

200373X, 200239T, 200312L

### Introduction

This report is about the installation of design of local area network at University of Moratuwa. Here we consider about the design of backbone network for University of Moratuwa which has multiple buildings such as academic departments, administrative offices, library and data center as well as the internal network of ENTC building. Purpose of this LAN design is to ensure for a long term use of 20-25 years. Every department is logically separated with the use of subnets. Wireless network is also available to provide access to every user account.

### Proposed Design

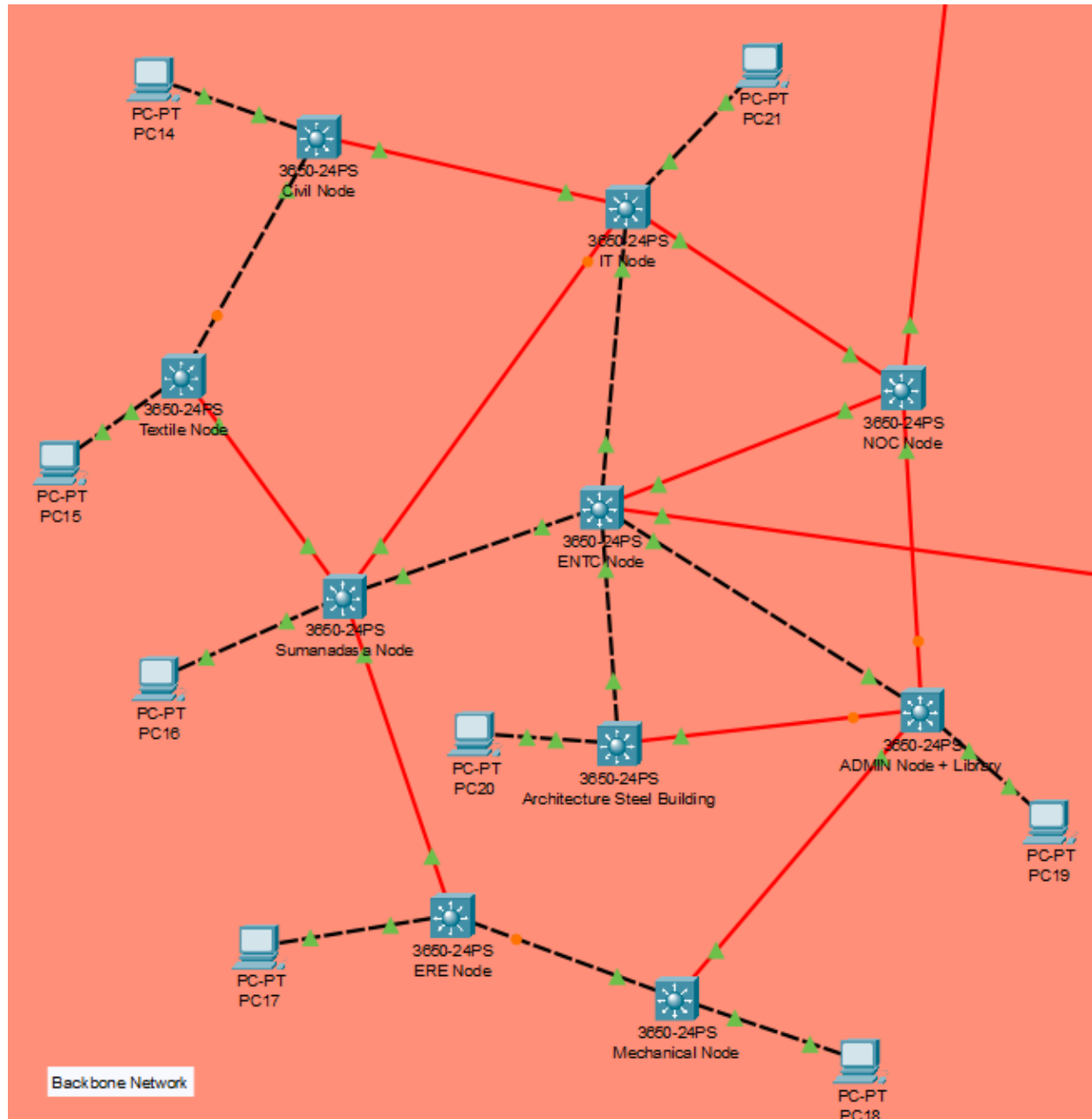
The design utilizes connectivity of wires. To keep an organized and well planned cabling system the network follows structural cabling standard. The cables are connected from rack to rack via overhead cable as it is very easy in the repair works. Types of cables are selected according to the devices and data transfer speed.

