

Cellular Networking Perspectives

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We will now be providing regular updates on the 3GPP2 IOS standard for BS-MS-C interoperability, as well as the specifications of the new TSG-X.

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Major Requirements*.....p. 1

The major requirements of a commercial location services standard to complement TIA/EIA-41 MAP, including routing, privacy, QoS and interactions with emergency call positioning).

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An update on the activities and specifications of 3GPP TSG CN that is responsible for defining protocols for the UMTS core network.

*Status of TIA-2001-B IOS
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The first report containing vendor implementation status for the IOS (TIA-2001) interface between Base Station and Mobile Switching Center equipment.

*3GPP2 TSG-X Core Network
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The first report listing projects for the new 3GPP2 TSG-X, the combination of TSG-N and TSG-P.

New Reports: IOS and TSG-X

This month introduces two new reports, covering the IOS protocol and the 3GPP2 TSG-X standards-setting body.

The first report (see Page 6) provides the status of vendor implementations of the IOS (Interoperability Specification, aka "A" interface) that connects Base Stations (the Radio Access Network) with the MSC and PDSN. This first issue provides basic information. We plan to expand to not only cover the various interfaces, but also the most important feature sets. To add, update or correct listings, vendors may contact the editor (David.Crowe@cnp-wireless.com).

There is no charge for this service. Information is listed as provided by vendors, so readers are encouraged to contact vendors to verify the information and obtain more details.

The second report summarizes the significant number of projects that the newly formed 3GPP2 TSG-X has inherited from the merger of TSG-N and TSG-P (see Page 7). Just like its predecessors, it will continue to have projects balloted and published by the TIA and other regional SDOs, but this group will work more independently than TSG-N and TIA TR-45.2 used to work in the past. There are obviously no specifications or reports that have yet been published by this group, but these will be added in future updates.

We will continue to report on TIA TR-45.2 and TR-45.6 as well as TSG-N and TSG-P specifications, until they have all been renamed.

Location Services, Part II: Major Requirements

We began a discussion of 3GPP2 location services (PN-4747) in our February, 2002 issue by describing the basic network architecture. This architecture was designed to satisfy a number of requirements, including:

- Routing to the Serving System
- Privacy and Security
- Startup Data
- Contents of Position Information
- Position Quality of Service (QoS)
- Interactions with Calls, particularly Emergency Calls

Routing to the Serving System

Location services clients will likely only be aware of the routing address of the home system (Home MPC). The Home MPC will need to obtain the routing address of the Serving System so that messages can be forwarded there. When an MS is roaming, there must be a method for determining the address of the currently serving location system to be communicated with. PN-4747 takes advantage of the location tracking (registration) inherent in TIA/EIA-41 systems, by allowing the Home MPC to query the HLR whenever it needs this information.

Privacy and Security

A person's location (of which an MS location is often a very good approximation) is quite sensitive to some people, and it must be protected from unauthorized disclosure.

Most support for privacy will have to be supplied by the Home System at the application level, negotiated between the requesting client and the Home Carrier.

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This does not require standardization, except to provide error codes that explain when requests are denied because of privacy restrictions.

In a tracking application ('MS-Terminated Positioning', for example), the client (e.g. a taxi firm) may identify the application being requested, and the identity of the MS. The Home MPC will receive this request and verify that the client is authorized to request that particular application, and it will also verify that the MS is registered with it for that service. The Serving System is not involved in this.

In order to ensure the privacy of an MS when it initiates services that may require its location ('MS-Initiated Positioning'), the Home System will provide a LIR (Location Information Restriction) mode to the Serving System as an extension to the TIA/EIA-41 profile. This is a crude instrument, either allowing all MS-initiated location services (e.g. location enabled directory assistance) or denying them completely.

To do anything more complex would require a standardized way for a Serving System to describe a service to a Home System – something that is unlikely to be shared between carriers that compete as much as they cooperate. This can be accomplished, in some cases, by combining the existing TIA/EIA-41 trigger facility with location services. By querying the HLR based on a dialed digit trigger, the HLR is now in control of whether positioning should be initiated, based on its internal privacy data and algorithms.

Security of data in PN-4747 is implicit in the physical security of the SS7 network. As location services migrate to IP networks, more care over security will need to be taken, possibly including encryption of network messages.

Startup Data

All current location systems, whether completely network-based or MS-assisted, require information about the current radio environment of the mobile. This information can only be easily supplied by the MSC/BSC. PN-4747 allows the Serving MPC to query the MSC for this information before initiating positioning. The MPC may also need to place the MS on a traffic channel to ensure that communications can occur or, in the case of network-based positioning, to ensure that triangulation has a signal to work with.

