V2.001

eMBMS from A-Z

Course Duration:

2 Days

Course Description:

- This course addresses the needs of engineers and technicians, who need to get familiar with Multimedia Broadcast technologies in general and the MBMS extensions introduced with 3GPP Release 9 and later in particular eMBMS).
- The course provides an overview of the important video broadcasting technologies, such as Digital Video Broadcasting (DVB), Digital Multimedia Broadcast (DMB), Advanced Television Systems Committed (ATSC) and their area of application (stationary desktop, in-car usage, handheld devices).
- Having the general broadcasting overview in mind, the subject will be expanded with the specific architecture of MBMS for both UTRAN and eUTRAN. We will explain the reference points, new network entities, operation modes and important session scenarios.
- Typical operations from the UE point of view will be explained in detailed diagrams.
- Clear focus is on MBMS in the Radio Access Network with the description of new logical channels (MCCH, MTCH, MCH and PMCH) as well as the mapping to transport and physical channels. Differences to MBMS in 3G environments will be indicated (dedicated channels vs. shared channel concept with MBMS subframes in LTE).
- Another important focus is the MBMS operation in the Radio Access Network (RAB setup, handover, service registration).
- Protocol extensions and enhancements introduced with 3GPP release 9 and beyond compared to the UMTS system of 3GPP release 6 will be explained in detail. This section also contains a detailed description and analysis of the FLUTE protocol.
- The MBMS user services, such as service subscription, data delivery, charging, security and QoS, which use the bearer services explained before, will be presented in detail. Some important service scenarios will intensify the understanding of MBMS services.

Pre-Requisites:

- The student should possess basic technical understanding of mobile technologies, such as UMTS. Basic knowledge of LTE access and resource management would be helpful.

Course Target:

After the course, the student will be able to …

- describe all technical aspects of the new broadcast technology development in 3GPP and how it compares to other broadcast technologies .
- describe in detail the changes imposed with 3GPP releases 6 to the UE, the Radio Access Network and the service delivery platform as well as changes in the protocol stack(s).

Table of Contents:

Overview of Broadcasting Technologies

- **Important broadcast technologies** / DVB (DVB-S, DVB-T/H), DMB, MBSAT, ATSC, MBMS
- **History of MBMS and its Future** / Rel.6 MBMS and its Limitations, Evolution with Rel.9, Rel.10, Rel. 11 and outlook, why cellular broadcast (eMBMS) gains the attention of operators, Impact and possibilities with LTE-A and beyond.
- **Some MBMS use cases and service categories** / text notification, video + audio + general content distribution, software download
- **Comparison between MBMS and some other broadcast technologies** / indication of operator advantages

MBMS Architecture and Operational Overview

- **Overview** / Architecture model, reference points
- **Role of Network Entities to support (e)MBMS** / BM-SC, UE, (e)UTRAN / GERAN, MBMS-GW, MCE
- **Specific new interfaces with eUTRAN** / M1, M2, M3
- **Operation modes** / Multicast Mode, Broadcast Mode
- **Operational Example of MBMS** / Announcement (XML), Subscription …

(e)MBMS in the Radio Access Network

- **MBMS specifics of Bearer Setup and Release** / GERAN, UTRAN, eUTRAN, interface specific view UE to packet core (legacy and EPC), use of common or dedicated channels
- **Changes to the GERAN protocol stacks** – Reference only
- **Changes to the UTRAN protocol stacks** – Reference only (possible case for Service Continuity)
- **eUTRAN protocol stacks, M2AP, M3AP** / EPS architecture refresh

- **Overview of new channels** / Overview of MCCH, MTCH, MCH PMCH, Comparison with 3G channels
- **Mapping of logical channels to transport and physical channels**. Logical channel Mapping Alternatives (LTE mixed mode vs dedicated mode)
- **MAC layer enhancements for MBMS** /
- **MBMS Details of the physical layer** / eUTRAN access mechanism refresh, Cyclic Prefix, MBMS Subcarrier Spacing, MBMS subframes decoding and allocation, SIB2 – SIB13, UE capability requirements.
- **Correlation of MBMS to RRC** / Access control procedure / collision avoidance, RRC modes and states,
- **MBMS Mobility Considerations** / periodical transmission of MBMS critical information, UE mobility actions

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MBMS User Services

- **Differentiation between MBMS user services and MBMS applications**
- **Subscription to MBMS services** / procedure overview
- **MBMS Data Delivery details**/ download services, streaming services, carousel services
- **MBMS Charging methods** / broadcast + multicast modes, subscription (key based charging, bearer level / application level charging)
- **MBMS Security aspects** / architecture, HTTP digest authentication, registration / de-registration, service and traffic key delivery procedures
- **QoS** / adaptation of MBMS user service to the access network QoS resources.

Protocol stack details for MBMS user services

- **Overview** / Architecture model, MBMS bearer, PTP bearer (diagnostics etc.)
- **Overview of FLUTE protocol** / Formats, use in MBMS, Messages and important parameters
- **Media codecs and formats** / Speech, Audio, Video, Images, Graphics, Text, Data formats, MBMS Metadata, MBMS FEC scheme

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End to End Scenarios

- **MBMS Notification** / initial conditions, applicability of this procedure, description,
- **MBMS Session Start** / initial conditions, applicability of this procedure, description.

- **MBMS Session Stop** / initial conditions, applicability of this procedure, description.
- **MBMS Registration** / initial conditions, applicability of this procedure, description.
- **MBMS De-Registration** / initial conditions, applicability of this procedure, description.
- **MBMS multicast service activation** / initial conditions, applicability of this procedure, description.
- **MBMS multicast service de-activation** / initial conditions, applicability of this procedure, description.
- **Inter SGSN routing area update** / initial conditions, applicability of this procedure, description.
- **Inter SGSN serving RNS relocation** / initial conditions, applicability of this procedure, description.
- **MBMS UE context synchronisation** / initial conditions, applicability of this procedure, description.
- **MBMS UE linking** / **de-linking mechanism** / initial conditions, applicability of this procedure, description.