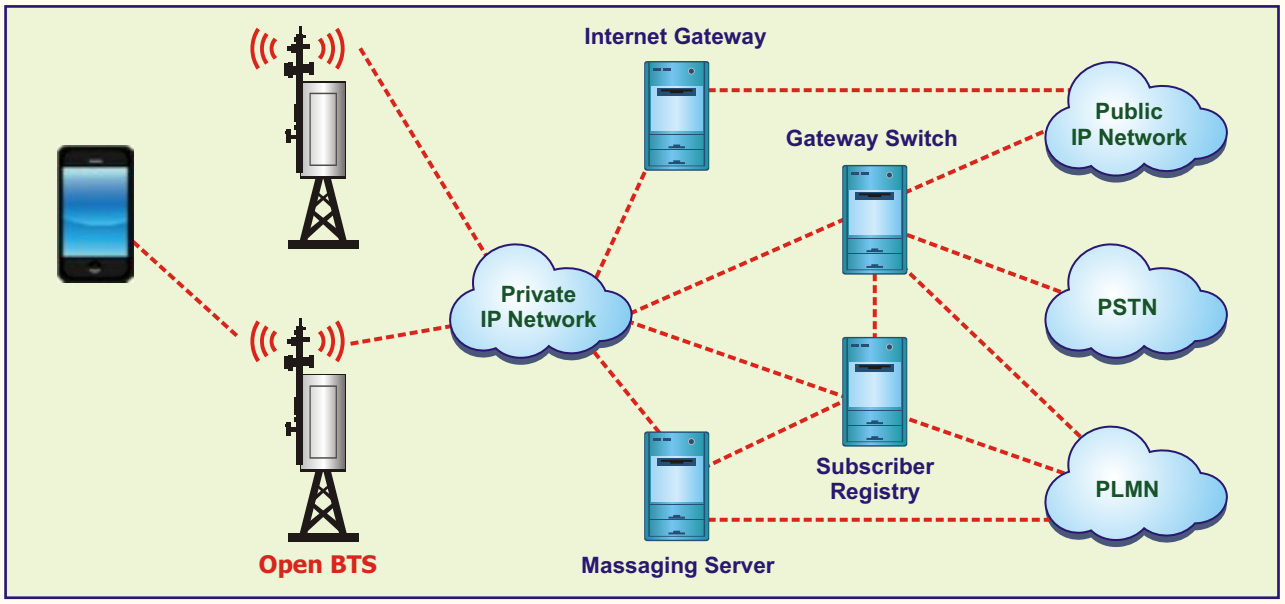
SIGMA

3G MOBILE SYSTEM TRAINER
Based on OPENBTS
MODEL - 3G-OPENBTS100

This trainer has been designed with a view to provide practical and experimental knowledge of 3G Mobile System based on OpenBTS .



What is OpenBTS (Open Base Transceiver Station)

- OpenBTS is a Unix application that uses a Software Radio to present a GSM air interface to Standard 2G GSM handset and uses a SIP softswitch or PBX to connect calls
- OpenBTS is a simplified form of IMS that works with 2G feature-phone handsets

FEATURES

- This 3G OpenBTS Mobile trainer is designed to explain, teach and experiment Real time 2.5G Mobile system in the laboratory with Mobile Tower and End users - 3G Mobile phones
- A Computer System is configured to implement Base Station Controller (BSC) functions, operations and maintenance and Network Management System (NMS) functions for controlling the Base stations.
- Software Defined Radio performs the function of BTS - which facilitates wireless communication between User Equipment UE or GSM cellular phones.
- It allows to connect a standard GSM mobile phone directly with VOIP networks as SIP endpoint to call PSTN landline or mobile phone on other networks in other locations using a software based GSM BTS
- The Trainer is designed with SDR based on RF / Spartan 6 FPGA Hardware.
- It works on Open Source BTS software
- 400MHz to 3400MHz Software Configurable Radio Transceiver
- Low power for FCC compliant licence free safe operation
- No recurring cost of software or licences
- FPGA programmable transmission and reception for low latency
- Supports both TDD & FDD Full Duplex as per 3GPP standards
- USB 3.0 High Speed USB Interface to Mobile Workstation as BSC
- Due to Real System students can test their new algorithms and Study OpenBTS and UE in class room
- Calculation of ARFCN, Measurement of RF signal level of BTS for call handover handoff study and various other experiments are possible

