

International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Q.1742.7

(10/2008)

SERIES Q: SWITCHING AND SIGNALLING

Signalling requirements and protocols for IMT-2000

**IMT-2000 References (approved as of
30 June 2008) to ANSI-41 evolved Core
Network with cdma2000 Access Network**

Recommendation ITU-T Q.1742.7



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Recommendation ITU-T Q.1742.7

IMT-2000 References (approved as of 30 June 2008) to ANSI-41 evolved Core Network with cdma2000 Access Network

Summary

Recommendation ITU-T Q.1742.7 associates the published core network standards from the regional standards development organizations (SDOs) with those 3GPP2 specifications that were approved as of 30 June 2008 for the IMT-2000 Family Member "ANSI-41 evolved Core Network with cdma2000 Access Network."

3GPP2 specifications that were approved as of 17 July 2001 were associated with the published core network standards from the regional standards development organizations in Recommendation ITU-T Q.1742.1. 3GPP2 specifications that were approved as of 11 July 2002 were associated with the published core network standards from the regional standards development organizations in Recommendation ITU-T Q.1742.2. 3GPP2 specifications that were approved as of 30 June 2003 were associated with the published core network standards from the regional standards development organizations in Recommendation ITU-T Q.1742.3. 3GPP2 specifications that were approved as of 30 June 2004 were associated with the published core network standards from the regional standards development organizations in Recommendation ITU-T Q.1742.4. 3GPP2 specifications that were approved as of 31 December 2005 were associated with the published core network standards from the regional standards development organizations in Recommendation ITU-T Q.1742.5. 3GPP2 specifications that were approved as of 31 December 2006 were associated with the published core network standards from the regional standards development organizations in Recommendation ITU-T Q.1742.6. The radio interface and radio access network and standards from the SDOs for this IMT-2000 Family Member are associated in Recommendation ITU-R M.1457-6. The associations for other IMT-2000 Family Members are identified in the ITU-T Q.174x-series Recommendation.

This Recommendation combines and associates the regional standards for the core network of this IMT-2000 Family Member into a global Recommendation.

Source

Recommendation ITU-T Q.1742.7 was approved on 14 October 2008 by ITU-T Study Group 19 (2005-2008) under Recommendation ITU-T A.8 procedure.

Keywords

ANSI-41, cdma2000, Core Network, IMT-2000, third generation system.

FOREWORD

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In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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Recommendation ITU-T Q.1742.7

IMT-2000 References (approved as of 30 June 2008) to ANSI-41 evolved Core Network with cdma2000 Access Network

1 Scope

This Recommendation identifies the IMT-2000 Family Member; "ANSI-41 evolved Core Network with cdma2000 Access Network." This set of referenced specifications includes those 3GPP2 specifications that were approved as of 30 June 2008.

The Core Network interfaces identified in this Recommendation and the radio interfaces and radio access network interfaces identified in Recommendation ITU-R M.1457 [1] constitute a complete system specification for the 3rd generation mobile system for terrestrial usage of this IMT-2000 Family Member.

It is the intent of the ITU-T that the references in this Recommendation are only to specifications that specify the network aspects of this IMT-2000 family member. In the event that a referenced specification also includes material that specifies any of the radio aspects of this IMT-2000 family member, Recommendation ITU-R M.1457 [1], shall take precedence.

NOTE – The structure and content of this Recommendation have been organized for ease of use by those familiar with the original source material; as such, the usual style of ITU-T Recommendations has not been applied.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [1] Recommendation ITU-R M.1457 (2001): Detailed specifications of the radio interfaces of international mobile telecommunications-2000 (IMT-2000)
- [2] ANSI; TIA/EIA 41D (1997): Cellular Radiotelecommunications Intersystem Operations (ANSI/TIA/EIA-41-D-97)
- [3] ANSI; TIA/EIA 95 (1999): Mobile Station-Base Station Compatibility Standard for Wideband Spread Spectrum Cellular Systems (ANSI/TIA/EIA-95-B-99)
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- [5] ANSI; TIA/EIA 136 (2001): TDMA Cellular PCS (ANSI/TIA/EIA-136, Rev C-2001)
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- [9] TIA Specification IS-2000 (2000): CDMA 2000 Series (TIA/EIA/IS-2000 Series Revision A)

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- [12a] CWTS; CWTS-MC-S.R0005-B (2002): Network Reference Model for cdma2000 Spread Spectrum Systems
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- [14] TIA/EIA TSB29-E (2002) International Implementation of Wireless Telecommunication Systems Compliant with TIA/EIA-41
- [15] TIA/EIA/IS-826 (2003) TIA/EIA-41-D Based Pre-Paid Charging Enhancements for Circuit Switched Data and Short Message (2003)

3 Definitions

This Recommendation defines the following terms:

Active: The MS is available for call delivery. This state is maintained by the MSC, the VLR and the HLR. (See also Available, Inactive and Unavailable.)

Access Denial Call Treatment: A tone, announcement, or call redirection applied as appropriate.

Access Network: Network that connects access technologies (such as a Radio Access Network) to the core network.

Adjunct MSC: A Mobile Switching Centre (MSC) that is providing adjunct services such as voice response, voice recognition, DTMF tone detection, voice message storage, etc.

Anchor MSC: The Mobile Switching Centre (MSC), that is the first to assign a traffic channel to a call on origination or termination is called the Anchor MSC. For the duration of this call, this MSC shall be the anchor (fixed) point in the event that the Mobile Station (MS) should be handed off to other MSCs.

Authentication: The act of verifying the identity of an entity (e.g., a user, device).

Available: The MS can accept a call delivery (i.e., the MS is in a known location and it is in a state able to accept call deliveries). The availability of a MS to accept a call delivery is maintained only by the MSC. (See also Active, Inactive and Unavailable.)

Base Transceiver Station: A piece of radio access network equipment that contains the radios and serves a geographic area.

Call Delivery: The process by which calls directed to the cellular subscriber are delivered to the subscriber while roaming in a visited system.

Call Delivery Method: Method by which a call is delivered to a subscriber in MSC-V.

Call Disconnect: The process of requesting the release of a connection between two or more network addresses.

Call Release: The process of relinquishing the facilities and circuits used for a call.

Call Termination: The process of connecting a subscriber to an incoming call.

Candidate MSC: This term is used during the handoff measurement request by the current serving MSC to reference the MSC that is being requested to provide its best CELL ID and SIGNAL QUALITY values.

Cell Site: The physical location of a cell's radio equipment and supporting systems. This term is also used to refer to the equipment located at the cell site.

Clearinghouse: A service used for the exchange and management of information.

Data Communications: The digital transmission of information (other than voice).

Dialogue: A user interaction sequence composed of tones and announcements that may gather information.

Gateway MSC: See MSC-G.

Home System: The system which is transmitting the System Identifier (SID) (refer to *EIA/TIA-553*) which is recognized by the MS as the "Home" SID.

Inactive: The MS is not available for call delivery. The MS may not be registered. The MS may be registered, but is out of radio contact (e.g., missing autonomous registrations) or is intentionally inaccessible for periods of time (e.g., slotted mode, paging frame class, or sleep mode). An inactive MS may accept SMS message deliveries. This state is maintained by the MSC, the VLR and the HLR. (See also Active, Available, and Unavailable.)

Market Identification (MarketID): A unique market identifier that is specified by the service provider (e.g., FCC assigned SID, CIBERNET assigned BID – see *TIA/EIA TSB29*).

Mobile Assisted Handoff (MAHO): A process where handoff measurements are done by the MS under the control of the MSC and Base Station. The MSC and Base Station retain the control over when the handoff actually occurs.

Mobility: The ability to access services from any point in the network. The degree of service availability may depend on the access network capabilities, as well as any service level agreements between the user's home network and the visited network. Types of mobility include personal mobility, service mobility, and terminal mobility.

Mobility Management: The set of functions used to manage a mobile user accessing a network other than that user's home network. These functions include communication with the home network for purposes of authentication, authorization, location updating and download of user information.

MSC-G: An MSC that is capable of the Intersystem procedures, defined in this Recommendation, between entities in the network reference model so as to provide service.

MSC-H: The "home" MSC of an MS which is broadcasting the SID that is recorded in the MS's Security and Identification memory, and to which the MS's Directory Number is assigned.

MSC-V: A "visited" MSC in whose service area a roamer is operating.

Network Reference Model: The functional entities and the associated interface reference points that may logically comprise a cellular network. (See clause 6.)

Number Portability: A mechanism that allows a user to retain the same directory number, regardless of the subscribed-to service provider. Number portability may be limited to specific

geographical areas. In the context of the All-IP network, the term "number portability" refers specifically to ITU-T E.164 numbers used for telephony.

Originating MSC: The MSC-H or MSC-G that initiates the call delivery procedures defined in this Recommendation.

Originating SMS supplementary service: Services or features that affect SMS message originations and are requested on a per message basis as supported by a particular teleservice, for example, delayed delivery, or message distribution to a list of destinations.

Personal Mobility: The ability of users to change their association with one or more terminals at any point and time. The user should continue to receive subscribed and otherwise authorized services as supported by the current MS and access network.

Personalized Services: Services that need access to the subscriber profile and/or are dependent on the overall call/session state (of the user) for reasons of service interaction. An example: a call termination service such as TIA/EIA-41's "Call Forward on Busy".

Protocol Extension: A mechanism provided to allow systems with a common bilateral agreement to extend the *TIA/EIA-41* protocol. There is a range of reserved Error Codes, Operation Codes, Parameter Identifiers (in addition to PRIVATE Parameter Identifiers), and ranges of values in enumerated parameter types and data fields. The only mechanism to resolve conflicting uses of protocol extension is to standardize their usage. The Protocol Extension mechanism is used at the risk of the implementation. Protocol Extensions should not be used unless the message recipient is known to support them.

Radio Access Network: The network that connects radio base stations to the core network. The RAN provides and maintains radio-specific functions, which may be unique to a given radio access technology, that allow users to access the core network.

Registered: The HLR has a pointer to a system serving an MS. A registered MS may be active or inactive.

Registration: The procedure by which a MS becomes listed as being present in the service area of an MSC.

Remote Feature Control Port (RFC Port): A terminating directory number supporting service profile modification.

Roamer Port: A terminating directory number supporting call delivery to mobile stations.

Roamer Service Profile: The specific set of features, capabilities and/or operating restrictions, other than financial accountability, associated with the subscriber.

Roamer Validation: That aspect of roamer service qualification dealing with financial accountability. Also, the general procedure by which a roamer's financial accountability is established.

Roaming: Action whereby users access services while outside of their subscribed home network.

Service Qualification: The service capabilities, features and privileges to which an MS is entitled. Also, the general procedure by which such service capabilities, features, and privileges become established in an MSC.

Serving MSC: The MSC which currently has the MS obtaining service at one of its cell sites within its coverage area.

Signaling: The information exchanged between the mobile station and the network, or within the network, for the purposes of service provision (e.g., connection establishment).

Switch Number (SWNO): A number uniquely identifying a particular switch (i.e., a group of cell sites and the associated switch resources) within a group of switches associated with a common MarketID.

Target MSC: The MSC which was selected from the candidate list as having the cell site with the best signal quality value for the MS during the location request function.

Temporary Local Directory Number (TLDN): A network address temporarily assigned for call setup.

Terminating SMS supplementary service: Services or features that affect SMS message terminations, for example, screening, forwarding, delivery to an MS, delayed delivery while roaming, or distribution to a group based upon a destination address.

Termination Address: One or more digits, as determined by the Home System, which identify the Terminating Party. This could include Speed Call Codes (when supported by the Home Service Provider), other Mobile Telephone Numbers or any valid World Telephone Number.

