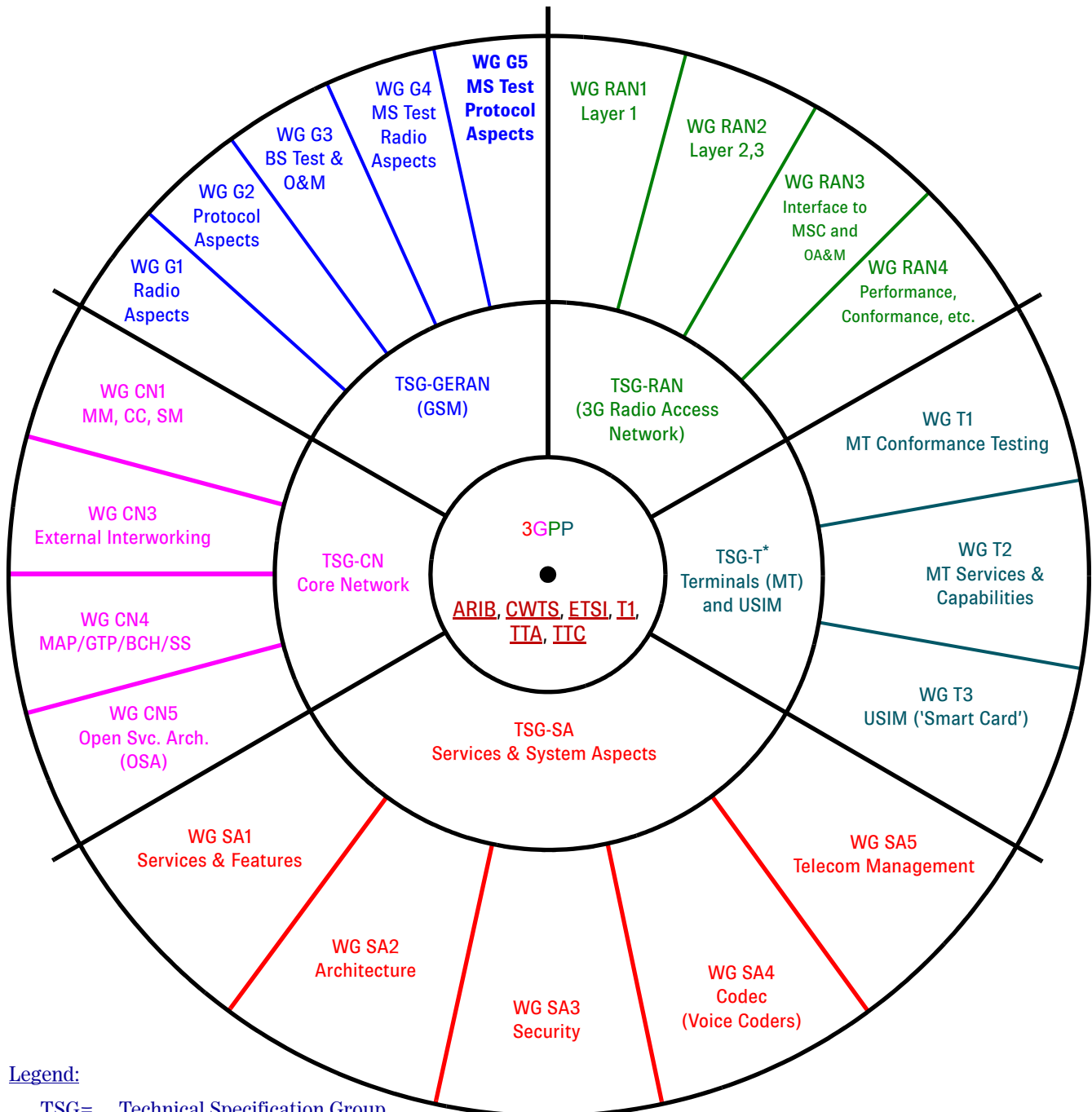
Document	Title	Status
tbd	Rel-6 Work Item Description for OSA Stage 2 & 3	Updated Work Item Description to include: <ul style="list-style-type: none"> <li>• New responsibility for Stage 2 (TS 32.127).</li> <li>• Deleting GUP support.</li> <li>• Adding high availability requirements.</li> </ul>
<b>Open Service Architecture; Application Programming Interface:</b>		
TS 29.198-01	Part 1: Overview	Rel 6 being revised.
TS 29.198-03	Part 3: Framework	
TS 29.198-04	Part 4: Call Control	
TS 29.198-04-2	Sub-part 2: Generic call control SCF	
TS 29.198-04-3	Sub-part 3: Multi-party call control SCF	
TS 29.198-04-4	Sub-part 4: Multimedia call control SCF	
TS 29.198-05	Part 5: Generic User Interaction	
TS 29.198-07	Part 7: Terminal Capabilities	
TS 29.198-08	Part 8: Data Session Control	
TS 29.198-11	Part 11: Account Management	
TS 29.198-12	Part 12: Charging	
TS 29.198-13	Part 13: Policy Management SCF	
TS 29.198-14	Part 14: Presence and Availability Management (PAM)	
TS 29.198-15	Part 15: Multimedia Messaging SCF	
<b>Open Service Access (OSA); Parlay X Web Services:</b>		
TS 29.199-01	Part 1: Common	Rel 6 available.
TS 29.199-02	Part 2: Third Party Call	
TS 29.199-03	Part 3: Call Notification	
TS 29.199-04	Part 4: Short Messaging	
TS 29.199-05	Part 5: Multimedia Messaging	
TS 29.199-06	Part 6: Payment	
TS 29.199-07	Part 7: Account Management	
TS 29.199-08	Part 8: Terminal Status	
TS 29.199-09	Part 9: Terminal Location	
TS 29.199-10	Part 10: Call Handling	
TS 29.199-11	Part 11: Audio Call	
TS 29.199-12	Part 12: Multimedia Conference	
TS 29.199-13	Part 13: Address List Management	
TS 29.199-14	Part 14: Presence	

