DIAMETER in mobile network environments

Diameter is the successor to RADIUS and the current AAA (Authentication / Authorization / Accounting) protocol used in many telecommunication environments like IMS and SAE. Especially its highly flexible approach, real-time credit-control, and the additional support of various interfaces make it the preferred AAA solution in today's mobile networks. It is used on a variety of interfaces for numerous functions like subscriber/location information transport, negotiation of bearer establishment or charging.

Within this course you get a good understanding of the Diameter protocol and its application in mobile networks. The focus is mainly on LTE/SAE and IMS.

Target Group

The course is addressed to technical staff to get a good overview about the DIAMETER protocol and its use in mobile networks.

Course Content

Register 1 - Introduction

DIAMETER overview

- Introduction to AAA
- Comparison RADIUS / DIAMETER
  - Limitations of RADIUS
  - DIAMETER as single protocol in packet based networks
- DIAMETER functions overview
  - Registration
  - Quality Control
  - Charging
- DIAMETER protocol structure overview
  - Base protocol
  - Application protocols

Network comparison today – future

- Overview of legacy mobile networks (2G/3G/4G)
  - Network architecture and interfaces
  - Legacy protocols in use
- Overview of future mobile networks (all IP infrastructure)
  - Network architecture and interfaces
  - Use of DIAMETER in future networks
  - LTE: MME, HSS, P-GW, PCRF, OCS, EIR
  - 2G/3G packet: GGSN, eRADIUS
  - IMS: CSCF, HSS, SLF, Charging GW
  - DIAMETER terminology

Course Duration:
3 days

Course Number:
NW1271

Requirements:
Basic knowledge of AAA principles and mobile networks

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Register 2 – Registration

Registration overview

- Mobile network architecture, interfaces and protocols
- General registration view
- Application Protocol for Registration

Registration message structure and message flow

- Example message structure "Authentication Information Request (AIR)"
- Example message flow MME – HSS
- Message formats in detail
  - AIR / AIA (Authentication)
  - ULR / ULA (Update)
  - CLR /CLA (Cancel)
- Message command description
- Capability Exchange, Device Watchdog, Disconnect Peer
- Re-Authentication, Abort Session, Session Termination

Error handling

- General principles
- Result code AVP
  - Informational
  - Success
  - Protocol Errors
  - Transient Failures
  - Permanent Failures

DIAMETER on the Gi interface

- 2G / 3G network overview
- eRADIUS for AAA

IMS specific DIAMETER registration

- IMS network architecture, interfaces and protocols
- Example message flow CSCF – HSS
- Message formats in detail
  - UAR / UAA (User)
  - MAR / MAA (Multimedia)
  - LIR / LIA (Location)
  - RTR / RTA (Registration Termination)

Register 3 – DIAMETER Routing

Components of DIAMETER architecture

- Routing based on DIAMETER
- DIAMETER connections and sessions
- DIAMETER Routing Agent (DRA)
- Specific DIAMETER Agents
  - Relay Agent
  - Proxy Agent
  - Redirect Agent
  - Translation Agent

DIAMETER load sharing and redundancy

- SCTP / TCP as layer 4 protocols
- SCTP signalling paths
- DIAMETER gateway functionalities – Signalling Transfer Point
- Routing bases on base and application protocol
- Application protocol translation
- Multi homing and load sharing scenarios
- Redundancy scenarios
- Security aspects
- Signalling example MME – DRA – HSS

Roaming

- DIAMETER non-Roaming / Roaming scenarios
- DIAMETER Roaming Gateway

Register 4 – Quality Control

Quality control overview

- Mobile network architecture, interfaces and protocols
- PCRF as central policy and charging controller

Quality control message structure and message flow

- Example message structure "Credit control request – initial (CCR–initial)"
- Example message flow PDN-GW – PCRF
- Message formats in detail
  - CCR / CCA (Credit Control)
  - Initial / update / termination

Quality control signalling in LTE

- Complete picture of message exchange
- Gx interface / application

Quality control signalling in IMS

- Complete picture of message exchange
- Rx interface / application

Register 5 – Charging

DIAMETER charging overview

- Mobile charging architecture, interfaces and protocols
- Charging in LTE and IMS
- Online charging (Gy interface)
- Charging gateway via Ga interface for offline charging
- Example message flow

Diameter credit control application (DCCA)

- DCCA basics
- DCCA architecture model
- Credit control messages (CCR / CCA)

Session based credit control

- General principles
- Credit control for multiple services within a session

One time event

- Direct debiting
- Balance check
- Refund

Credit control AVPs and result codes

- Credit control AVPS
- Result code AVP values

DCCA supplementary

- Failure handling
- Tariff time change

IMS charging

- IMS charging network architecture, interfaces and protocols
- Charging control function
- ACR / ACA (Accounting)