

ETHERNET BASED LAN TRAINER [ViLAN-02]

Vi Microsystems Proudly introduces a series of LAN trainers for networking laboratory. This trainer has been designed to teach the basics of networking concept. It exposes different layers of networking concept like PHY (Physical Layer), MAC (Media Access Control), Transport Layer etc., Many experiments have been formulated for hands on programming exercise to the students on topologies like Bus, Ring & Star and Protocols like ALOHA, CSMA, CSMA / CD & CSMA / CA.

ViLAN-02 is based on Ethernet Protocol based OSI of a LAN implementation. In this TCP & UDP protocol is used instead of General Open Protocol. Using Ethernet cards of 4 PCs, various topology have been formed to conduct various experiment as per Anna University.

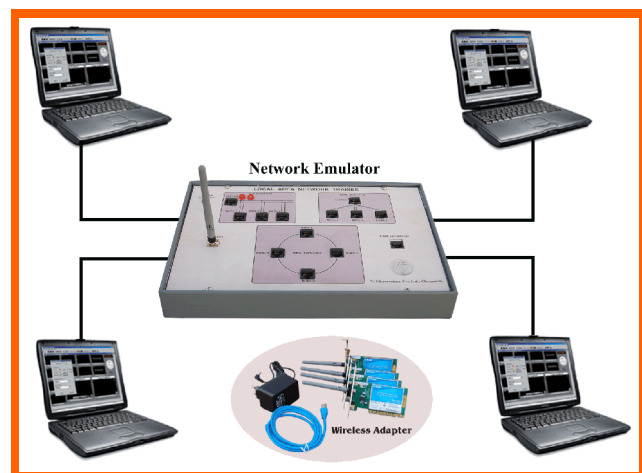
This trainer is also provided with one access point and the wireless Ethernet LAN cards, so that all topology and protocols can be studied in wireless technology (IEEE.802.11b)

The software provided along with the trainer will assist the students to study the various effects, measurement of error rate, understand the protocols, topologies etc., along with the graphical representation.

HARDWARE FEATURES

- * All Hardwares are housed in a sleek box
- * Designed for connecting 4 PCs in various topologies
- * 4 Nos of RJ45 Connectors provided to form Bus Topology
- * 4 Nos of RJ45 Connectors provided to form Star Topology
- * 4 Nos of RJ45 Connectors provided to form Ring Topology
- * One RJ45 connectors provided for expansion
- * Expandable upto 256 PCs by cascading multiple ViLAN-02
- * This will use the built in LAN cards of 4 PCs

- * RJ45 connectors provided to form various topology
 - i. Star
 - ii. Bus
 - iii. Ring
- * Protocol supported
 - # Ethernet (IEEE 802.3)
 - # Wireless LAN (IEEE 802.11b)
 - # MAC layer protocol : ALOHA, CSMA/CD, CSMA/CA



SOFTWARE

- i. Network and protocol analyzing software
- ii. Network study software [ViLAN-SWRtsim]

Deliverable for Ethernet based LAN trainer [ViLAN-02]
<ul style="list-style-type: none">* Network Emulator for CSMA / CD, CSMA/CA, ALOHA protocols study, with circuitry to form topologies like Bus, Ring & Star.* RJ45 cables- 4 Nos to connect network emulator with 4 PCs* 4 Nos of Wireless LAN cards with Access point.* Network study software* User Manuals* RS232 Cable - 2 Nos* Parallel Cable - 2 Nos

LAN TRAINER [ViLAN-01A]

Vi Micro introduces a Advanced LAN trainer (ViLAN-01A) to study

- i. Ethernet based LAN features using 4 PCs
- ii. Wireless LAN trainer
- iii. Open Source Interconnect (OSI) based LAN implemented using ARM7 & FPGA device



