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Simulation Transfer of Files from PC To PC Using LAN Trainer Kit

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ABSTRACT: Ethernet is one of the few protocols that has increased its bandwidth, while retaining its basic functional characteristics such as Layer 2 protocol, frame format, packet oriented, non- guaranteed delivery. As the capability to drive signals faster over both copper and fiber media has increased due to advances in circuit design and process technology, Ethernet too has seen its capabilities extend beyond the ubiquitous triple speed (10/100/1000 Mb/s) MAC to 10 Gb/s and beyond.

The 10 Gigabit Ethernet standard is specified in IEEE 802.3ae 2002 and its most recent amendments (2008). With rapidly changing patterns of computing shifting between "thick" to "thin" clients, powerful workstations to centralized servers, and advancing regulatory requirements for data backup, Ethernet has been extended to support many applications.

The increase in affordable computing and multimedia processing in both home and enterprise systems has resulted in the explosion of data generated and consumed in public and private networks. Ethernet plays a vital role in delivering this data end-to-end and providing a common backhaul for interconnect and data backup.

Keywords: Ethernet, bandwidth, protocols

1 INTRODUCTION

LAN Trainer based on ARM7(LPC2292) 32 bit processor and a separate FPGA device. 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., The full PHY layer of the OSI is implemented in the FPGA device using VHDL codes. 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. 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. ViLAN-03 LAN Trainer Consists of Three NIC (Network Interface Card) Cards.

2 LAN

This trainer also consists of a "Built in Ethernet Based LAN Trainer". This Trainer Designed for connecting 4 PCs in various topologies like Star, Ring and Bus. This Trainer will use the built in LAN cards of 4 PCs. One RJ-45 connector is provided for expanding up to 256 PCs by cascading multiple ViLAN-03.

This Trainer also consist of independent "Serial and Parallel Extension" card for Communication between two PCs through serial mode(RS-232) and Parallel Mode(LPT). It exposes the basic concepts of serial and Parallel Communication.

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.

3 OSI-LAN IMPLEMENTATION

An ARM 7, 32 Bit Processor is used here to implement MAC layer and other layer of OSI format. An FPGA device (Spartan 3) is used to implement the PHY layer of the OSI Format. This is as shown below,

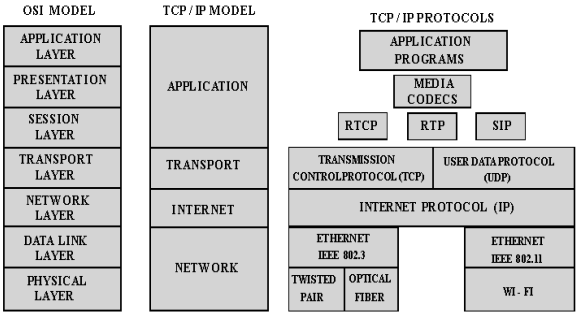


Figure - 1

By adding a 10 / 100 MBPS Ethernet chip to ARM 7, the above hardware can be directly interfaced to a PC Network Card or to a Hub of a PC Network as shown below.