Traffic: Information generated by the subscriber that is transported on the network (i.e., user voice or data).

Unavailable: The MS cannot accept a normal call delivery (i.e., the MS is in an unknown location or it is in a state unable to accept call deliveries). The availability of an MS to accept a call delivery is maintained only by the MSC. (See also Active, Available, and Inactive.)

Unregistered: A state where the MS is unavailable for any type of termination event and the HLR pointer is not directed to any visited system.

Visited Network: The visited network is a carrier's network where a subscriber currently is roaming. The term visited network is more business significant, than geographically significant.

Visited System: From the MS's perspective, a system which is transmitting a SID which is not recognized by the MS as the "Home" SID. From a network perspective, the system in which an MS is currently registered.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations:

μ	Microsecond (10^{-6} second)
3G	Third Generation
3GPP2	Third Generation Partnership Project (ANSI driven)
AAA	Authentication, Authorization, and Accounting
AC	Authentication Centre
ADDs	Application Data Delivery Service
ADPCM	Adaptive Differential Pulse Code Modulation
ADS	Asynchronous Data Service
AGW	Access GateWay
AH	Answer Hold
AMPS	Advanced Mobile Phone System
ANSI	American National Standards Institute
AOC	Advice of Charge

API	Application Programming Interface
ARIB	Association of Radio Industries and Businesses (Japan)
AS	Application Server
BCMCS	Broadcast-Multicast Services
BCSMs	Basic Call State Models
BS	Base Station
BSC	Base Station Controller
BTS	Basic Transceiver System
CAN	Converged Access Network
CCF	Call Control Function
CDCP	Call Data Collection Point
CDGP	Call Data Generation Point
CDIS	Call Data Information Source
CDMA	Code Division Multiple Access
CDRP	Call Data Rating Point
CMIP	Client Mobile IP
CN	Core Network
CNAP	Calling Name Presentation
CNAR	Calling Name Restriction
CNIP	Calling Number Identification Presentation
CSC	Customer Service Centre
CSCF	Call Session Control Functions
CWTS	China Wireless Telecommunication Standard Group
DCCH	Dedicated Control Channel
DFP	Distributed Functional Plane
DMH	Data Message Handler
DP	Detection Point
DP	Data Privacy
DSA	Data Subscriber Authentication
DTMF	Dual Tone Multi-Frequency
E2E	End-to-End
eBS	evolved Based Station
EIA	Electronics Industry Association
EIR	Equipment Identity Register
EMS	Enhanced Message Service
ESN	Electronic Serial Number
ESP	Encapsulating Security Payload

FCC	Federal Communications Commission
FFMA	File Format for Multimedia Services
FPH	FreePhone
FPLMTS	Future Public Land Mobile Telecommunications Systems – now IMT-2000
GEEO	Global ECO (Emergency Call Origination)
GSM	Formerly: Group Special Mobile, Now: Global System For Mobile Communications
HA	Home Agent
HLR	Home Location Register
HSS	Home Subscriber Server
IM	IP Multimedia Call Model
IMS	IP Multimedia core network Subsystem
IMSI	International Mobile Subscriber Identity
IMT	International Mobile Telecommunications
IMT-2000	International Mobile Telecommunications – 2000
IOTA	IP Over-the-Air
IOTA HCM	Internet based Over-the-Air Handset Configuration Management
IP	Internet Protocol
IP	Intelligent Peripheral
IPE	In Path Equipment
IS	Interim Standard
ISDN	Integrated Services Digital Network
ISIM	IP multimedia Services Identity Module
ISLP	InterSystem Link Protocol
IWF	InterWorking Function
LBSS	Location Based Services System
LMA	Local Mobility Agent
LMSD	Legacy Mobile Station Domain
MAP	Mobile Application Part
MC	Multi-Carrier
MC	Message Centre
MDN	Mobile Directory Number
MEID	Mobile Equipment Identifier
MGW	Media Gateway
MHz	Megahertz (10^6 Hertz)
MM	Multimedia Message
MMS	Multimedia Messaging Service

MS	Mobile Station
MSC	Mobile Switching Centre
MSID	Mobile Station Identifier
NAM	Number Assignment Module
NAMPS	Narrowband Advanced Mobile Phone Service
NDSS	Network Directed System Selection
NRM	Network Reference Model
OAM&P	Operations, Administration, Maintenance and Provisioning
OSA	Open Service Access
OTAF	Over the-Air Function
OTAPA	Over-the-Air Parameter Administration
OTASP	Over-the-Air Service Provisioning
PCF	Packet Control Function
PCS	Personal Communications Service
PCS	Personal Communications System
PDE	Positioning Determining Entity
PDS	Packet Data Surveillance
PDSN	Packet Data Serving Node
PL	Preferred Language
PMIP	Proxy Mobile IP
PN	Project Number
PPC	Pre-Paid Charging
PPP	Point-to-Point Protocol
PRC	Premium Rate Charging
RAN	Radio Access Network
RUAC	Rejection of Undesired Annoying Calls
R-UIM	Removable User Identity Module
SC	Subscriber Confidentially
SCF	Selective Call Forwarding
SCF	Session Control Function
SCP	Service Control Point
SCS	Service Capability Server
SDO	Standards Development Organization
SDP	Session Description Protocol
SID	System Identifier
SIP	Session Initiation Protocol
SME	Short Message Entity

SMS	Service Management System
SMS	Short Message Service
SMTP	Simple Mail Transfer Protocol
SN	Service Node
SRG	System Release Guide
SRNC	Session Reference Network Controller
SS7	Signaling System 7
SSF	Service Switching Function
SSG	Special Study Group
TFO	Tandem Free Operation
TrFO	Transcoder Free Operation
TIA	Telecommunications Industry Association
TMSI	Temporary Mobile Station Identification
TRAU	Transcoder and Rate Adaptor Unit
TSB	Telecommunications Systems Bulletin
TTA	Telecommunications Technology Association (Korea)
TTC	Telecommunication Technology Committee (Japan)
UICC	Universal Integrated Circuit Card
UIM	User Identity Module
UMB	Ultra Mobile Broadband
USCF	User Selective Call Forwarding
VASP	Value-Added Service Provider
VLR	Visitor Location Register
WIN	Wireless Intelligent Network
WLL	Wireless Local Loop
WNP	Wireless Number Portability

5 Introduction

The Core Network for cdma2000 is based on an evolved ANSI-41 2nd generation mobile system. The core network technical specifications have been developed in a third generation partnership project (approved in 3GPP2 as of 30 June 2008) and transposed to the involved regional Standards Development Organizations (SDOs). The system will support different applications ranging from narrow-band to wideband communications capability with integrated personal and terminal mobility to meet the user and service requirements.

The Core Network interfaces identified in this Recommendation and the radio interfaces and radio access network interfaces identified in Recommendation ITU-R M.1457 [1] constitute a complete system specification for the 3rd generation mobile system for terrestrial usage of this IMT-2000 Family Member.



The descriptions in clauses 6, 7, and 8 and the descriptions of the Technical Specifications listed in clause 10 are for informative purposes only. Normative information is in the tables for the respective specification.

6 Basic architecture for the ANSI-41 evolved Core Network with cdma2000 Access Network family member

The basic architecture for the ANSI-41 evolved Core Network with cdma2000 Access Network family member includes a circuit-based and packet-based core network and an all-IP multimedia domain.

The following text is based on reference [12 a-d] clause 2.1.

Figure 6-1 presents the network entities and associated reference points that comprise the ANSI-41 evolved Core Network with cdma2000 Access Network. The network entities are represented by squares, triangles and rounded corner rectangles; circles represent the reference points. The network reference model in this Recommendation is the compilation of several reference models currently in use.

- The network reference model is a functional block diagram.
- A network entity represents a group of functions, not a physical device. For example, a Mobile Switching Centre (MSC) is a physical device; it comprises frames, shelves, circuit packs, etc. The physical device may comprise a single network entity such as the MSC, or it may comprise some combination such as the MSC, the Visitor Location Register (VLR), the Home Location Register (HLR), and the Authentication Centre (AC). The physical realization is an implementation issue; a manufacturer may choose any physical implementation of network entities, either individually or in combination, as long as the implementation meets the functional requirements. Sometimes, for practical reasons, the functional network entity is a physical device. The Mobile Station (MS) is an excellent example.
- A reference point is a conceptual point that divides two groups of functions. It is not necessarily a physical interface. A reference point only becomes a physical interface when the network entities on either side of it are contained in different physical devices.
- A "Collective Entity" contains encompassed network entities that are an instance of the collective.
- A "Composite Entity" contains encompassed network entities that are part of the composite.

entities are represented by squares and rectangles; the interfaces between network entities are reference points identified by numbers. Figure 6-2 includes several reference points that have dual labels. Either of these labels may be used in the specifications relating to these reference points.

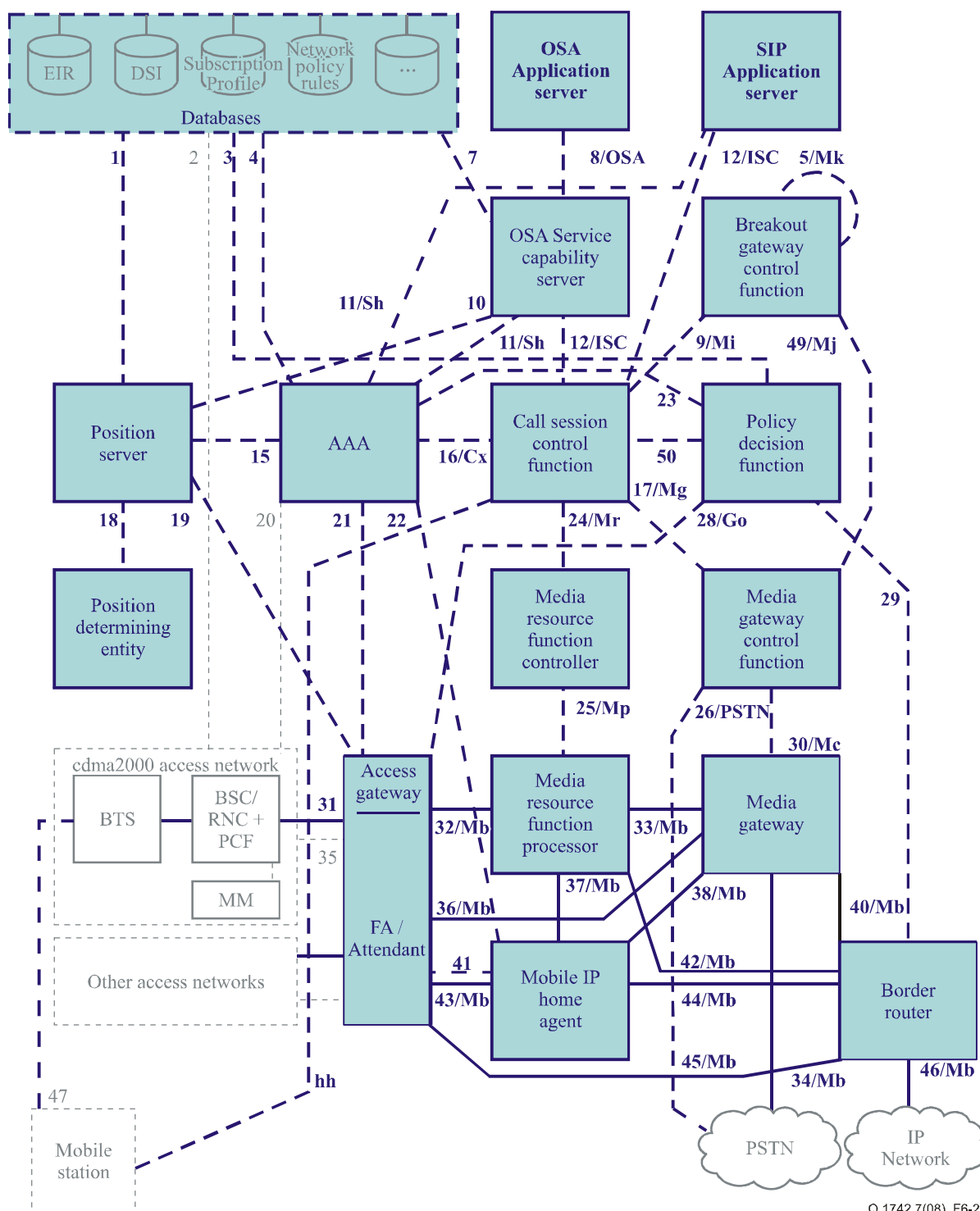


Figure 6-2 – ANSI-41 evolved Core Network with cdma2000 Access Network IP MMD Core Network Architecture Model

The MMD of the All-IP Network offers both general packet data support and multi-media session capabilities. The multi-media session capabilities are built on top of the general packet data support capabilities. The general packet data capabilities may be deployed without the multi-media session capabilities. Some network entities are common to providing both capabilities.