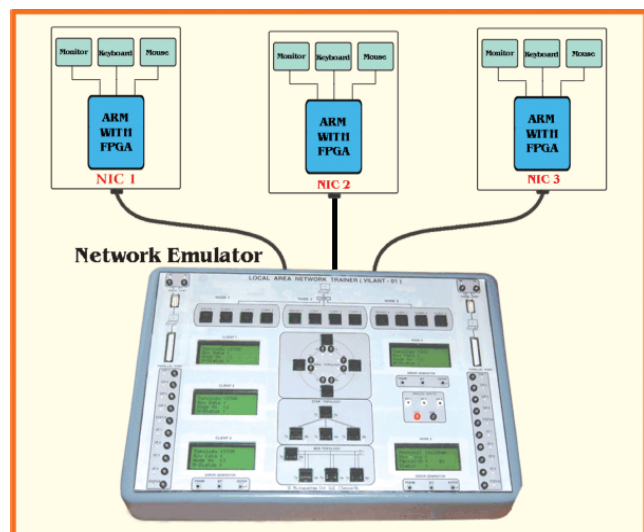
This trainer use an ARM7 processor and a separate FPGA device to implement 7 layers as per OSI-LAN standard. The keypoint of this OSI-LAN standard is the MAC and PHY layer. The MAC layer is implemented in the powerful ARM 7 based hardware. The full PHY layer of the OSI is implemented in the FPGA device using VHDL codes.

The OSI is implemented in the open system, hence a student can study each layer of the OSI-LAN and modify the codes for better efficient implementation of OSI-LAN.

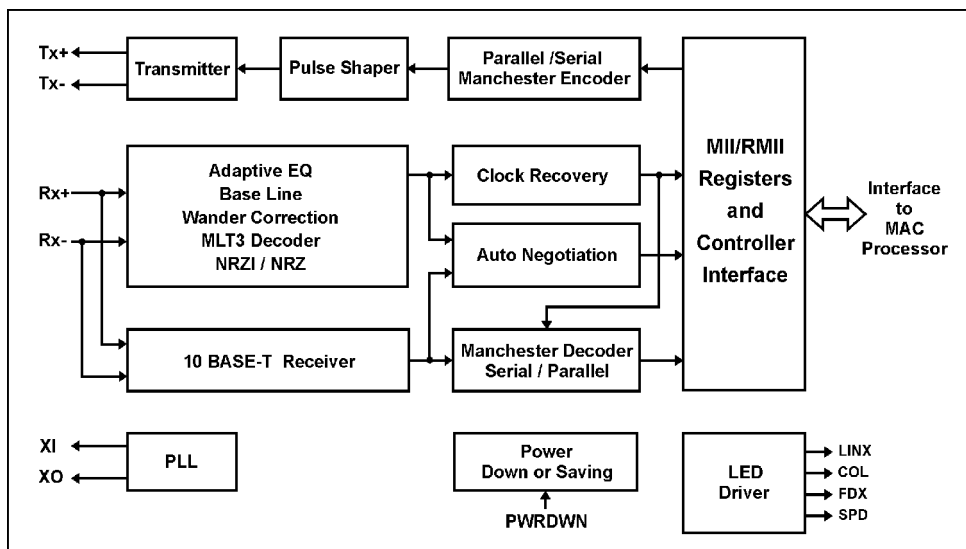
This trainer is also provided with one access point and Wireless Ethernet LAN cards, so that all topology and protocols can be studied in wireless technology (IEEE.802.11b).

HARDWARE FEATURES

- * An ideal open platform to implement the network component and then can be integrated together to produce a complete network system
- * ARM 7 based board for MAC layer and Application layer implementation
- * Separate FPGA provided for implementing PHY layer of OSI using VHDL coding for students to study and improve the code
- * PHY layer includes Serial / Parallel converter, Manchester Coding / Decoding etc.,
- * 3 Nos of ARM 7 boards as Network controller in one trainer
- * Each network controller can provide one server & 3 nodes, A total of 9 nodes possible
- * Expansion upto 32 Nodes possible by cascading Multiple Advance LAN trainer [ViLAN-01A]
- * Most of the features of a commercial available physical layer transceiver (eg. KS8721B2) are implemented in FPGA



- * Physical Layer features
 - # Parallel to Serial communication
 - # Manchester coding / 5B Coding
 - # NRZ Encoder / NRZ Decoder
 - # Pulse shaper
 - # Level converter for transmitter
- * Receiver side
 - # Level converter
 - # Manchester decoder
 - # Serial to Parallel conversion
 - # Register controller interface for MAC interface using ARM 7



This trainer also consist of a “Built in Ethernet Based LAN Trainer”

Features of Ethernet Based LAN Trainer

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 - # Wireless LAN (IEEE 802.11b)
 - # MAC layer protocol : ALOHA, CSMA/CD, CSMA/CA

In the above LAN Trainer (ViLAN-01A), the 7 layers of OSI are implemented in the following way.