Contents of Position Information

Position is more than just a latitude and longitude. It can include a number of additional parameters:

- Time.
- Technology used to acquire position
- Horizontal Velocity (speed and 2D direction).
- Vertical Velocity (speed and up/down direction).
- Confidence (Uncertainty) of the various measurements.

Velocity and Confidence parameters will only be supplied if requested by the Position Quality of Service (PQoS).

Position Quality of Service (PQoS)

There are often several types of position information that can be provided, depending on the accuracy required, 'staleness' of the measurement and response-time tolerance.

The PQoS defines this, as well as whether each optional position information element is even required. It can specify:

- Horizontal position accuracy and desired confidence.
- Horizontal position accuracy, desired confidence and whether this information should be returned.
- Maximum allowed age of a cached position (to be returned instead of a new position fix).
- Priority – 7 different levels.
- Response time – No Delay, Low Delay or Delay Tolerant.

Note that it is quite possible to request a PQoS that cannot be met by any existing positioning technology.

Position fixes that are returned to a client will not always meet the requested PQoS. Although an error will be returned (and positioning will not be initiated) if it is not believed that a position meeting PQoS can be obtained by any available position technology, if positioning is initiated, but the information obtained by the Serving System unexpectedly does not meet PQoS, it will still be returned to the client, so as not to waste positioning resources.

Interactions with Calls, particularly Emergency Calls

While MS-assisted positioning for commercial ('Value Added') services is underway, it is possible that an emergency call (e.g. 911) is initiated. This may require that the commercial positioning be abandoned in favor of positioning for the emergency call. This may not be necessary if the same MPC is used for commercial and emergency positioning, as the MPC may be able to return the same position to satisfy both requests (depending on the PQoS).

Positioning is also complicated by normal (non-emergency) calls. The traffic channel used for positioning will not be suitable for a voice call because it probably uses CDMA Service Option 35 or 36. Consequently, the current traffic channel must be dropped, a traffic channel with a voice service option must be assigned, and then the positioning can resume, in parallel with the voice call. A similar channel shuffle is required if a voice call is disconnected while positioning is ongoing.

Some calls are defined by the network as 'call associated' (e.g. location enabled directory assistance). If this type of call is abandoned before positioning is complete, positioning should also be abandoned. This is controlled by the network, as the MS is unaware of the connection between the call and the positioning.

To be concluded...

Our third and final part of this series will describe the PN-4747 protocol, illustrating how new and existing TIA/EIA-41 operations are used to obtain the location of a mobile, paying particular attention to roaming situations. Some of the major parameters will also be described.

Links

As a free service, we provide a spectrum of links to virtually every aspect of wireless communications. If you need further information about standards and regulatory organizations, technology forums, wireless associations or wireless vendors and service providers, if you are seeking a consulting firm, or if you desire a broader news perspective by reading reports from other wireless news sources, then check out our links page at:

www.cnp-wireless.com/links.html

3GPP TSG CN (Core Network) Update

3GPP TSG Core Network (TSG CN) specifies the Core Network (an evolution from the GSM Core Network). This includes the:

- User Equipment – CN layer 3 radio protocols (Call Control, Session Management, Mobility Management),
- Signalling between CN nodes,
- Interconnection with external networks,
- Core network aspects of the Iu interface,
- O&M requirements,
- Packet related matters such as mapping of QoS.

TSG CN has completed most of its work for Release 5 (Rel 5). This is the first release to define an IP Multimedia Subsystem ('All IP').

A time extension was granted to complete some outstanding issues, including some cleanup in TS 24.228 (IP Multimedia Subsystem).

Most of the 3GPP specifications with dependencies on IETF (Internet Engineering Task Force) RFCs are expected to be approved, except for Diameter.

All TSG CN Working Group chair and vice-chair positions will be filled by elections at the upcoming 1Q'2003 meetings.

A workshop on joint IETF and 3GPP Rel 6 requirements will be held on January 27th and 28th, 2003 in San Francisco. This meeting will be co-chaired by the TSG-CN chairman and an IETF representative.

TSG CN WG1 (MM/CC/SM/SMS)

3GPP TSG CN Working Group 1 (CN1) defines the User Equipment–Core Network L3 radio protocols for Call Control (CC), Session Management (SM), Mobility Management (MM) and SMS. This includes SIP Call Control and SDP protocols for the IM (IP Multimedia) subsystem.