Figure 6-3 shows the entities that comprise the general packet data support portion of the MMD core network. These are known collectively as the Packet Data Subsystem (PDS). Figure 6-3 includes several reference points that have dual labels. Either of these labels may be used in the specifications relating to these reference points.

NOTE 2 – In Figure 6-3, the network elements and reference points highlighted in "blue" identify the "Packet Data Subsystem".

Figure 6-3

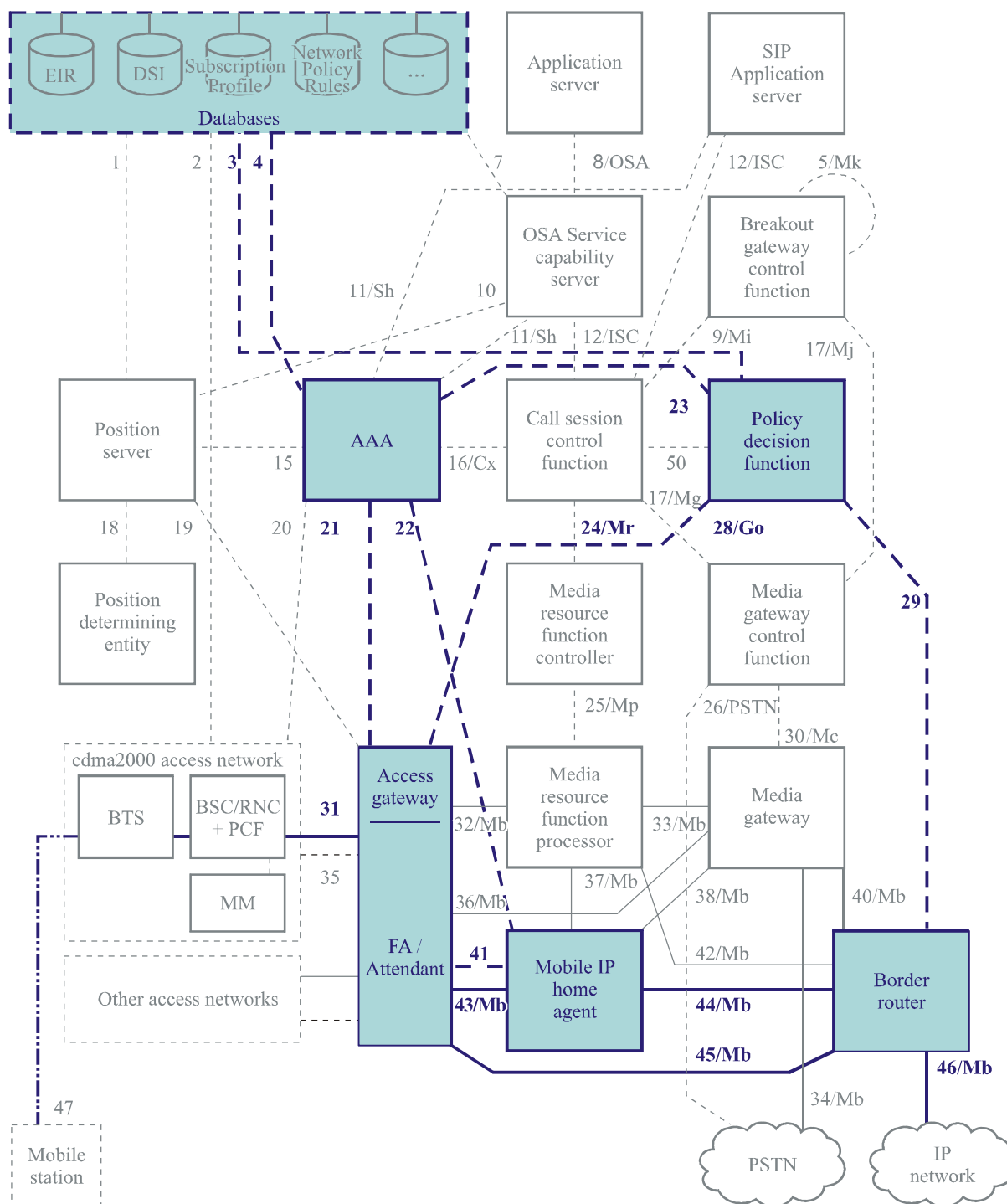
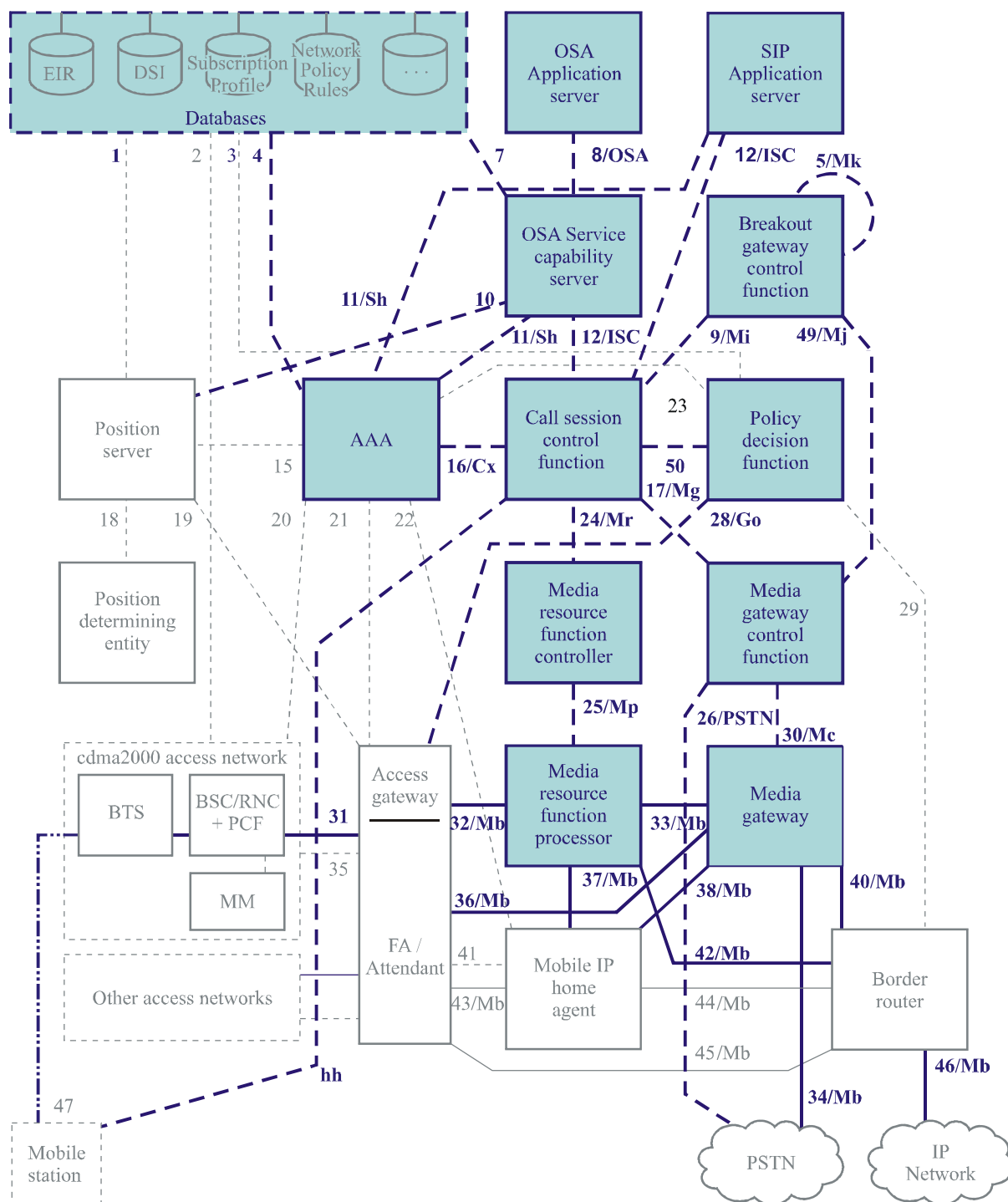


**Figure 6-3 – ANSI-41 evolved Core Network with cdma2000 Access Network
Packet Data Subsystem Core Network Architecture Model**

Figure 6-4 shows the entities that comprise the multimedia session capabilities of an All-IP network. These entities are known collectively as the IP Multimedia Session Subsystem (IMS). Figure 6-4 includes several reference points that have dual labels. Either of these labels may be used in the specifications relating to these reference points.

NOTE 3 – In Figure 6-4, the "IP Multimedia Session Subsystem" is identified by the network elements and reference points highlighted in "blue".



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Figure 6-4 – ANSI-41 evolved Core Network with cdma2000 Access Network IP Multimedia Session Subsystem Core Network Architecture Model

The session control functions within the IMS are logically interconnected in various ways in the session scenarios. Figure 6-5 identifies the reference points within the IMS between these session control entities. In many cases there are dual labels for these reference points either of which may be used in the applicable specifications.

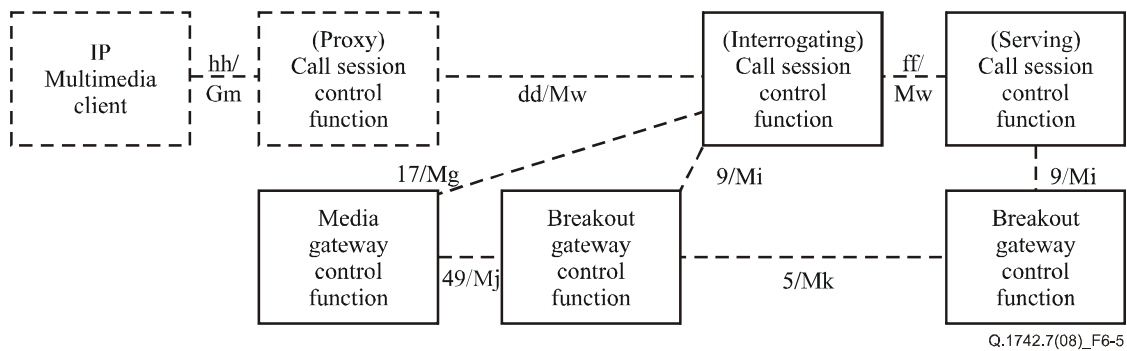


Figure 6-5 – Session Control Reference Model

Figure 6-6 shows the network reference model for the Converged Access Network (CAN) for the non-roaming case. This system supports access via the Ultra Mobile Broadband (UMB) air interface.