Each main node in university is connected to fiber cable. All of them are connected with two cables as backup for the whole network. In some backup connections we have used cross over copper cable to reduce the material cost.

We have connected ENTC, IT, ADMIN + Library to NOC node to reduce the overall traffic coming inside and going outside the university. This could increase the speed of the university network as well.

Architecture Steel building is newly added to the Backbone network.

## Network Diagram



### IP addressing scheme

Department/ Building	Number of Hosts	Network address	Broadcast address	Address range	Subnet mask
ENTC	<u>509</u>	<u>10.10.30.0</u>	<u>10.10.31.255</u>	<u>10.10.30.1-</u> <u>10.10.31.254</u>	<u>255.255.254.0</u>
NOC	<u>8189</u>	<u>10.10.31.2</u>	<u>10.10.31.255</u>	<u>10.10.16-</u> <u>10.10.31.254</u>	<u>255.255.224.0</u>

There are nine subnets with approximately 509 hosts per each subnet.

### Justification of components

The types of cables are selected according to the devices connected and data transfer speed.

### Features of 3650 Layer 3 Switch

**We selected this type switch because we can configure ip and dhcp in these type of routers.**

- Integrated wireless controller capability with:
  - Up to 40G of wireless capacity per switch (48-port models)
  - Support for up to 50 access points and 1000 wireless clients on each switching entity (switch or stack)
- 24 and 48 10/100/1000 data and PoE+ models with energy-efficient Ethernet (EEE) supported ports
- 24 and 48 100-Mbps and 1-, 2.5-, 5-, and 10-Gbps (multigigabit) Cisco UPOE and PoE+ models with EEE
- Five fixed-uplink models with four Gigabit Ethernet, two 10 Gigabit Ethernet, four 10 Gigabit Ethernet, eight 10 Gigabit Ethernet, or two 40 Gigabit Ethernet Quad Small Form-Factor Pluggable Plus (QSFP+) ports
- 24-port and 48-port 10/100/1000 PoE+ models with lower noise and reduced depth of 11.62 inches for shallow depth cabinets in enterprise, retail, and branch-office environments

- Support for external power system RPS 2300 on the 3650 mini-SKUs for power redundancy
- Full IEEE 802.3at (PoE+) with 30W power on all ports in 1 rack unit (RU) form factor
- Cisco UPOE with 60W power per port in 1 rack unit (RU) form factor
- IEEE 802.3bz (2.5GBASE-T and 5GBASE-T) to go beyond 1 Gbps with existing Category 5e and Category 6
- IEEE 802.1ba Audio Video Bridging (AVB) built in to provide a better AV experience, including improved time synchronization and quality of service (QoS)
- **Software support for IPv4 and IPv6 routing, multicast routing, modular QoS, Flexible NetFlow (FNF) Version 9, and enhanced security features**