3.1 NIC card

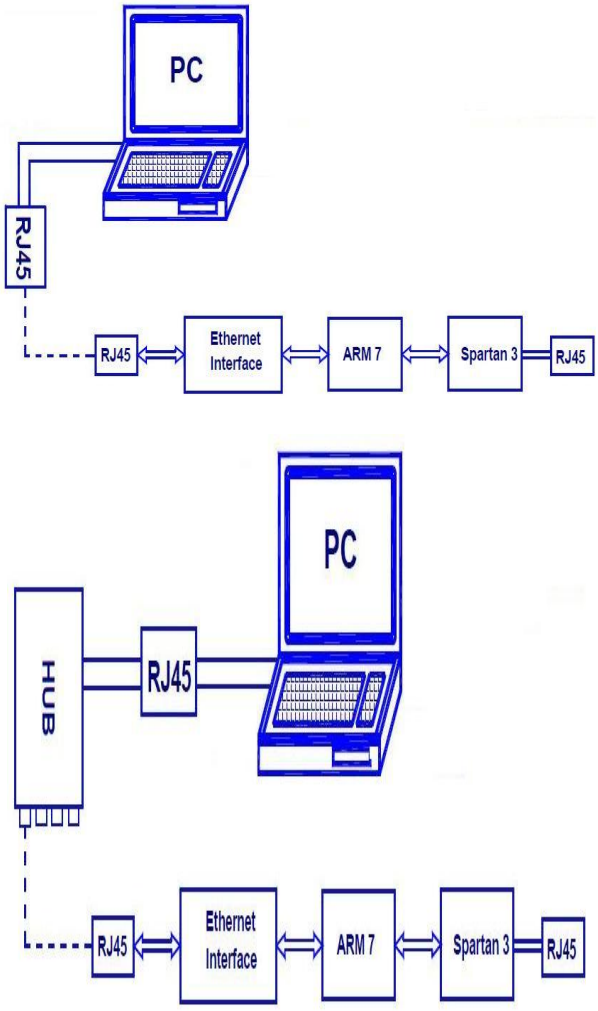


Figure - 2

The above hardware forms as one NIC card. We can have such NIC cards in multiple and form various topology. Since we need a cost effective OSI LAN Hardware, The same FPGA is configured for multiple LAN lines. In ViLAN-03 each NIC is configured as 1 Server & 3 Nodes as shown below. Even though each LAN lines can be configured for higher transfer rate, presently configured for 4 LAN lines as 1 Server and 3 Modes for a maximum speed of 1 MBPS.

In the above the red lines shows how to connect the patch cards for ring topology.

Figure - 3

The Server or Each Node can send and receive data at a maximum rate of 1 MBPS. It is programmable by the user from 8 KBPS - 1 MBPS

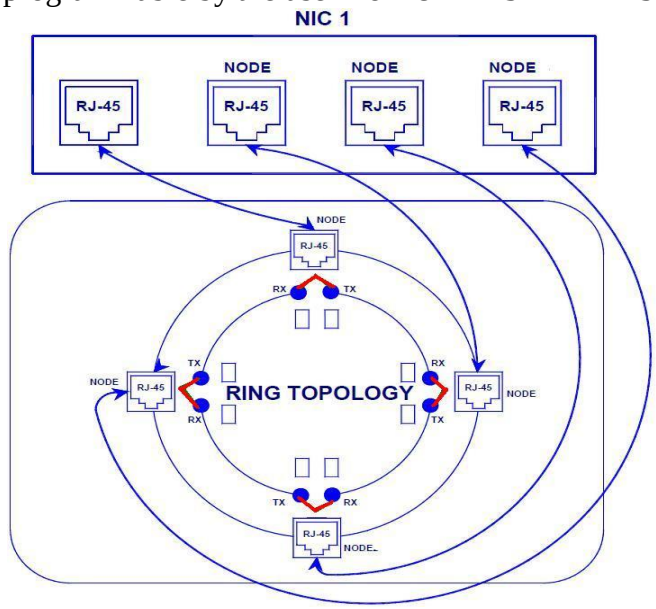


Figure - 4

As i mentioned earlier the ring topology experiments had no server. If you set the destination node the transmitting node acts as a server and the receiving node can be act as a

host. In ring topology if any one cable is disconnected or not properly connected means the total network will be disconnected. So you must notice that all cables are connected or not before you going to send the data.

4 SIMULATION RESULTS

In the computer world, a port is a set of signal lines that the microprocessor, or CPU, uses to exchange data with other components. Typical uses for ports are communicating with printer, modems, keyboards and PC to PC etc., Most computer ports are digital, where each signal, or bit, is 0 or 1. A parallel port transfers multiple bit at once. Thus it is often called as printer Port or Centronics port (this name came from a popular printer manufacturing company 'Centronics' who devised some standards for parallel port).

