**College Network Design**

**Project Summary**  
A simulation of the college network using Packet Tracer.

**Introduction**  
Networks in educational institutions rely on advanced technologies to ensure efficient communication between various devices. This project aims to design a simulated college network divided into multiple sub-networks (VLANs) for each floor of the building. The choice of VLAN technology improves performance, enhances security, and simplifies network management.

**Project Description**

**General Design**  
The college consists of four floors, each containing offices, classrooms, and auditoriums. The network is segmented into sub-networks using VLAN technology to improve performance and security. All devices are interconnected via switches, and a router is used to enable inter-VLAN communication. Cameras are connected to dedicated switches to enhance network performance by reducing congestion and allowing independent management of the security network.  
Additionally, each VLAN is designed with 3 to 4 unused interfaces to accommodate future expansion, allowing for the addition of devices or network growth without significant redesign.

**First Floor**

* Contains six offices.
* Each office is assigned to a separate VLAN.
* Devices:
  + VLAN 10: 3 PCs, 1 Printer. (4 unused interfaces)
  + VLAN 20: 3 PCs, 2 Printers, 1 Switch. (4 unused interfaces)
  + VLAN 30: 2 PCs, 1 Printer. (4 unused interfaces)
  + VLAN 40: 6 PCs, 1 Printer. (3 unused interfaces)
  + VLAN 50: 3 PCs, 1 Printer. (3 unused interfaces)
  + VLAN 60: 3 PCs, 1 Printer, 1 Switch, 1 Camera. (3 unused interfaces)
* Cameras:
  + 2 cameras on the staircase.
  + 2 cameras in the corridors.
* All cameras are connected via switches located on the second floor.

**Second Floor**

* Contains six offices, four auditoriums, and a theater.
* Devices:
  + VLAN 70: 1 PC, 1 Printer, 1 Switch. (2 unused interfaces)
  + VLAN 80: 1 PC, 1 Printer. (2 unused interfaces)
  + VLAN 90: 4 PCs, 1 Printer, 1 Camera. (2 unused interfaces)
  + VLAN 100: 5 PCs, 1 Printer. (3 unused interfaces)
* Offices dedicated to camera management:
  + First office: 2 PCs, 2 Switches (connected to cameras).
  + Second office: 2 PCs, 1 Switch (connected to cameras).
* Cameras:
  + 2 cameras on the staircase.
  + 3 cameras in the corridors.
  + Each of the 4 auditoriums has 2 cameras.

**Third Floor**

* Contains six offices.
* VLAN Distribution:
  + VLAN 110: (3 unused interfaces)
    - First office: 2 PCs.
    - Second office: 2 PCs.
    - Third office: 1 PC, 1 Printer.
    - Fourth office: 1 PC, 1 Printer.
  + VLAN 120: (2 unused interfaces)
    - First office: 4 PCs, 1 Printer, 1 Camera.
    - Second office: 5 PCs, 1 Printer.
* Cameras:
  + 2 cameras on the staircase.
  + 3 cameras in the corridors.
  + Each of the 4 auditoriums has 2 cameras.

**Fourth Floor**

* Similar to the third floor:
* VLAN Distribution:
  + VLAN 110: (3 unused interfaces)
    - First office: 2 PCs.
    - Second office: 2 PCs.
    - Third office: 1 PC, 1 Printer.
    - Fourth office: 1 PC, 1 Printer.
  + VLAN 120: (2 unused interfaces)
    - First office: 4 PCs, 1 Printer, 1 Camera.
    - Second office: 5 PCs, 1 Printer.
* Cameras:
  + 2 cameras on the staircase.
  + 3 cameras in the corridors.
  + Each of the 4 auditoriums has 2 cameras.

**Adding the Connection to the Workshops and Labs Building**

The college network is extended to a separate building called the Workshops and Labs Building, which consists of four floors, each with a dedicated VLAN. The building is connected to the college network via a router using RIP v2 for routing between networks.

**Design in the Workshops and Labs Building**

1. **First Floor:**
   * Devices: 2 PCs, 1 Switch, 1 Camera.
   * VLAN: VLAN 1.
2. **Second Floor:**
   * Devices: 2 PCs, 1 Switch, 1 Camera.
   * VLAN: VLAN 2.
3. **Third Floor:**
   * Devices: 2 PCs, 1 Switch, 1 Camera.
   * VLAN: VLAN 3.
4. **Fourth Floor (Labs):**
   * Each lab has 5 PCs.
   * VLAN: VLAN 4 for all labs.

**Routing and RIP v2**

* The college network and the Workshops and Labs Building are connected via a router, and RIP v2 is used for dynamic routing between the networks.
* RIP v2 helps in sharing routing information efficiently, ensuring seamless communication between the college and workshops building networks.

**Evaluation of the Design**  
This network design improves performance, ensures data security, and simplifies management between different sections of the college. By utilizing VLAN technology and separating security systems, the design achieves high efficiency and reliability. It is a robust solution that supports current requirements while being flexible enough for future upgrades. The inclusion of unused interfaces in each VLAN ensures the scalability and adaptability of the network for future expansions. The integration of the Workshops and Labs Building adds more resources, and RIP v2 ensures efficient communication between both buildings.

**Conclusion**  
The design of this college network provides an effective solution for high-performance, secure, and scalable networking. It is adaptable to future growth, with provisions for expansion and improved management of network traffic. The use of VLANs, RIP v2, and dedicated camera management ensures that the network can handle increasing demands while maintaining optimal performance and security.

A diagram of a network

Description automatically generated