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All-IP Core Network Multimedia Domain

Overview

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ALL-IP CORE NETWORK MULTIMEDIA DOMAIN - OVERVIEW

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Table 1. Abbreviations 8

FOREWORD

This Technical Specification has been produced by the 3rd Generation Partnership Project 2 (3GPP2).

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REVISION HISTORY

Revision	Changes	Date
0, v1.0	Initial Publication	December 2003
0, v2.0	Version Update	July 2005

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1 Introduction

The ~~3GPP2~~ Multimedia Domain (MMD) is a CDMA [12] based wireless network providing 3rd generation capabilities and based on IP protocols, elements and principles. This document provides an introduction to the core network elements and interfaces that make up a portion of the MMD. This document also introduces the series of documents that provide the complete specification of the core network interfaces and protocols that provide this part of the MMD capabilities.

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2 Scope

This document contains the introduction of the Stage-1, Stage-2 and Stage-3 recommendations for the ~~3GPP2 All-IP~~ Multimedia Domain. It includes an overview of the system elements and interfaces and lists the series of documents that provide the complete specifications for the core network portions of the MMD. Not all MMD entities and interfaces may be covered by this version of this series of specifications. The specific entities and interfaces covered by a particular version are identified in each of the individual specifications.

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3 Reference

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4 [1] 3GPP2 S.R0037-0, “IP Network Architecture Model for cdma2000 Spread Spectrum
5 Systems”, Version 3.0, August, 2003.
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7 [2] 3GPP2 X.S0011-C, “Wireless IP Network Standard”, Version 2.0.0, September 25, 2003.
8
9 [3] 3GPP2 X.S0013-002-0 v1.0, “IP Multimedia Subsystem (IMS); Stage-2”
10
11 [4] 3GPP2 X.S0013-003-0 v2.0, “IP Multimedia (IM) session handling; IM call model”
12
13 [5] 3GPP2 X.S0013-004-0 v2.0, “IP Multimedia Call Control Protocol based on SIP and SDP;
14 Stage-3”
15
16 [6] 3GPP2 X.S0013-005-0 v2.0, “IP Multimedia (IM) Subsystem Cx Interface; Signaling flows
17 and message contents”
18
19 [7] 3GPP2 X.S0013-006-0 v2.0, “Cx Interface based on the Diameter protocol; Protocol details”
20
21 [8] 3GPP2 X.S0013-007-0 v1.0, “IP Multimedia Subsystem; Charging Architecture”
22
23 [9] 3GPP2 X.S0013-008-0 v2.0, “IP Multimedia Subsystem; Accounting, Information Flows and
24 Protocol”
25
26 [10] 3GPP2 X.S0013-010-0 v2.0, “IP Multimedia Subsystem (IMS) Sh Interface signaling flows
27 and message contents”
28
29 [11] 3GPP2 X.S0013-011-0 v2.0, “Sh interface based on the Diameter protocol”
30
31 [12] C.S0001-A to 6, “cdma2000 Family of Standards for Spread Spectrum Systems”; 3GPP2;
32 March 2000
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4 Terminology

This document uses the following “verbal forms” and “verbal form definitions”:

- a. “shall” and “shall not” identify items of interest that are to be strictly followed and from which no deviation is recommended,
- b. “should” and “should not” indicate items of interest that are highly desirable and particularly suitable, without identifying or excluding other items; or (in the negative form) indicate items of interest that are not desirable, are not particularly suitable, or are not recommended but not prohibited, and
- c. “may” and “may not” indicate items of interest that are optional but permissible within the limits of this recommendation.

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5 Assumptions

a. The architecture described in this document assumes the following protocols:

I. SIP (Session Initiation Protocol),

II. DIAMETER, and

III. MOBILE IP.

b. The use, support, and interoperation of IPv4 and IPv6 in the All-IP network is currently assumed in this document, but whether IPv6 should be used exclusively needs to be strongly considered in ongoing work.

c. There are known bearer paths not shown in Figure 2 (e.g., bearer paths between the Application Servers and the Border Router, the Application Servers and the Media Resource Function Processor). Some of these interfaces are shown in additional diagrams in this document, but not numerically labeled, see Section 2.

d. There are known signaling paths not shown in Figure 2 (e.g., signaling paths between two Call Session Control Function (CSCF), two AAA, an external SIP entity beyond the Border Router and the CSCF). Some of these interfaces are shown in additional diagrams in this document, but not numerically labeled, see Section 2.

6 Definitions

This section provides definitions of some terms used within this document.

6.1 Quality of Service (QoS)

QoS refers to a set of capabilities that a network may provide to a communications session. These capabilities can be specified so that particular applications (e.g., conversational voice, video, streaming audio) fulfill human factors or other requirements with respect to fidelity and performance.