4.1SIMULATION RESULTS PC TO PC LAN-TRANSMITTER

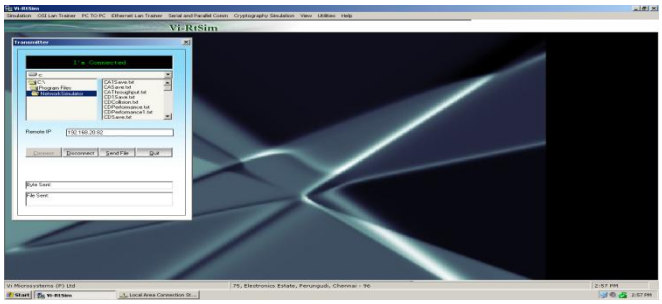


Figure - 5

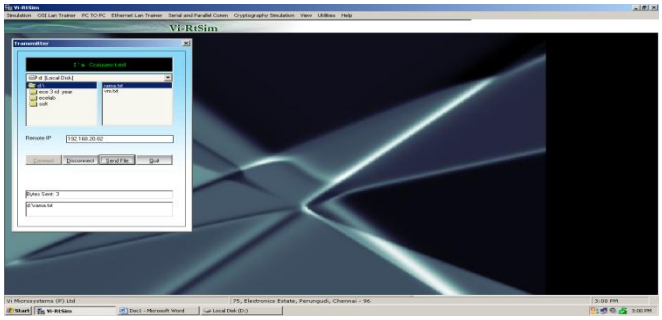


Figure - 6

4.2SIMULATION RESULTS PC TO PC LAN-RECEIVER

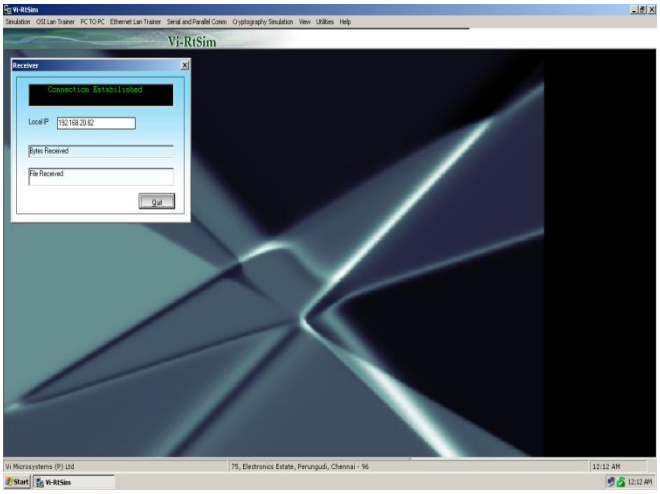


Figure - 7

