Project Title

“Next-Generation Smart Integrated City Infrastructure with IoT Automation, Multi-VLAN Segmentation, and Advanced Cybersecurity Enforcement Using Cisco Packet Tracer”

Project Description

This project implements a fully functional Smart City Network using Cisco Packet Tracer, integrating IoT automation, secure multi-VLAN architecture, and advanced cybersecurity features. The network is structured around a centralized Layer-3 core that routes multiple smart city sectors, including residential, commercial, government, public WiFi, IoT devices, and server zones.
IoT devices such as smart streetlights, traffic controls, parking sensors, CCTV cameras, and smart home components are deployed and centrally managed via the Cisco IoT server. Automation rules are used to enable intelligent responses to real-time events.
Security is enforced through ACL-based segmentation, port security, DHCP snooping, DAI, encrypted management, and logging. The design demonstrates a modern, scalable, and secure smart city environment suitable for real-world applications and enterprise-level understanding of networking and cybersecurity.

Project Overview

This project presents a fully simulated **Next-Generation Smart City Network** built entirely with **Cisco Packet Tracer**, integrating **IoT automation**, **multi-layer network segmentation**, and **advanced cybersecurity controls**.
The design focuses on creating a scalable, secure, and intelligent metropolitan infrastructure where residential, commercial, government, and public service sectors operate on isolated VLANs, enforced by strong access control and monitoring mechanisms.

The Smart City incorporates:

- Automated street lighting
- Smart traffic control
- Smart parking systems
- Environmental sensors

- Smart home devices
- CCTV surveillance
  All IoT devices are centrally managed through the **Cisco IoT Server**.

Advanced cybersecurity features such as ACL-based zone filtering, port security, DHCP snooping, secure management protocols, and basic firewall policies are implemented to ensure data protection, network segmentation, and secure city operations.

Advanced Features Included in the Project

1. Network Architecture & Segmentation

- Multi-VLAN design
- Router-on-a-stick Inter-VLAN routing
- Layer-2 & Layer-3 switching
- DHCP server for multiple subnets
- DNS, NTP, Web Server, and IoT Server

2. IoT Automation & Smart City Services

- Smart street lights (motion-controlled)
- Smart traffic lights (sensor-based)
- Smart parking system
- Smart home: door, fan, AC, thermostat
- CCTV monitoring with alerts
- Environmental sensors (temperature, humidity, pollution)
- IoT rules & scripts for automation

3. Cybersecurity & Access Control

- Advanced ACL policies for VLAN isolation
- Strict Port Security (Sticky MAC)
- DHCP Snooping + Dynamic ARP Inspection
- Basic Firewall Zone Simulation
- Encrypted remote access (SSH)
- Secure password policies
- Syslog server for logging (conceptual)
- IDS-like packet monitoring (Packet Tracer simulation)

4. Redundancy & Reliability (Packet Tracer Level)

- Dual-router gateway simulation
- Static route backup paths

- Load balancing between city zones (conceptual)

5. Monitoring & Management

- IoT monitoring dashboard
- Network event logging
- Packet flow testing (ping, traceroute)
- ACL verification & security testing

Required Devices (with Quantities)

Core & Distribution Layer

Device Type	Quantity	Purpose
Layer-3 Switch (3560/3650)	**1**	Core routing + Inter-VLAN
Routers	**1–2**	Gateway simulation
Server(s)	**3–5**	DHCP, DNS, NTP, Web, Syslog, IoT

Access Layer

Device Type	Quantity
Layer-2 Switches (2960)	**3–5**

End Devices

Device Type	Quantity
PCs	**6–10**
Laptops	**4–6**
Wireless Routers	**2**

IoT Devices (Smart City Layer)

IoT Device	Quantity
Smart Street Lights	**6–10**
Smart Traffic Lights	**4**
Parking Sensors	**4–6**
CCTV Cameras	**4–6**
Motion Sensors	**4–6**
Smart Doors	**2**

IoT Device	Quantity
Temperature Sensors	**2**
Humidity Sensors	**2**
Smart Home Devices (Fan, Lamp, AC)	**4–6**

Other Devices

Device	Quantity
Tablet / Smartphone (IoT Control)	**2**

VLAN & Functional Mapping

VLAN ID	Zone	Purpose
VLAN 10	Residential	Houses, Smart Homes, IoT
VLAN 20	Commercial	Shops, Offices, WiFi
VLAN 30	Government	Secured PCs + CCTV
VLAN 40	Public WiFi	Guests / Citizens
VLAN 50	IoT Devices	Sensors + Smart city devices
VLAN 60	Server Farm	All Management Services