6.2 Home Subscriber Server (HSS)

For the document specifications related to the IP Multimedia Subsystem (IMS) elements and the Sh and Cx interfaces (see “11/Sh” and “16/Cx” in Figures 2, 3, 4 and 6), the term “HSS” is used to represent the Home AAA entity plus the Databases to which it interfaces. When used to define interfaces, the term HSS implies interfaces to the AAA component of the collective. The functionalities of the HSS collective and its interfaces are solely defined by the MMD document specifications and their normative references. The use of this term does not imply the support of any additional functionalities. Other functionalities and interfaces supported by the AAA and Databases (e.g., Packet Data Subsystem Authentication, Authorization, Accounting) defined in other document specifications are not changed by the use of the HSS term in the MMD series of document specifications.

Figure 1 shows the HSS collective. For the purposes of specification of the IMS elements and interfaces, the AAA plus the Databases are equivalent to the HSS:

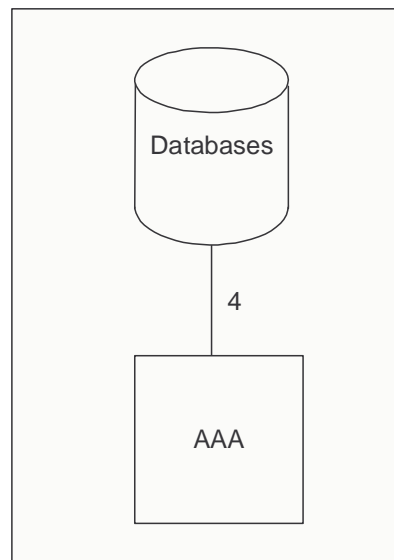


Figure 1 HSS Collective

7 Abbreviations

This section provides a definition of the abbreviations used within this recommendation, as:

AAA	Authentication, Authorization, and Accounting
AGW	Access Gateway
API	Application Programming Interface
AS	Application Server
BR	Border Router
BSC	Base Station Controller
BTS	Base Transceiver System
CSCF	Call Session Control Function
DB	Database
DSI	Dynamic Subscriber Information
EIR	Equipment Identity Register
FA	Foreign Agent
HA	Home Agent
I-CSCF	Interrogating CSCF
HSS	Home Subscriber Server
IMS	IP Multimedia Subsystem
IP	Internet Protocol
IPv4	Internet Protocol Version 4
IPv6	Internet Protocol Version 6
MGW	Media Gateway
MGCF	Media Gateway Control Function
MM	Mobility Manager
MRFC	Media Resource Function Controller
MRFP	Media Resource Function Processor
OSA	Open Service Access
<u>OSF</u>	<u>Operations Systems Function</u>
<u>OSS</u>	<u>Open Support System</u>
PCF	Packet Control Function
P-CSCF	Proxy-CSCF
PDE	Position Determining Entity
PDF	Policy Decision Function
PDS	Packet Data Subsystem
PSTN	Public Switched Telephone Network
QoS	Quality of Service
MMD	Multimedia Domain

RNC	Radio Network Controller
SCS	Service Capability Server
S-CSCF	Serving CSCF
SIP	Session Initiation Protocol

Table 1. Abbreviations

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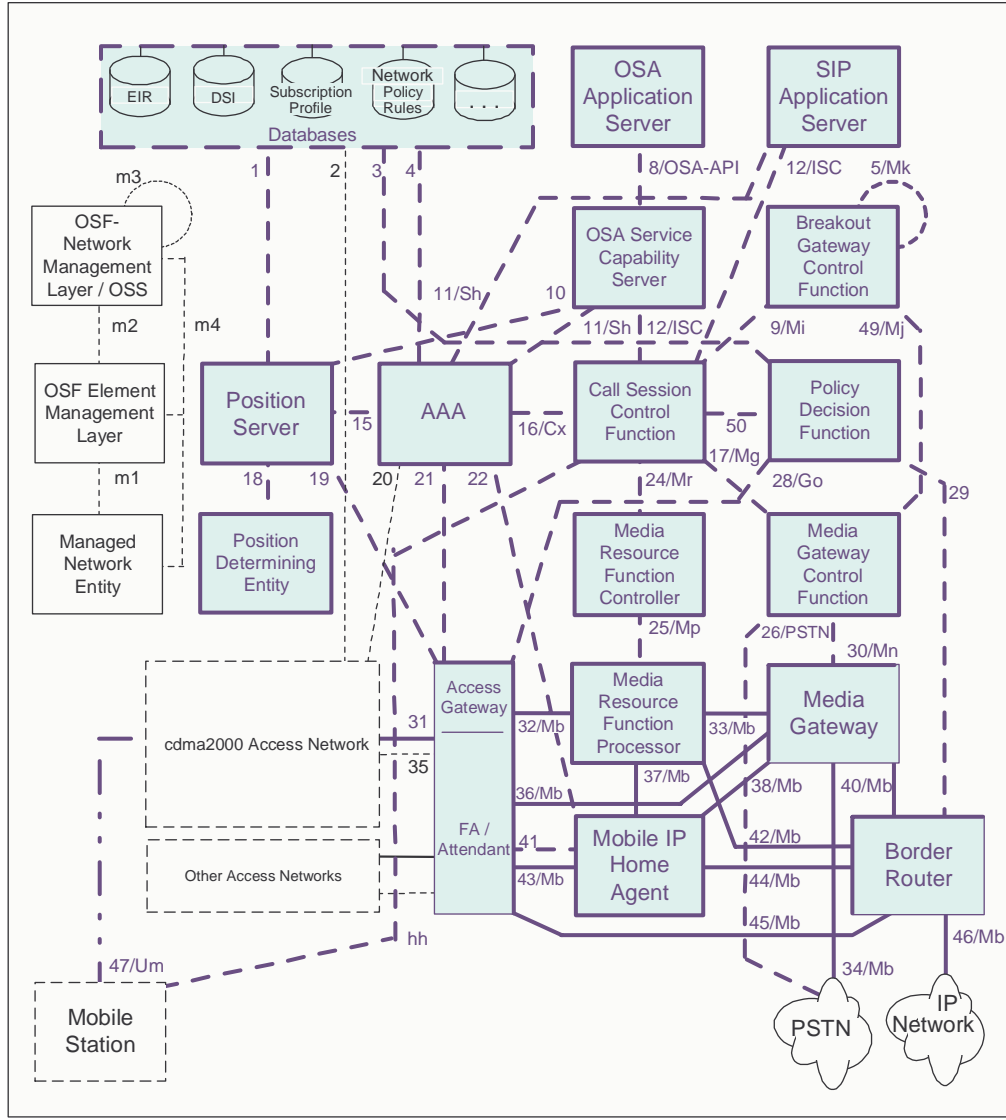
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8 MMD Core Network Architecture