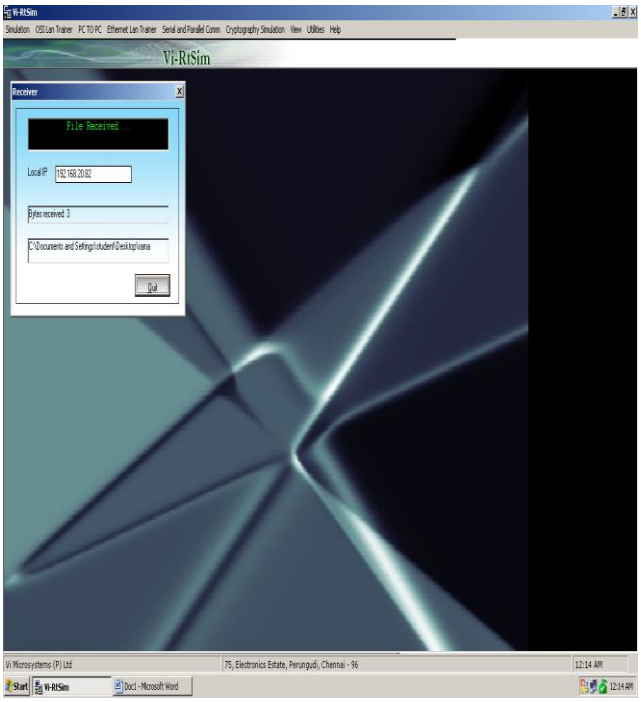


Figure - 8

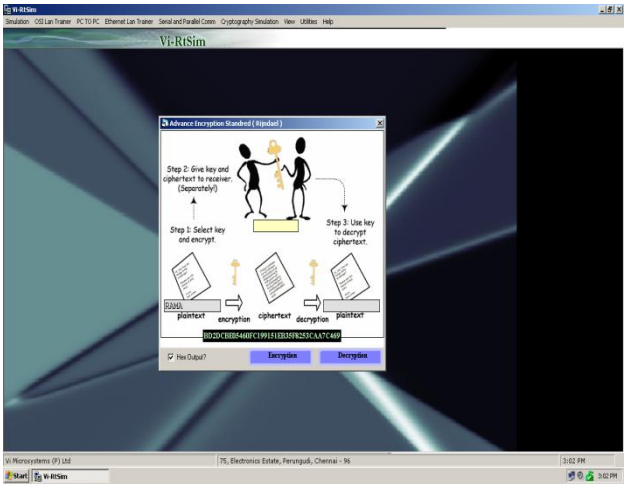
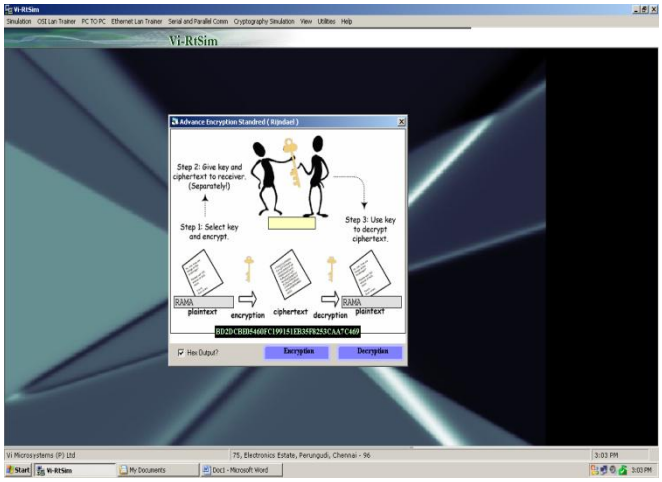


Figure - 9



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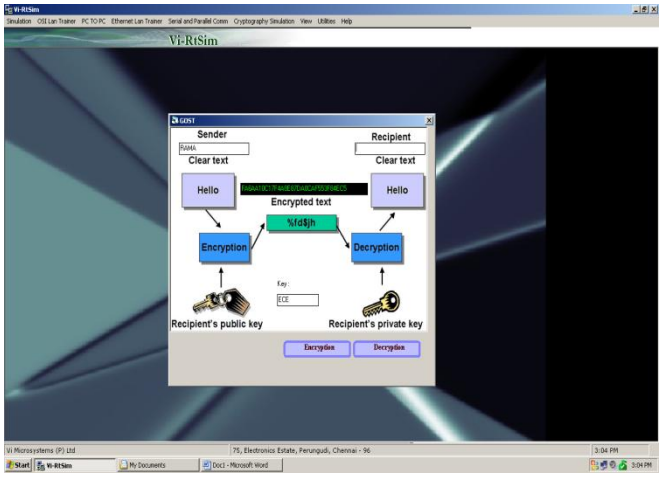