# 3GPP Organization (TSGs and Working Groups)

# Cellular Networking Perspectives

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**Legend:**

TSG= Technical Specification Group

WG = Working Group

Other acronyms at: [www.cnp-wireless.com/glossary.html](http://www.cnp-wireless.com/glossary.html)

\* - TSG-T may be disbanded soon, with remaining work distributed to other TSGs.



# 3GPP2 TSG-X (and related SDOs) Wireless Core Network Specifications

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Note: 1. IS- Interim Standard, TSB- Telecommunications Systems Bulletin, PN- 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 TIA at [www.tiaonline.org/standards/search\\_n\\_order.cfm](http://www.tiaonline.org/standards/search_n_order.cfm).

### 3GPP2 TSG-X Core Network Technical Specification Group - Specifications

Specification	Description	Status
X.S0001	CDMA Packet Data Service Rev-1	Development
X.S0002	Network (TIA-41) Support for Location Services (LCS)	Published 03/04
X.S0003	TIA/EIA-41-D Network Enhancements to Support CDMA SIM Roaming to GSM	V&V 11/04
X.S0004-E	TIA/EIA-41-E Integration	Parts Published
X.S0004-F	TIA/EIA-41-F Integration	Development
X.S0006	TIA/EIA-41 Enhanced Security Services (ESA/AKA)	Development
X.S0007	TIA/EIA-41 Enhancements for Secure Mode OTASP and OTAPA	See TIA-906
X.S0008	TIA/EIA-41 Support for the Mobile Equipment Identity (MEID)	Published 10/04
X.S0009	WIN Location-based Services Phase III	Published 07/04
X.S0010	WIN Pre-Paid Charging Enhancements	Published 01/04
X.S0011-C	TIA/EIA-835 Enhancements	Published 09/03
<b>X.S0011-D</b>	<b>Wireless IP Network based on IETF Protocols</b>	<b>Development</b>
<b>X.S0012</b>	<b>LMSD Step 1 (IP Bearer)</b>	<b>Published 05/03</b>
X.S0013	IP Core Network - Multimedia Domain	Published 02/04
X.S0014	Wireless Radio Telecommunications Intersystem Non-Signaling Data Communication DMH (Data Message Handler)	V&V
X.S0015	Accounting and Auditing All-IP System Requirements	See S.P0075
X.S0016-A	Multimedia Message Services	Published 05/03
<b>X.S0016-B</b>	<b>Multimedia Message Services</b>	<b>Published 07/04</b>
X.S0017	Open Service Access (OSA): Application Programming Interface	Published 09/03
X.S0018	LMSD Step 1	Published 05/03
<b>X.S0019</b>	<b>Broadcast/Multicast Services (BCMCS) Security Framework</b>	<b>Ballot 10/04</b>
<b>X.S0020</b>	<b>Addendum to Wireless IP Networking</b>	<b>See P.S0001-B-2</b>
<b>X.S0021-A</b>	<b>Roamer Database Verification (RDV) Version 3</b>	<b>See TIA-847</b>
<b>X.S0021-B</b>	<b>RDV with revised error tables.</b>	<b>Published 08/04</b>
<b>X.S0022</b>	<b>Broadcast/Multicast in cdma2000 Wireless IP Network</b>	<b>Ballot 10/04</b>
<b>X.S0023</b>	<b>GSM/ANSI-41 Interworking</b>	<b>Published 07/04</b>
X.S0024	User Plane LCS ('LCS over IP')	Development
<b>X.S0025</b>	<b>LMSD Step 2</b>	<b>Development</b>