Important discussions at this meeting included:

- A method of detecting an IMS emergency call for Rel 5 by attempting to switch from packet mode to circuit mode.
- Continuation of a discussion on whether to support Short Message Service (SMS) over GPRS.

Table 1: 3GPP TSG CN Working Group 1 (MM/CM/SM/SMS) Specification Updates

Document	Title	Status
tbd	Support of Presence Service in Core Network Signalling Protocols	New work item.
tbd	Interoperability and Commonality between IP Multimedia Systems using different "IP connectivity Network"; Stage 3	
TS 23.009	Handover Procedures	Rel 99, Rel 4, and Rel 5 versions being revised.
TS 23.034	High Speed Circuit Switched Data (HSCSD); Stage 2	Rel 5 version being revised.
TS 23.122	NAS Functions Related to Mobile Station (MS) in Idle Mode	Rel 99, Rel 4, and Rel 5 versions being revised.
TS 23.218	IP Multimedia (IM) Session Handling; IP Multimedia (IM) Call Model; Stage 2	Rel 5 version being revised.
TS 24.007	Mobile Radio Interface Signalling Layer 3; General Aspects	Rel 99 and Rel 4 versions being revised.
TS 24.008	Mobile Radio Interface Layer 3 Specification; Core Network Protocols; Stage 3	Rel 99, Rel 4, and Rel 5 versions being revised.
TS 24.011	Point-to-Point (PP) Short Message Service (SMS) Support on Mobile Radio Interface	Rel 5 version being revised.
TS 24.228	Signalling Flows for the IP Multimedia Call Control Based on SIP and SDP; Stage 3	
TS 24.229	IP Multimedia Call Control Protocol Based on SIP and SDP; Stage 3	
TS 29.018	General Packet Radio Service (GPRS); Serving GPRS Support Node (SGSN) – Visitors Location Register (VLR) Gs Interface Layer 3 Specification	
TS 43.068	Voice Group Call Service (VGCS); Stage 2	
TS 43.069	Voice Broadcast Service (VBS); Stage 2	

TSG CN WG2 (CAMEL)

3GPP TSG CN Working Group 2 (CN2) is responsible for Stage 2 and Stage 3 specifications of CAMEL (Customized Applications for Mobile network Enhanced Logic). This capability provides mechanisms to support services

consistently and independently of the serving network, by querying external peripherals (SCPs).

CAMEL is intended to facilitate service control of operator-specific services from a point outside the serving PLMN, and it is to help provide subscribers with operator-

specific services even when roaming. Its aims and underlying technologies are similar to WIN (Wireless Intelligent Network) in 3GPP2.

At the last meeting, it was decided not to merge CN2 with CN4 at this time, however this idea will be re-evaluated later in 2003

Table 2: 3GPP TSG CN Working Group 2 CAMEL Specification Update

Document	Title	Status
TS 23.078	Customized Applications for Mobile Network Enhanced Logic (CAMEL) Phase 4–Stage 2; General	Rel 99, Rel 4 and Rel 5 versions being revised.
TS 23.278	Customized Applications for Mobile Network Enhanced Logic (CAMEL) Phase 4–Stage 2; IM CN Interworking	Rel 5 version being revised.
TS 29.078	Customized Applications for Mobile Network Enhanced Logic; CAMEL Application Part (CAP) Specification	Rel 99, Rel 4 and Rel 5 versions being revised.

TSG CN WG3 (Interworking with External Networks)

3GPP TSG CN Working Group 3 (CN3) specifies bearer capabilities for circuit and packet switched data services, and it specifies the necessary interworking functions towards both the user equipment in the UMTS PLMN and the terminal equipment in the external network.

In addition, CN3 is responsible for end-to-end QoS for the UMTS core network in Rel 5 and beyond.

At this meeting, there was continuing discussion on TR 29.962, which defines the interworking between the 3GPP profile of

the Session Initiation Protocol (SIP), which mandates SIP extensions not supported by the IETF RFC. CN1 will work with other CN Working Groups on a solution.

