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SERIES Q: SWITCHING AND SIGNALLING

Signalling requirements and protocols for IMT-2000

**IMT-2000 references (approved as of
31 December 2005) to ANSI-41 evolved core
network with cdma2000 access network**

ITU-T Recommendation Q.1742.5



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ITU-T Recommendation Q.1742.5

IMT-2000 references (approved as of 31 December 2005) to ANSI-41 evolved core network with cdma2000 access network

Summary

This Recommendation associates the published core network standards from the regional standards development organizations (SDOs) with those 3GPP2 specifications that were approved as of 31 December 2005 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 ITU-T Rec. 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 ITU-T Rec. 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 ITU-T Rec. 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 ITU-T Rec. Q.1742.4. 3GPP2 specifications that are approved as of 31 December 2006 will be associated with published core network standards in future ITU-T Rec. Q.1742.6. The radio interface and radio access network and standards from the SDOs for this IMT-2000 Family Member are associated in ITU-R Rec. M.1457-5. The associations for other IMT-2000 family members are identified in the ITU-T Rec. Q.174x series.

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

Source

ITU-T Recommendation Q.1742.5 was approved on 13 September 2006 by ITU-T Study Group 19 (2005-2008) under the ITU-T Recommendation A.8 procedure.

Keywords

ANSI-41, cdma2000, core network, IMT-2000, third generation system.

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ITU-T Recommendation Q.1742.5

IMT-2000 references (approved as of 31 December 2005) 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 31 December 2005.

The core network interfaces identified in this Recommendation and the radio interfaces and radio access network interfaces identified in ITU-R Rec. M.1457-5 [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, ITU-R Rec. M.1457-5 [1], shall take precedence.

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] ITU-R Recommendation M.1457-5 (2006), *Detailed specifications of the radio interfaces of International Mobile Telecommunications-2000 (IMT-2000)*.
- [2] ANSI/TIA/EIA 41-D (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)*.
- [4] ANSI/TIA/EIA 124 (2001), *Wireless Radio Telecommunications Intersystem Non-Signalling Data Communication DMH (Data Message Handler) (ANSI/124-D-2001)*.
- [5] ANSI/TIA/EIA 136 (2001), *TDMA Cellular PCS (ANSI/TIA/EIA-136, Rev C-2001)*.
- [6] ANSI/TIA/EIA 553A (1999), *Mobile Station – Base Station Compatibility Standard (ANSI TIA/EIA-553-A-99)*.
- [7] ANSI/TIA/EIA 664A (2000), *Cellular Features Description (ANSI/TIA/EIA-664-A-2000)*.
- [8] TIA Specification IS-91 (1999), *Base Station – Mobile Station Compatibility Specification for 800 MHz Cellular, Auxiliary, and Residential Services (TIA/EIA/IS-91-A)*.
- [9] TIA Specification IS-2000 (2000), *CDMA 2000 Series (TIA/EIA/IS-2000 Series Revision A)*.
- [10] TIA Specification IS-2001-A (2001), *Interoperability Specifications (IOS) for cdma2000 Access Network Interfaces (TIA/EIA/IS-2001-A)*.

- [11] TIA Specification TSB-29D (2000), *International Implementation of Wireless Telecommunication Systems Compliant with TIA/EIA-41*.
- [12a] CWTS; CWTS-MC-S.R0005-B (2002), *Network Reference Model for cdma2000 Spread Spectrum Systems*.
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- [13b] TTA; TTAT.3G-S.R0037-0 v3.0 (2003), *IP Network Architecture Model for cdma2000 Spread Spectrum Systems*.
- [13c] TTC; TS-3GB-S.R0037-0 v3.0 (2003), *IP Network Architecture Model for cdma2000 Spread Spectrum Systems*.
- [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:

- 3.1 access denial call treatment:** A tone, announcement, or call redirection applied as appropriate.
- 3.2 access network:** Network that connects access technologies (such as a Radio Access Network) to the core network.
- 3.3 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".)
- 3.4 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.
- 3.5 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.
- 3.6 authentication:** The act of verifying the identity of an entity (e.g., a user, device).
- 3.7 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".)
- 3.8 base transceiver station:** A piece of radio access network equipment that contains the radios and serves a geographic area.
- 3.9 call delivery:** The process by which calls directed to the cellular subscriber are delivered to the subscriber while roaming in a visited system.
- 3.10 call delivery method:** Method by which a call is delivered to a subscriber in MSC-V.