<b>X.S0026</b>	<b>Transcoder Free Operation (TrFO)</b>	<b>Replaced by X.S0025</b>
<b>X.S0027</b>	<b>Presence Service in four parts (000-Overview, 001-Architecture, 002-Security, 003-Core Network Protocol)</b>	<b>Published 10/04</b>
<b>X.S0028</b>	<b>Wireless Local Area Network (WLAN) Interworking with CDMA2000</b>	<b>V&amp;V 11/04</b>

X.S0029	'All-IP' Conferencing based on TS 24.147	Development
X.S0030	Enhancements to Message Waiting Notification (MWN)	Development
X.S0031	WIN Consolidation	Development
X.S0032	ENUM Core Network Impact	Development
X.S0033	OTA Support for MEID	Development
X.S0034	CDMA/GPRS Roaming	Development
X.S0035	X.S0004 (TIA-41) Enhancements to Support WLAN Interworking	Development

### 3GPP2 TSG-X Core Network TSG - Reports & Manuals

Standard	Description	Status
X.M-0001	Editor's Manual	Development
X.R0001	TSG-X Detailed Working Procedures	Development

### 3GPP2 TSG-N Specifications (N.Sxxxx)

Specification	Description	Status
N.S0003	User Identity Module (UIM)	Published 04/01
N.S0004	WIN Phase II	See IS-848
N.S0005	Intersystem Operations	See TIA/EIA-41-E
N.S0006	PCS Multi-band Operations	See TSB76
N.S0007	DCCH (Digital Control Channel for TDMA)	See IS-730
N.S0008	Circuit Mode Services	See IS-735
N.S0009	IMSI Support in TIA/EIA-41	See IS-751
N.S0010	Advanced CDMA Features	See IS-735
N.S0011	OTASP and OTAPA	See IS-725-A
N.S0012	Calling Name Presentation (CNAP) and Restriction (CNAR)	See IS-764
N.S0013	WIN Phase I	See IS-771
N.S0014	Authentication Enhancements	See IS-778
N.S0015	TIA/EIA-41-D Miscellaneous Enhancements	Development
N.S0016	TIA/EIA-41-D Internationalization	See IS-807
N.S0017	International Implementations of Systems Compliant with TIA/EIA-41	See TSB29-C
N.S0017-A	International Implementations of Systems Compliant with TIA/EIA-41	See TSB29-D
<b>N.S0017-B</b>	<b>International Implementations of Systems Compliant with TIA/EIA-41 (with IFAST information removed)</b>	<b>See TSB29-E</b>
N.S0018	Prepaid Charging (WIN Phase II)	See IS-826
N.S0019	Intersystem Link Protocol (ISLP)	See IS-728
N.S0020	Segmentation and Reassembly	See IS-812
N.S0021	User Selective Call Forwarding	See IS-838
N.S0022	Answer Hold	See IS-837
N.S0023	Automatic Code Gapping (ACG)	See IS-786
N.S0024	MDN-based Message Centers (MC)	See IS-841
N.S0025	Roamer Database Verification	See IS-847
<b>N.S0025-A</b>	<b>Roamer Database Verification</b>	<b>See IS-847-A</b>
<b>N.S0025-B</b>	<b>Roamer Database Verification</b>	<b>See IS-847-B</b>
N.S0026	Near Real-Time Call Detail/Billing Record Transfer	See TIA/EIA-124
N.S0027	Enhanced International Dialing, Calling Number Identification, Callback and Calling Party Category Identification	See IS-875
N.S0028	CDMA IP Network Requirements and Architecture Model	See IS-884
N.S0029	Inter-System Operations for Roaming and Mobility	See TIA/EIA-41-F
<b>N.S0030</b>	<b>Enhanced Wireless 9-1-1, Phase 2</b>	<b>See J-STD-036-A</b>