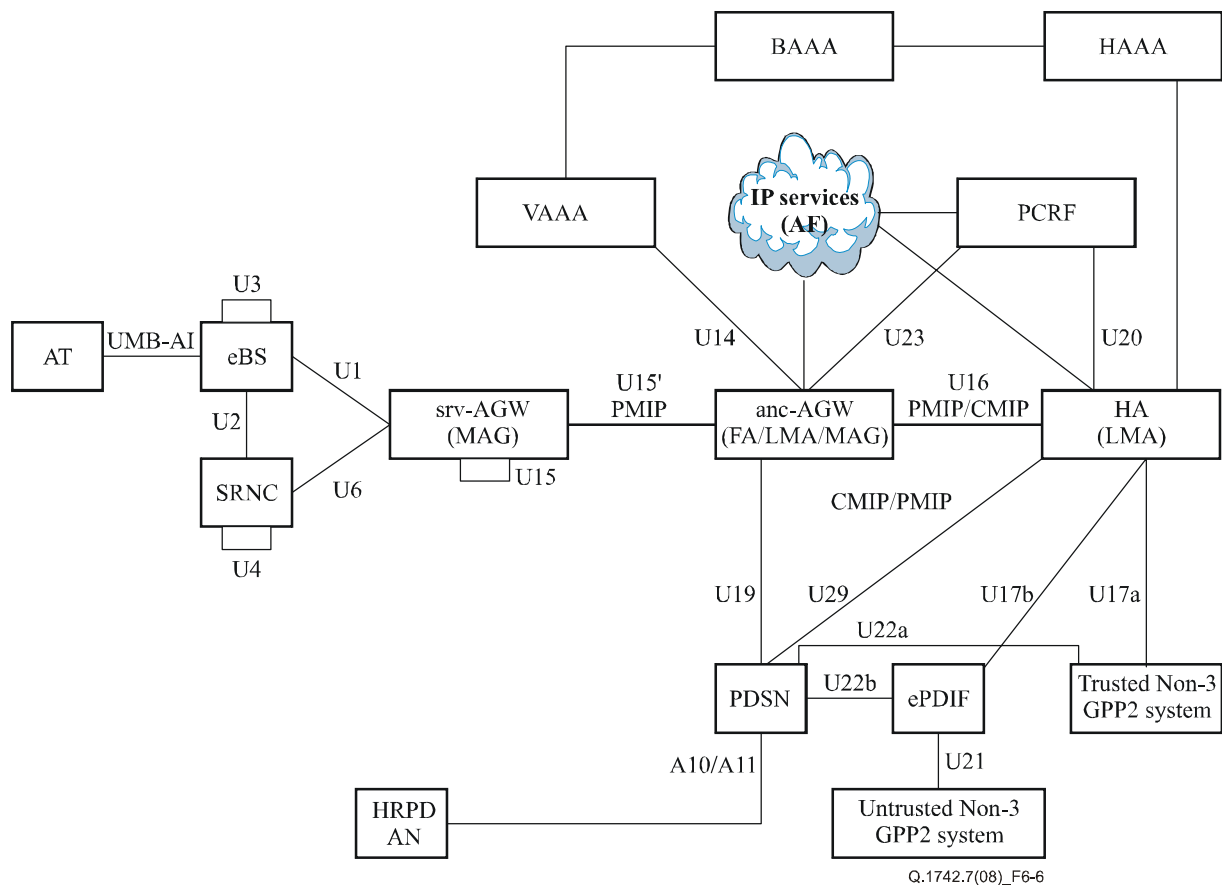


Figure 6-6 – Converged Access Network Reference Model, non-Roaming

Figure 6-7 shows the network reference model for the Converged Access Network (CAN) for the roaming case.

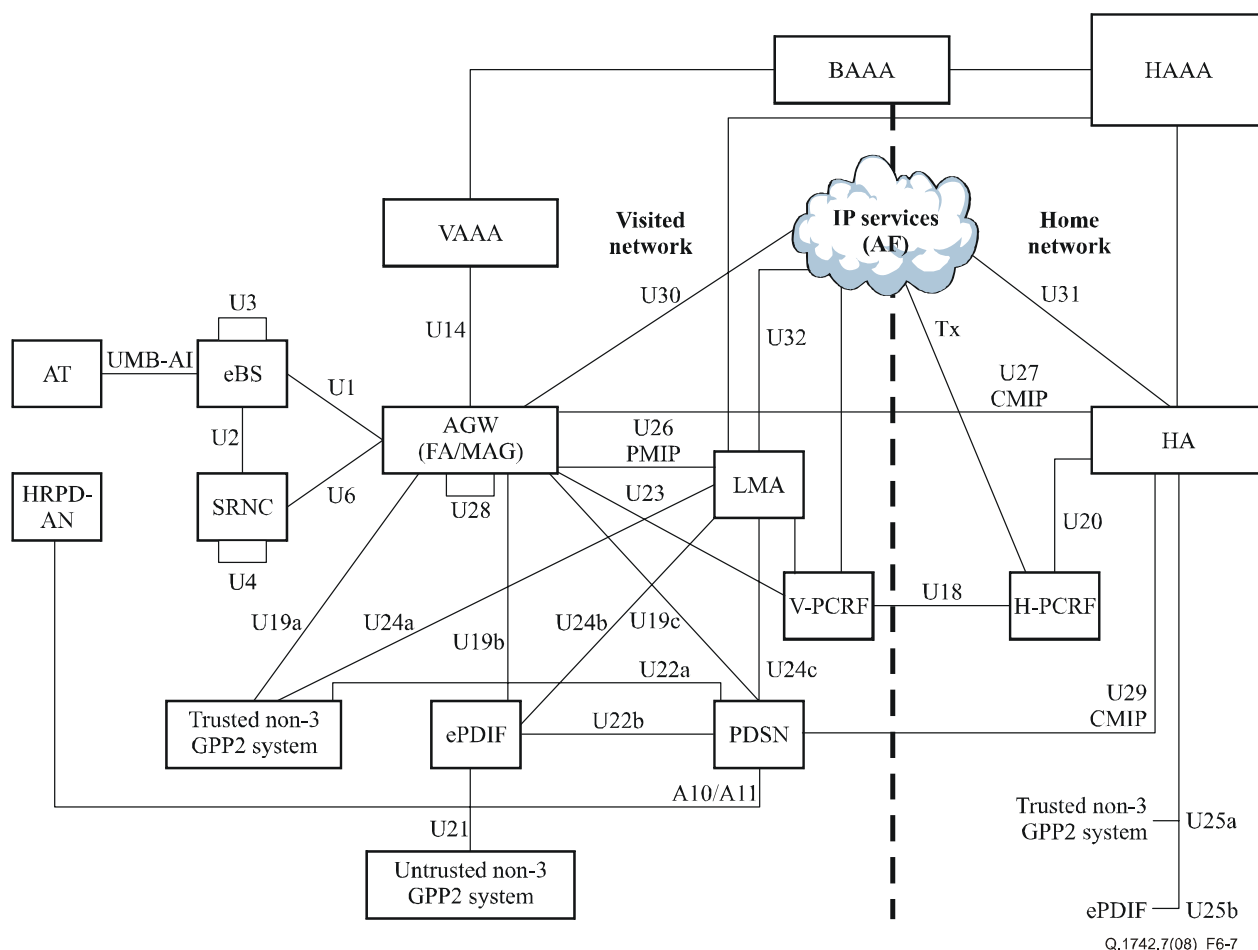


Figure 6-7 – Converged Access Network Reference Model – Roaming

7 Network Entities

7.1 Authentication, Authorization and Accounting (AAA)

The AAA is an entity that provides IP based Authentication, authorization, and Accounting. The AAA maintains security associations with peer AAA entities to support intra- and/or inter-administrative domain AAA functions.

- The Authentication Function provides Authentication of users.
- The Authorization Function of AAA provides authorization of service requests based on subscriber profiles, and network policy. It also generates keys required for establishing security associations between PDSNs in access provider networks and HAs in home IP networks.

The Accounting Function gathers accounting data concerning the services used by individual subscribers.

7.2 Authentication Centre (AC)

The AC is an entity that manages the authentication information related to the MS. The AC may, or may not be located within, and be indistinguishable from an HLR. An AC may serve more than one HLR.

7.3 Call Data Collection Point (CDCP)

The CDCP is the entity that collects the call detail information.

7.4 Call Data Generation Point (CDGP)

The CDGP is an entity which provides call detail information to the CDCP [in ANSI-124 format]. This may be the entity that converts call detail information from a proprietary format into a standard format. All information from the CDGP to the CDCP must be in this standard format.

7.5 Call Data Information Source (CDIS)

The CDIS is an entity that can be the source of call detail information. This information may be in proprietary format. It is not required to be in the standard format.

7.6 Call Data Rating Point (CDRP)

The CDRP is the entity that takes the unrated call detail information and applies the applicable charge and tax related information. The charge and tax information is added using the standard format.

7.7 Collection Function (CF) – [Intercept]

The CF is an entity that is responsible for collecting intercepted communications for a lawfully authorized law enforcement agency.

The CFs typically include:

- the ability to receive and process call contents information for each intercept subject;
- the ability to receive information regarding each intercept subject (e.g., call associated or non-call associated) from the Delivery function and process it.

7.8 Coordinate Routing Data Base (CRDB)

The CRDB is an entity that stores information to translate a given position expressed as a latitude and longitude to a string of digits.

7.9 Customer Service Centre (CSC)

The CSC is an entity where service provider representatives receive telephone calls from customers wishing to subscribe to initial wireless service or request a change in the customer's existing service. The CSC interfaces proprietarily with the OTAF to perform network and MS related changes necessary to complete the service provisioning request.

7.10 Delivery Function (DF) – [Intercept]

The DF is an entity that is responsible for delivering intercepted communications to one or more collection functions.

The DFs typically include:

- The ability to accept call contents for each intercept subject over one or more channels from each Access function.
- The ability to deliver call contents for each intercept subject over one or more channels to a Collection function as authorized for each law enforcement agency.
- The ability to accept information over one or more data channels and combine that information into a single data flow for each intercept subject.
- The ability to filter or select information on an intercept subject before delivery to a Collection function as authorized for a particular law enforcement agency.
- The optional ability to detect audio in-band DTMF digits for translation and delivery to a Collection function as authorized for a particular law enforcement agency.

- The ability to duplicate and deliver information on the intercept subject to one or more Collection functions as authorized for each law enforcement agency.
- The ability to provide security to restrict access.

7.11 Equipment Identity Register (EIR)

The EIR is an entity that is the register to which user equipment identity may be assigned for record purposes. The nature, purpose, and utilization of this information is an area for further study.

7.12 evolved Packet Data Interworking Function (ePDIF)

The evolved Packet Data Interworking Function (ePDIF) is an Interworking function for connectivity between a 3GPP2 network and an untrusted non-3GPP2 network (for example, WiFi AP).

7.13 Home Agent (HA)

The HA is an entity that:

- Authenticates Mobile IP registrations from the MS.
- Redirects packets to the foreign agent component of the PDSN, and optionally receives and routes reverse packets from the foreign agent component of the PDSN.
- May establish, maintain and terminate secure communications to the PDSN.
- Receives provisioning information from the AAA Function for users.
- May assign a dynamic home IP address.

Depending on the architectural configuration, the HA may include the Local Mobility Agent (LMA).