- 3.11 call disconnect:** The process of requesting the release of a connection between two or more network addresses.
- 3.12 call release:** The process of relinquishing the facilities and circuits used for a call.
- 3.13 call termination:** The process of connecting a subscriber to an incoming call.
- 3.14 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.
- 3.15 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.
- 3.16 clearinghouse:** A service used for the exchange and management of information.
- 3.17 data communications:** The digital transmission of information (other than voice).
- 3.18 dialogue:** A user interaction sequence composed of tones and announcements that may gather information.
- 3.19 gateway MSC:** See MSC-G.
- 3.20 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.
- 3.21 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".)
- 3.22 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).
- 3.23 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.
- 3.24 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.
- 3.25 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.
- 3.26 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.
- 3.27 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.
- 3.28 MSC-V:** A "visited" MSC in whose service area a roamer is operating.
- 3.29 network reference model:** The functional entities and the associated interface reference points that may logically comprise a cellular network. (See clause 6.)

3.30 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 E.164 numbers used for telephony.

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

3.32 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.

3.33 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.

3.34 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".

3.35 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.

3.36 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.

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

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

3.39 remote feature control port (RFC port): A terminating directory number supporting service profile modification.

3.40 roamer port: A terminating directory number supporting call delivery to mobile stations.

3.41 roamer service profile: The specific set of features, capabilities and/or operating restrictions, other than financial accountability, associated with the subscriber.

3.42 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.

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

3.44 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.

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

- 3.46 signalling:** The information exchanged between the mobile station and the network, or within the network, for the purposes of service provision (e.g., connection establishment).
- 3.47 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.
- 3.48 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.
- 3.49 temporary local directory number (TLDN):** A network address temporarily assigned for call setup.
- 3.50 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.
- 3.51 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.
- 3.52 traffic:** The information generated by the subscriber that is transported on the network (i.e., user voice or data).
- 3.53 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".)
- 3.54 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.
- 3.55 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.
- 3.56 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)
AC	Authentication Centre
ADDS	Application Data Delivery Service
ADPCM	Adaptive Differential Pulse Code Modulation
ADS	Asynchronous Data Service
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
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
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
EIA	Electronics Industry Association
EIR	Equipment Identity Register
EMS	Enhanced Message Service
ESN	Electronic Serial Number
ESP	Encapsulating Security Payload
FCC	Federal Communications Commission
FFMS	File Format for Multimedia Services
FPH	FreePhone

FPLMTS	Future Public Land Mobile Telecommunications Systems – now IMT-2000
GEEO	Global ECO (Emergency Call Origination)
GSM	Global System For Mobile Communications (Formerly: Group Special Mobile)
HA	Home Agent
HHS	Home Subscriber Server
HLR	Home Location Register
IETF	Internet Engineering Task Force
IM	IP Multimedia
IMS	IP Multimedia 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
ISO	International Organization for Standardization
ITU	International Telecommunication Union
ITU-R	International Telecommunication Union – Radiocommunication Sector
ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
IWF	Interworking Function
LBSS	Location Based Services System
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 Element
PDS	Packet Data Surveillance
PDSN	Packet Data Serving Node
PL	Preferred Language
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	Service Call Forwarding
SCF	Service 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
SS7	Signalling System 7
SSF	Service Switching Function
SSG	Special Study Group
TFO	Tandem Free Operation
TIA	Telecommunications Industry Association
TMSI	Temporary Mobile Station Identification
TR	Transmit-Receive (as in TR45)
TRAU	Transcoder and Rate Adaptor Unit
TrFO	Transcoder Free Operation
TSB	Telecommunications Systems Bulletin
TTA	Telecommunications Technology Association (Korea)
TTC	Telecommunication Technology Committee (Japan)
UICC	Universal Integrated Circuit Card
UIM	User Identity Module
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 31 December 2005) and transposed to the involved regional Standards Development Organizations (SDOs). The system will support different applications ranging from narrowband 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 ITU-R Rec. M.1457-5 [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.