**3GPP2 TSG-P Specifications (P.Sxxxx)**

Specification	Description	Status
P.S0001	Wireless IP Network based on IETF Protocols	See IS-835
P.S0001-A	Wireless IP Network Standard	Published 08/00
P.S0001-A-1	Addendum to P.S0001-A	Published 01/01
P.S0001-Av3	Wireless IP Network Standard	See IS-835-A
P.S0001-B	Wireless IP Network Standard	See IS-835-B
<b>P.S0001-B-2</b>	<b>Wireless IP Network</b>	<b>Development</b>

**3GPP2 TSG-P Reports (P.Rxxxx)**

Report	Description	Status
P.R0001	Wireless IP Network Architecture based on IETF Protocols	Published 08/00

**TIA TR-45.2 ANSI Standards and Annexes**

ANSI Std.	Description	Status
J-STD-025	ANSI version of J-STD-025	Published 12/00
<b>J-STD-025-B</b>	<b>Surveillance of Packet Data Communications (Wireline and Wireless)</b>	<b>Published 12/03</b>
TIA/EIA-41-D	Intersystem Operations	Published 12/97
TIA/EIA-93-A	Ai and Di Interfaces Standard (including 9-1-1 Phase I: Cell/Sector Location)	Published 11/98
TIA/EIA-93-B	Ai and Di Interfaces Standard (including JIP and 9-1-1 Phase II location)	Published 07/01
TIA/EIA-124-B	Cellular Inter-System Non-Signaling Data Communications	Published 06/99
TIA/EIA-124-C	Support for WIN and CIBERNET NSDP-B-and-S protocol	Published 09/00
TIA/EIA-124-D	Further enhancements to call detail and billing records	Published 12/01
TIA/EIA-660	Cellular Dialing Plan (formerly IS-52)	Published 07/96 Rescinded
TIA/EIA-664	Cellular Feature Descriptions (formerly IS-53)	Published 06/96
TIA/EIA-664-A	Cellular Features Stage I Description	Published 12/00
TIA/EIA-664-B	Addition of part 804 (enhanced security)	Ballot 07/03
<b>TIA-41-D- AD1</b>	<b>Addendum to TIA/EIA-41-D</b>	<b>Published 04/02</b>
<b>TIA-664-B-1</b>	<b>Modification of Part 803 (Network Services) and addition of Part 805 (CDMA Packet Data Services)</b>	<b>Development</b>

**TIA TR-45.2 Standards**

Standard	Description	Status
J-STD-025-A	CALEA Surveillance Support (joint with ATIS T1) including FCC Report and Order Requirements	Published 05/00
<b>J-STD-025-A</b>	<b>Upgrade to ANSI [ballot extended to January, 2003]</b>	<b>Published 04/03</b>
J-STD-034	Enhanced Wireless 9-1-1, Phase I: Identify Mobile and Cell/Sector Location	Published 12/97
J-STD-036	Enhanced 9-1-1 (E911), Phase II (125 m. location accuracy)	Published 08/00
J-STD-036-1	Corrected and Enhanced Emergency Services with Support for SMS, Inter-System Handoff and SAMPS	Published 12/00
J-STD-036-A	Enhanced 9-1-1 (E911), Phase II (125 m. location accuracy)	Published 06/02
J-STD-036-A-1	Addendum to Support Interim Position for Routing Emergency Calls More Accurately	Published 03/03
J-STD-036-B	Enhanced 9-1-1 (E911) Revisions to Incorporate Field Experience	Ballot 11/04

