# Module 11 CCNA -Automation and Programmability

1. Explain How Automation Impacts Network Management Compare Traditional network with Controller based networking

**Ans.** Network automation simplifies and enhances network management by reducing manual interventions, increasing efficiency, and improving scalability. Key benefits include:

* Reduced Human Errors: Automation minimizes misconfigurations and operational mistakes.
* Faster Deployment: Automated provisioning and configuration speed up network deployment.
* Improved Scalability: Large networks can be managed more efficiently without proportional increases in manpower.
* Enhanced Security: Automation ensures security policies are consistently enforced.
* Real-time Monitoring & Troubleshooting: Automated tools detect and resolve issues faster than manual processes.

**Comparison: Traditional Network vs. Controller-Based Networking**

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| **Feature** | **Traditional Network** | **Controller-Based Networking** |
| **Architecture** | Distributed, device-centric | Centralized control via SDN Controller |
| **Configuration** | Manual, CLI-based | Automated, policy-driven |
| **Management** | Device-by-device | Centralized, intent-based |
| **Scalability** | Limited by manual effort | Highly scalable with automation |
| **Security** | Configured per device | Centralized security policies |
| **Flexibility** | Less adaptable to changes | Highly adaptable, dynamic routing |
| **Troubleshooting** | Requires manual intervention | Automated diagnostics & self-healing |

1. Explain Virtualization

**Ans.** Virtualization is the process of creating virtual versions of physical resources like servers, storage, or networks using software. It allows multiple operating systems or applications to run on a single physical machine by using a hypervisor, improving efficiency, reducing costs, and enhancing flexibility.

1. Describe Characteristics of REST-based API Explain methods of Automation.

**Ans.** Characteristics of REST-based API:

1. **Stateless** – Each request is independent; no client context is stored on the server.
2. **Client-Server** – Separation of concerns between client and server.
3. **Uniform Interface** – Standard use of HTTP methods (GET, POST, PUT, DELETE).
4. **Resource-Based** – Data is treated as resources, accessed via URIs.
5. **Cacheable** – Responses can be cached to improve performance.
6. **Layered System** – Architecture can have multiple layers like proxy, auth server.
7. **Optional Code on Demand** – Servers can send executable code to clients.

**Methods of Automation:**

1. **API Testing Tools** – Postman, RestAssured, SoapUI, JMeter.
2. **CI/CD Integration** – Automated testing in pipelines (Jenkins, GitHub Actions).
3. **Scripting** – Use languages like Python or Java for automation scripts.
4. **Mocking** – Simulate APIs using tools like WireMock or Postman Mock Server.
5. **Monitoring** – Automated tools to track performance and errors (e.g., Prometheus).
6. Explain SDN

**Ans. SDN (Software Defined Networking):** SDN is a networking approach that separates the control plane (decision-making) from the data plane (traffic forwarding). Instead of each device making its own decisions, a central SDN controller manages the entire network.

1. Explain DNA Center

**Ans.** Cisco DNA Center is a centralized network management and automation platform by Cisco. It helps manage, monitor, and automate the entire network (wired, wireless, and WAN) using AI, automation, and analytics.

1. Explain SD-Access and SD-WAN

**Ans.**

* **SD-Access:** SD-Access (Software-Defined Access) is a Cisco solution for automating and securing LAN (Local Area Network) access. It uses DNA Center to manage users, devices, and policies, making network access more secure and easier to control.
* **SD-WAN:** SD-WAN (Software-Defined Wide Area Network) is used to manage and optimize WAN connections (like between branches and cloud). It improves performance, reduces costs, and centrally controls traffic over multiple links (MPLS, internet, LTE).
* **SD-Access** = Simplifies and secures **local network** access.
* **SD-WAN** = Optimizes and controls **wide-area** connectivity.