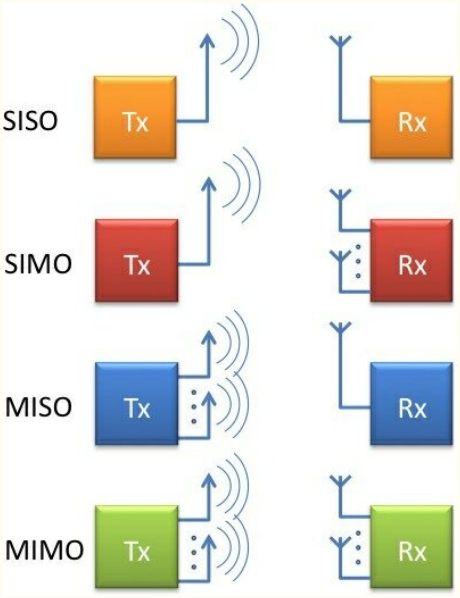
MIMO WIRELESS TRANSMITTER RECEIVER TRAINER

MODEL - MIMO100

This trainer has been designed with a view to provide practical and experimental knowledge of Multiple Input and Multiple Output Wireless Transmitter Receiver System.



What is MIMO (Multiple Input and Multiple Output)

- In MIMO Mobile system there are more than One Transmitter Antenna at Mobile Transmitter Tower and More than One Receiver Antenna at Mobile Receiver. This increases Data transmission / reception rate more than double depending upon Antennas used.
- MIMO (multiple input, multiple output) is an antenna technology for wireless communications in which multiple antennas are used at both the source (transmitter) and the destination (receiver). The antennas at each end of the communications circuit are combined to minimize errors and optimize data speed.
- **Users** connecting to this Mobile Tower are known as **User Equipment** - **UE.**

Different Types of MIMO Implementations

- There are four possible configurations for MIMO systems.

SISO (Single-Input, Single-Output)

It is Standard Single Antenna Transmitter and Single Antenna Receiver technology. SISO do not provide any type of robustness or capacity improvement and represent a basic wireless communication link.

SIMO (Single-Input, Multiple-Output)

SIMO systems are configurations that provide receive-side diversity and provide additional robustness, but no capacity improvement.

MISO (Multiple Input, Single-Output)

MISO provides transmitter diversity in that it couples to the channel at a different point in space such that the links will not have the same fading characteristics though to the receive antenna and spatial sum of the signals will be dominated by the stronger of the two signals.

MIMO (Multiple Input, Multiple-Output)

MIMO output systems de-multiplex the source data stream into multiple independent channel streams. This provides for both redundancy and channel capacity improvement. It apply principles of diversity reception to increase bit rate while maintaining same transmitted power and bandwidth.

FEATURES

- This MIMO Wireless Transmitter Receiver is designed to explain, teach and experiment Real time MIMO Wireless system in the laboratory.
- It works on OFDM communication system.
- The Trainer is designed with RF / Xilinx Virtex-6 LX240T FPGA
- It works on Open Source MIMO LTE software
- Interface between MIMO Transmitter and Receiver is done by 1Gbps Ethernet Ports.
- The system can be configured as SISO, MISO or 2 x 2 MIMO which can be extended up to 256 x 256 MIMO.
- The default OFDM Reference Design project includes noMAC as a software project.
- Streaming Wireless Video is used to demonstrate 2x 2 MIMO TX RX system.
- Due to Real System students can test their new algorithms and Study MIMO and UE in class room.

