Lab 11: Simulating LANs using CSMA channel in NS3

11.1 Campus Network Design for IUT

Islamic University of Technology (IUT) is expanding its campus and requires a new network infrastructure to support several academic departments, administrative offices, and centralized services. As the network engineer, you are responsible for designing and configuring the network to ensure secure, efficient, and scalable operations across the campus.

The new campus consists of multiple buildings housing the following departments and offices:

Buildings

1. **Departments (Academic Buildings)**
   i. Computer Science & Engineering (CSE) - Building 1
   ii. Electrical & Electronics Engineering (EEE) - Building 2
   iii. Mechanical & Production Engineering (MPE) - Building 3
2. **Centralized Services (Shared Building)**
   i. ICT Center (Building 4 - Floor 1)
   ii. Administration Department (Building 4 - Floor 2)
   iii. Registrar's Office (Building 4 - Floor 3)

Number of Connected Device

1. **Departments (Academic Buildings)**
   i. Computer Science & Engineering (CSE) - 60 devices.
   ii. Electrical & Electronics Engineering (EEE) - 60 devices.
   iii. Mechanical & Production Engineering (MPE) - 40 devices
2. **Centralized Services (Shared Building)**
   i. ICT Center - 10 devices.
   ii. Administration Department - 20 devices.
   iii. Registrar's Office - 10 devices.

Network Requirements

- All devices (computers, etc.) should be configured dynamically.
- Each department must be isolated from each other in terms of broadcast traffic.
- Implement appropriate routing protocols (Global Routing in ns3) to allow inter-department communication.
- The University can use the following network address to assign the IP addresses to the devices, $192.168.x + 1.0/24$, where x represents the last two digits of your student ID. Subnet the given network where necessary.

Your task is to implement a functional and scalable network for the campus using the ns3 simulation tool that meets all of the specified requirements and allows for future growth and expansions.

* Assign the IP addresses automatically (use the IPv4AddressHelper class) where necessary.
* Connect at least two devices for each department.