Table 3: 3GPP TSG CN Working Group 3 External Interworking Specification Update

Document	Title	Status
TS 23.172	Technical Realization of Circuit Switched (CS) Multimedia Service; UDI/RDI Fallback and Service Modification	Rel 5 version being revised.
TR 23.910	Circuit Switched Data Bearer Services	Rel 4 and Rel 5 version being revised.
TS 24.022	Radio Link Protocol (RLP) for Circuit Switched Bearer and Teleservices	
TS 27.001	General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)	Rel 5 version being revised.
TS 27.060	Packet Domain; Mobile Station (MS) supporting Packet Switched Services	
TS 29.007	General Requirements on Interworking Between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)	Rel 99, Rel 4, and Rel 5 versions being revised.
TS 29.061	Packet Domain; Interworking Between the Public Land Mobile Network (PLMN) Supporting Packet-based Services and Packet Data Networks (PDN)	
TS 29.207	Policy Control over Go Interface	
TS 29.208	End-to-End QoS Signalling Flows	
TS 43.010	GSM Public Land Mobile Network (PLMN) Connection Types	
TS 44.021	Digital Cellular Telecommunications System (Phase 2+); Rate Adaptation on the Mobile Station–Base Station System (MS–BSS) Interface	Rel 5 version being revised.
TS 48.020	Rate adaptation on the Base Station System–Mobile-services Switching Center (BSS–MSC) Interface	

TSG CN WG4 (MAP/GTP/BCH/SS)

3GPP TSG CN Working Group 4 (CN4) standardizes the core network Stage 2 for Supplementary Services (SS), Basic Call Processing, Mobility Management within

the Core Network, and the Bearer Independent Architecture. CN4 also specifies mobile-specific protocols within the core network

Comments

We welcome comments on the format or contents of *Cellular Networking Perspectives*. We can be reached via email at: cnpsales@cnp-wireless.com

Table 4: 3GPP TSG CN Working Group 4 MAP/GTP/BCH/SS Specification Update

Document	Title	Status
tbd	Protocol Definition for Automatic Distribution of MAP Security Keys	New work item
TS 23.003	Numbering, Addressing and Identification	Rel 5 version being revised.
TS 23.008	Organization of Subscriber Data	
TS 23.018	Basic Call Handling; Technical Realization	
TS 23.079	Support of Optimal Routing (SOR); Technical Realization	Rel 99, Rel 4, and Rel 5 versions being revised.
TS 23.153	Out of Band Transcoder Control; Stage 2	Rel 99 and Rel 4 versions being revised.
TS 23.205	Bearer-independent Circuit-switched Core Network; Stage 2	Rel 5 version being revised.
TS 24.080	Mobile Radio Interface Layer 3 Supplementary Services Specification; Formats and Coding	
TS 29.002	Mobile Application Part (MAP) Specification	Rel 99, Rel 4, and Rel 5 versions being revised.
TS 29.010	Information Element Mapping Between Mobile Station – Base Station Systems (MS–BSS) and Base Station System – Mobile-Services Switching Center (BSS–MSC); Signalling Procedures and the Mobile Application Part (MAP)	
TS 29.060	General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) across the Gn and Gp Interfaces	
TS 29.202	SS7 Signalling Transport in Core Network; Stage 3	Rel 4 and Rel 5 versions being revised.
TS 29.228	IP Multimedia (IM) Subsystem Cx and Dx interfaces; Signalling Flows and Message Contents	Rel 5 version being revised.
TS 29.229	Cx and Dx Interface based on the Diameter Protocol; Protocol Details	
TS 29.232	Media Gateway Controller (MGC) – Media Gateway (MGW) Interface; Stage 3	Rel 4 and Rel 5 versions being revised.
TS 29.328	IP Multimedia (IM) Subsystem Sh interface; Signalling Flows and Message Content	Rel 5 version being revised.
TS 29.329	Sh Interface based on the Diameter Protocol; Protocol Details	
TS 30.002	Guidelines for the modification of the Mobile Application Part (MAP) in Phase 2	Rel 5 version being published.

TSG CN WG5 (OSA)

3GPP TSG CN Working Group 5 (CN5) defines the Stage 3 protocol for interfaces specific to the UMTS Open Service Access (OSA). It develops APIs (Application Programming Interfaces) for OSA. The UMTS network provides these interfaces to facilitate service implementations. CN5 work is based on Service Requirements from SA1 and the Architecture defined by SA2.

It has been decided that CN5 will only bring Change Requests (CRs) to TSG meetings every 6 months, in order to synchronize with the Parlay specifications. Therefore, there were no CRs at the last meeting, and this is the reason why there is no updated list of specifications in this report.

Meetings

The last plenary meeting of TSG CN#18 was held December 4 – 8, 2002 in New Orleans, USA.

The next plenaries will be held:

- March 11 – 14, 2003 in Jersey, Channel Islands (British Isles);
- June 3 – 6, 2003 in Hammenlinna, Finland;
- September 16 – 19, 2003 in Berlin, Germany; and
- December 9 – 12, 2003 in Hawaii, USA.