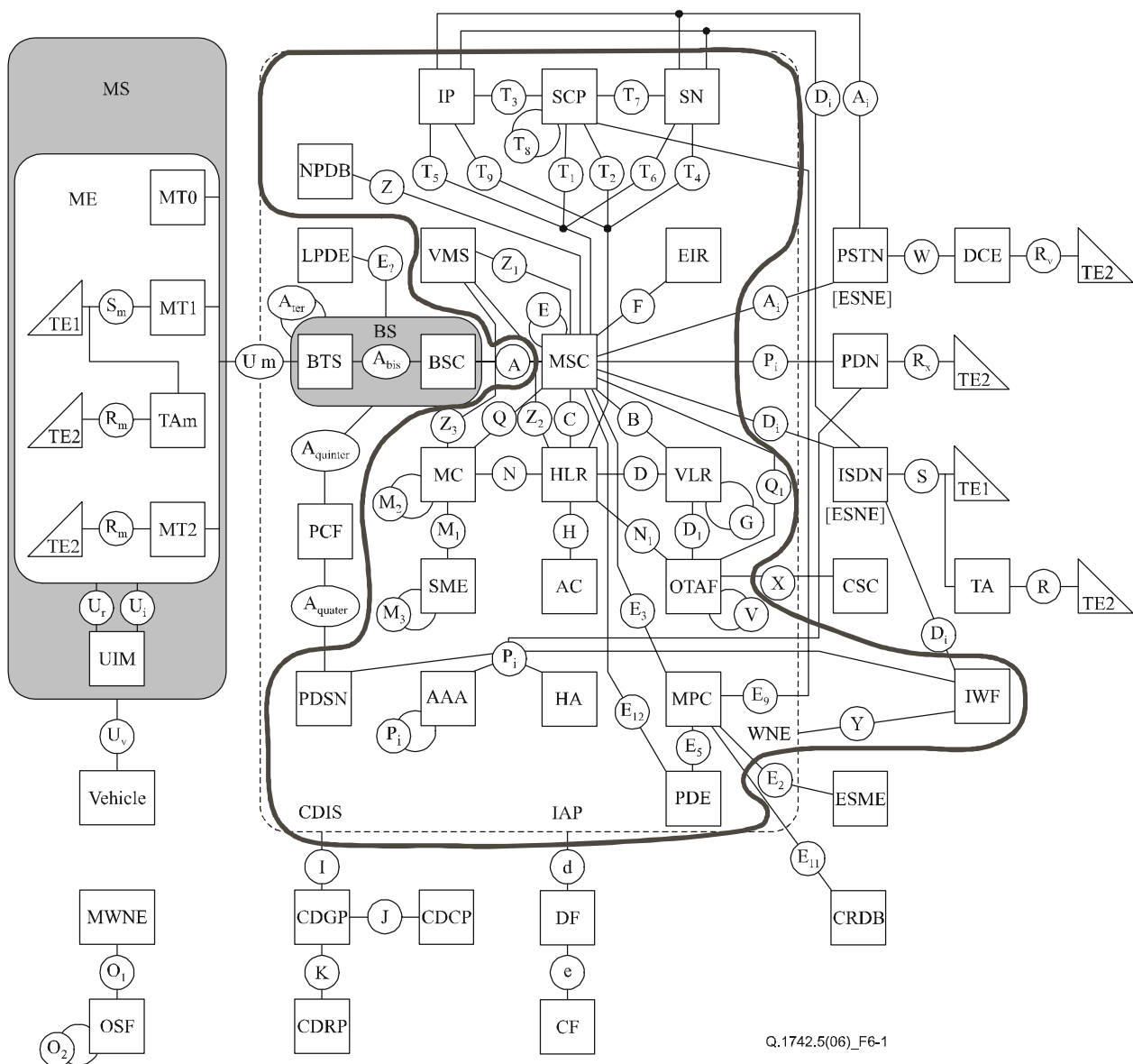
6 Basic architecture for the ANSI-41 evolved core network with cdma2000 access network family member

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 references [12 a-d] section 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.



△ □ ▽ Specific network entity

▭ Composite entity

▭ Collective entity

—(H)— Interface reference point

⊗ Interface to another instance of the same Network Entity

— Line intersection

NOTE – The portion of the figure within the solid line is the Core Network.