SPECIFICATIONS

(A) General Specifications

1.	Frequency Band	:	400-3400 MHz includes ISM band Channel Center Freqency
2.	GSM Channel Bandwidth	:	200 KHz
3.	No of RF Carriers	:	124/374
4.	Carrier Spacing	:	200 KHz
5.	Duplex Spacing	:	(TX-RX Separation) 45 MHz / 95 MHz Access channel
6.	Modulation	:	GMSK, 8- PSK
7.	Demodulation	:	Coherent
8.	Transmission Bit rate	:	270.83 Kbps
9.	Access Technology	:	TDMA
10.	Duplex Technique	:	FDD
11.	Speech CODECs	:	FR (Full Rate) Speech
12.	CODEC Bit Rate	:	13Kb/s
13.	Output power at antenna 1mW		
14.	Base Station Receiver	:	Conforms to 3GPP 45 and 3GPP 51.021.
15.	Data Streaming	:	Upto 400MS/s
16.	Backhaul Support	:	Radio, Satellite, Leased line
17.	Interface	:	USB 3.0 between Host controller & BTS Transceiver
18.	BTS Software	:	along with source code provided
19.	BTS software	:	Supports unlimited TRX.
20.	GPRS	:	Supports functionality
21.	PDCH	:	Supported
22.	GSM Antenna		
	Frequency	:	700- 2700 MHZ
	Type of Antenna	:	Omni & Directional
	Minimum Gain	:	6 dBi for Directional Antenna, 1 dBi for Omni Antenna

(B) Hardware Supplied

1.	BTS	:	2 Nos
2.	UE	:	2 Nos of 3G Mobile Phones
3.	SIM Cards	:	2 Nos
4.	SIM Card Programmer	:	1 No
4.	GSM Antennas	:	4 Nos
6.	Laptops	:	2 Nos

(C) Software Supplied

1.	Operating System	:	Linux
2.	Programming Language	:	ANSI C ++
3.	OpenBTS Software	:	1 No.
4.	Protocol Analyser Software - Wireshark	:	1 No

(D) Accessories Supplied

1. USB 3.0 - USB 3.0 Cables
2. Power Supply Adapters
3. RF Attenuators (variable and fixed)
4. **Books for OpenBTS Mobile Communication : 10 Nos in pdf Format**
5. **Mp4 Video Class for Mobile Communication : 40 Classes in Mp4 on Pen Drive**

EXPERIMENTS

1. To Study Theory and Block Diagram of 3G GSM / GPRS/UMTS Mobile System - BTS, BSC and UE
2. To Study OpenBTS System
3. To understand Asterisk PBX Design Software
4. To Study SIP/IP Protocols and Systems
5. To Study IP Network, PSTN Network and PLMN Networks
6. To Study Serving Gateway - SGW
7. To Study Messaging Server, Subscriber Registry, Gate Switch and Internet gateway
8. To measure the spectral distribution of GSM frequencies at given location and find a free channel.
9. To configure BTS software to set Mobile country code, Network operator code, GSM band and ARFCN channel
10. To get and set your IMSI
11. To configure the BTS Software to enable open / limited registration
12. To assign a phone number to each registered phone
13. To Register phone to the BTS network
14. To list the TMSI of the phones registered on network.
15. To enable call logging of subscribers on BTS
16. To configure Asterisk communication Server for IP PBX and VOIP gateway
17. To Send and receive an SMS using BTS.
18. To establish a voice phone call as echo on mobile phone
19. To establish a voice phone call to another cellular phone
20. To establish a voice phone call to another cellular phone on different network/country
21. To establish roaming between 2 BTS and 2 UE (User Equipment)
22. To capture and analyse GSM packets using Wireshark Protocol analyzer software
23. To establish a data communication link using GPRS
24. To study hard & soft call handoff
25. To demonstrate and understand different types of faults
26. To understand Glossary and Acronyms used in 2G-4G Mobile Technology

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Dealer:-