Figure 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 2 includes several reference points that have dual labels. Either of these labels may be used in the [document specification](#) relating to these reference points. Note: in Figure 2 the “MMD Core Network” is identified by the network elements and reference points highlighted in “blue”.

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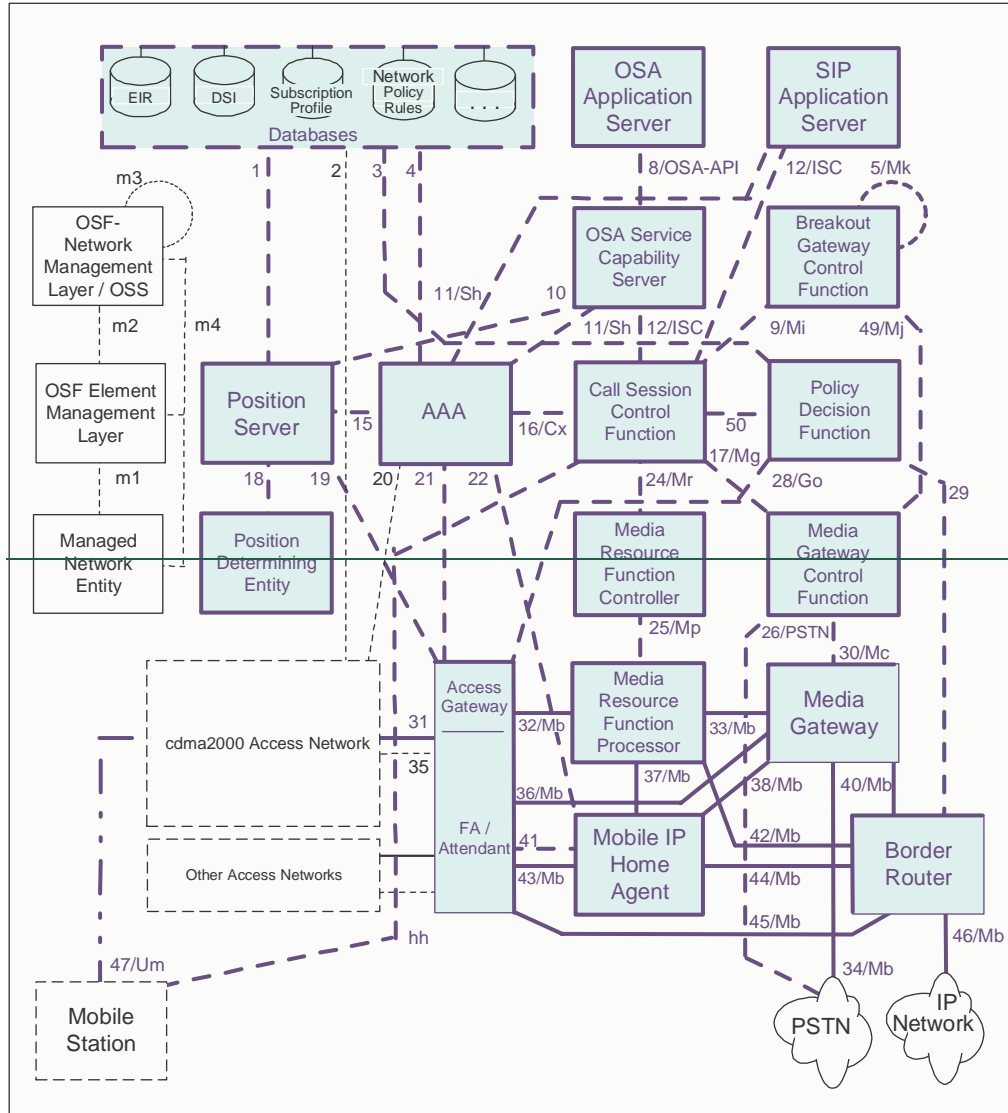
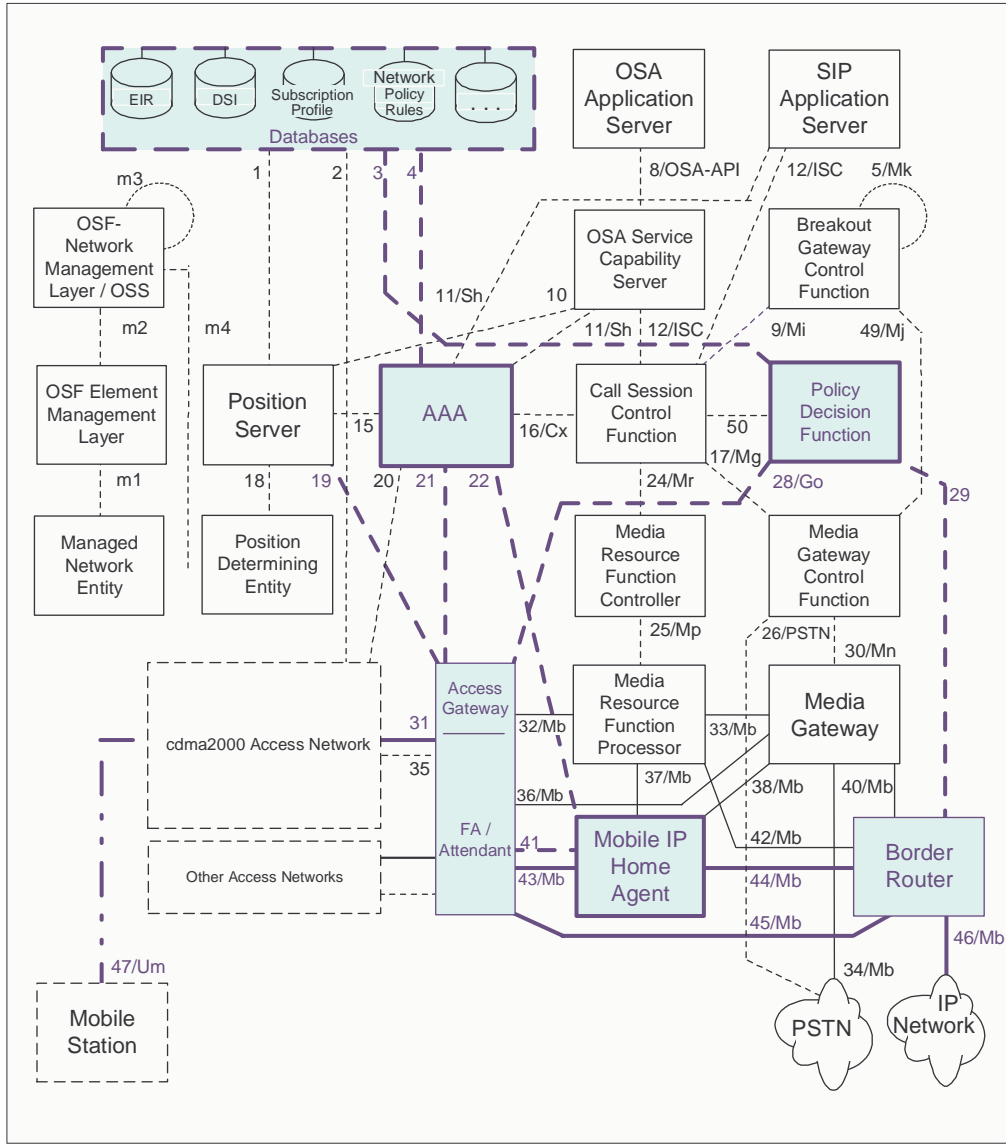


Figure 2 3GPP2-MMD Core Network Architecture Model

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 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 3 includes several reference points that have dual labels. Either of these labels may be used in the [documentspecification](#) relating to these reference points. Note: in Figure 3 the “Packet Data Subsystem” is identified by the network elements and reference points highlighted in “blue”.