<b>J-STD-038-B</b>	<b>Adds CDMA voice and SMS support to J-STD-038</b>	<b>Published 10/04</b>
<b>J-STD-038-C</b>	<b>GSM GPRS/CDMA Packet Data Roaming</b>	<b>Replaced by X.S0034</b>
TIA/EIA-41-E	Intersystem Operations, including TSB76, IS-730, 735, 737, 751, 756-A, 764, 771, 778, 807, 812, J-STD-034, N.S0015	Partially published
TIA/EIA-41-F	Intersystem Operations, including IS-786, 808, 824, 826, 837, 838, 841, 847, 848, 880, J-STD-036	Development
TIA/EIA-124-E	Further enhancements to call detail and billing records, including support for location services and IP-based telephony	Ballot 11/04
<b>TIA/EIA-881</b>	<b>IP-based Location Services (LCS)</b>	<b>Development</b>
<b>TIA/EIA-1021</b>	<b>Transcoder Free Operations (TrFO)</b>	<b>Development</b>
IS-725-A	IS-725 enhanced to include Over-the-air Parameter Administration (OTAPA)	Published 07/99
IS-771	WIN (Wireless Intelligent Network) Phase I: voice controlled services and call screening	Published 07/99
IS-771-1	WIN Phase I addendum	Published 08/01
IS-778	Authentication Enhancements	Published 03/99
IS-786	Automatic Code Gapping (ACG) Overload Control	Published 11/00
IS-807	Internationalization of TIA/EIA-41	Published 08/99
IS-807-1	Updates global title translation types in IS-807	Published 03/00
IS-808	User Identification Module (R-UIM) for use in 3G systems	Published 12/00
IS-812	TIA/EIA-41 Message Segmentation (to overcome SS7 network packet size limitations)	Published 08/99
IS-824	Broadcast/Multicast Short Message Service (BTTC)	Published 11/99
IS-826	WIN Phase II: Prepaid calling	Published 08/00
<b>IS-826-A</b>	<b>WIN Phase II: Prepaid calling</b>	<b>Ballot 09/03</b>
IS-837	Answer Hold (AH)	Published 07/00
IS-838	User Selective Call Forwarding (USCF)	Published 08/00
IS-841	MDN Based Message Centers	Published 09/00
IS-847	VLR Roamer Database Verification (RDV)	Published 03/01
IS-847-A	RDV, allowing MDN range verification and query of nodes other than VLR	Published 07/02
<b>IS-847-B</b>	<b>Roamer Database Validation (corrections to error code handling tables)</b>	<b>Published 08/04</b>
IS-848	WIN Phase II: Enhanced Charging Services (Premium Rate Charging, Wireless Freephone)	Published 12/00
IS-872	IP Core Network Support for Legacy Mobiles (LMSD) - Step 1	Published 12/02
<b>IS-872-A</b>	<b>IP Core Network Support for LMSD Step 1</b>	<b>Published 05/04</b>
IS-875	Network Based Enhancements for International Dialing, Calling Number ID and Callback	Published 05/01
IS-880	Intersystem Support for CDMA Packet Data, Phase I	Published 07/02
TIA-728	Inter-System Link Protocol (ISLP). Supports data calls after inter-MSC handoff.	Published 04/98
TIA-730	TIA/EIA-41 Support for IS-136 DCCH (TDMA digital control channel)	Published 08/97
TIA-735	TIA/EIA-41 Support for CDMA (Network directed system selection (NDSS) and Temporary MS Identifiers (TMSI))	Published 02/98
TIA-737	TIA/EIA-41 Support for Circuit Switched Data Services for CDMA and TDMA Terminals	Published 04/98
TIA-751	TIA/EIA-41 support for International Mobile Station Identity (E.212 IMSI)	Published 02/98
TIA-756-A	Wireless Number Portability (WNP), Phase II (MDN/MIN separation to allow porting to or from wireless phone numbers)	Published 12/98
TIA-756-A-1	Allow emergency numbers to be portable	Published 10/02
TIA-764	Calling Name Presentation/Restriction	Published 06/98
<b>TIA-843</b>	<b>WIN Phase III: Location Based Services</b>	<b>Published 08/04</b>
TIA-868	SIM roaming from TIA/EIA-41 (CDMA) to GSM	See X.S0003
<b>TIA-873</b>	<b>IP Core Network Support for Multimedia Terminals (MMD). Parts 00, 02, 03 (Stage 2), 04 (SIP/SDP), 05/06 (Cx Ifc),</b>	<b>Published 12/03</b>