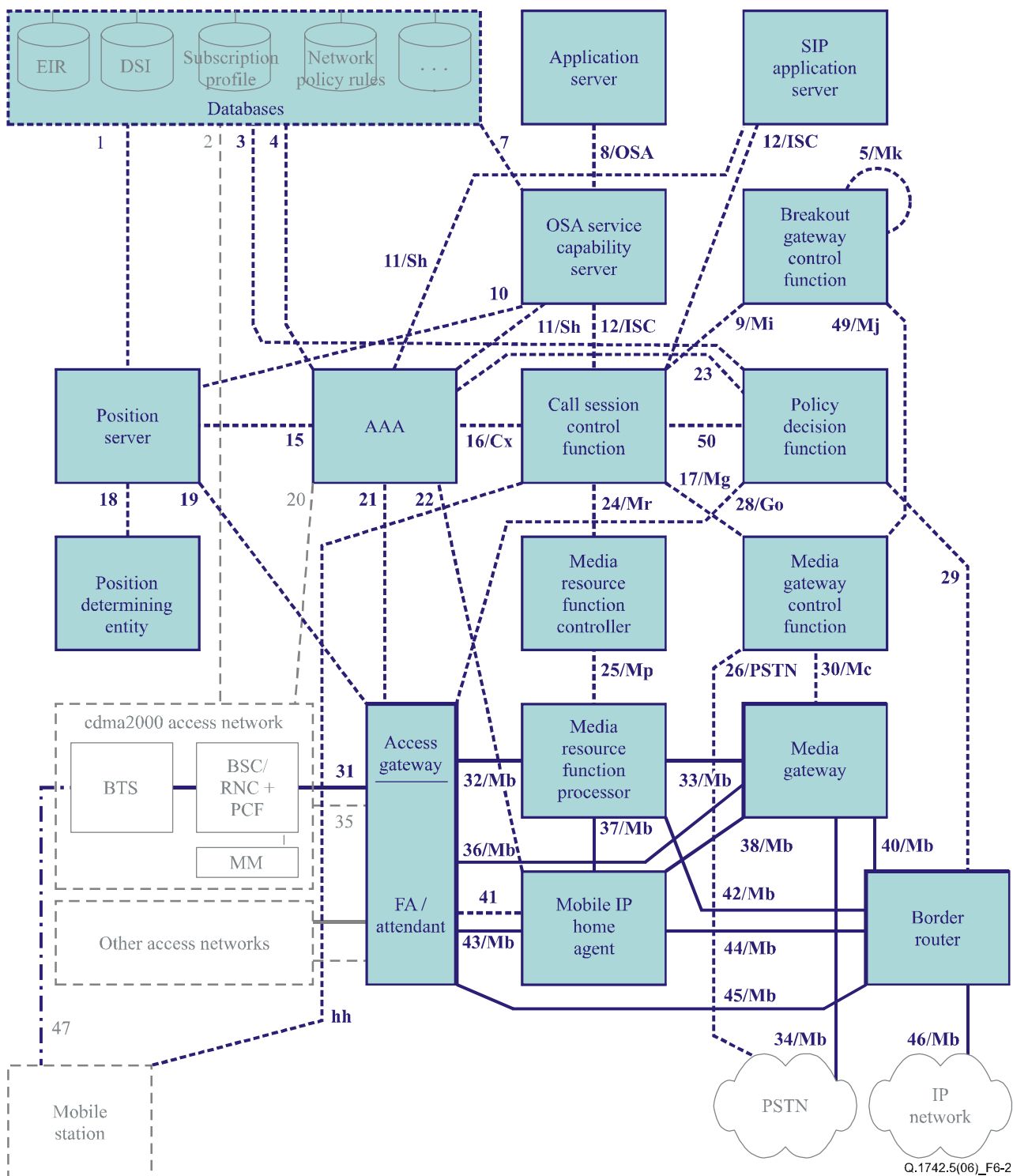
Figure 6-1/Q.1742.5 – ANSI-41 evolved core network with cdma2000 access network reference model

The basic architecture for the ANSI-41 evolved core network with cdma2000 access network family member also includes an all-IP multimedia domain. The following text is based on references [13 a-c] section 2.1.

All-IP MMD Core Network Architecture:

Figure 6-2 presents the core network entities and associated reference points that comprise the MMD (Multimedia Domain) of the wireless all-IP Network Architecture Model. The network 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.