SPECIFICATIONS

(A) General Specifications

1.	MIMO Implementation	:	1X1, 1X2, 2X1, 2x2 and expandable to Massive MIMO 256x 256
2.	Frequency Band of Hardware	:	2.4 (2412 to 2462 Mhz) and 5GHz (5180 to 5805 Mhz
3.	Bandwidth	:	40 MHz
4.	FPGA	:	Xilinx Virtex-6 LX240T FPGA
5.	RF Interface	:	2 programmable RF interfaces
6.	ADC	:	12-Bit Resolution, 100MSps ADCs
7.	DAC	:	12-Bit Resolution; 170MSps DACs
8.	PA	:	Dual-band PA (20dBm Tx power)
9.	Synchronisation Clock	:	Shared clocking for MIMO applications
		:	200MHz LVDS oscillator
10.	MIMO Interface	:	2 Nos of 1 Gbps Ethernet Ports
11.	Add-on RF Module Slots	:	up to 4 Nos of FMC HPC for Full Duplex MIMO Communication
12.	Diversity Support	:	SFBC, STBC, STTC,
13.	Memory	:	2GB SO-DIMM DDR3
14.	EEPROM	:	128 Kbit IIC EEPROM
15.	SD Card	:	Provided
16.	FPGA configuration	:	via JTAG, SD card or on-board flash
17.	User I/O	:	USB-UART
		:	12 LEDs
		:	2 Seven Segment Displays
		:	4 Push Buttons
		:	4-Bit DIP Switch
		:	16-Bit 2.5V I/O Header
18.	Capture	:	IQ Vectors at any part of signal chain. User can process the IQ
19.	Software Compatibility	:	Linux , GnuRadio, LabVIEW, MATLAB Simulink, C++ and Python
20.	Study of functionality of Precoding, Spatial multiplexing, Diversity coding		
21.	Antenna Connections	:	Two 50 ohm SMA terminators
22.	Fully programmable waveform generation and processing		
23.	JTAG programming with JTAG programming cable		

(B) Hardware Supplied

1.	MIMO Trainer	:	1 No.
2.	1GB Switch	:	1 No
3.	SD Card	:	1 No.
4.	Antennas	:	4 Nos.
5.	Laptop	:	1 No

(C) Software Supplied

1.	Operating System	:	Linux
2.	Programming Language	:	C ++, Python
3.	Xilinx ISE Software	:	13.4 - 1 No.
4.	Matlab 2011a Software	:	1 No Demo Version
5.	USB-UART Driver	:	USB-UART transceivers from FTDI
6.	Virtual COM Driver	:	1 No
7.	Terminal Software	:	Putty Terminal Software
8.	Xilinx Platform Studio (XPS)	:	1 No

(D) Accessories Supplied

1.	Ethernet Cables	:	2 Nos
2.	Power Supply Adapter	:	1 No.
4.	RF Attenuators	:	2 Nos
5.	SMA Cables	:	4 Nos
6.	**Books for MIMO OFDM Communication**	**:**	**10 Nos in pdf Format**
7.	**Mp4 Video Class for MIMO OFDM Communication**	**:**	**40 Classes in Mp4 on Pen Drive**

EXPERIMENTS

1. To Study Theory and Block Diagram of MIMO OFDM 4G LTE Mobile System
2. To Study different Hardware parts of MIMO
3. To Study different Software used in MIMO Trainer
4. To Study Xlink FPGAs
5. To Install Xlink ISE
6. To Install Matlab Software
7. To Configure Xlink and Matlab Software
8. To implement 2 x 2 MIMO configuration
9. To transmit and receive Streaming Video using 2 x 2 MIMO
10. To observe Constellation Diagrams
11. To carry out SISO Transmission and Reception
12. To carry out SISO OFDM Communication
13. To carry out MIMO OFDM Communication
14. To carry out Synchronized Nodes Example
15. To carry out Multi-Node Array Example
16. To carry out Spectrogram Example
17. To carry out OFDM Reference Design - Wireless/Wired Bridge
18. To carry out OFDM Reference Design - CSMA Link
19. To establish SISO, SIMO and MISO configurations
20. To Carry out Channel Estimate Viewer i.e to extract OFDM Rx events from a log file, saves them to a structured array, imports the array into MATLAB and displays the channel
21. To build a Custom Frequency Hopping MAC with the 802.11 Reference Design
22. To building a Custom Token Passing MAC with the 802.11 Reference Design
23. To observe IBSS (ad hoc) with Multiple Traffic Flows
24. To demonstrate and understand different types of faults
25. To understand Glossary and Acronyms used in OFDM MIMO Wireless Technology

Sigma Trainers
E-103, Jai Ambe Nagar,
Near Udgam School, Thaltej,
AHMEDABAD - 380054.

Phone : 079-26852427 / 26767512
Fax : 079-26840290 / 26759661
ISDN : 079-26859162 / 26853758
Email : sales@sigmatrainers.com
: sigmatrainers@sify.com
Web : www.sigmatrainers.com

Dealer:-