TIA-873-1	IP Core Network Support for Multimedia Terminals (MMD). Parts 00, 02, 03 (Stage 2), 04 (SIP/SDP), 05/06 (Cx Ifc),	See X.S0013v2
TIA-880-A	Intersystem Support for CDMA Packet Data, Phase II	See X.S0001
TIA-881	Network (TIA-41) Support for Location Services (LCS)	Published 03/04
TIA-917	Wireless Priority Service (WPS)	Published 09/04
TIA-934-000	Multimedia Messaging Service (MMS) Overview	Published 05/03
TIA-934-000-B	Multimedia Messaging Service (MMS) Overview	Published 10/04
TIA-934-200	MMS Stage-2, Functional Description	Published 05/03
TIA-934-200-1	MMS Stage-2, Functional Description	Published 10/04
TIA-934-310	MMS MM1 Interface Stage-3 using OMA/WAP	Published 05/03
TIA-934-310-1	MMS MM1 Interface Stage-3 using OMA/WAP	Published 10/04
TIA-934-311	MMS MM1 Interface Stage-3 using M-IMAP for Message Submission and Retrieval	Published 05/03
TIA-934-312	MMS MM1 Stage 3 using SIP	Published 10/04
TIA-934-330	MMS MM3 Interface Stage-3 for Internet Mail Exchange	Published 10/04
TIA-934-340	MMS MM4 Interface Stage-3 Intercarrier Interworking	Published 05/03
TIA-934-340-1	MMS MM4 Interface Stage-3 Intercarrier Interworking	Published 10/04
TIA-934-370	MMS MM7 Interface. VASP Interworking Stage-3	Published 05/03
TIA-934-370-1	MMS MM7 Interface. VASP Interworking Stage-3	Published 10/04
TIA-935	Circuit-switched (e.g. voice) call precedence over CDMA packet data session (CPOP)	Published 06/03
TIA-937	Open Service Access (OSA): Application Programming Interface (API)	Published 06/03
TIA-945	Enhanced Security (authentication and encryption) for TIA/EIA-41 (ESA/AKA)	See X.S0006
TIA-1022	Legacy MS Domain Step-2 (LMSD-2)	Development
TIA-1032	Presence Service Architecture & Functional Description (in two parts)	See X.P0027
TIA-1071	IP Multimedia Subsystem Electronic Surveillance - Technical Aspects	Development
PN-0178	Broadcast/Multicast Services (BCMCS) Security Framework	See X.S0019
PN-4927	Interworking and interoperability (IIF) enhancements to support IS-868	Completed

## TIA TR-45.2 Telecommunications Systems Bulletins (TSBs)

TSB	Description	Status
TSB-29-E	TSB-29 revision with SID block assignments removed	Published 12/02
TSB-56-A	Application Level Testing for IS-41 Rev. B, IS-53 Rev. 0 and TSB-51	Published 06/94
TSB-76	PCS Multi-Band Support	Published 09/96
TSB-114	Broadcast of Emergency Alert Messages to Wireless Phones (EAS)	Published 12/99
TSB-124	Support for WIN Prepaid (IS-826)	Published 10/00