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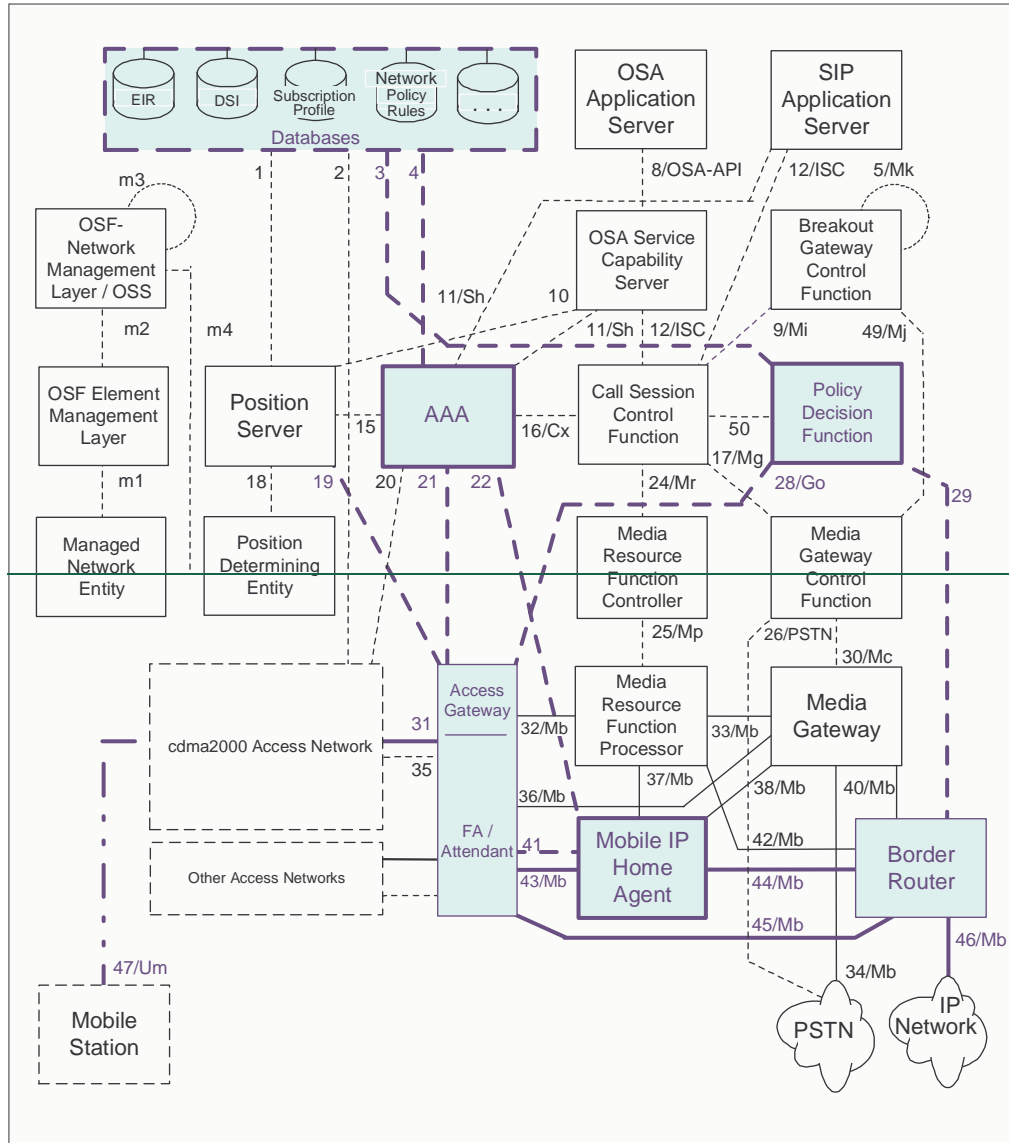
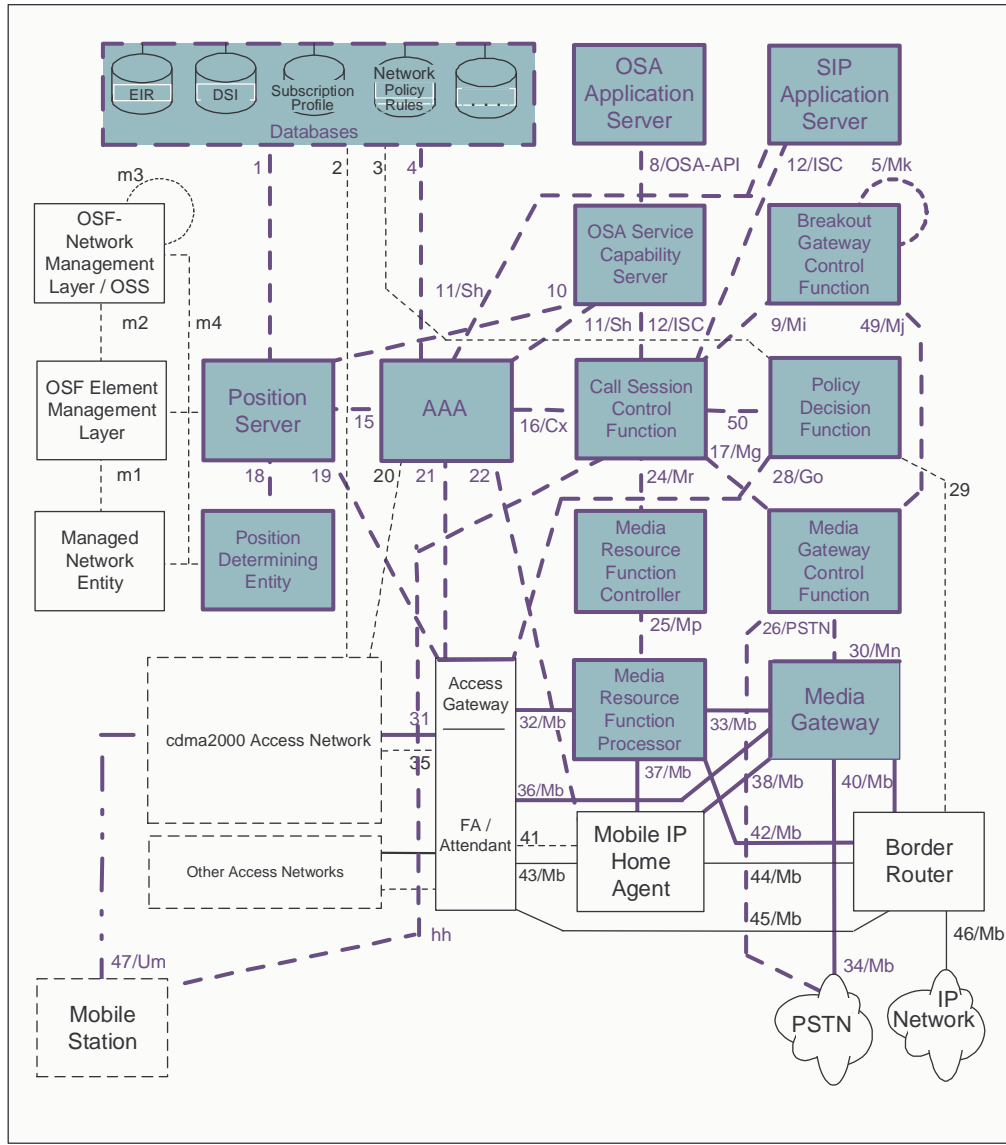