Full meeting information is available at:

www.3gpp.org/Meetings/meetings.htm

Status of TIA-2001-B IOS (BS-MS-C “A” Interface) Implementations

IOS Interfaces	TIA-2001 IOS Equipment Vendor										
	Alcatel	Ericsson	Fujitsu	Hitachi	Huawei	Lucent	Motorola	NEC	Nortel	Samsung	ZTE
A1, A2, A5 – (BS-MS-C Interface)		Ⓢ		Ⓢ		√	√		√	√	
A3, A7 – (BS-BS Interface)		√		Ⓢ		√	√		√	√	
A8, A9 – (BS-PCF Interface)				Ⓢ			√				
A10, A11 – (PCF-PDSN Interface)		Ⓢ		Ⓢ		√	√		√	√	
Abis – (BTS-BSC Interface)	<i>Not implemented by any vendors.</i>										

Symbols	
√	In field trial or commercial service.
XQ'XX	Specifies the quarter during which commercial availability is expected (e.g. 4Q'01).
Ⓢ	In lab trial.
Ⓢ	Under Development
Red Bold	Red and bold indicate a change in status since the last report.

Terms & Acronyms
See www.cnp-wireless.com/glossary.html

3GPP2 TSG-X Core Network Specifications

Cellular Networking Perspectives

Editor: David.Crowe@cnp-wireless.com

First publication

- Note: 1. X.S - TSG-X Specification; XR - TSG-X Report; XP - TSG-X Project.
2. Bold Type indicates a modification since the previous publication of this information.
3. Published 3GPP2 specifications will be available at: http://www.3gpp2.org/Public_html/specs/index.cfm
4. Most TSG-X specifications are still only available as their TSG-N, TSG-P or TIA equivalent.

3GPP2 Core Network Technical Specification Group - Projects

Standard	Description	Status
X.P-0001	CDMA Packet Data Service Rev-1	See TIA/EIA/ IS-880-A
X.P-0002	LS Authentication/Privacy/Security And Enhancements	See TIA/EIA/ IS-881
X.P-0003	TIA/EIA-41-D Network Enhancements to Support CDMA SIM Roaming to GSM	See TIA/EIA/ IS-868
X.P-0004	TIA/EIA-41-E Integration	See TIA/EIA-41-E
X.P-0005	TIA/EIA-41-F Integration	See TIA/EIA-41-F
X.P-0006	TIA/EIA-41 Enhanced Security Services (ESA/AKA)	See TIA/EIA-41-D
X.P-0007	TIA/EIA-41 Enhancements for Secure Mode OTASP and OTAPA	See TIA/EIA-906
X.P-0008	TIA/EIA-41 Support for the Mobile Equipment Identity (MEID)	See TIA-928
X.P-0009	WIN Location-based Services Phase III	See IS-843
X.P-0010	WIN Pre-Paid Charging Enhancements	See TIA/EIA/ IS-826-A
X.P-0011	TIA/EIA-836 Enhancements	See TIA/EIA-835-C
X.P-0013	IP Core Network - Multimedia Domain	See TIA/EIA/ IS-873
X.P-0014	Wireless Radio Telecommunications Intersystem Non-Signaling Data Communication DMH (Data Message Handler)	See TIA-124-E
X.P-0015	Accounting and Auditing All-IP System Requirements	
X.P-0016	Multimedia Message Services	See TIA-934
X.P-0017	Open Service Access (OSA): Application Programming Interface	See TIA-937
X.P-xxxx	Subscribed Rate for Packet Data	

X.P-xxxx Enhanced Message Service

X.P-xxxx IP-based Service Architecture

X.P-xxxx Prepaid Service Support for HRPD

X.P-xxxx Internet Over-the-Air Handset Configuration

X.P-xxxx File and Media Format for Multimedia Services

X.P-xxxx Common Security Algorithms

X.P-xxxx 1xEV-DV Capabilities

X.P-xxxx Wireless Applications Management

X.P-xxxx IP Broadcast and IP Multicast

X.P-xxxx Multimedia Streaming

X.P-xxxx Network Initiated Data Session

X.P-xxxx Enhanced Call Recovery

X.P-xxxx Enhanced Packet Data Air Interface Security

X.P-xxxx Wideband Speech Codec for CDMA2000 Systems

X.P-xxxx Security Framework for Data Services via HRPD

X.P-xxxx IP-based Location Services (LCS)

X.P-xxxx Standardized Packet Data Performance Testing

X.P-xxxx Wireless Local Area Network (WLAN) Interworking with CDMA2000

X.P-xxxx Voice Over IP (VoIP)

X.P-xxxx End to End QoS

X.P-xxxx Diameter Base Protocol Support