



[info@primebitsolution.com](mailto:info@primebitsolution.com)

+91 8790059362

***GSTIN: 36BEZPK1785C1Z2***

---



Training Name : 4G Protocol Testing Training  
Duration : 4 Months

---

## **MODULE 1: UMTS (3G) AND GSM (2G) BASIC**

- 2G and 3G Network Architecture - CS & PS domain.
- RAT- FDMA, TDMA, CDMA, WCDMA, DFDMA, SCFDMA.
- SDU,PDU, UMTS N/W Architecture
- UMTS Protocol Architecture
- UMTS Channel

## **MODULE 2: LTE STANDARDIZATION (3GPP)**

- What is 3GPP?
- 3GPP release and process
- LTE Standardization Phase
- LTE Specification and 3GPP Structure

## **MODULE 3: LTE SYSTEM ARCHITECTURE**

- EUTRAN, EPC, SAE & EPC Architecture.
- Logical Elements and their Interfaces
- Roaming Architecture configuration
- LTE Architecture with legacy 3GPP interworking with an interface and their protocols.
- LTE identifier – UE, Identifier, MME Identifier, TAI Architecture

## **MODULE 4: LTE PROTOCOL STACK ARCHITECTURE AND CHANNELS**

- Control plane and User plane
- L1,L2,L3 Architecture
- Logical channel, Transport channel, Physical channel
- Control Information ( CI), Channel Mapping
- Uu - Control/ User plane
- S1- Control /User plane
- X2 -User/ Control plane
- S6a -Control plane
- S3/ S4/ S5/ S8/ S10/ S11- C plane/ U plane
- LTE bearer - Default and Dedicated

## **MODULE 5: PHYSICAL LAYER**

- EUTRA Air interface capability
- FDD Bands
- TDD Bands
- FDD and TDD Frame Architecture
- TDD UL/ DL Configuration
- LTE UE Categories
- Resource grid and Resource block
- OFDMA, SCFDMA, MIMO
- Physical UL and DL Signaling
- Physical UL and DL Control Information
- Physical channels
- UE Power on procedure

## **MODULE 6: PHYSICAL LAYER PROCEDURES**

- HARQ Procedure , Timing Advance , Power control, Random Access procedure
- Physical layer measurement , UE measurement, enodeB measurement
- Physical layer parameter configuration

## **MODULE 7: RLC LAYER**

- RLC Architecture and function - TM , AM , UM
- Framing and reordering
- ARQ operation, Window operation
- RLC PDU Format
- SDU Discard and RLC Re- establishment

## **MODULE 8: MAC LAYER AND PROCEDURES**

- MAC Architecture and function
  - MAC PDU format , LCID , LCGID , MAC - CE
  - MAC Procedures
    - a) Dynamic and SPS Scheduling
    - b) SR , BSR , and PHR
-

- 
- c) Logical channel prioritization
  - d) DRx
  - e) HARQ and TTI bundling
  - f) Measurement gap
  - g) RACH Procedure - Contention and Non - contention

## **MODULE 9: PDCP LAYER AND PROCEDURE**

- PDCP Function and architecture
- Header compression and security
- Data Transfer, PDCP PDU Format

## **MODULE 10: RRC AND NAS LAYER**

- RRC states and state transition , SRB & DRB PLMN and cell Selection
- Cell Reselection and access verification
- RRC Layer Architecture and function
- RRC procedures -
  - a) RCC connection establishment
  - b) RCC connection release
  - c) System information
  - d) RCC connection re - establishment
  - e) paging
  - f) RCC connection re - configuration
  - g) Measurement Procedure

## **MODULE 11: NAS LAYER - EPS MOBILITY MANAGEMENT PROCEDURE**

- NAS state - EMM and ESM
- NAS Authentication procedure
- Security mode control procedure
- Attach procedure
- Detach procedure , TAU procedure
- Service request and extended service request procedure
- Paging procedure

---

## **MODULE 12: NAS - EPS SESSION MANAGEMENT PROCEDURE**

- Dedicated EPS bearer context activation
- EPS bearer context activation
- EPS bearer context deactivation
- UE requested PDN connectivity
- UE request PDN disconnect
- UE requested bearer resource allocation
- UE request bearer resource modification

## **MODULE 13: UE MOBILITY AND HANDOVER**

- RRC connected mode mobility
  - a) Intra LTE H.0 within MME pool area
  - b) Intra LTE H.0 Inter MME pool area
  - c) Inter RAT H.0 - release with read direction
- RRC Idle mode mobility
- Cell Reselection

## **MODULE 14: CSFB**

- CSFB system architecture
- Voice domain preference and UE usage setting
- CSFB call flow -
  - a) Mobile registration
  - b) Mobile originating call
  - c) Mobile terminating call

## **MODULE 15: 3GPP SPECIFICATION , PROJECT AND TOOLS**

- 3GPP - 36 series for LTE layers
  - Analyse 3GPP log, LTE logs
  - Decoding 3GPP LTE messages and logs
  - ASN. 1 compiler to describe 3GPP layer 3 message format
  - LTE protocol test lab setup and explanation Conformance Testing
  - Different types of testing certification

## **MODULE 16: TESTING WITH PYTHON SCRIPTING**

- 
- Overview of Programming with Python
  - Native Datatypes and Operators
  - Python Statements and Conditionals
  - Functions and Module
  - Strings
  - Object oriented programming with Python
  - Errors and Exception Handling
  - File handing and File Exception Handling
  - Regular expression
  - Python Date and Time Module
  - Python Network Programming

## **MODULE 17: PROJECT**

- Our technical expert will guide the project by explaining how to develop test plans and test cases based on the marketing and design requirements for new features or update existing features .
- Validate the design and test new features , functionalities thoroughly providing thorough coverage to features testing.
- Conformance, IoT, regression, performance and stability testing.
- Discover the bugs, file them using bug tracking tool, verify bugs after the fix and track the bug status.
- Reproduce the customer reported bugs, verify the fix convert it to test case.
- Write test cases using TTCN3 ,Python or any other tool selected.

## **MODULE 18: QUALCOMM LIVE TOOLS**

- QPST, QXDM, QCAT
- Protocol Analyzer and Network Simulator .
- Chipset and Log capture tool
- 3GPP Testing Specification