Figure 3 3GPP2-Packet Data Subsystem Core Network Architecture Model

Figure 4 shows the entities that comprise the multimedia session capabilities of an All-IP network. These entities are known collectively as the IP Multimedia Subsystem (IMS). Figure 4 includes several reference points that have dual labels. Either of these labels may be used in the documents specifications relating to these reference points. Note: in Figure 4 the “IP Multimedia Subsystem” is identified by the network elements and reference points highlighted in “blue”.



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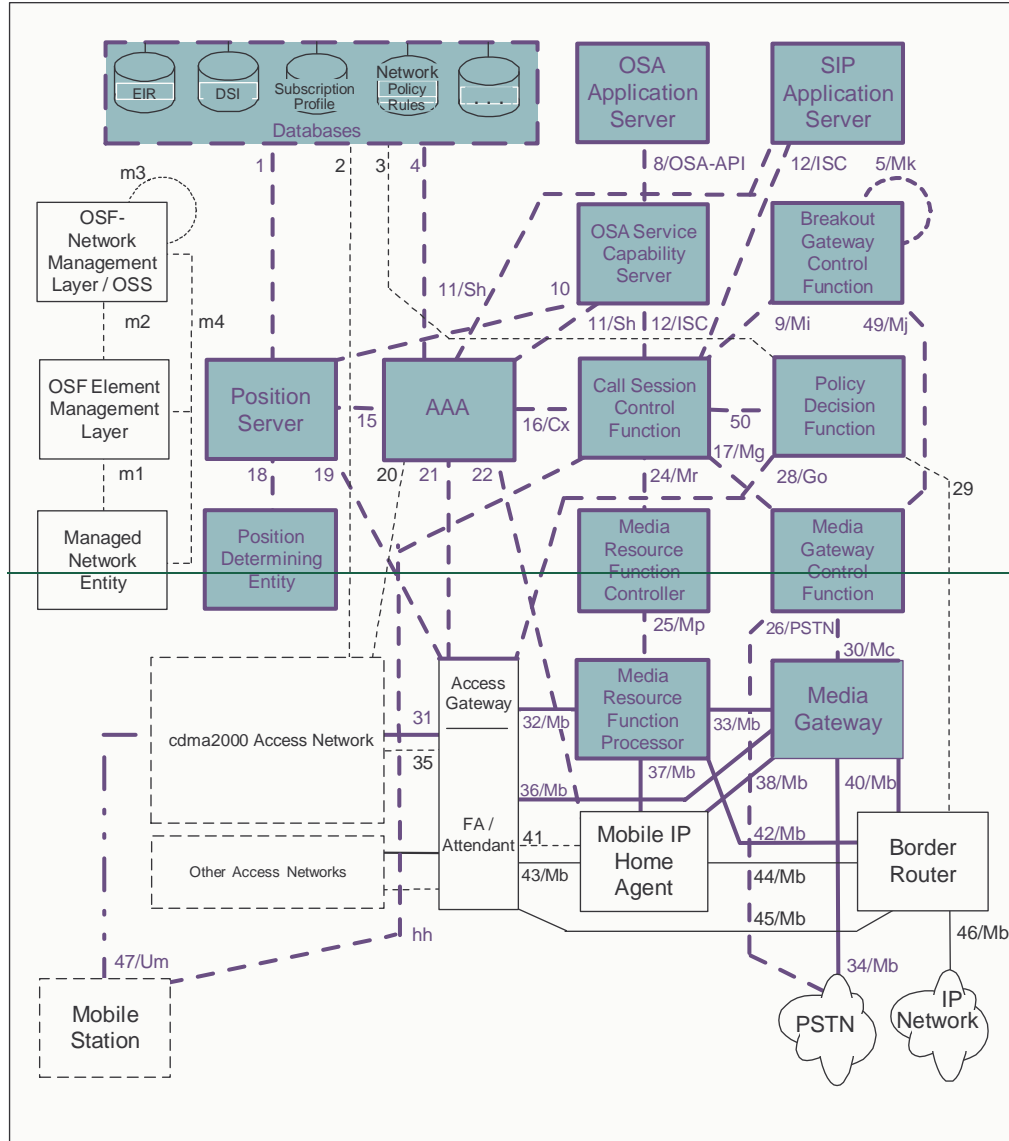