7.14 Home Location Register (HLR)

The HLR is the location register to which a user identity is assigned for record purposes such as subscriber information (e.g., Electronic Serial Number (ESN), Mobile Directory Number (MDN), Profile Information, Current Location, Authorization Period).

7.15 Intelligent Peripheral (IP)

The IP is an entity that performs specialized resource functions such as playing announcements, collecting digits, performing speech-to-text or text-to-speech conversion, recording and storing voice messages, facsimile services, data services, etc.

7.16 Intercept Access Point (IAP)

The IAP is an entity that provides access to the communications to, or from, the equipment, facilities, or services of an intercept subject.

7.17 Interworking Function (IWF)

The IWF is an entity that provides information conversion for one or more WNEs. An IWF may have an interface to a single WNE providing conversion services. An IWF may augment an identified interface between two WNEs, providing conversion services to both WNEs.

7.18 IP Services

IP Services comprise any IP-based services provided by the operator or 3rd party. This may be part of the Internet or a closed network.

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7.19 Local Position Determining Entity (LPDE)

The LPDE facilitates the determination of the position or geographical location of a wireless terminal. Each LPDE supports one or more position determining technologies. Multiple LPDEs using the same technology may serve the coverage area of a Mobile Position Centre (MPC) and the multiple LPDEs each using a different technology may serve the same coverage area of an MPC. Local PDEs (LPDEs) reside at the Base Station (BS).

7.20 Managed Wireless Network Entity (MWNE)

A MWNE (within the Collective Entity) or any specific network entity having Operation System wireless management needs, including another Operations System.

7.21 Message Centre (MC)

The MC is an entity that stores and forwards short messages. The MC may also provide supplementary services for Short Message Service (SMS).

7.22 Mobile Position Centre (MPC)

The MPC selects a PDE to determine the position of a mobile station. The MPC may restrict access to position information (e.g., require that the MS be engaged in an emergency call or only release position information to authorized network entities).

7.23 Mobile Switching Centre (MSC)

The MSC switches circuit mode MS originated or MS terminated traffic. An MSC is usually connected to at least one BS. It may connect to the other public networks (PSTN, ISDN, etc.), other MSCs in the same network, or MSCs in different networks. The MSC may store information to support these capabilities.

7.24 Number Portability DataBase (NPDB)

The NPDB is an entity which provides portability information for portable Directory Numbers.

7.25 Over-The-Air Service Provisioning Function (OTAF)

The OTAF is an entity that interfaces proprietarily to CSCs to support service provisioning activities. The OTAF interfaces with the MSC to send MS orders necessary to complete service provisioning requests.

7.26 Packet Data Network (PDN)

A PDN, such as the Internet, provides a packet data transport mechanism between processing network entities capable of using such services.

7.27 Packet Data Serving Node (PDSN)

The PDSN routes MS-originated or MS-terminated packet data traffic. The PDSN establishes, maintains, and terminates link layer sessions to MSs. The PDSN may interface to one or more MSs and may interface to one or more PDNs.

7.28 Position Determining Entity (PDE)

A PDE facilitates determination of the position or geographical location of a wireless terminal. Each PDE supports one or more position determining technologies. Multiple PDEs using the same technology may serve the coverage area of a Mobile Position Centre (MPC) and the multiple PDEs each using a different technology may serve the same coverage area of an MPC.

7.29 Service Control Point (SCP)

The SCP is an entity that acts as a real-time database and transaction processing system that provides service control and service data functionality.

7.30 Service Node (SN)

The SN is an entity that provides service control, service data, specialized resources and call control functions to support bearer-related services.

7.31 Short Message Entity (SME)

The SME is an entity that composes and decomposes short messages. A SME may, or may not be located within, and be indistinguishable from, an HLR, MC, VLR, MS, or MSC.

7.32 Visitor Location Register (VLR)

The VLR is the location register other than the HLR used by an MSC to retrieve information for handling of calls to or from a visiting subscriber. The VLR may, or may not be located within, and be indistinguishable from an MSC. The VLR may serve more than one MSC.

7.33 Voice Message Centre (VMS)

A VMS stores received voice messages, data messages, e.g., email, or both message types and supports a method to retrieve previously stored messages. A VMS may also support (on a Directory Number basis) notification of the presence of stored messages and notification of a change in the number of voice messages, data messages, or both message types that are waiting retrieval.

7.34 Wireless Network Entity (WNE)

A Network Entity in the wireless Collective Entity.

The remaining text in this clause is based on reference [13 a-c] clause 2.1.

7.35 Access Gateway (AGW)

The Access Gateway (AGW) is an entity that provides the user's "point of IP connectivity" to the network. That is, the AGW is in effect the first-hop router for the mobile terminal. The AGW performs layer 3 services and above, including hot-lining, accounting, policy enforcement, etc.

7.36 Access Terminal (AT)

The access terminal is the subscriber device supported by the network.

7.37 Application Server

Application Servers provide value-added network-based services for wireless subscribers. These services may be accessed via the OSA Service Capability Server (OSA-SCS) or accessed directly from the user's mobile station via other network entities, by-passing the OSA-SCS.

7.38 Authentication, Authorization and Accounting (AAA)

The AAA is an entity that provides IP-based Authentication, authorization, and Accounting. The AAA maintains security associations with peer AAA entities to support intra- and/or inter-administrative domain AAA functions.

- The Authentication Function is an entity that provides Authentication of terminal devices and subscribers.

- The Authorization Function of AAA provides authorization of requests for services and/or bandwidth, etc. and has access to the Policy Repository, the Directory Services, Subscriber Profiles, and the Device Register.
- The Accounting Function gathers data concerning the services, QoS, and multimedia resources requested and used by individual subscribers.

7.39 Border Router (BR)

The BR connects the Core Network with peer networks (e.g., other service providers, corporate networks, Internet). The BR performs IP packet routing, exterior gateway routing protocols, and policing of incoming and outgoing traffic, ensuring traffic complies with defined Service Level Agreements established with peer networks. The BR may intercept any QoS allocation request, and issue a request to the Policy Decision Function (PDF), which shall verify that the requested inbound and/or outbound QoS is available. A successful response from the PDF may cause the BR to forward the bandwidth allocation request to its final destination.

7.40 Breakout Gateway Control Function (BGCF)

The BGCF selects the network in which PSTN breakout is to occur and, within the network where the breakout is to occur, selects the MGCF.

7.41 Call Session Control Function (CSCF)

The CSCF establishes, monitors, supports, releases Multimedia sessions, and manages the user's service interactions.

7.42 Databases (DB)

The information in the core network DBs may include but is not limited to EIR, Dynamic Subscriber Information, Network Policy Rules and Subscriber Profile data.

7.43 evolved Base Station (eBS)

The evolved base Station (eBS) provides the over-the-air signaling and user data transport that is used by the AT for connectivity to the radio access network.

7.44 IP Multimedia Client

The IP Multimedia Client communicates with Application Servers, P-CSCFs, and other IP Multimedia Clients. The IP Multimedia Client is an application that resides in the MS.

7.45 IP Network

The IP network corresponds to IP-based packet data networks that provide a transport mechanism between the core network and external IP networks. IP Network represents packet networks connected to the core network including the public Internet, private IP backbone networks and private IP networks such as corporate Intranets.

7.46 Local Mobility Anchor (LMA)

The Local Mobility Anchor is the home agent for the mobile node in the Proxy Mobile IPv6 domain. It is the topological anchor point for the mobile node's home prefix and is the entity that manages the mobile node's reachability state.

7.47 Media Gateway (MGW)

The MGW provides an interface between the packet environment of the Core Network and the circuit switched environment of the PSTN for bearer traffic, when equipped with circuit

capabilities. The MGW may provide vocoding and/or transcoding functions to the bearer traffic. The MGW may also provide modem functions to convert digital byte streams to and from audio modem tones placed on circuits, and may provide the capability to terminate PPP (Point-to-Point Protocol) connections. It also provides policy enforcement relative to its activities and resources.

7.48 Media Gateway Control Function (MGCF)

The MGCF provides the ability to control a Media Gateway through standardized interfaces. Such control includes allocation and deallocation of resources of the Media Gateway, as well as modification of the usage of those resources.

7.49 Media Resource Function Controller (MRFC)

The MRFC, in conjunction with the MRFP, provides a set of resources within the core network that are useful in supporting services to subscribers. The MRFC, in conjunction with the MRFP, provides multi-way conference bridges, announcement playback services, tone playback services, etc.

7.50 Media Resource Function Processor (MRFP)

The MRFP, in conjunction with the controlling entity, provides multi-way conference bridges, announcement playback services, tone playback services, etc.

7.51 Mobile IP Home Agent (HA)

The HA provides two major functions: registering the current point of attachment of the user, and forwarding of IP packets to and from the current point of attachment (IPv4 Care of Address [CoA] and/or IPv6 Co-located CoA) of the user. The HA accepts registration requests using the Mobile IP protocol and uses the information in those requests to update internal information about the current point of attachment of the user, i.e., the current IP address to be used to transmit and receive IP packets to and from that user. The HA interacts with the AAA to receive Mobile IP registration requests that have been authenticated, and to return Mobile IP registration responses. The HA also interacts with the Access Gateway to receive subsequent Mobile IP registration requests. The HA may interact with several network entities in performing its work of forwarding IP packets to the current point of attachment of the user.

7.52 Mobile Station (MS)

The MS is a wireless terminal used by subscribers to access the Legacy MS Domain or the IP Multimedia Domain services over a radio interface. MSs include portable units (e.g., hand-held units), units installed in vehicles, and somewhat paradoxically, fixed location MSs. The MS is the interface equipment used to terminate the radio path at the subscriber. A MS is a ME with a programmed UIM.

7.53 non-3GPP2 System

A non-3GPP2 System may be trusted or untrusted. The AT accesses an operator's network via an ePDIF if the access network is untrusted, and the AT accesses an operator's network directly (i.e., without an ePDIF) if the access network is trusted.

7.54 OSA Service Capability Server (OSA-SCS)

The OSA-SCS provides access to network resources needed during service application execution. The interface towards the Application Server uses application programming interfaces such as Open Service Architecture (OSA). The interfaces towards other network entities use the relevant protocols.

7.55 Policy Decision Function (PDF)

The PDF provides management of core network QoS resources within its own core network necessary to support services to network users. It communicates with the Access Gateway to provide authorization of resource allocations. The PDF makes policy decisions with regard to use of core network QoS resources within its own network, including consideration of Service Level Agreements (SLAs [Note, the maintenance of SLAs is for further study.]). QoS policy information for network resource utilization may be forwarded to and cached by the PDF.

7.56 Position Determining Entity (PDE)

The PDE communicates with the Position Server to determine the precise geographic position of the MS based on input data provided by the Position Server.

7.57 Position Server

The Position Server provides geographic position information to requesting entities.

7.58 Public Switched Telephone Network (PSTN)

The PSTN is defined in accordance with the appropriate applicable national and regional standards.

7.59 Proxy Mobile Agent (PMA) or Mobile Access Gateway (MAG)

The Proxy mobile agent (or mobile access gateway) is a function that manages the mobility-related signaling for a mobile node that is attached to its access link. It is responsible for tracking the mobile node's attachment to the link and for signaling the mobile node's local mobility anchor. PMA is PMIP4 term and MAG is PMIP6 term.

7.60 Policy and Charging Rules Function (PCRF)

The PCRF provides rules to the AGW over the U23 reference point for Quality of Service and charging control.

