ARICENT ™

Emerging Mobile Technology:

3G and Beyond

A Tutorial on Mobile Terminals
*by*
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Total Duration: 3.5 Hours

The Tutorial will present a comprehensive coverage of Software & Hardware architecture of 2G/3G/B3G Mobile Terminals. The seminar focuses on the following major aspects:

Brief Overview on Mobile Handset architecture covering the major blocks and the software layers

- Detailed functionalities of the Software layers like MMI Framework, Middleware components like BREW, BMP, J2ME and their importance in terms of developing Mobile applications.
- Understanding how to develop personalized services like Messaging, Video and Push-to-X services and Multimedia applications like Video Streaming/ Telephony, Camera, Media Player for 3G and HSDPA Mobile Handhelds.
- Various Operating systems used in the Mobile Handset (Symbian, Windows Mobile, Montavista Linux and Android)
- Functional block diagram on the handset hardware and its functionalities (RF Front-end Transceiver, Baseband, Power Management Unit, Power Amplifier)
- Wireless Protocol Stack Architecture and its working principles (GSM/GPRS/UMTS/WLAN/CDMA2K/Wi-MAX)
- Call establishment scenarios like Voice call, Packet call & SMS.
- NEXT GEN Mobile Terminal Software architecture and its new protocols/layers:
  - ❑ IMS Client Framework
  - ❑ Seamless Connectivity - Handover Decision and Execution Layer
  - ❑ Cross-layer design
  - ❑ Mobile Application Security Framework
  - ❑ 4G MAC layer
  - ❑ Common Data link layer
  - ❑ Unified Hardware Abstraction Layer
- How to ensure seamless mobility for continuous data transfer while the subscriber moves across various cellular networks during on-line service.
- How to provide smooth data transfer switching between various cellular networks based on user preferences and the available network resources.
- New Emerging Trends like DLNA, NFC, Wi-MAX, DVB-H etc.,
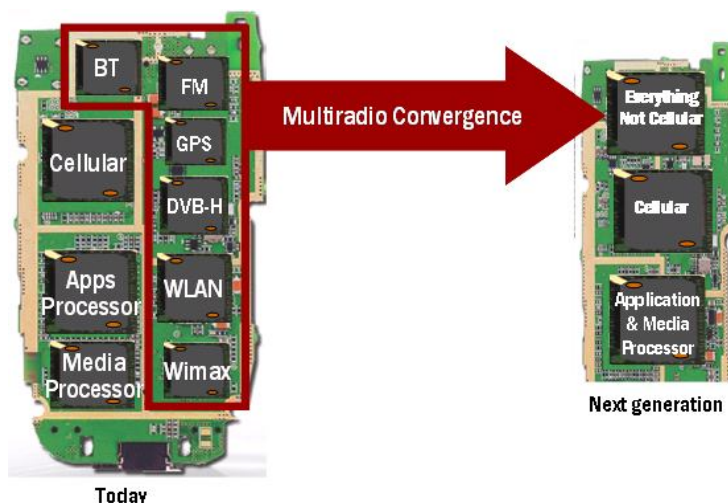
Course Details

Module 1: General Software Architecture and its major layers: (1 hour)

- ✓ MMI Framework in General
  - ❑ What is a framework?
  - ❑ Requirement
  - ❑ Generic block diagram
  - ❑ Components
  - ❑ Features and functionalities
  - ❑ Services offered by framework
- ✓ MMI Simulator
  - ❑ Requirement
  - ❑ Features
  - ❑ Functionalities
  - ❑ Advantages
- ✓ Application layer
  - ❑ Requirement
  - ❑ Interaction with framework
  - ❑ Interaction with device drivers/Network
  - ❑ Usage of AT Command Service
- ✓ Middleware
  - ❑ Requirement
  - ❑ Differentiation between middleware and application layer
  - ❑ Advantages of middleware
  - ❑ BREW
  - ❑ J2ME
  - ❑ WAP
- ✓ Mobile Applications
  - ❑ Messaging (IM/SMS/MS)
  - ❑ DRM
  - ❑ Video Telephony
  - ❑ Video Streaming
  - ❑ Push 2 X Services (Talk/View/Video/Share)
  - ❑ Home Networking
  - ❑ Browser
  - ❑ E-mail
- ✓ Mobile Operating Systems
  - ❑ WINDOWS MOBILE
  - ❑ Symbian
  - ❑ Linux
  - ❑ ANDROID