Figure 4 3GPP2-IMS Core Network Architecture Model

The session control functions within the IMS are logically interconnected in various ways in the session scenarios. Figure 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 documents specification. The Breakout Gateway Control Function (BGCF) and the Media Gateway Control Function (MGCF) may be in any network (i.e., home, visited, 3rd party).

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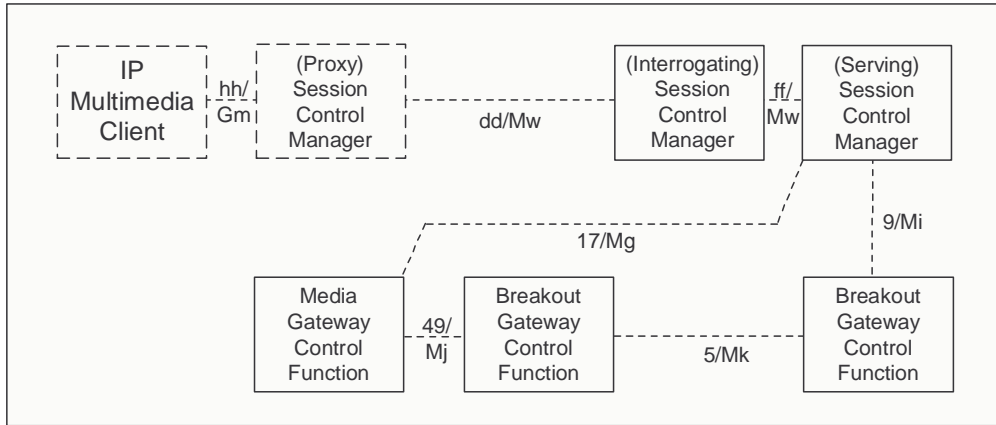


Figure 5 Session Control Reference Model

In addition to the PDS and IMS there is also a collection of entities that provide specific service capabilities for the MMD (e.g., geo-location capabilities, presence capabilities). These entities comprise the service capability subsystem portion of the MMD. Figure 6 shows the entities that comprise the service capability subsystem portion of the MMD. Figure 6 identifies the reference points within the MMD service capability subsystem 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 [documents specifications](#).

