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# System Requirement Specification Document

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Diameter Base Protocol API SRS

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Version 1.0

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**Document Information****Document Sign Off**

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Date	Revision	Author	Description
February 11, 2008		Shafaq Irshad	Details of System Requirement Specifications.

**Document Purpose**

The information provided in this document explains both functional and non functional requirements for diameter base protocol API. It clearly identifies the requirements and contains detail information about it. For complete scope of Diameter base protocol please see the **Project Proposal**.

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## 1. References & Abbreviations

### References

Following is the 3GPP reference document list, which is related to the information present in this document:

[1] IETF RFC 3588: "Diameter Base Protocol".

[2] 3GPP TS 29.229: "Cx and Dx interfaces based on the Diameter protocol".

[3] 3GPP TS 29.329: "Sh Interface based on the Diameter protocol; Protocol details".

[4] 3GPP TS 32.296: "Telecommunication management; Online Charging System (OCS): Applications and interfaces;".

### Abbreviations

Following are the abbreviations that have been used in the document:

<b>API</b>	Application Program Interface.
<b>AVPs</b>	Attribute Value Pair.
<b>DIM</b>	Diameter Base Protocol.
<b>Description</b>	Detailed requirement description.
<b>Group Name</b>	Functional Requirement Grouping representing the Diameter Base Protocol API.
<b>ID</b>	ID is for internal requirement reference.
<b>Name</b>	Requirement Title
<b>SCTP</b>	Stream Control Transmission Protocol.
<b>TCP</b>	Transmission Control Protocol.

## 2. Project Overview

Diameter is the AAA protocol selected by 3GPP to provide Authentication, Authorization and Accounting (AAA) services in the IMS. The Diameter Base Protocol [RFC 3588] contains the basic functionality required for AAA model and is mandated in all Diameter nodes. The Diameter applications are extensions of the basic functionality that are tailored for a particular usage of Diameter in a particular environment. Diameter runs over reliable transport protocols, TCP and SCTP. This diameter project will implement IP Multimedia Subsystems's Home Subscriber Server supporting Cx/DX [2] and Sh [3] interfaces as defined by 3GPP standards, Online Charging System (OCS) [4] and Offline Charging System (CDF&CGF). This document specifically describes the Diameter Base Protocol API. The Diameter Base Protocol implementation (API) will address all the requirements mandated by the IETF RFC 3588.

The following components in IMS will use Diameter Base Protocol API in their implementation.

- Home Subscriber Server (HSS)
- Subscriber Locator Function (SLF)
- Charging Data Function (CDF) &
- Online Charging System (OCF).

The detailed information about these components can be found in 3GPP standards

### 3. Functional Requirements

Following illustrates functional requirements of diameter base protocol.

#### Requirement: 1 - API for management of Realm based routing table

<b>ID</b>	DIM – 00018.
<b>Group Name</b>	Diameter Base Protocol.
<b>Name</b>	API for management of Realm based routing table.
<b>Description</b>	The implementation should provide a convenient mechanism through an API to create, edit, and manipulate Realm based routing table entries as described in Diameter RFC 3588.

#### Requirement: 2 - API for Peer table management

<b>ID</b>	DIM – 00017.
<b>Group Name</b>	Diameter Base Protocol.
<b>Name</b>	API for Peer table management
<b>Description</b>	The implementation should provide a convenient mechanism through an API to create, edit, and manipulate Peer Table entries as described in Diameter RFC 3588.

#### Requirement: 3 - API to create Diameter packets and AVPs

<b>ID</b>	DIM – 00008.
<b>Group Name</b>	Diameter Base Protocol.
<b>Name</b>	API to create Diameter packets and AVPs.
<b>Description</b>	The implementation should provide convenient API to create Diameter packets and AVPs.



**Requirement: 4 - API to parse diameter packets and AVPs**

<b>ID</b>	DIM – 00009.
<b>Group Name</b>	Diameter Base Protocol.
<b>Name</b>	API to parse diameter packets and AVPs
<b>Description</b>	The implementation should provide convenient API to parse received Diameter packets and AVPs into efficient data structures.

**Requirement: 5- High level provisions for creation of diameter request and answer messages**

<b>ID</b>	DIM – 00012.
<b>Group Name</b>	Diameter Base Protocol.
<b>Name</b>	High level provisions for creation of diameter request and answer messages.
<b>Description</b>	The implementation should provide a way to create and modify request/answer Diameter messages on a higher level of abstraction and utility than just the creation of a diameter or AVP packet.

**Requirement: 6 - Implementation of basic accounting state machine**

<b>ID</b>	DIM – 00016.
<b>Group Name</b>	Diameter Base Protocol.
<b>Name</b>	Implementation of basic accounting state machine.
<b>Description</b>	The implementation should implement the basic accounting state machine as described in base protocol RFC 3588.

**Requirement: 7 - Implementation of Diameter peer state machines**

<b>ID</b>	DIM – 00014.
<b>Group Name</b>	Diameter Base Protocol.
<b>Name</b>	Implementation of Diameter peer state machines
<b>Description</b>	The implementation should implement the peer state machines as described in the base protocol RFC 3588 and the Transport Profile RFC.

**Requirement: 8 - Mechanism and provision for extensibility for Diameter base protocol**

<b>ID</b>	DIM - 00011
<b>Group Name</b>	Diameter Base Protocol.
<b>Name</b>	Mechanism and provision for extensibility for Diameter base protocol.
<b>Description</b>	Common programmatic extensibility mechanism should be provided ( e.g. based on some sort of an XML file to be parsed by implementation at initialization time ) . This common extensibility mechanism should be usable for all extensibility requirements e.g. using derived AVP data types , new command codes ,etc. This will serve as dictionary for Diameter base protocol.

