CCNA -Automation and Programmability

1. **Network Automation Impacts Network Management**. With Network Automation, various Network Management activities are done such as network management, testing, deployment, [**configuration**](https://ipcisco.com/cisco-packet-tracer-configuration-examples-2/) and various network operations.
2. Controller-based networking, also known as Software-Defined Networking (SDN), has several advantages over traditional networking, including:

* Flexibility
* SDN is software-based, while traditional networking is hardware-based, making SDN more flexible.
* Centralized management
* SDN controllers provide a centralized view of the network, allowing administrators to control the network from a single interface.
* Automation
* SDN controllers can enable automation through northbound APIs.
* Security
* SDN offers better security through greater visibility and the ability to define secure pathways.
* Ease of implementation
* SDN's programmability and automation make it easier to control and implement changes to the network.

In traditional networks, each network device is managed independently, whereas in controller-based networks, all network devices are managed centrally through the controller.

1. Virtualization is a process that allows a computer to share its hardware resources with multiple digitally separated environments. Each virtualized environment runs within its allocated resources, such as memory, processing power, and storage.
2. REST-based APIs have several characteristics, including:

* Client-server architecture
* The client and server applications are independent of each other. The client only knows the URI of the requested resource.
* Statelessness
* Each request includes all the information needed to process it, so the server doesn't need to store data about a user between requests.
* Uniform interface
* All requests for the same resource look the same, and use a standard format for requests and responses.
* Layered system
* Calls and responses go through different layers. The client interacts with the server through a single endpoint, while the server can interact with multiple backend systems.
* Cacheability
* Resources can be cached on the client or server side.
* Self-descriptive messages
* Calls and responses include information on how to process and interpret them.
* Headers
* REST APIs use headers to return metadata information about a resource.
* Bulk APIs
* REST APIs support bulk APIs, which can send large numbers of transaction requests to the server.
* Parameters
* RESTful API requests can include parameters that give the server more details about what needs to be done.

REST APIs are built on HTTP

1. Automation has been achieved by various means including mechanical, hydraulic, pneumatic, electrical, electronic devices, and computers, usually in combination.
2. Software-Defined Networking (SDN) is an approach to networking that uses software-based controllers or application programming interfaces (APIs) to communicate with underlying hardware infrastructure and direct traffic on a network.
3. Cisco DNA Center allows network administrators to receive advanced insights into network performance. No more guesswork as to the root cause of slow downs, or issues - DNA provides analytics to troubleshoot as the network environment changes.
4. SD-WAN and SD-Access are ways to approach software-defined networking terminology. While SD-Access is used to change the architecture of LAN networks, SD-WAN creates next-generation wide area networks with significant automation capabilities instead of MPLS/VPLS