Figure - 11

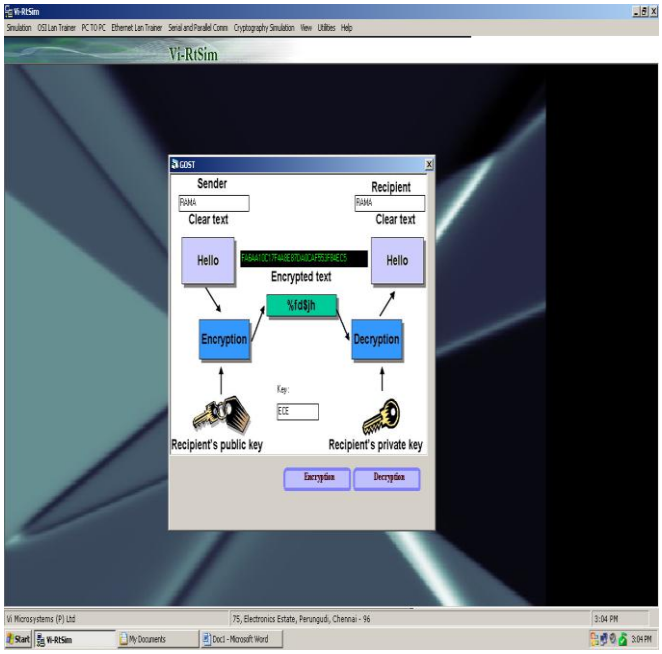

Figure - 12

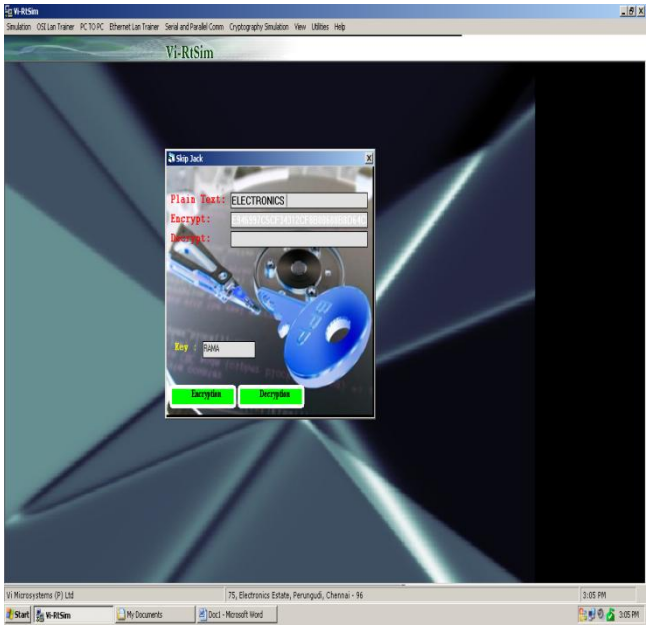

Figure - 13

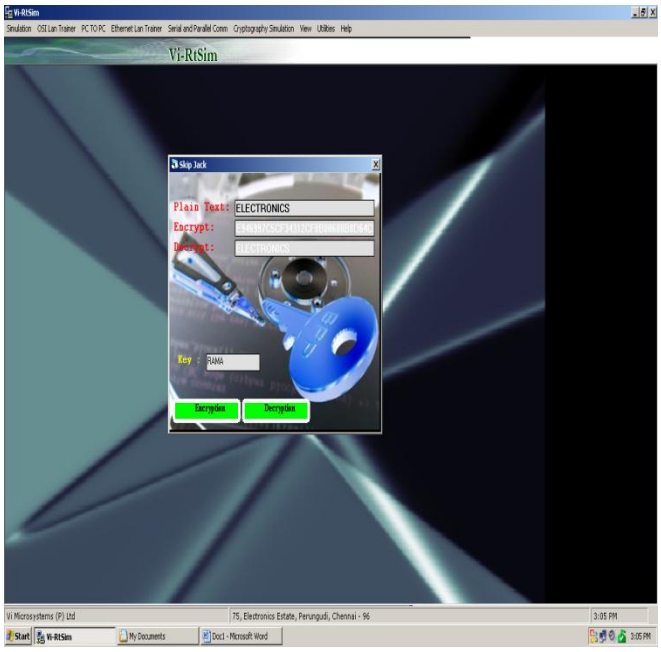

Figure - 14

5 FUTURE WORK

Enterprise and service provider network architects so far had to rely on a complex set of networking technologies to provide end-to-end services to their customers. Ethernet, OC-12, OC-48, SONET, SDH, and packet over SONET/SDH are some of the technologies that these providers had relied on.

With Ethernet being the de-facto standard inside the Enterprise, an entire range of devices from simple switches to intelligent Ethernet based

multi-layer switches have proliferated. Service providers would like to extend this network architecture to cover intra-campus and ultimately inter-campus internetworking.

Ethernet has scaled both in bandwidth (10 Gb/s) as well as physical range (over 40 km), while preserving the frame formats and other features of the protocol. Hence, Enterprises can continue to benefit from their investments in Ethernet such as – operator training, higher layer processing such as routing, caching, server load balancing and policy based intranets. Now, with
10 Gb/s Ethernet, these same functions can be supported for traffic in LAN, MAN and even
WAN.

The convergence of both media (voice, video) and data onto packet switched networks using TCP/IP running over Ethernet is now a reality, with all parts of this ecosystem in place. The promise of convergence can finally be realized with 10 Gigabit Ethernet.

CONCLUSION

10 Gigabit Ethernet provides the necessary performance at the right cost point to facilitate the convergence of diverse network traffic onto a common IP / Ethernet platform.

The ten-fold increase from 1 Gb/s Ethernet, allows it to support next generation Enterprise applications with ease. Network operators benefit from economies of scale by having to manage a single network protocol that can handle diverse types of network traffic.

The increase in its range, supported by fiber media, allows this ubiquitous interface to scale across small to mid-size campuses. The higher bandwidth permits storage access and backup operations to be supported on the same network.

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