Diameter has been adopted by 3GPP and 3GPP2 standards bodies for AAA in IMS mobile systems and networks and is designed to perform these functions in both local and roaming (ROAMOPS model) situations. It is also the AAA protocol selected by TISPAN, the ETSI committee in charge of FMC (Fixed Mobile Convergence) standardization.

Diameter has been designed to ensure as much backward compatibility as possible with the RADIUS (Remote Authentication Dial In User Service) protocol widely deployed in current intranet and internet configurations. Diameter introduces many enhancements in order to address several RADIUS shortcomings and deficiencies such as lack of end-to-end security, limited size of length and identifier fields, and limited failure detection mechanisms.

Diameter is defined as a base protocol used in conjunction with a set of applications. Its base protocol provides mechanisms for reliable transport, message delivery and error handling between Diameter clients and servers. It provides:
- Delivery of AVPs (Attribute Value Pairs)
- Capabilities negotiation
- Error notification
- Basic services necessary for applications, such as handling of user sessions or accounting

Diameter can be extended through addition of new commands and AVPs in order to face ever expanding set of new application requirements. Enea Diameter-Bricks is the Enea implementation of the Enea Diameter protocol.

The standardized protocol mechanism, AVP and messages for Cx/Dx, Sh, e2, Ro, RF, Gq/Gu’ IMS interfaces are available in Enea Diameter-Bricks.

**Diameter**

All interfaces and entities composing IMS are not represented on the previous diagram in order to simplify its representation. The following lists of acronyms and reference points show which products are relevant according to customer development.

**Enea Diameter-Bricks**

Enea Diameter-Bricks is a portable implementation of Diameter base protocol. It is compliant with:
- IETF RFC 3588–Diameter Base Protocol
- IETF RFC 3589–Diameter Command Codes for Third Generation Partnership Project (3GPP) – Release 5
- IETF RFC 3539: Authentication, Authorization and Accounting Transport Profile
- ETSI TS 129 329 (i.e. 3GPP TS 29.329) – IP Multimedia Subsystem (IMS) Sh interface signaling flows and message contents – Release 5 and 6
- ETSI TS 129 329 (i.e. 3GPP TS 29.329)–Sh interface based on the Diameter protocol – Release 5 and 6
Enea® Diameter-Bricks

**Acronyms Definition**

- **P-CSCF**: Proxy Call State Control Function
- **PDF**: Policy Decision Function
- **I-CSCF**: Interrogating Call State Control Function
- **S-CSCF**: Serving Call State Control Function
- **MGCF**: Media Gateway Control Function
- **T-MGF**: Trunking Media Gateway Function
- **BGCF**: Border Gateway Control Function
- **SGF**: Signaling Gateway Function
- **IMGW**: IMS Media Gateway
- **IFM**: Inter Working Function
- **IBCF**: Interconnection Border Control Function
- **IBGF**: Interconnection Border Gateway Function
- **MRFC**: Media Resource Function Controller
- **MRFP**: Media Resource Function Processor
- **AS**: Application Server
- **HSS**: Home Subscriber Server
- **SLF**: Subscriber Location Function
- **NASS**: Network Attachment Sub System
- **RACS**: Resource and Admission Control Sub System
- **IP-CAN**: PI Connectivity Access Network
- **CCF**: Charging Collection Function (Off line Charging System)
- **ECF**: Event Charging Function (On line Charging System)

**Signaling Protocols**

- **DIAMETER**
- **SIP**
- **H.248 (Megaco)**
- **DIAMETER-BRICKS**
- **DIAMETER-BRICKS**
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**Ref Point Definition**

- **Cx-CSCF–HSS**: Proxy Call State Control Function
- **Sh**: Home Subscriber Server
- **Mr**: Media Resource Function Controller
- **Mp**: Media Resource Function Processor
- **Mw**: Media Gateway
- **Mc**: Media Gateway Control Function
- **Rf**: Charging Collection Function
- **Ro**: Charging Collection Function
- **Gq**: Charging Collection Function
- **Gm**: Charging Collection Function

**Enea Netbricks Products**

- **DIAMETER-BRICKS**
- **DIAMETER-BRICKS**
- **DIAMETER-BRICKS**
- **DIAMETER-BRICKS**
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- **DIAMETER-BRICKS**

**Enea Diameter-Bricks functions are available through the following set of configurable APIs:**

- **Full control API providing access to all available commands and AVPs**
- **Selectable oriented API restricted to command and AVP required at reference points (Cx/Dx, Sh, Ro/Rf, Gq) and implementing interface specific content controls**

Enea Diameter-Bricks utilizes object oriented design and a message passing mechanism for inter-entity communication. Interfaces to many commercial operating systems are provided including Linux, Microsoft Windows®, AMX®, Nucleus®, Enea OSE®, PSOS+,® Thread-X, Unix, VRTX®, and VxWorks®.

Enea Diameter-Bricks can be easily combined with other Enea Netbricks signaling protocols (SIP-Bricks, SCTP-Bricks) providing a unique protocol baseline for IMS functions development. Specifically Enea Diameter-Bricks addresses the OEM market of HSS, CSCF, Application Server and OSA Gateways manufacturers.

Enea can develop custom products based on Enea Diameter-Bricks technology according to customers’ specifications.

**Enea Diameter-Bricks main features**

- **Support of TCP and SCTP as transport protocol with compatibility with IPsec support as specified in RFC 3554**
- **IPV4 and IPV6 support**
- **Support of multiple applications instances**
- **Failover and Fallback procedure to alternate diameter peers**
- **Complete timer management**
- **Support of both types of diameter applications: Authentication/Authorization and Accounting**
- **Built-in tracking and logging mechanism**
ENEATM DIAMETER-BRICKSTM

High level of flexibility thanks to dynamic configuration/reconfiguration procedures
Seamless integration with other IMS signaling protocols from Enea: SCTP-Bricks, SIP-Bricks
Package includes source code (including build files and application examples), documentation (English), training, warranty and support period
Highly field proven portable design

Enea Diameter-Bricks Software Architecture
Enea Diameter-Bricks software architecture is composed of the following entities:
- System Management: configuration and local management
- Diameter base protocol: FSM and syntax
  - Full API: full control Diameter protocol API
  - Cx API: Cx API oriented module
  - Sh API: Sh API oriented module
  - Ro/Rf API: Charging oriented API module
  - Gq API: Gq API oriented module
- Services: OS Abstract Layer

Enea Diameter-Bricks is designed for a seamless integration with:
- SCTP: Stream Control Transport Protocol
- Socket Adaptation: Standard socket interface wrapper for TCP or SCTP (when native)

Enea Diameter-Bricks service is available to:
- AAA Applications: Customer AAA diameter applications