



Features

- Modular Workbench
- Compute Server for DHCP, FTP and DNS
- Router & Layer 2 Switch
- Wireless Access Point
- Computer Hardware Training with Fault findings
- LAN Training System with Protocol Analyser and Simulation Software
- Network and Internet Security Training Software
- LAN Tool Kit
- STAR, BUS and RING Topology
- Network Protection and Troubleshooting
- CLI and Web Managed Configuration of a Switch & Router
- Configuring a WAP and Wireless LAN
- VLAN Set-up
- Protocols selection
 - ♦ Stop and Wait
 - ♦ Go back to n
 - ♦ Selective repeat
 - ♦ Sliding window
 - ♦ Token Ring
 - ♦ Token Bus
 - ♦ CSMA / CD
 - ♦ CSMA / CA
- Simulated operation of hacking and tracking activities
 - ♦ Hacking via HTTP
 - ♦ Hacking via FTP
 - ♦ Hacking via phishing
 - ♦ Hacking via spywares
 - ♦ Hacking via virus
 - ♦ Hacking via software
- Exhaustive Experimental Manual

Curriculum

The Objective of the System is to teach the following Curriculum:

Note: Specifications are subject to change.

Data Communication Components:

Fundamentals of a Desktop Computer with fault - findings, Initialisation, Configuration and Data Transfer using Serial, USB and Ethernet Ports

Types of Networks:

Network Media-UPT Cables and wiring scheme, Topologies-Star, Bus & Ring Topology,

Server:

Client and Server Roles, Peer to Peer Network, Install and Configure Windows Server, Install and configure Active Directory, Implementing AD Services, Configuring a Server as a Web and FTP Server, Mail Box, DHCP and DNS Services

Network Devices:

Command line Interface & Web Managed Configuration of Switch, Configuring a WAP & Wireless LAN, Out of band and In band Management.

Network Switching and Routing:

Study of OSI Layer (Physical, Data Link, Network & Transport Layer), Address Routing Protocol (ARP), IP Addressing technique (IP4/IP6) and Subnetting, Installation and Configuration of TCP/IP Protocol Utilities: PING, IPCONFIG, HOSTNAME, ROUTE, TRACERT etc. Packet Switching, Setup and configure a Virtual LAN , Spanning Tree Protocol, Command Line Interface and IP Routing, Network Protocols, Network Simulation Tools.

Protocols:

- Stop and Wait
- Go back to n
- Selective repeat
- Sliding window
- Token Ring

- Token Bus
- CSMA / CD
- CSMA / CA, Real Time Protocol Analysis - TCP/IP & UDP

Network and Internet Security:

Network Security, Wireless Security Measures, Cyber Security, Cryptography, Simulate Hacking and Tracking via HTTP, FTP, Phishing, Spywares, Virus, Software

System Specification

a) Workbench:

The Training System and Network Devices are aesthetically embedded on the Network Rack and Workbench.

It has a power indicator & ON/OFF Control and Circuit Breaker of rating 3Amp with ON/OFF Control and along with over load protection. Access door provided for equipment removal and maintenance.

The Workbench is supplied with a 1 KVA UPS/Inverter to cater for all equipment on board the workbench.

(b) Computer Server - 1 No

Server provides is designed to run on-premises and hybrid cloud solutions, delivering enterprise-class performance, security, reliability, and expandability

Processor : Intel® Xeon® E-2224 (4-Core, 3.4 GHz, 71 W)

Number of Processors : One

Memory: 8 GB UDIMM DDR4 (1x 8 GB) or better

Network Controller Embedded : 1Gb 2-Port 361 I Ethernet Adapter

Storage Controller Embedded : S100i SW RAID with 4 SATA ports

Internal Storage : 4 LFF HDD Bays - 1TB SATA

PCI-Express Slots: 1 PCIe 3.0 slots

Power Supply (1) External Power Supply

Industry Standard Compliance:

- Advanced Encryption Standard (AES),
- Active Directory v1.0

Windows Server 2019 Essential -Single User License Monitor, Keyboard, Mouse supplied with the Server.

c) Client Workstation - 3 Nos (OPTIONAL)

d) COMPUTER HARDWARE TRAINING SYSTEM -1 No.