**Requirement: 9 – Native/Inbuilt support for all basic AVP Data types as per RFC 3588**

<b>ID</b>	DIM – 00010.
<b>Group Name</b>	Diameter Base Protocol.
<b>Name</b>	Native/Inbuilt support for all basic AVP Data types as per RFC 3588.
<b>Description</b>	The implementation should support all native data types for AVPs as described in RFC 3588.

**Requirement: 10 - Support for diameter session management**

<b>ID</b>	DIM – 00013.
<b>Group Name</b>	Diameter Base Protocol.
<b>Name</b>	Support for diameter session management.
<b>Description</b>	The implementation should provide a convenient way to manage diameter sessions .This would include the support for sending and receiving diameter messages over diameter sessions by using RFC 3588 defined Session-Id AVP.

**Requirement: 11 - Support for dynamic discovery of diameter peers through DNS NAPTR records**

<b>ID</b>	DIM – 00019.
<b>Group Name</b>	Diameter Base Protocol.
<b>Name</b>	Support for dynamic discovery of diameter peers through DNS NAPTR records.
<b>Description</b>	The implementation should support the dynamic discovery of diameter peers through DNS NAPTR based mechanisms. NOTE: The implementation will not support the dynamic discovery of diameter peers through SLP.

**Requirement: 12 - Support for error handling as mandated by the Diameter base protocol**

<b>ID</b>	DIM – 00020.
<b>Group Name</b>	Diameter Base Protocol.
<b>Name</b>	Support for error handling as mandated by the Diameter base protocol.
<b>Description</b>	The implementation should provide full support for error handling as mandated by Diameter base protocol RFC 3588.

**Requirement: 13 - Support for TCP and SCTP as transport protocols**

<b>ID</b>	DIM – 00006.
<b>Group Name</b>	Diameter Base Protocol.
<b>Name</b>	Support for TCP and SCTP as transport protocols.
<b>Description</b>	The implementation should support transport connections over TCP as well as SCTP, with easy to use programmatic high level mechanisms to indicate either of the underlying transport protocol.

**Requirement: 14 - Support of diameter base protocol standard command set**

<b>ID</b>	DIM – 00007.
<b>Group Name</b>	Diameter Base Protocol.
<b>Name</b>	Support of diameter base protocol standard command set.
<b>Description</b>	The implementation should natively support the standard command set as described in Diameter base protocol RFC 3588.

## 4. Non-Functional Requirements

Following illustrates non- functional requirements of diameter protocol.

**Requirement: 1- Interoperability with other standard diameter implementations and test suites**

<b>ID</b>	DIM – 00025.
<b>Group Name</b>	Diameter Base Protocol.
<b>Name</b>	Interoperability with other standard diameter implementations and test suites.
<b>Description</b>	The implementation would be fully inter-operable with other standard implemented Diameter base protocols. If a third party industry standard diameter interoperability test tool will exists, we will demonstrate conformance to it.

**Requirement: 2 - Performance metrics to be adhered to**

<b>ID</b>	DIM – 00026.
<b>Group Name</b>	Diameter Base Protocol.
<b>Name</b>	Performance metrics to be met.
<b>Description</b>	Following are the minimum threshold for the implementation: Number of concurrent sessions supported within a threshold of graceful performance = 5000 Throughput ( messages per second ) : 300 on send side , 300 on receive side Number of transport connections to other peers : 32.

**Requirement: 3 - Programmatic convenience of usage**

<b>ID</b>	DIM – 00021.
<b>Group Name</b>	Diameter Base Protocol.
<b>Name</b>	Programmatic convenience of usage
<b>Description</b>	<p>The implementation should provide programmatic facilitation to easily develop diameter relay, proxy, redirect and translation agents on top of itself as and when required.</p> <p>The implementation should provide programmatic facilitation to easily develop diameter applications on top of itself as and when required.</p>

**Requirement: 4 - Support for configurability**

<b>ID</b>	DIM – 00022.
<b>Group Name</b>	Diameter Base Protocol.
<b>Name</b>	Support for configurability.
<b>Description</b>	<p>The implementation should provide some sort of mechanism for configuration at initialization time , e.g. through the use of XML based configuration files .Optionally we can provide a small configuration utility for the administrator for initial configuration as well as notifying the implementation that configuration settings in the file have changed and app should reload the file and reconfigure accordingly.</p> <p>The application should be re-configurable to as much a degree as possible at runtime.</p>

**Requirement: 5 - Support for logging**

<b>ID</b>	DIM – 00024.
<b>Group Name</b>	Diameter Base Protocol.
<b>Name</b>	Support for logging.
<b>Description</b>	The implementation should support some sort of a logging mechanism by providing provisions to log messages of various types like informational and error messages.

**Requirement: 6 - Thread safety and re-entrance**

<b>ID</b>	DIM – 00023.
<b>Group Name</b>	Diameter Base Protocol.
<b>Name</b>	Thread safety and re-entrance.
<b>Description</b>	The library associated with the implementation should be in the form of a re-entrant thread safe library.

## 5. Operating Environment Requirements

The system will primarily be developed and tested on Linux/Unix based Operating Systems. But our goal is to make it a platform independent solution. The target platforms are:

- Linux ,
- Microsoft Windows &
- Solaris.