### Wireless Access Point

#### ***Air-ap18521-e-k9 access point used in university.***

Full Duplex

100Mbps Bandwidth

Antenna - Internal Antennas

Regulatory Domain E (E regulatory domain): - 2.412 to 2.472 GHz; 3 channels

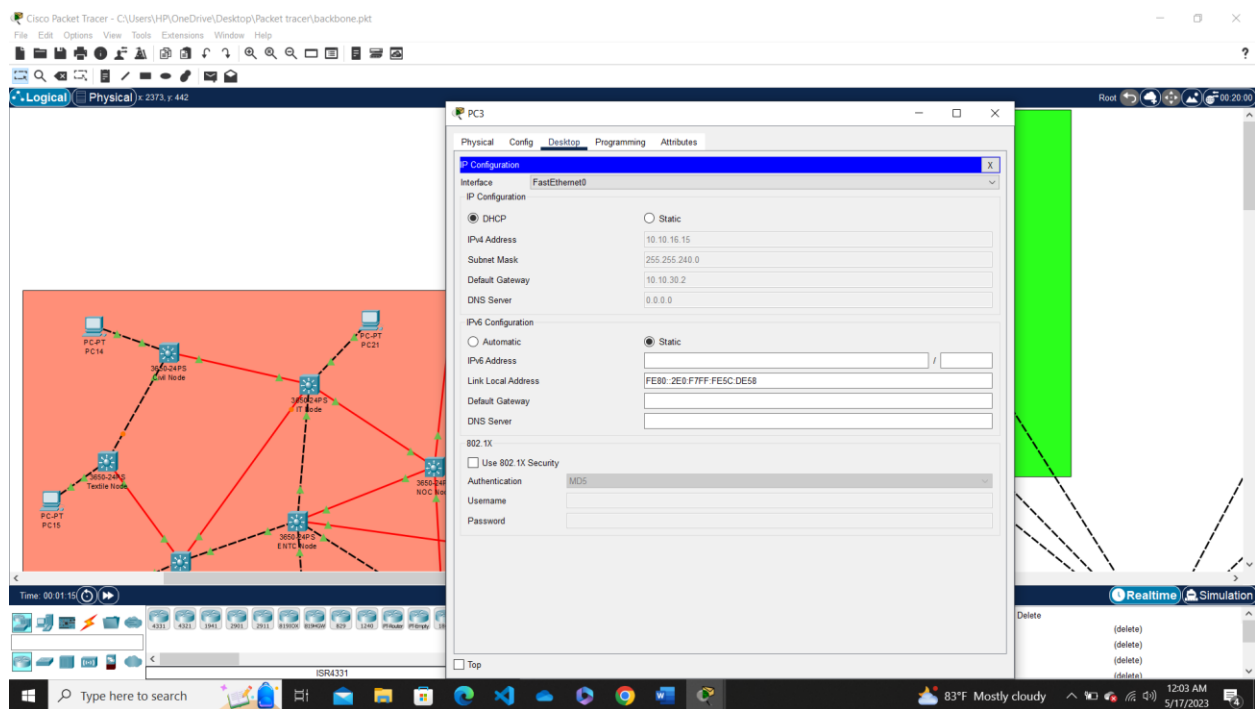
### Billing

We are using wireless access points are already existing ones.

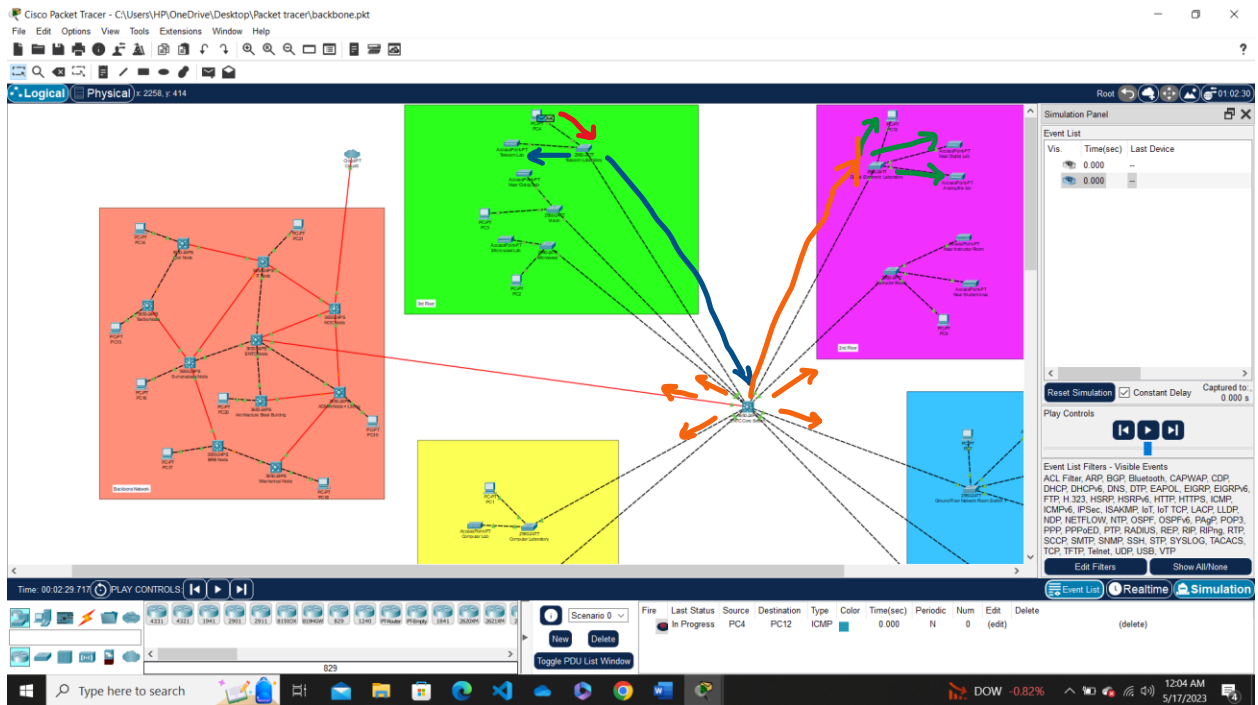
3650 Layer 3 switch	11	\$3719	\$40 909
24 Port switch	10	\$760	\$7 600
Patch Panel	10	\$19.99	\$199.9
Wireless Access points	15	\$978	\$14 670
Total			\$63 378.9

## Simulation Results

### DHCP enabled inside ENTC Network



### Packet travel(First ICMP travel multicasting)



## Second Packet