- Processor Type Core i3 Processor
- Mother board With Intel Chipset
- Memory (RAM) 4GB
- Display adaptor card Built in mother board
- Hard disk Above 500 GB (SATA)
- Monitor 15"TFT colour SVGA
- SMPS 450 watts
- Drive DVD R/W drive (SATA)
- Sound card Built in mother board
- Accessories: Keyboard, Mouse, Speakers

& Microphone, Fault panel: 9 switch faults in the following section with Toggle switch, Serial port/USB,VGA, SATA1 - for DVD, SATA2 - Hard Disk, Audio, SMPS tester section

e) Router - 1 No

- Aggregate Throughput : 35 Mbps or better
- Total onboard WAN or LAN 10/100/1000 ports : 2 Nos RJ-45-based ports : 2 Nos
- Default memory double-data-rate 3 (DDR3) error -correction-code (ECC) DRAM : 4 GB
- Default flash memory 8 GB
- Serial console port - RJ45 (up to 115.2 kbps): 1
- Protocols: IPv4, IPv6, static routes, Routing Information Protocol Versions 1 and 2 (RIP and RIPv2), Open Shortest Path First (OSPF), Enhanced Interior Gateway Routing Protocol (EIGRP), Border Gateway Protocol (BGP), BGP Router Reflector, Intermediate System-to-Intermediate System (IS-IS), Multicast Internet Group
- Management Protocol Version 3 (IGMPv3), Protocol Independent
- Multicast sparse mode (PIM SM), PIM Source-Specific Multicast (SSM), Resource Reservation Protocol (RSVP) etc

f) Managed Layer 2 SWITCH - 1 No

Processor and Memory:

- Processor : 800 MHz, 512 MB SDRAM, 256 MB flash; packet buffer: 1.5 MB
- IEEE 802.1Q VLAN support
- Support for up to 256 VLANs with a VLAN ID range of 2-4093 IEEE 802.1 X access control
- Authentication of network users on a per port basis prior to permitting network access.
- Port authentication includes assigned VLAN, Spanning Tree Protocol (STP)
- Supports standard IEEE 802.1 D STP, IEEE 802.1w Rapid Spanning Tree Protocol (RSTP) for faster convergence, and IEEE 802.1 s Multiple Spanning Tree Protocol (MSTP on local web).
- IGMP snooping vl /v2
- Improves network performance through multicast filtering, instead of flooding traffic on all ports.
- Address Resolution Protocol (ARP)
- The ARP table displays all of the IP addresses that have been resolved to MAC addresses, either dynamically or through static entry configuration..

g) Wireless Access Point - 1 No

- 5GHz 802.11ac and 2.4 GHz 802.11n 300 Mbps max rate) radios, dual-band antennas, 10/100/1000BASE-T Ethernet network interfaces (RJ-45)- 4 LAN port and 1 WAN Port

Note: Specifications are subject to change.

h)Trainer Boards consisting of LAN Training System - 1 No

- Hardware Topology
 - i) Star ii) Bus iii) Ring
- Nodes : 4 Nodes
- Data Rate : 10/100 Mbps
- Interconnection : RJ45 connection cable to connect hardware to computer LAN card
- Software Topology selection
 - i) Star ii) Bus iii) Ring
- Protocols selection
 - (i) Stop and Wait (ii) Go back to n (iii) Selective repeat (iv) Sliding window (v) Token Ring (vi) Token Bus
 - (vii) CSMA / CD (viii) CSMA / CA
- Packet Size : 128, 256, 512, 1024, 2048, 4096, 8192, 16384
- Inter packet delay : 1000, 2000, 3000, 4000, 5000ms
- Error generation : Bad packet, acknowledgment lost and auto error generation
- Encryption and decryption of data
- Network details: Indication of computer name, IP address, Port number, status of network, MAC address and operating system on computer.
- Graphical representation: Graphic representation of Data on software screen with differentiation of packet to be transmitted, packet being transmitted, packet transmitted with acknowledgment, packet with acknowledgment lost error, packet with bad packet error and packet which is discarded or resend.
- Measurement and plotting: Error rate calculation, Throughput calculation
- Protocol analysis: Indication of packet serial number, file name, file size, file number, receiver name, workgroup, receiver IP address, current packet, total packets, packet length, delay, protocol, topology, receiver MAC address, port number, packet send time, acknowledgment receive time, inter packet delay, data rate (Mbps), number of resend packets, acknowledgment value
- Network analysis: Indication of packet serial number, file name, file size, file number, receiver name, work group, receiver IP address, total packets, packet length, time out, protocol, topology, receiver MAC address, port number, file send start time, file sent completion time, transmission time, data rate (MBPS), error.