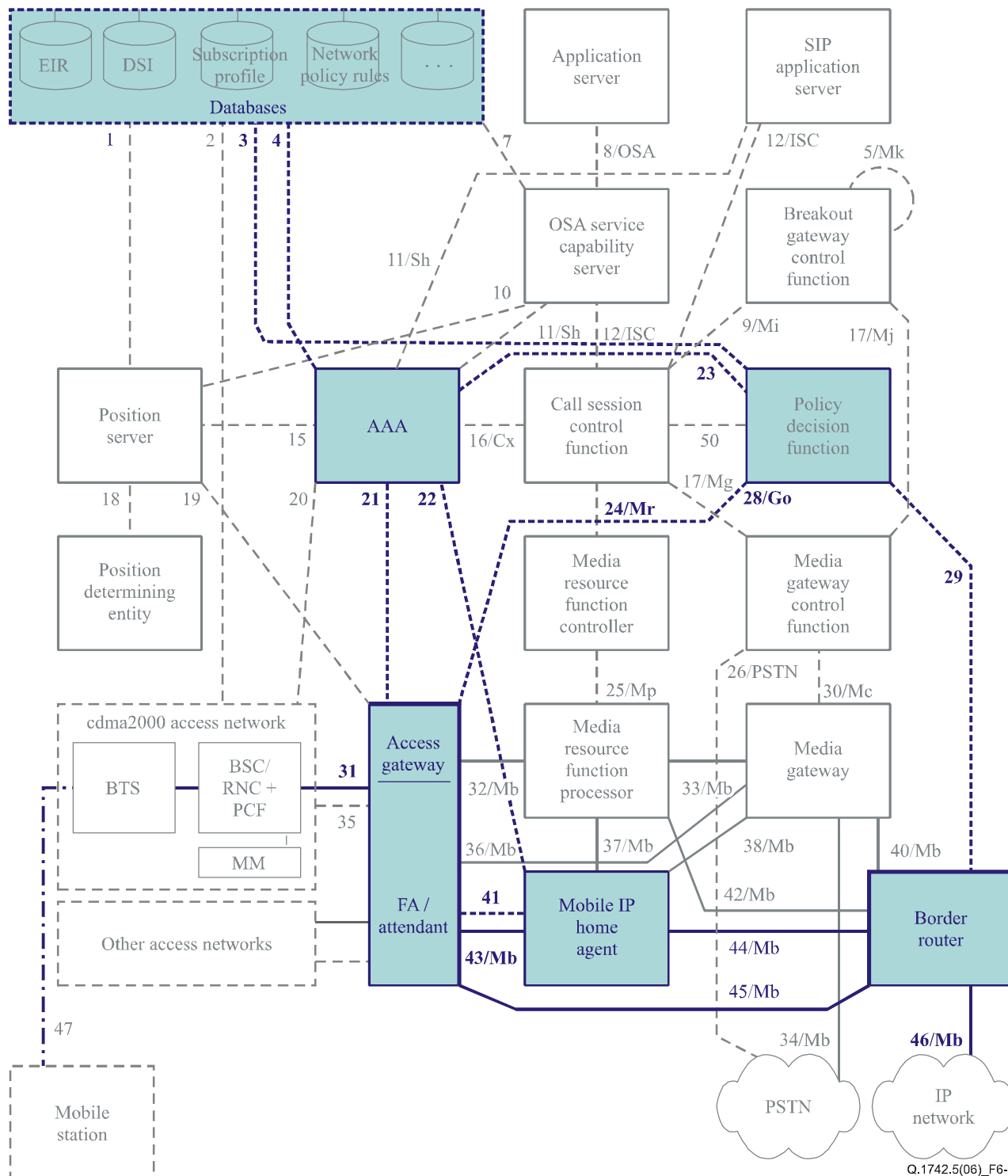
NOTE – The "IP MMD core network" is identified by the network elements and reference points indicated in bold (solid lines and dotted lines) and shaded in boxes (in blue in the electronic version).

Figure 6-2/Q.1742.5 – 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 multimedia session capabilities. The multimedia session capabilities are built on top of the general packet data support

capabilities. The general packet data capabilities may be deployed without the multimedia session capabilities. Some network entities are common to providing both capabilities.