7.61 Session Reference Network Controller (SRNC)

The Session Reference Network Controller (SRNC) is responsible for maintaining the session reference with the AT. The SRNC is also responsible for supporting idle state management of the AT, and providing paging control functions when the AT is idle. The SRNC contains a Session Anchor Access Network Route Instance (ANRI) for each AT it is supporting.

8 Reference Points

The following text is based on reference [12 a-d] clause 2.1.2.

8.1 Reference Point B

Reference Point B is the interface between the MSC and the VLR.

8.2 Reference Point C

Reference Point C is the interface between the MSC and the HLR.

8.3 Reference Point D

Reference Point D is the interface between the VLR and HLR.

8.4 Reference Point d

Reference Point d is the interface between an IAP and the DF.

8.5 Reference Point D₁

Reference Point D₁ is the interface between the OTAF and the VLR.

8.6 Reference Point D_i

Reference Point D_i is the interface between:

- The IP and the ISDN
- The IWF and the ISDN
- The MSC and the ISDN [ESBE]
- The SN and the ISDN

8.7 Reference Point E

Reference Point E is the interface between the MSC and MSC.

8.8 Reference Point E₃

Reference Point E₃ is the interface between the MPC and the MSC.

8.9 Reference Point E₅

Reference Point E₅ is the interface between the MPC and the PDE.

8.10 Reference Point E₉

Reference Point E₉ is the interface between the MPC and the SCP.

8.11 Reference Point E₁₁

Reference Point E₁₁ is the interface between the CRDB and the MPC.

8.12 Reference Point E₁₂

Reference Point E₁₂ is the interface between the MSC and the PDE.

8.13 Reference Point e

Reference Point e is the interface between the CF and the DF.

8.14 Reference Point F

Reference Point F is the interface between the MSC and the EIR.

8.15 Reference Point G

Reference Point G is the interface between the VLR and the VLR.

8.16 Reference Point H

Reference Point H is the interface between the HLR and the AC.

8.17 Reference Point I

Reference Point I is the interface between the CDIS and the CDGP.

8.18 Reference Point J

Reference Point J is the interface between the CDGP and the CDCP.

8.19 Reference Point K

Reference Point K is the interface between the CDGP and the CDRP.

8.20 Reference Point L

Reserved.

8.21 Reference Point M₁

Reference Point M₁ is the interface between the SME and the MC.

8.22 Reference Point M₂

Reference Point M₂ is the MC to MC interface.

8.23 Reference Point M₃

Reference Point M₃ is the SME to SME interface.

8.24 Reference Point N

Reference Point N is the interface between the HLR and the MC.

8.25 Reference Point N₁

Reference Point N₁ is the interface between the HLR and the OTAF.

8.26 Reference Point O₁

Reference Point O₁ is the interface between an MWNE and the OSF.

8.27 Reference Point O₂

Reference Point O₂ is the interface between an OSF and the OSF.

8.28 Reference Point P_i

Reference Point P_i is the interface between:

- The AAA and the AAA,
- The AAA and the PDN,
- The IWF and the PDN,
- The MSC and the PDN, plus
- The PDSN and the PDN.

8.29 Reference Point Q

Reference Point Q is the interface between the MC and the MSC.

8.30 Reference Point Q₁

Reference Point Q₁ is the interface between the MSC and the OTAF.

8.31 Reference Point T₁

Reference Point T₁ is the interface between the MSC and the SCP.

8.32 Reference Point T₂

Reference Point T₂ is the interface between the HLR and the SCP.

8.33 Reference Point T₃

Reference Point T₃ is the interface between the IP and the SCP.

8.34 Reference Point T₄

Reference Point T₄ is the interface between the HLR and the SN.

8.35 Reference Point T₅

Reference Point T₅ is the interface between the IP and the MSC.

8.36 Reference Point T₆

Reference Point T₆ is the interface between the MSC and the SN.

8.37 Reference Point T₇

Reference Point T₇ is the interface between the SCP and the SN.

8.38 Reference Point T₈

Reference Point T₈ is the interface between the SCP and the SCP.

8.39 Reference Point T₉

Reference Point T₉ is the interface between the HLR and the IP.

8.40 Reference Point V

Reference Point V is the interface between the OTAF and the OTAF.

8.41 Reference Point X

Reference Point X is the interface between the CSC and the OTAF.

8.42 Reference Point Y

Reference Point Y is the interface between a Wireless Network Entity (WNE) and the IWF.

8.43 Reference Point Z

Reference Point Z is the interface between the MSC and the NPDB.

8.44 Reference Point Z₁

Reference Point Z₁ is the interface between the MSC and the VMS.

8.45 Reference Point Z₂

Reference Point Z₂ is the interface between the HLR and the VMS.

8.46 Reference Point Z₃

Reference Point Z₃ is the interface between the MC and the VMS

The remaining text in this clause is based on reference [13 a-c] clause 2.1.

An interface exists when two Network Entities are interconnected through exactly one signalling or bearer stream Reference Point. The Reference Points and their associated Network Entities are:

8.47 Reference Point 1

Reference Point 1 is the signaling interface between the Databases and the Position Server [Multimedia Domain only].

8.48 Reference Point 2

Reference Point 2 is the signaling interface between the Databases and the cdma2000 Access Network.

8.49 Reference Point 3

Reference Point 3 is the signaling interface between the Databases and the Policy Decision Function [Multimedia Domain only].

8.50 Reference Point 4

Reference Point 4 is the signaling interface between the Databases and the AAA.

8.51 Reference Point 5/Mk

Reference Point 5/Mk is the signaling interface between Breakout Gateway Control Functions [Multimedia Domain only].

8.52 Reference Point 6

Reference Point 6 is the signaling interface between the Databases and the Legacy MS Domain Support [Legacy MS Domain only].

8.53 Reference Point 7

Reference Point 7 is the signaling interface between the OSA Service Capability Server and the Databases.

8.54 Reference Point 8/OSA

Reference Point 8/OSA is the signaling interface between the OSA Application Server and the OSA Service Capability Server. Reference Point 8/OSA may employ interfacing techniques that support a wide spectrum of capabilities, ranging from secure (e.g., application programming interfaces such as Parlay, used for un-trusted parties) to non-secure (e.g., used for trusted parties).

8.55 Reference Point 9/Mi

Reference Point 9/Mi is the signaling interface between the Visited Network's BGCF and the Home Service Network's Serving-CSCF.

8.56 Reference Point 10

Reference Point 10 is the signaling interface between the Position Server and the OSA Service Capability Server [Multimedia Domain only].

8.57 Reference Point 11/Sh

Reference Point 11/Sh is the signaling interface between the SIP Application Server and the AAA and between the OSA Service Capability Server and the AAA for user's service authentication and/or authorization, and for retrieving information from the MMD database [Multimedia Domain only].

8.58 Reference Point 12/ISC

Reference Point 12/ISC is the signaling interface between the SIP Application Server and Call Session Control Function and between the OSA Service Capability Server and the Call Session Control Function for service control [Multimedia Domain only].

8.59 Reference Point 13

Reference Point 13 is the signaling interface between the Legacy MS Domain Support and the PSTN [Legacy MS Domain only].

8.60 Reference Point 14

Reference Point 14 is the signaling interface between the Legacy MS Domain Support and the MAP (TIA/EIA-41 & GSM) [Legacy MS Domain only].

8.61 Reference Point 15

Reference Point 15 is the signaling interface between the Position Server and AAA.

8.62 Reference Point 16/Cx

Reference Point 16/Cx is the signaling interface between the AAA and the Call Session Control Function [Multimedia Domain only].

8.63 Reference Point 17/Mg

Reference Point 17/Mg is the signaling interface between the Call Session Control Function and the Media Gateway Control Function [Multimedia Domain only].

8.64 Reference Point 18

Reference Point 18 is the signaling interface between the Position Server and the Position Determining Entity.

8.65 Reference Point 19

Reference Point 19 is the signaling interface between the Position Server and the Access Gateway [Multimedia Domain only].

8.66 Reference Point 20

Reference Point 20 is the signaling interface between the AAA and the cdma2000 Access Network [Multimedia Domain only].

8.67 Reference Point 21

Reference Point 21 is the signaling interface between the AAA and Access Gateway.

8.68 Reference Point 22

Reference Point 22 is the signaling interface between the AAA and the Mobile IP Home Agent.

8.69 Reference Point 23

Reference Point 23 is the signaling interface between the AAA and the Policy Decision Function [Multimedia Domain only].

8.70 Reference Point 24/Mr

Reference Point 24/Mr is the signaling interface between the Call Session Control Function and the Media Resource Function Controller [Multimedia Domain only].

8.71 Reference Point 25/Mp

Reference Point 25/Mp is the signaling interface between the Media Resource Function Controller and the Media Resource Function Processor.

8.72 Reference Point 26/PSTN

Reference Point 26/PSTN is the signaling interface between the Media Gateway Control Function and the PSTN [Multimedia Domain only].

8.73 Reference Point 27

Reference Point 27 is the bearer stream interface between the cdma2000 Access Network and the Media Gateway [Legacy MS Domain only].

8.74 Reference Point 28/Go

Reference Point 28/Go is the signaling interface between the Policy Decision Function and Access Gateway.

8.75 Reference Point 29

Reference Point 29 is the signaling interface between Policy Decision Function and the Border Router.

8.76 Reference Point 30/Mc

Reference Point 30/Mc is the signaling interface between the Media Gateway Control Function and the Media Gateway [Multimedia Domain only].

8.77 Reference Point 31

Reference Point 31 is the bearer stream interface between cdma2000 Access Network and the Access Gateway.

8.78 Reference Point 32/Mb

Reference Point 32/Mb is the bearer stream interface between the Access Gateway and the Media Resource Function Processor [Multimedia Domain only].

8.79 Reference Point 33/Mb

Reference Point 33/Mb is the bearer stream interface between the Media Resource Function Processor and the Media Gateway.

8.80 Reference Point 34/Mb

Reference Point 34/Mb is the bearer stream interface between the Media Gateway and the PSTN.

8.81 Reference Point 35

Reference Point 35 is the signaling interface between the cdma2000 Access Network and the Access Gateway.

8.82 Reference Point 36/Mb

Reference Point 36/Mb is the bearer stream interface between the Access Gateway and the Media Gateway [Multimedia Domain only].

8.83 Reference Point 37/Mb

Reference Point 37/Mb is the bearer stream interface between the Media Resource Function Processor and the Mobile IP Home Agent [Multimedia Domain only].

8.84 Reference Point 38/Mb

Reference Point 38/Mb is the bearer stream interface between the Media Gateway and the Mobile IP Home Agent [Multimedia Domain only].

8.85 Reference Point 39

Reference Point 39 is the signaling interface between the Media Gateway and the Legacy MS Domain Support [Legacy MS Domain only].

8.86 Reference Point 40/Mb

Reference Point 40/Mb is the bearer streams interface between the Media Gateway and the Border Router.

8.87 Reference Point 41

Reference Point 41 is the signaling interface between the Access Gateway and the Mobile IP Home Agent.

8.88 Reference Point 42/Mb

Reference Point 42/Mb is the bearer streams interface between the Media Resource Function Processor and the Border Router.

8.89 Reference Point 43/Mb

Reference Point 43/Mb is the bearer streams interface between the Access Gateway and the Mobile IP Home Agent.

8.90 Reference Point 44/Mb

Reference Point 44/Mb is the bearer stream interface between the Mobile IP Home Agent and the Border Router.

8.91 Reference Point 45/Mb

Reference Point 45/Mb is the bearer stream interface between the Access Gateway and the Border Router.

8.92 Reference Point 46/Mb

Reference Point 46/Mb is the bearer stream interface between the Border Router and the IP Network.

