Certification in Advanced 3G Mobile Communications

Course Code:- FS_3GMCC
Duration :- 18 Weeks
Technical Level :- Expert

Training Objectives: - Certification in Advanced 3G Mobile Communications (*First-Step Comprehensive Training Program*) is an extensive and one-of-its-kind training program. We are offering "*Advanced 3G Mobile Communications Certificate*" and "*Work Experience Certificate*" in this program. This is highly recommended for fresh graduates and students looking for job opportunities in wireless or mobile communications industry. This training program would equip you with enough knowledge to make you a suitable candidate for any company.

Learning Objectives: - On completion of this program the student will learn:

1. landline telephone network architecture
2. Signaling System 7 or CCS#7 architecture and protocols
3. signaling flow for call setup in landline telephone networks
4. technology behind 2G & 3G mobile networks
5. architecture of 2G & 3G mobile networks
6. signaling flow for call setup in 2G & 3G mobile networks

Pre-Requisites:- B.E, B.E (Final Year), M.C.A, B.C.A, M.E or equivalent

Audience: - Suitable for students, fresh graduates, marketing professionals and anyone aspiring to be a part of mobile communications industry.

Benefits & Key Highlights:-

1. Opportunity to work on an Industry Standard Project *[Optional Module]*
2. Work experience Certificate on completion of project work
3. Practice interviews with those actually conducting interviews in IT companies
4. Placement guidance & full technical support, even after completion of training

Course Contents: - This training program is divided in two parts; (i) the main course & (ii) optional project work.

The main course covers following topics:

1. What is Telecommunications
2. Examples of Telecom Networks
3. Telecom Signaling
4. Signaling Transmission Methods
    1. Robbed-Bit Signaling
    2. Direct Current (DC) Signaling
    3. In-Band and Out-of-Band Signaling
    4. Channel Associated Signaling (CAS) and Common Channel Signaling (CCS)
5. Switching
6. Telephone Network Architecture
    1. Telephone switch
    2. Local Loop
    3. Central Office (CO) / End Office
    4. Local Exchange Carrier (LEC) Network
    5. Inter-Exchange Carriers (IEC / IXC) or Long Distance Carrier Networks
7. Signaling in the telephone network
8. Simple Telephone network working
9. Signaling System #7 (SS7)
10. SS7 Functions
11. SS7 Signaling Points
    1. Service Switching Point (SSP)
    2. Signaling Transfer Point (STP)
    3. Signaling Control Point (SCP)
12. SS7 Network Architecture
13. SS7 Links
    1. A Links
    2. B Links
    3. C Links
    4. D Links
    5. F Links
    6. E Links
14. SS7 Protocols
    1. MTP-1
    2. MTP-2

3. MTP-3
4. ISUP - ISDN User Part
5. SCCP - Signaling Connection Control Part
6. TCAP - Transactions Capability Application Part

15. GSM Network Architecture
    1. Cellular Architecture
    2. Network Components
    3. GSM Network interfaces
16. Public Land Mobile Network (PLMN)
    1. PLMN Identifier.
    2. Location Area Identifier (LAI)
    3. Cell Global Identifier (CGI)
17. Mobile Equipment
18. Subscriber Identity Module (SIM)
19. Identification of Mobile Station
    1. IMSI (International Mobile Subscriber Identity)
    2. MSISDN (Mobile Station International ISDN Number)
    3. IMEI (International Mobile Equipment Identity)
    4. TMSI (Temporary Mobile Subscriber Identity)
20. Base Station Controller
21. Base Transceiver Station
22. Transcoding and Rate Adaptation Unit
23. Abis Interface
24. BSC to BTS connection
    1. Star Configuration
    2. Serial Configuration
25. Network Switching Subsystem
    1. NSS Architecture
    2. Home Location Register (HLR) and Authentication Center (AuC)
    3. Visitor Location Register
    4. Mobile Switching Center (MSC)
    5. Equipment Identity Register (EIR)
26. Air Interface
27. Air interface structure
    1. TDMA Frame
    2. Allocation of Time-Slots
    3. Transceiver (TRX)
    4. Frame structure
    5. Burst Formats
28. Synchronization between Uplink and Downlink
29. Physical Channels on Air-Interface
30. Logical Channels on Air-Interface
    1. Traffic Channels
    2. Signaling Channels
31. Handover procedures in GSM
    1. Internal Handovers
    2. External handovers
        1. Intra-MSC handover
        2. Inter-MSC handover
32. Evolution from GSM to UMTS
33. Advantages of UMTS
34. Differences between UMTS and GSM
35. WCDMA Vs FDMA/TDMA
36. UMTS Network Architecture
37. User Equipment
    1. UE Architecture
    2. Mobile Equipment
    3. Terminal Equipment
    4. Mobile Termination
    5. User Equipment Functions
    6. UMTS SIM (USIM)
38. Spread Spectrum modulation
39. Code Division Multiple Access (CDMA)
    1. Mathematical foundation for CDMA
    2. Orthogonal Vectors
    3. Walsh Matrices
    4. CDMA
    5. Advantages of CDMA over FDMA/TDMA systems
40. Wideband CDMA (WCDMA)
    1. Practical Implementation of WCDMA for UMTS radio access
    2. Key parameters of WCDMA
    3. Chip rate
41. Duplex transmission methods
    1. Frequency Division Duplex (FDD)
    2. Time Division Duplex (TDD)
42. Rake Receiver
43. Power control
    1. Open Loop Power control (OLPC)
    2. Closed Loop Power control (CLPC)
44. Admission Control
45. Macro diversity
46. UMTS Terrestrial Radio Access Network Architecture (UTRAN) 31
    1. UTRAN Architecture
    2. UTRAN Connection Management Functions
    3. Radio Network Subsystem (RNS)
    4. Radio Access Bearer (RAB)
    5. Node-B
    6. Radio Network Controller
47. Handover Procedures in UMTS
    1. Types of Handovers