Module 2: Protocol Stack , Call Establishment and Idle-mode Scenarios (0.5 hour)

- ✓ Wireless Protocol Stacks
  - ❑ GSM / GPRS
  - ❑ UMTS
  - ❑ CDMA2K
  - ❑ WLAN
  - ❑ Wi-MAX
- ✓ Voice Call establishment in GSM/UMTS Network
  - ❑ Mobile Originating
  - ❑ Mobile Terminating
- ✓ Packet Call establishment in GPRS Network
- ✓ Short Messaging Service (SMS)
- ✓ Multimedia call (Video Streaming / Video Telephony)

Module 3: Hardware Architecture: Functional Blocks (0.5 hour)

- ✓ Base band Processor
- ✓ RF Transceiver
- ✓ Front-end Module (FEM)
- ✓ Power Management Unit
- ✓ Memory Management
- ✓ Boot-up Sequence
- ✓ Emerging Hardware Platforms
  - ❑ Qualcomm 7K/8K, / TI OMAP 3430 / Intel ATOM
- ✓ Device Drivers
  - ❑ LCD
  - ❑ Keypad
  - ❑ Camera
  - ❑ USB
  - ❑ MMC / SD
- ✓ Hardware abstraction layer
  - ❑ Hardware and Software Integration supporting advanced cellular technologies

Module 4: Emerging Trends (1 hour)

- ✓ Expectations of Future Networks: Convergence Platform
- ✓ Next GEN Mobile Terminal Software Architecture
- ✓ Seamless Mobility (Inter-system handover from one network to another network)
- ✓ IMS Client
- ✓ Mobile TV (DVB-H)
- ✓ Re-configuration Technology
- ✓ Broadband access (Wi-Max)
- ✓ Near Field Communication (NFC)
- ✓ Digital Living Network Alliance (DLNA)
- ✓ Long Term Evolution (LTE)

Specific Goals and Objectives

- Understand the Software and Hardware architecture of Mobile Terminals
- Gain knowledge on various software layers functionalities.
- Learn the design and Implementation techniques of Mobile Applications/ Protocol Stacks/Reference Hardware for Mobile Terminals.

Expected Background of the Audience

- Students and academics involved in Research on mobile communications.
- Developers of Wireless Applications
- Industry Professionals involved in Wireless Terminal Design.

Prerequisites

- Participants are expected to have knowledge on Terminal Software Architecture.

About S. Vijay Anand

Vijay is Director - Engineering in Mobile Terminal Products Group for ARICENT Technologies Limited. In this capacity, he directs research activities that drive the state-of-art in the design of next-generation wireless/Multimedia technologies, focusing primarily on NEXT GEN Design architecture for Mobile handheld devices, defines strategy and prepares the Technology Roadmap for ARICENT's Mobile Terminal Products. He and his engineering group builds proof-of-concepts, engage with academia, file patents, and publish papers in competitive conferences and journals for the research community. He has organized and chaired several technical sessions and gave tutorials on "Mobile Device Architecture: Present and Future", "Digital Living Network Alliance", "Fixed Mobile Convergence" at various International Conferences and symposia like NTMS 07, WPMC 07, CSI 07, IEEE Wi-MAX, ICEMC2 , AICT & MAP. He is a sought after panelist, keynote speaker, and architect on next generation mobile terminals.

He has been involved in several international Research projects related to Mobile communication systems. Vijay has 18+ years of experience and has Published, more than 10 Research Papers at major Wireless International Conferences - WTS, WWC, WWRF, IMSAA and COMSWARE and engaged academic Institutions for Research Projects and filed 2 software patents. He is the author for the best-paper award winning articles. He can be reached at **vijay.anand@aricent.com**