## TIA TR-45.2 Superseded and Cancelled Specifications

Standard	Description	Status
J-STD-025	CALEA surveillance support (joint with ATIS T1) - Interim Standard	Published 12/97 Rescinded 05/01
J-STD-025-1	Addendum to J-STD-025	Published 07/00 Rescinded 05/01
J-STD-025-2	Addendum to J-STD-025	Published 07/00 Rescinded 05/01
J-STD-025-C	LAES enhancements, including All-IP systems, MEID, Mobile IPv6 and CGVoP	On hold
IS-41-C	Cellular Radio Telecommunications Intersystem Operations	Published 02/96
IS-52-A	Uniform Dialing Procedures for use in Cellular Radiotelephone Systems	Published 03/95

IS-53-A	Cellular Features Description	Published 04/95
IS-725	IS-41 support for Over-the-air Service Provisioning (OTASP)	Published 09/97
IS-756	Wireless Number Portability (WNP), Phase I (database query)	Published 04/98
TIA-756-A-2	Allow TLDNs to be pooled	Cancelled
TIA-756-B	Number Pooling Enhancements	Cancelled
TIA-906	Secure Mode Over-the-Air Service Provisioning (OTASP) and Parameter Administration (OTAPA)	On hold
TSB-29-A	International Implementation of Cellular Systems Compliant with TIA-553	Rescinded
TSB-29-B	International Implementation of Wireless Systems	Rescinded
TSB-29-B.1	TSB-29-B addendum including IFAST#6 updates (11/97)	Rescinded
TSB-29-B.2	TSB-29-B addendum, including IFAST #7 updates (02/98)	Rescinded
TSB-29-C	International Implementations of Wireless Systems	Published 09/99 Rescinded 12/00
TSB-29-C-1	Addendum to International Implementations of Wireless Systems	Published 12/99 Rescinded 12/00
TSB-29-D	TSB-29 revision with IFAST-assigned IRM codes removed	Published 12/00
TSB-41	Technical Notes for IS-41 Revision B	Published 11/94
TSB-51	Inter-System Authentication, Signaling Message Encryption and Voice Privacy	Published 05/93
TSB-55	IS-41 Rev. A/B Forward Compatibility ("Tech Notes")	Published 05/94
TSB-64	Wideband Spread Spectrum Intersystem Operations	Published 02/94
TSB-65	Border Cell Problems	Replaced by TIA/EIA-41-D
PN-4288	Enhanced Emergency Services (E9-1-1), Phase III: Optional features beyond FCC mandate	On hold

## TIA TR-45.6 3G Packet Data Standards

Standard	Description	Status
IS-835	CDMA2000 Wireless IP Network Standard	Published 12/00
IS-835-1	Addendum to IS-835	Replaced by IS-835-A
IS-835-A	CDMA2000 Wireless IP Network Standard	Published 05/01
IS-835-B	Supports IPv6, Dynamic Home Agent, QoS and Push Services	Published 09/02
<b>IS-835-B-1</b>	<b>Addendum to IS-835-B-1</b>	<b>Ballot 02/04</b>
IS-835-C	CDMA2000 Wireless IP Network Standard	Published 08/03
<b>TIA-835-D</b>	<b>CDMA2000 Wireless IP Network Standard</b>	<b>See X.S0011-D</b>
TIA-930	Legacy Mobile Station Domain (LMSD) Step 1 bearer protocol	Published 01/03
<b>TIA-1041</b>	<b>Broadcast/Multicast in cdma2000 Wireless IP Network</b>	<b>See X.P0022</b>
<b>TIA-1050</b>	<b>Wireless Local Area Network (WLAN) Interworking with CDMA2000</b>	<b>See X.P0028</b>
<b>TIA-1072</b>	<b>Technical Aspects of Surveillance of Push-to-Talk over Cellular for cdma2000</b>	<b>Development</b>
TSB-115	CDMA2000 Wireless IP Architecture based on IETF Protocols	Published 12/00

## TIA TR-45.6 CDPD - Cellular Digital Packet Data

Standard	Description	Status
TIA/EIA-732	Revisions to CDPD and Upgrade to ANSI	Published 06/01
<b>IS-732</b>	<b>Cellular Digital Packet Data (CDPD) - multiple parts</b>	<b>Published 12/97 Rescinded</b>
TSB-87	CDPD support services (Directory, Authentication, DNS, Testing, Identifiers, Numbering)	Published 12/97