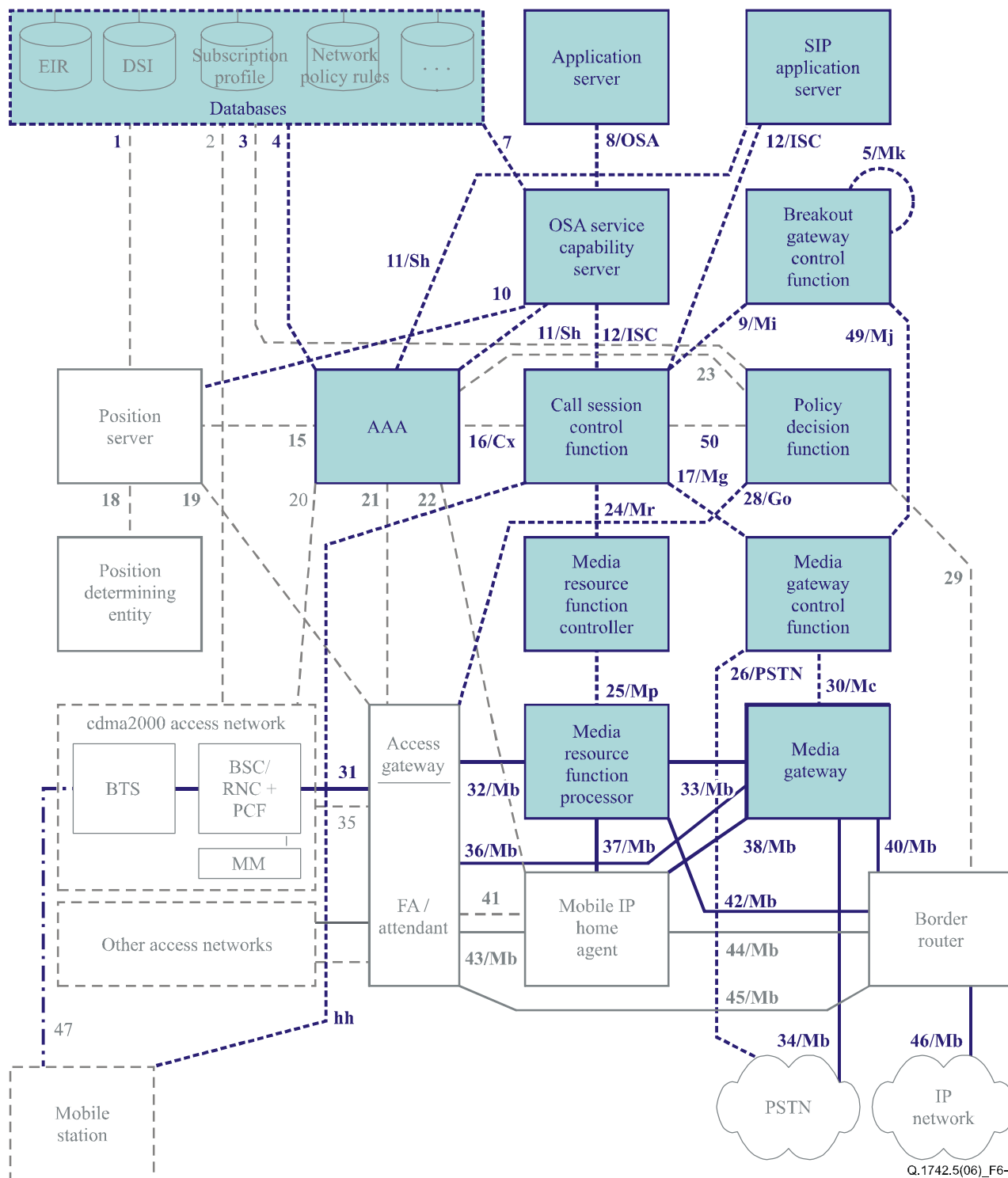
Figure 6-3 shows the entities that comprise the general packet data support portion of the MMD core network. These are known collectively as the Packet Data Subsystem (PDS). Figure 6-3 includes several reference points that have dual labels. Either of these labels may be used in the specifications relating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



NOTE – The "Packet Data Subsystem" is identified by the network elements and reference points indicated in bold (solid lines and dotted lines) and shaded in boxes (in blue in the electronic version).

Figure 6-3/Q.1742.5 – 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 – The "IP Multimedia Session Subsystem" is identified by the network elements and reference points indicated in bold (solid lines and dotted lines) and shaded in boxes (in blue in the electronic version).

Figure 6-4/Q.1742.5 – 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.