2. Soft Handovers
3. SRNS Relocation
4. Hard Handovers

48. UMTS Core Network
    1. UMTS Core Network Architecture
    2. Home PLMN
    3. Home Location Register (HLR) / Authentication Center (AuC)
    4. Circuit Switched Domain
    5. Mobile Switching Center (MSC)
    6. Visitor Location Register (VLR)
    7. Gateway Mobile Switching Center (GMSC)
    8. Gateway GPRS Support Node (GGSN)
    9. Serving GPRS Support Node (SGSN)
49. Simultaneous connection of UMTS CN to GSM BSS and UTRAN

Course Material: - This course is covered as following:

1. White board sessions recorded over 6 DVD's covering all the course topics
2. Technical notes covering all the course topics in detail.
3. Access to quizzes and assignments through e-University
4. Advanced topics discussed during classroom/tutorial sessions scheduled over weekends

Query Resolution Methods:-

1. Interactive classroom/tutorial sessions scheduled during weekends covering advanced topics and other interesting discussions.
2. Voice conference sessions over Skype
3. Emails
4. Discussion Forum in e-University

Evaluations:

1. Online Quizzes and Assignments for each course topic
2. Interviews at regular intervals

Project Work *[Optional Module]*:- In Parallel, you may choose to work on an industry standard project. These projects have been carefully picked based on current technology focus of telecom companies. On completion of this program, you would get a work experience certificate from our parent company.

Benefits of Project Work:-

1. Adds great value to your CV.
2. Helps you in applying for jobs that require experience.
3. With experience and a good industry standard project in your CV, you can expect far more interview calls.
4. Makes you familiar with software development & design procedures used for telecom & mobile communications industry.
5. Helps you in understanding professional methods of software development

Projects Offered at Aspire Academy:-

1. **Encoders & Decoders for SS7 messages -** This project would give an insight to the complex methods of protocol development. This knowledge would be useful for development of any protocol.

2. **Encoders & Decoders for BSSMAP messages –** BSSMAP messages carry signaling over GSM A-Interface or between BSC and MSC.

3. **Signaling Transport (SIGTRAN) -** SIGTRAN is used for transmission of SS7 signaling over IP Networks. Modern telecom networks are increasingly using SIGTRAN.

4. **Location Services -** Location Services are being implemented by every mobile network operator for generation of higher revenues. These services are customizable based on the location of the mobile subscribers.

5. **Short Messaging Services (SMS) -** This is the most commonly used service for transmission of short text messages over the mobile networks.

6. **Supplementary Services -** Supplementary Services are built over basic services like speech call. These include Call-Forwarding, Call-Waiting etc.

7. **Security in 2G Networks -** The security architecture of GSM networks.

8. **Security in 3G Networks -** The security architecture of 3G/UMTS networks.

Project Duration:- Expected duration for project work is *20 Weeks*. Project Work would be scheduled in parallel with study.

Course Fee:-

1. Rs. 10000 for Indian Students (including postal charges)
2. $ 550 for Non-Resident Students (excluding postal charges)

Project Fee:-

1. Rs. 8000 for Indian Students
2. $ 500 for Non-Resident Students