Module 11 CCNA -Automation and Programmability

1 Explain How Automation Impacts Network Management.
- Automation in network management refers to the use of software and technology to automate repetitive tasks, configuration, management, and troubleshooting of network devices and services.
- Efficiency: Automation reduces manual intervention, allowing IT teams to handle larger networks with fewer resources.
- Consistency: Automated processes ensure configurations and policies are applied uniformly across the network, reducing errors.
- Speed: Tasks such as provisioning, configuration changes, and troubleshooting can be performed much faster.

2 Compare Traditional network with Controller based networking
- Traditional Network: In traditional networks, each network device operates independently with its own configuration. Management is typically manual, requiring CLI commands

Controller-Based Networking: In controller-based networking , a centralized controller manages the network. The controller communicates with network devices using protocols like OpenFlow, allowing for centralized configuration, management, and policy enforcement. This architecture provides greater agility, easier scalability, and better control over network behavior.

3 Explain Virtualization
Virtualization refers to the creation of virtual rather than actual versions of servers, networks, storage devices, or operating systems. It allows multiple virtual instances to run on a single physical resource, enabling better resource utilization, scalability, and flexibility. In networking, virtualization can apply to virtual networks (VLANs), virtual switches, virtual routers, and even entire virtual data centers.

4 Describe Characteristics of REST-based API
- REST (Representational State Transfer) is an architectural style for designing networked applications. Key characteristics of REST-based APIs include:

Statelessness: Each request from a client to the server must contain all the necessary information for the server to understand and fulfill the request. The server does not store any client context between requests.

Uniform Interface: REST APIs use standard HTTP methods (GET, POST, PUT, DELETE) and standard data formats to access and manipulate resources.

Resource-Based: Resources like objects or data are identified by URLs, and clients interact with these resources using CRUD (Create, Read, Update, Delete) operations.

Client-Server Architecture: REST separates the client and server, allowing them to evolve independently. Clients are not concerned with the internal workings of the server, only with the exposed APIs.

5 Explain methods of Automation
- Using scripts to automate repetitive tasks such as configuration changes, monitoring, and reporting.

 Automating end-to-end processes across multiple systems or domains
Using centralized controllers to automate network configuration, and traffic management.

6 Explain SDN
SDN is an architecture that separates the network control plane from the forwarding plane to enable centralized control of the network through software.

A centralized controller manages network behavior and traffic flows.
 Network behavior can be dynamically configured and adjusted using software applications.
SDN uses open protocols and APIs for communication between the control and data planes.

7 Explain DNA Center
- DNA Center is a centralized network management and orchestration platform that provides automation, assurance, and analytics for enterprise networks. Key features include:
Simplifies network provisioning, policy management, and troubleshooting through automation.
Monitors network performance, health, and security posture in real-time.
Provides insights into network traffic patterns, application performance, and user behavior.
 Implements security policies and segmentation across the network.

8 Explain SD-Access and SD-WAN
SD-Access (Software-Defined Access): SD-Access extends the principles of SDN to enterprise access networks, providing centralized policy management, automation of network segmentation, and enhanced security through policy-based controls.

SD-WAN (Software-Defined Wide Area Network): SD-WAN simplifies the management and operation of a WAN by decoupling the networking hardware from its control mechanism. It allows enterprises to build higher-performance WANs using lower-cost internet access.