Data Communication Training System (PC-Embedded) -1 No (Optional)

- 128 X 64 Graphics LCD display.
- Memory-Flash 2MX16 Parallel,
- DRAM 16M X 32 Parallel ,
- Micro SD Card, Ethernet Port:10/100 Ethernet RMII Interface, Interface Port - USB.

Note: Specifications are subject to change.

- On Board 12C, SPI and CAN Bus.
- Facility for programming of Drivers for USB and Ethernet Port in Bare Metal level.

Real Time Network Protocol Analyser Software - 1 User

- The Protocol Analyser Software should be able to Capture live packet data from a network interface.
- Facility to Open files containing packet data captured with many other packet capture programs.
- Facility to Import packets from text files containing hex dumps of packet data.
- Facility to Display packets with very detailed protocol information.
- Facility to Save packet data captured.
- Facility to Export some or all packets in a number of capture file formats.
- Facility to Filter packets before and after capture of data using Capture Filter and Display Filter like Ethernet broadcast, No ARP,Ipv4 ,TCP only, UDP only, HTTP, non HTTP etc.
- Facility to Create various statistics like Captured File Properties, Protocol Hierarchy, Packet Length, I/O Graphs etc.

LAN Tool Kit - 1 Set

- LAN Cable Tester : 2 Nos
- RJ-45 Connectors : 200 Nos
- Crimping Tool : 2 Nos,
- Cat5e Cable : 100 mtrs.

Scope of Learning

Computer Hardware

- To study different parts of Computer Hardware
- To introduce the switch faults in different sections of computer Hardware and study its effect

Server

- Computer Server with Windows Server Operating System
- Install and Configure Windows Server
- Install and configure Active Directory, Implementing AD Services
- Configuration of FTP Server
- Configuring a Server for DHCP
- Installation and Configuring DNS Resolution

Local Area Network and Protocols

- Study of Ethernet LAN and Wireless LAN
- Study of data encryption and decryption
- Implementation and study of stop and wait protocol
- Implementation and study of go back to n protocol
- Implementation and study of selective repeat protocol
- Study of token ring and token bus protocol

- Study of sliding window protocol
- Study of CSMA / CA protocol
- Study of CSMA / CD protocol
- Measure of throughput and the effect of bit errors on various protocols
- Socket programming

Network Switching And Routing

- Understanding and preparation of Ethernet cable.
- To study of the OSI Reference Model.
- Establishing a Console Session with Tera Term Topology.
- Building a basic switch and end device configuration.
- Viewing Wired NIC Information.
- Viewing Network Device MAC Addresses.
- Building a Switch and Router Network Topology.
- Calculating IPv4 Subnets.
- Identifying IPv6 Addresses.
- Designing and Implementing a Sub netted IPv4 Addressing.
- Configuring IPv6 Addresses on Network.
- Configuring Basic Switch Settings.
- Configuring Initial Router Settings.
- Accessing Network Devices with SSH.
- Implementing Inter-VLAN Routing.
- Implementing VLANs and Trunking.
- Configuring Router-on-a-Stick Inter-VLAN Routing.

Wireless LAN

- Viewing Wireless NIC Information.
- Configure Firewall Setting.
- Configure Wireless Router and Client.
- Configure DHCP on a Wireless Router.
- Configure Mobile Device for Wi-Fi Connectivity.

Internet Security

Simulation techniques

- HTTP technique
 - ♦ Brute force algorithm
 - ♦ View/add/edit/update contents
 - ♦ Login history
- FTP technique
 - ♦ Brute force algorithm
 - ♦ Upload/download files
- Phishing technique
 - ♦ Compose mail/inbox
- Spyware technique
 - ♦ Brute force algorithm
- Upload/download spyware
- Virus technique
- Upload/download e-mail virus

Note: Specifications are subject to change.