8.93 Reference Point 47

Reference Point 47 is the Radio Link (air interface) between the Mobile Station and the cdma2000 Access Network.

8.94 Reference Point 48

Reference Point 48 is the signaling interface between the cdma2000 Access Network and the Legacy MS Domain Support [Legacy MS Domain only].

8.95 Reference Point 49/(Mj)

Reference Point 49/(Mj) is the signaling interface between the Breakout Gateway Control Function and the Media Gateway Control Function [Multimedia Domain only].

8.96 Reference Point 50

Reference Point 50 is the signaling interface between the Policy Decision Function and the P-CSCF [Multimedia Domain only].

8.97 Reference Point U1

Reference Point U1 carries control and bearer information between evolved Base Station (eBS) and the Access GateWay (AGW). The U1 reference point includes interfaces for bearer transport (user data and signaling), QoS, and accounting.

8.98 Reference Point U2

Reference Point U2 provides interfaces for carrying control information between the eBS and the SRNC.

8.99 Reference Point U3

Reference Point U3 carries control and bearer information between eBSs.

8.100 Reference Point U4

Reference Point U4 carries control information between SRNCs.

8.101 Reference Point U6

Reference Point U6 connects the SRNC to the AGW.

8.102 Reference Point U14

Reference Point U14 connects the anc-AGW or AGW with the AAA infrastructure via the Visited AAA server (VAAA). This reference point implements a signaling protocol to support user authentication, authorization and accounting.

8.103 Reference Point U15

Reference Point U15 carries control and bearer information between srv-AGW. U15 reference point provides local mobility based on PMIP.

8.104 Reference Point U15'

Reference Point U15' carries control and bearer information between two AGWs: the Serving AGW (srv-AGW) and the Anchor AGW (anc-AGW). This reference point is not exposed if the srv-AGW and anc-AGW are collocated. This reference point also carries policy information.

8.105 Reference Point U16

Reference Point U16 carries control and bearer information between the AGW and the Home Agent (HA), and supports bearer transport and signaling for mobility.

8.106 Reference Point U17

Reference Point U17 carries control and bearer information between the 3GPP2 network and a non-3GPP2 network. The U17a reference point carries control and bearer information between the 3GPP2 network and a trusted non-3GPP2 network (e.g., 3GPP SAE/LTE or WiMAX). The U17b reference point carries control and bearer information between the 3GPP2 network and an untrusted non-3GPP2 network via the ePDIF (e.g., a WiFi network).

8.107 Reference Point U18

Reference Point U18 carries control information between a Visited PCRF (V-PCRF) and a Home PCRF (H-PCRF) in order to transfer policy and charging rules between domains.

8.108 Reference Point U19

Reference Point U19 carries control and bearer (optional) information between the AGW and the trusted non-3GPP2 System (U19a), and between the AGW and the ePDIF (U19b), and between the anc-AGW/AGW and the PDSN (U19/U19c). The U19 reference point supports fast/seamless handoff between a CAN and another system.

8.109 Reference Point U20

Reference Point U20 connects the HA and the PCRF, and allows (QoS) policy and charging information to be conveyed to the HA.

8.110 Reference Point U21

Reference Point U21 connects the ePDIF to an untrusted non-3GPP2 access network.

8.111 Reference Point U22

Reference Point U22 provides two separate interfaces: U22a and U22b. The U22a reference point connects the PDSN to a trusted non-3GPP2 network. For this connection the ePDIF is not required to be on the data path. The U22b reference point, however, carries control and bearer information between the PDSN and an untrusted non-3GPP2 network. For this connection the ePDIF is required to be on the data path.

8.112 Reference Point U23

Reference Point U23 carries control information from the (QoS) Policy and Charging Rules Function (PCRF) to the anc-AGW/AGW.

8.113 Reference Point U24

Reference Point U24 carries control and bearer information between an LMA and another system. The U24 reference point carries control and bearer information with PMIP between the LMA and the trusted non-3GPP2 System (U24a), and between the LMA and the ePDIF (U24b), and between the LMA and the PDSN (U24c). The U24 reference point supports handoff between a CAN and another system.

8.114 Reference Point U25

Reference Point U25 carries control and bearer information with CMIP between the HA and the trusted non-3GPP2 System (U25a), and between the HA and the ePDIF (U25b). The U25 reference point supports handoff between a CAN and another system.

8.115 Reference Point U26

Reference Point U26 carries control and bearer information with PMIP between the LMA and the AGW and supports handoff between AGWs.

8.116 Reference Point U27

Reference Point U27 carries control and bearer information with CMIP between the HA and the AGW and supports handoff between AGWs.

8.117 Reference Point U28

Reference Point U28 carries control and bearer (optional) information between the AGWs and supports fast inter-AGW handoff.

8.118 Reference Point U29

Reference Point U29 carries control and bearer information between the HA and the PDSN. The U29 reference point carries CMIP and PMIP for the split AGW architectures. The U29 reference point carries CMIP for the single AGW architecture.

8.119 Reference Point U30

Reference Point U30 carries IP traffic between the AGW and the IP Services network.

8.120 Reference Point U31

Reference Point U31 carries IP traffic between the HA and the IP Services network.

8.121 Reference Point U32

Reference Point U32 carries IP traffic between the LMA and the IP Services network.

8.122 Reference Point UMB-AI

Reference Point UMB-AI (Air Interface) carries control and bearer information between the AT and the eBS.

9 Technical specifications structure

This clause provides an overview of the specifications for this IMT-2000 Family member based on ANSI-41 evolved Core Network with cdma2000 Access Network. Details for these specifications may be found in clause 10.

The following text describes the numbering scheme for the specifications and reports for the 3GPP2 3rd Generation Mobile System.

The 3GPP2 document-numbering scheme is indicated as follows:

A.Bcccc-w-x version y.z

Where:

- 1) A denotes the TSG (A, C, N, P, S) which developed the specification where:
 - TSG-A develops RAN (i.e., A-interface) specifications
 - TSG-C develops air interface specifications
 - TSG-N develops intersystem interface specifications
 - TSG-P develops packet data specifications

- TSG-S develops service and system aspects specifications including Stage 1 requirements descriptions and OAM&P specifications
- 2) B denotes project, report, specification (P, R, S).
- 3) cccc denotes a four (4) digit number which identifies the specific specification
- 4) w denotes revision
 - 0 is the first release (0th revision),
 - A is the first revision,
 - and so on
- 5) x denotes whether this is the prime revision or an addendum
 - 0 is the prime revision, and is used when the document is first created
 - 1 is the first addendum
 - 2 is the second addendum
 - and so on
- 6) y is the "point release" indicator – 0 is used when the document is first created; the number is incremented whenever approved for publishing by the plenary of a TSG (e.g., 1 is the first approval by the plenary for publishing).
- 7) z is an internal edit level. The internal edit level z, is always reset to 0 when the document is approved by the applicable plenary. It is incremented by the entity (e.g., working group) that is developing the document for each new edit release.

NOTE 1 – If the designator w and the designator x are both equal to 0, then neither designator needs to be included.

NOTE 2 – The document reference section does not need to include "version y.z" unless specifically needed to resolve a technical incompatibility that would exist.

10 Technical Specifications

All dates in the tables of clause 10 are formatted day-month-year. If no day is shown for the document, then the format is -month-year.¹

10.1 A Series RAN Specifications

The 3GPP2 A Series RAN specifications are outside of the scope of this Recommendation. The radio access network to core network interface specifications for the cdma2000 (ANSI-41 evolved core network with cdma2000 access network) system family will be referenced in a new issue of Recommendation ITU-R M.1457.

10.2 Intersystem Specifications

10.2.1 N.S0003-0 v.1.0 User Identity Module (April 2001)

This standard defines the enhancements required for the support of mobile stations equipped with User Identification Modules (UIM). The UIM provides functionality to certain types of mobile stations to enable them to operate in the wireless network.

¹ Note on nomenclature of TIA documents: before TIA was accredited, documents were created under EIA. After TIA was accredited as a standards development organization, documents were named beginning with TIA/EIA. TIA documents can now stand by themselves, so since 2000, documents are now titled TIA only. The IS was an interim standard valid for 3 years and that naming system is no longer used for new documents.

This document defines requirements for the wireless network to support operation of UIM equipped mobile stations. A UIM provides compatible mobile stations with the parameters required of mobile stations operating in the TIA/EIA-41 environment and specific additional functionality unique to UIM-equipped mobile stations.

The UIM can be in one of two forms, as either integrated within the mobile or removable that can be inserted or removed from the mobile equipment. This document addresses Removable UIM (R-UIM) only.

	Document No.	Version	Status	Issued date	Location
CCSA	CWTS-MC-N.S0003-0	1.0	Published	-02-2002	http://www.ccsa.org.cn/english/tc/files.php?docpath=/ITU-R/M.1457/M.1457-4/MC
TIA	TIA/EIA/IS-808		Published	--12-2000	http://www.tiaonline.org/standards/catalog/search.cfm
TTA	TTAE.3G-N.S0003	1	Approved	13-07-2000	http://www.tta.or.kr/standardDB/stnfile/TTAE_3G-N_S0003.zip
TTC	TS-3GB-N.S0003v1.0	1.0	TTC Published	29-05-2001	http://www.ttc.or.jp/imt2000/ts/tsns0003-v10.pdf

10.2.2 N.S0004-0 v 1.0 WIN Phase 2 (April 2001)

- Triggers for Preferred Language
- Advice of Charge – Rejection of Undesired Annoying Calls
- Premium Rate Charging
- Freephone

Premium Rate Charging (PRC), Freephone (FPH) and Advice of Charging (AOC) are charging related services that provide a set of advanced wireless charging capabilities. Rejection of Undesired Annoying Calls (RUAC) is a screening service that blocks undesired annoying calls to the subscriber. Enhanced Preferred Language (EPL) uses Wireless Intelligent Network (WIN) capabilities to provide announcements to the subscriber in the subscriber's preferred language. This specification presents a recommended plan for the implementation of WIN capabilities that support these features. The WIN capabilities are for use in the Wireless Radiotelephone Service.

	Document No.	Version	Status	Issued date	Location
CCSA	CWTS-MC-N.S0004-0	1.0	Published	-02-2002	http://www.ccsa.org.cn/english/tc/files.php?docpath=/ITU-R/M.1457/M.1457-4/MC
TIA	TIA/EIA/IS-848		Published	--12-2000	http://www.tiaonline.org/standards/catalog/search.cfm
TTA	TTAE.3G-N.S0004	1	Approved	13-07-2000	http://www.tta.or.kr/standardDB/stnfile/TTAE_3G-N_S0004.zip
TTC	TS-3GB-N.S0004-0v1.0	1.0	TTC Published	29-05-2001	http://www.ttc.or.jp/imt2000/ts/tsns0004-0v10.pdf

10.2.3 N.S0005-0 Version 1.0 Cellular Radiotelecommunications Intersystem Operations (no date)

(O) The purpose of this document is to identify those cellular services which require intersystem cooperation, to present the general background against which those services are to be provided, and to summarize the principal considerations which have governed and directed the particular approaches taken in the procedural recommendations.

	Document No.	Version	Status	Issued date	Location
CCSA	YDT 1031-1999	1.0	Published	-12-1999	http://www.ccsa.org.cn/english/tc/files.php?docpath=/ITU-R/M.1457/M.1457-4/MC
TIA	TIA/EIA-41-D		Published	--12-1997	http://www.tiaonline.org/standards/catalog/search.cfm
TTA	TTAE.3G-N.S0005	1	Approved	13-07-2000	http://www.tta.or.kr/standardDB/stnfile/TTAE_3G-N_S0005.zip

10.2.4 N.S0006 Version 1.0.0 PCS Multi-band Based on IS-41-C Revision: 0 (28 January 2000)

3GPP2 document was withdrawn.

