LTE-M and NB-IoT Signaling and Operations

5G_306x | Expert-Led Live | 5G Access | Expert
Course Duration: 3 days

LTE-M and NB-IoT in the Low Power Wide Area (LPWA) cellular deployment have requirements such as low cost, enhanced coverage, high capacity, and long battery life. This course describes network architecture enhancements in LTE networks for IoT such as NIDD and SCEF. The fundamental operations such as network acquisition, random access, RRC connection setup, data transfer, and mobility are covered. This course requires message traces provided by the customer to step through various scenarios and exercises.

Intended Audience

Technical personnel working for wireless operators, equipment and device manufacturers, who need a detailed look at LTE-M/eMTC and NB-IoT.

Objectives

After completing this course, the student will be able to:

- Describe key features of LTE-M and NB-IoT
- Illustrate the network architecture with LPWA enhancements
- Explain how of PSM and eDRX help increase UE battery life
- Describe how EAB and optimized TAU reduce the signaling load
- Summarize key parameters of System Information messages for LTE-M and NB-IoT
- Discuss Attach enhancements for LTE-M and NB-IoT
- Describe key operational configurations of LTE-M and NB-IoT physical channels
- List main KPIs for LTE-M and NB-IoT

Outline

1. Network and Device Architecture
1.1 MTC, eMTC, NB-IoT, & EC-GSM
1.2 LTE network enhancements (e.g., NIDD and SCEF)
1.3 APIs toward customer AS: OMA, OneM2M, and RESTful APIs
1.4 External device identifiers
1.5 UE module industry overview
1.6 UE architecture

2. LPWA IoT-centric Features
2.1 Wireless optimizations for IoT
2.2 Power Save Mode (PSM)
2.3 eDRX in Connected and Idle modes
2.4 High latency communication
2.5 Extended Access Barring (EAB)
2.6 Optimized TAU signaling
2.7 Half Duplex (HD) FDD
2.8 eMBMS for IoT

3. LTE-M: A Closer Look
3.1 Characteristics of UE category M1
3.2 CE Mode A and CE Mode B
3.3 MIB, SIB1-BR, and SIB2
3.4 LTE-M Random Access
3.5 RRC Connection Setup for LTE-M
3.6 LTE-M Attach enhancements
3.7 MPDCCH configuration
3.8 Using PDSCH, PUCCH, & PUSCH for LTE-M data transfer
3.9 LTE-M KPIs

4. NB-IoT: A Closer Look
4.1 Overview of UE category NB1
4.2 Deployment scenarios (in-band, guard band, and standalone)
4.3 Category NB1 multicarrier support
4.4 Network acquisition in NB-IoT
4.5 MIB-NB and System Information
4.6 Random Access in NB-IoT
4.7 NB-IoT RRC Connection Setup
4.8 NB-IoT Attach enhancements
4.9 NPDCCH configuration
4.10 NPDSCH, NPUCCH & NPUSCH for NB-IoT data transfer
4.11 NB-IoT KPIs

5. Additional Material
5.1 APIs (OMA, OneM2M, & RESTful) and IoT Protocols (MQTT-SN, CoAP, & Non-IP)
5.2 UE location determination methods
5.3 IoT enhancements in EC-GSM