1. PHYSICAL TRANSMITTER SIDE

A FPGA (Spartan 3 Device) is used to implement all the physical layer activities of the OSI.

- * Physical Layer Transmitter side
 - # Parallel to Serial Communication
 - # Manchester coding
 - # NRZ Encoder / NRZ Decoder
 - # Pulse shapes
 - # Level converter for transmitter
- * Physical Layer Receiver side
 - # Level converter
 - # Manchester decoder
 - # Serial to Parallel conversion
 - # Register & Controller interface to MAC interface using ARM 7

2. DATA LINK LAYER

a) Media Access Control

The MAC layer is implemented in the ARM7 processor and interfaced to the FPGA device for the PHY layer of the OSI. Following are the Protocol supplied for the MAC implementation.

- * ALOHA
 - # Pure ALOHA
 - # Slotted ALOHA
 - * CSMA / CD
 - # Collision detection
 - # Data & Reception in a typical setup
 - # Performance Analysis
 - * Token Bus
 - # Initialization of the logical ring
 - # Data & Reception in a typical setup
 - # Performance Analysis
 - * Token Ring
 - # Round trip time
 - # Media Access time
 - # Performance Analysis
- b. Logical Link Control : Error and Flow control in link layer
- c. Data Link layer : Stop and Wait and various window protocol for reliable data transfer

3. NETWORK LAYER : Addressing and Routing algorithm like distance vector, link state will be implemented here.

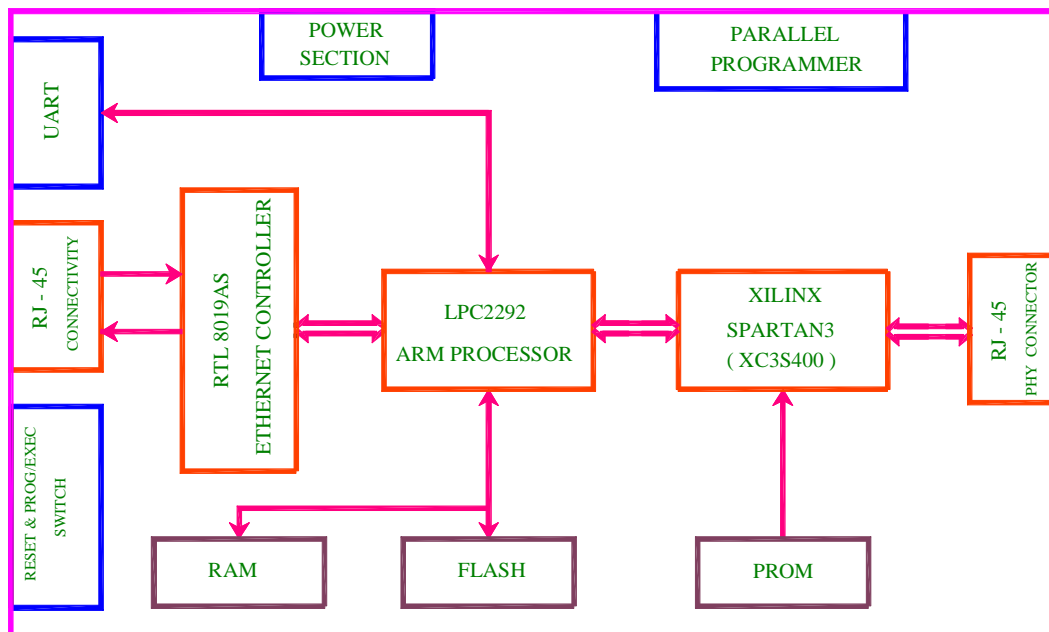
4. TRANSPORT LAYER : Service point addressing, segmentation and connection control will be implemented here.

5. APPLICATION LAYER SERVICES

- * SMTP (Simple Mail Transfer Protocol)
- * FTP (File Transfer Protocol)

This software package is also provided with source codes (Under License Agreement) for users to understand the flow and also to try some changes to see the behavior changes using the design.

ARM7 & FPGA BASED NETWORK CONTROLLER



- * ARM 7 (LPC2292) Processor at 60 MHz Speed
- * 256 KB On-chip Flash, 16KB On-chip RAM
- * 32 MB SDRAM
- * 4 MB Flash
- * Ethernet connectivity using RTL8019AS
- * FPGA device is used to implement the 7 Layers

Note : All Device dependent software can be offered to colleges under License agreement

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