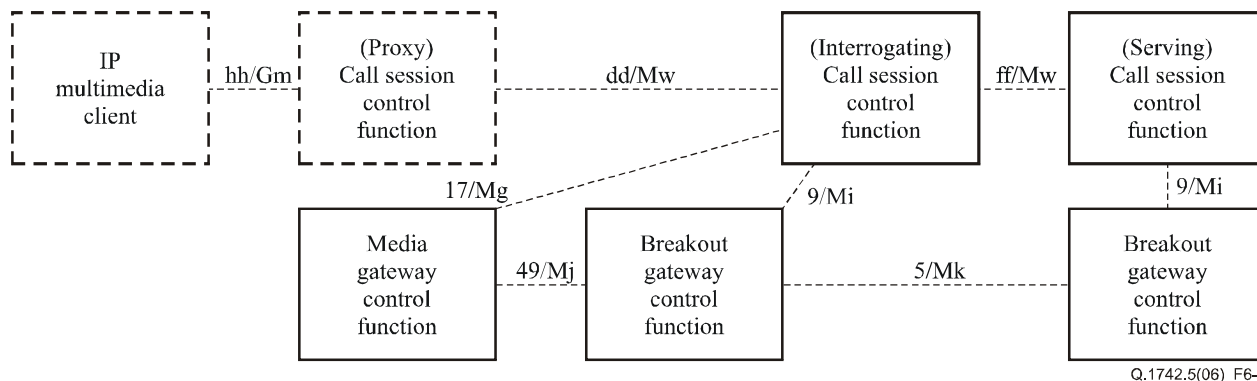


Figure 6-5/Q.1742.5 – Session Control Reference Model

7 Network entities

The following text is based on references [12 a-d] section 2.1.1.

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 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.

7.13 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).

7.14 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.

7.15 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.

7.16 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.

7.17 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).

7.18 Managed Wireless Network Entity (MWNE)

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

7.19 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).

7.20 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).

7.21 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.

7.22 Number Portability DataBase (NPDB)

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

7.23 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.

7.24 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.

7.25 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.

7.26 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.

7.27 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.

7.28 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.

7.29 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.

7.30 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.

7.31 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.

7.32 Wireless Network Entity (WNE)

A Network Entity in the wireless Collective Entity.

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

7.33 Access Gateway (AGW)

The CDMA2000 AGW consists of the PDSN and other logical functions required to interface the core network to the CDMA2000 RAN.

- 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.

7.34 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.

7.35 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 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.

7.36 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.

7.37 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.

7.38 Call Session Control Function (CSCF)

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

7.39 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.

7.40 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.

7.41 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.

7.42 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.

7.43 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.

7.44 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.

7.45 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.

7.46 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.

7.47 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.

7.48 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.

7.49 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). QoS policy information for network resource utilization may be forwarded to and cached by the PDF.

NOTE – The maintenance of SLAs is for further study.

7.50 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.

7.51 Position Server

The Position Server provides geographic position information to requesting entities.

7.52 Public Switched Telephone Network (PSTN)

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

8 Reference Points

The following text is based on references [12 a-d] section 2.1.2.

8.1 Reference Point B

Reference Point B is the interface between 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 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 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 references [13 a-c] section 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 signalling interface between the Databases and the Position Server (Multimedia Domain only).

8.48 Reference Point 2

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

8.49 Reference Point 3

Reference Point 3 is the signalling interface between the Databases and the Policy Decision Function (Multimedia Domain only).

8.50 Reference Point 4

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

8.51 Reference Point 5/Mk

Reference Point 5/Mk is the signalling interface between Breakout Gateway Control Functions (Multimedia Domain only).

8.52 Reference Point 6

Reference Point 6 is the signalling interface between the Databases and the Legacy MS Domain Support (Legacy MS Domain only).

8.53 Reference Point 7

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

8.54 Reference Point 8/OSA

Reference Point 8/OSA is the signalling 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 signalling 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 signalling 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 signalling 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 signalling 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 signalling interface between the Legacy MS Domain Support and the PSTN (Legacy MS Domain only).

8.60 Reference Point 14

Reference Point 14 is the signalling 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 signalling interface between the Position Server and AAA.

8.62 Reference Point 16/Cx

Reference Point 16/Cx is the signalling 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 signalling 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 signalling interface between the Position Server and the Position Determining Entity.

8.65 Reference Point 19

Reference Point 19 is the signalling interface between the Position Server and the Access Gateway (Multimedia Domain only).

8.66 Reference Point 20

Reference Point 20 is the signalling interface between the AAA and the cdma2000 Access Network (Multimedia Domain only).

8.67 Reference Point 21

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

8.68 Reference Point 22

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