10.2.5 N.S0008 Version 1.0 Circuit Mode Services (no date)

This Standard presents a recommended plan for the implementation of Uniform Features for use in the Cellular Radiotelephone Service. Its intent is to describe services and features so that the manner in which a subscriber may place calls using such features and services may remain reasonably consistent from system to system. It is not intended to require that specific service offerings be required of all service providers.

Services:

- Asynchronous Data Service (ADS)
- Data Privacy (DP)
- Group 3 Facsimile Service (G3 Fax)
- Service Negotiation (SN)
- Mobile Termination Functions

	Document No.	Version	Status	Issued date	Location
CCSA	CWTS-MC-N.S0008	1.0	Published	-02-2002	http://www.ccsa.org.cn/english/tc/files.php?docpath=/ITU-R/M.1457/M.1457-4/MC
TIA	TIA-737		Published	--01-2002	http://www.tiaonline.org/standards/catalog/search.cfm
TTA	TTAE.3G-N.S0008 V1.0	1.0	Approved	28-10-2002	http://www.tta.or.kr/standardDB/stnfile/TTAE.3G-N.S0008v1.0.pdf
TTC	JP-3GB-N.S0008	1	TTC Published	31-03-2000	http://www.ttc.or.jp/imt2000/std/jpns0008.pdf

10.2.6 N.S0009-0 Version 1.0 IMSI (no date)

	Document No.	Version	Status	Issued date	Location
CCSA	CWTS-MC-N.S0009-0	1.0	Published	-02-2002	http://www.ccsa.org.cn/english/tc/files.php?docpath=/ITU-R/M.1457/M.1457-4/MC
TIA	TIA-751		Published	--01-2002	http://www.tiaonline.org/standards/catalog/search.cfm
TTA	TTAE.3G-N.S0009	1	Approved	13-07-2000	http://www.tta.or.kr/standardDB/stnfile/TTAE_3G-N_S0009.zip
TTC	JP-3GB-N.S0009	1	TTC Published	31-03-2000	http://www.ttc.or.jp/imt2000/std/jpns0009.pdf

10.2.7 N.S0010-0 Version 1.0 Advanced features in Wideband Spread Spectrum Systems (no date)

For this revision of this Standard, the advanced CDMA features include: Network Directed System Selection (NDSS) and Subscriber Confidentiality (SC) supported by TMSI.

	Document No.	Version	Status	Issued date	Location
CCSA	CWTS-MC-N.S0010-0	1.0	Published	-02-2002	http://www.ccsa.org.cn/english/tc/files.php?docpath=/ITU-R/M.1457/M.1457-4/MC
TIA	TIA-735		Published	--01-2002	http://www.tiaonline.org/standards/catalog/search.cfm
TTA	TTAE.3G-N.S0010 v1.0	1.0	Approved	28-10-2002	http://www.tta.or.kr/standardDB/stnfile/TTAE.3G-N.S0010-0v1.0.pdf
TTC	JP-3GB-N.S0010-0	1	TTC Published	31-03-2000	http://www.ttc.or.jp/imt2000/std/jpns0010.pdf

10.2.8 N.S0011-0 Version 1.0 OTASP and OTAPA (no date)

This document presents recommendations for supporting the Over-The-Air "Service Provisioning" (OTASP) and "Parameter Administration" (OTAPA) capability.

Specifically, this document includes Stage-1 recommendations for OTASP Subscriber Feature and OTAPA Network Feature Descriptions. It also provides intersystem operation recommendations for supporting the OTASP & OTAPA capability for the CDMA and TDMA air interfaces, with Stage-2 operations and scenarios, Stage-3 operations and parameter definitions plus Stage-3 procedures.

	Document No.	Version	Status	Issued date	Location
CCSA	CWTS-MC-N.S0011-0	1.0	Published	-02-2002	http://www.ccsa.org.cn/english/tc/files.php?docpath=/ITU-R/M.1457/M.1457-4/MC
TIA	TIA/EIA/IS-725-A		Published	--07-1999	http://www.tiaonline.org/standards/catalog/search.cfm
TTA	TTAE.3G-N.S0011	1	Approved	13-07-2000	http://www.tta.or.kr/standardDB/stnfile/TTAE_3G-N_S0011.zip
TTC	JP-3GB.N.S0011	1	TTC Published	31-03-2000	http://www.ttc.or.jp/imt2000/std/jpns0011.pdf

10.2.9 N.S0012-0 CNAP/CNAR Revision: 0 (28 January 2000)

This document presents a recommended plan for the implementation of Calling Name Presentation (CNAP) and Calling Name Restriction (CNAR) for use in the Wireless Radiotelephone Service.

	Document No.	Version	Status	Issued date	Location
CCSA	CWTS-MC-N.S0012-0	1.0	Published	-02-2002	http://www.ccsa.org.cn/english/tc/files.php?docpath=/ITU-R/M.1457/M.1457-4/MC
TIA	TIA-764		Published	--01-2002	http://www.tiaonline.org/standards/catalog/search.cfm
TTA	TTAE.3G-N.S0012	1	Approved	13-07-2000	http://www.tta.or.kr/standardDB/stnfile/TTAE_3G-N_S0012.zip
TTC	JP-3GB-N.S0012	1	TTC Published	31-03-2000	http://www.ttc.or.jp/imt2000/std/jpns0012.pdf

10.2.10 N.S0013-0 Version 1.0 WIN Phase 1 (no date)

The Wireless Intelligent Network (WIN) is a network which supports the use of intelligent network capabilities to provide seamless terminal services, personal mobility services and advanced network services in mobile environment.

This document presents a recommended plan for the implementation of the Wireless Intelligent Network (WIN) for use in the Wireless Radiotelephone Service.

	Document No.	Version	Status	Issued date	Location
CCSA	CWTS-MC-N.S0013-0	1.0	Published	-02-2002	http://www.ccsa.org.cn/english/tc/files.php?docpath=/ITU-R/M.1457/M.1457-4/MC
TIA	TIA/EIA/IS-771 TIA/EIA/IS-771-1		Published Published	--07-1999 --08-2001	http://www.tiaonline.org/standards/catalog/search.cfm
TTA	TTAE.3G-N.S0013	1	Approved	13-07-2000	http://www.tta.or.kr/standardDB/stnfile/TTAE_3G-N_S0013.zip
TTC	JP-3GB-N.S0013	1	TTC Published	31-03-2000	http://www.ttc.or.jp/imt2000/std/jpns0013.pdf

10.2.11 N.S0014-0 Version 1.0 Authentication Enhancements (no date)

This Standard presents a recommended plan for the implementation of authentication enhancements for use in the Wireless Radiotelephone Service. Its intent is to describe the authentication enhancements so that the manner in which a system implements them may remain reasonably consistent from system to system.

The authentication enhancements include:

- Count Update after Handoff
- Obtaining subscriber profile before authentication on initial system access
- Handling of suspicious call originations
- Identify the Serving MSC when reporting the outcome of a requested authentication operation
- Handling of authentication capable mobile stations when the home system is not authentication capable
- Clarification and editorial correction of authentication procedures
- Miscellaneous authentication enhancements

	Document No.	Version	Status	Issued date	Location
CCSA	CWTS-MC-N.S0014-0	1.0	Published	-02-2002	http://www.ccsa.org.cn/english/tc/files.php?docpath=/ITU-R/M.1457/M.1457-4/MC
TIA	TIA/EIA/IS-778		Published	--03-1999	http://www.tiaonline.org/standards/catalog/search.cfm
TTA	TTAE.3G-N.S0014	1	Approved	13-07-2000	http://www.tta.or.kr/standardDB/stnfile/TTAE_3G-N_S0014.zip
TTC	JP-3GB-N.S0014	1	TTC Published	31-03-2000	http://www.ttc.or.jp/imt2000/std/jpns0014.pdf

10.2.12 N.S0015 Version 1.0.0 ANSI-41-D Miscellaneous Enhancements (28 January 2000)

This document is intended to justify *TIA/EIA-41-D* technical enhancement or technical correction contributions that have been supported for incorporation into PN-3590 (*TIA/EIA-41-E*) but are not expected to be published in a *TIA/EIA-41-D* enhancement Interim Standard (IS).

This document is for tracking purposes only, there is no intention of publishing the contents of this document independent of ANSI/TIA/EIA-41-E.

	Document No.	Version	Status	Issued date	Location
CCSA	CWTS-MC-N.S0015	1.0.0	Published	-02-2002	http://www.ccsa.org.cn/english/tc/files.php?docpath=/ITU-R/M.1457/M.1457-4/MC
TTA	TTAE.3G-N.S0015 v1.0.0	1.0.0	Approved	28-10-2002	http://www.tta.or.kr/standardDB/stnfile/TTAE.3G-N.S0015v1.0.0.pdf

10.2.13 N.S0016-0 Version 1.0 TIA/EIA-41-D Internationalization (no date)

This document specifies the ANSI/TIA/EIA-41-D Chapters 1, 3, 5 and 6 enhancements that are necessary to support international intersystem operations.

	Document No.	Version	Status	Issued date	Location
CCSA	CWTS-MC-N.S0016-0	1.0	Published	-02-2002	http://www.ccsa.org.cn/english/tc/files.php?docpath=/ITU-R/M.1457/M.1457-4/MC
TIA	TIA/EIA/IS-807 TIA/EIA/IS-807-1		Published Published	--08-1999 --03-2000	http://www.tiaonline.org/standards/catalog/search.cfm
TTA	TTAE.3G-N.S0016	1	Approved	13-07-2000	http://www.tta.or.kr/standardDB/stnfile/TTAE_3G-N_S0016.zip
TTC	JP-3GB-N.S0016	1	TTC Published	31-03-2000	http://www.ttc.or.jp/imt2000/std/jpns0016.pdf

10.2.14 N.S0017-B Version 1.0.0 International Implementation of Wireless Telecommunication Systems Compliant with TIA/EIA-41 Revision: B (December 2002)

When the first edition of Mobile Station – Land Station Compatibility Specification (*IS-3*, now *TIA/EIA-553-A*) was issued, it was envisioned that it would be adopted for use within Northern America. Provisions were included for international implementation; however, detailed guidelines to assist with such implementations were not included. Subcommittee TR-45.2 recognized the need to provide such guidance, and charted a Working Group (Working Group VI) with this responsibility. The result of this Working Group's deliberations has been the production of TSB-29 as well as ongoing internationalization of other TIA standards, such as *TIA/EIA-41-D* (*N.S0005*), *TIA-751* (*N.S0009*), *TIA/EIA/IS-807* (*N.S0016*), *TIA/EIA/IS-875* (*N.S0027*), *TIA/EIA-124* (*N.S0026*), *TIA/EIA-136*, *IS-95*, *IS-91* and *TIA/EIA-2000* (*C.S0001*). TSG-N has taken TSB-29 and produced the specification N.S0017.

The principle aspects of international implementation addressed by this document are:

- The administration and assignment of System Identification Numbers (SIDs)
- The administration and assignment of Mobile Identification Numbers (MINs)
- Format of International Mobile Subscriber Identifiers (IMSI)

The goal of this publication is to provide the international wireless telecommunications industry with the framework permitting the coordinated implementation of Wireless Radio Telecommunication Systems in compliance with the provisions of the AMPS family of air interface standards (e.g., *TIA/EIA-553*, *IS-54*, *IS-91*, *IS-95*, *TIA/EIA-2000* and *TIA/EIA-136*).