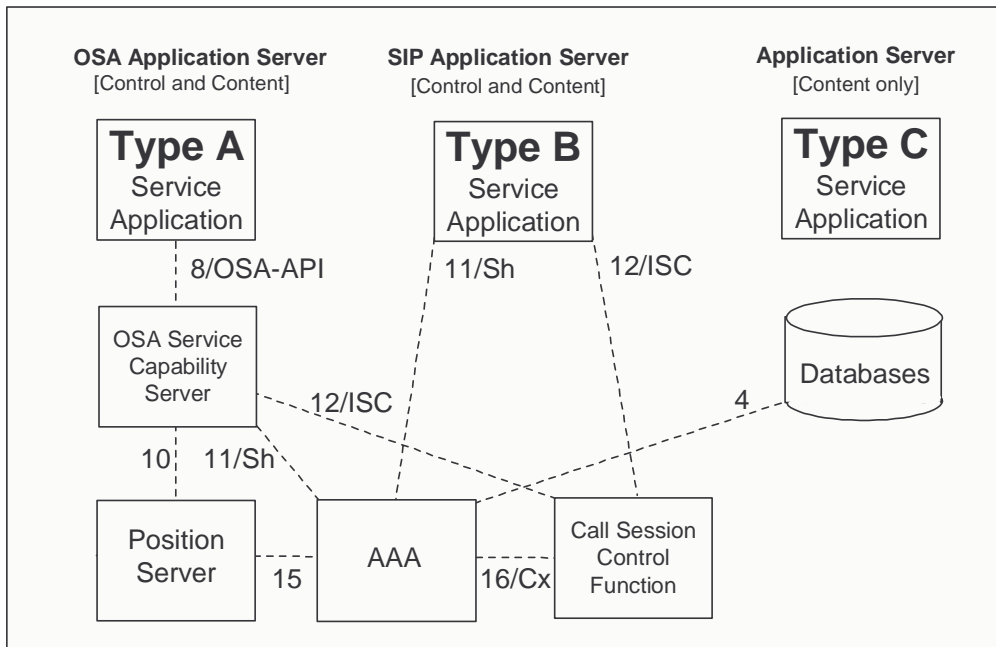


Figure 6 Multimedia Application Server Control Plane

8.1 Network Entities

Each network entity may be a physical device, it may form part of a physical device, or it may be distributed over a number of physical devices. The Network Entities are identified in [1] and detailed description of the functions and procedures provided by these Network Entities is provided in the

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1 documents listed in Sections 3, 4 and 5. The following sections include further explanation regarding
2 the functionality of these network entities not included in Sections 3, 4 and 5.

3 4 **8.1.1 Application Server (AS)**

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6 Application Server (AS) interfaces: These interfaces offer applications access to a range of network
7 capabilities and information in two categories, Open Service Access (OSA) based AS and SIP based
8 Application Servers. The Application Programming Interface (API) to be used on Reference Point 8 is
9 a standard interface between the Application Server and the OSA Service Capability Server (OSA
10 SCS).
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12 13 14 **8.2 Reference Points**

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16 An interface exists when two Network Entities are interconnected through exactly one signaling or
17 bearer stream Reference Point. Reference Points identify that a logical relationship exists between two
18 Network Entities. An interface is defined across a specific Reference Point by defining the protocol
19 and data exchanged between the entities. Zero, one or more interfaces may be defined for each
20 reference point in the MMD. The Reference Points are identified in [1].
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9 Document Specifications for the core network packet data subsystem

The ~~3GPP2~~ MMD is specified by a series of documents of which this document provides an overview. The Packet Data Subsystem is specified in [2].

~~Specification of the i~~ Interfaces corresponding to reference points 3, 4, 23, 28/Go, 29, 44, 45, 46, and 50, which are shown in the reference model, are not addressed in this version of the series of MMD documents specifications.

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10 Document Specifications for the core network IP Multimedia subsystem

The ~~3GPP2~~ MMD is specified by a series of documents of which this document, Part 0, provides an overview. The following documents comprise the ~~detailed specifications for the~~ Core Network IP Multimedia Subsystem (IMS). ~~Specification of the~~ interfaces corresponding to reference points 4, 7, 10, 25, 28/Go, 29, 30, and 50, which are shown in the reference model, are not addressed in this version of the series of MMD ~~documents~~ specifications.

- a. IP Multimedia Subsystem (IMS); Stage-2 [3]:
This document ~~covers Stage 2 specification of the IMS~~ includes functional entity actions and information flows for the entities and interfaces that comprise the IMS. For this release this includes the following interfaces: 11/Sh, 12/ISC, 16/Cx, 17/Mg, 24/Mr, 25/Mp, 26/Go, 30/Mne, 34/Mb, 46Mb, 50, dd/Mw, ff/Mw, hh/Gm, and ii,
- b. IP Multimedia (IM) session handling; IM call model [4]:
This document covers the call model to be supported by SIP session control functional entities,
- c. IP Multimedia Call Control Protocol based on SIP and SDP; Stage-3 [5]:
This document specifies the Stage-3 for the 12/ISC, 17/Mg, 24/Mr, 46/Mb, 50, dd/Mw, ff/Mw, hh/Gm, and ii interfaces,
- d. IP Multimedia (IM) Subsystem Cx Interface; Signaling flows and message contents [6]:
This document specifies detailed Stage-2 for interface 16/Cx,
- e. Cx Interface based on the Diameter protocol; Protocol details [7]:
This document specifies Stage-3 for interface 16/Cx,
- f. IP Multimedia Subsystem; Charging Architecture [8]:
This document specifies the architecture for off-line and on-line accounting functions, and
- g. IP Multimedia Subsystem Accounting, Information Flows and Protocol [9]:
This document specifies detailed Stage-2 and Stage-3 for the IMS Accounting interfaces.

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11 Document Specifications for the core network service capability subsystem

The ~~3GPP2~~ MMD is specified by a series of documents of which this document provides an overview. The following documents comprise ~~the detailed specifications for~~ the Core Network Service Capabilities Subsystem (SCS). ~~Specification of the~~ interfaces corresponding to reference points 4, 7, 10, and 15, which are shown in the reference model, are not addressed in this version of the series of MMD ~~documents~~ specifications.

- a. IP Multimedia Subsystem (IMS) Sh Interface signaling flows and message contents [10]:

This document specifies detailed Stage-2 for interface 11/Sh.

- b. Sh interface based on the Diameter protocol [11]:

This document specifies Stage-3 for interface 11/Sh.

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