

Software Defined Networks

(SDN)

Joel Sivanish

CSCD330-HW6

Eastern Washington University

What is Software Defined Networks?

- SDN separates a network's control plane from its data plane.
- A centralized controller makes routing decisions instead of individual routers.
- Switches act as simple forwarding devices using rules installed by the controller.
- SDN introduces programmability, automation, and flexible policy management.

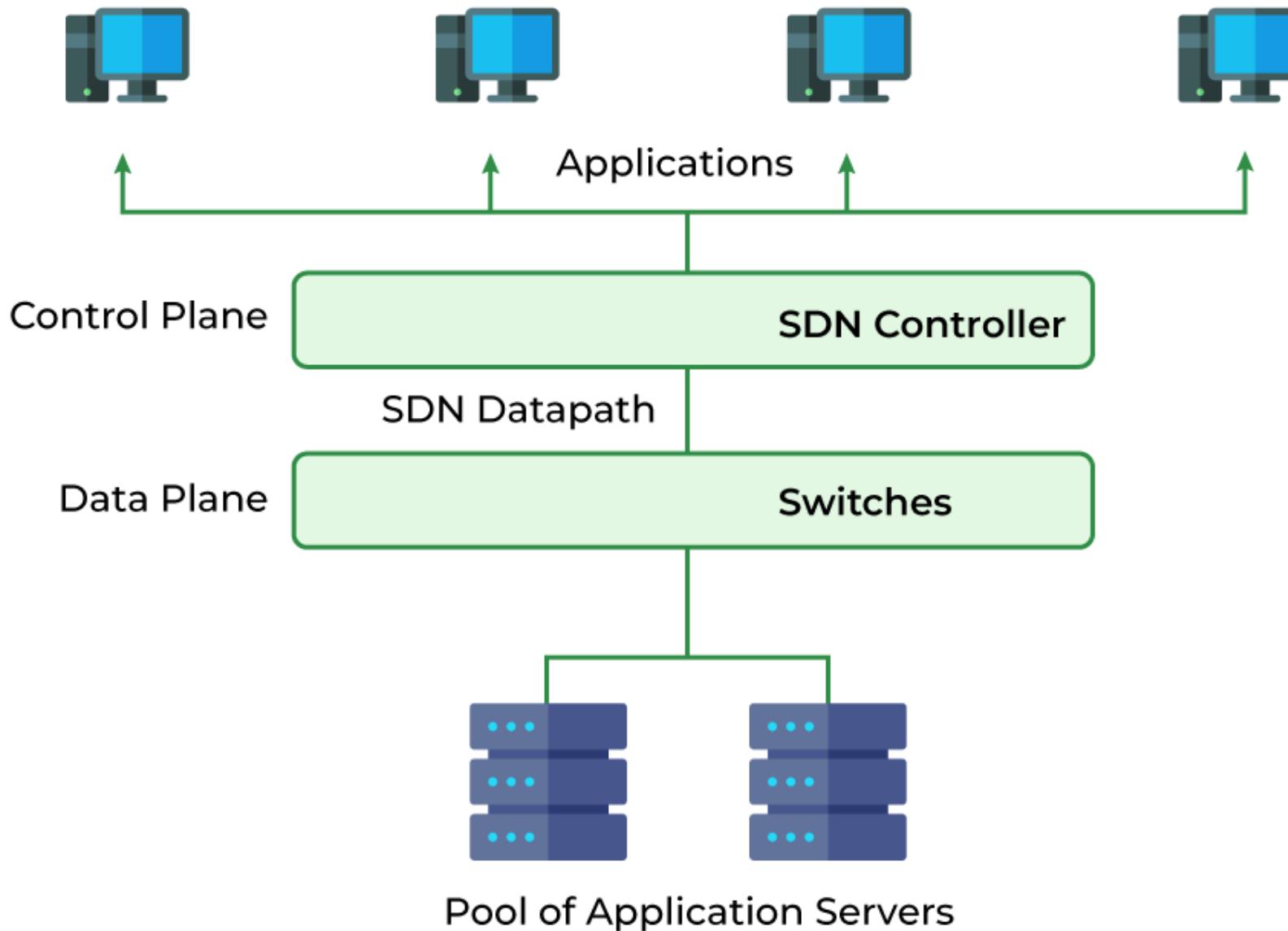
Why does SDN Exist?

- Traditional networks require manual configuration on each device.
- Scaling a network becomes difficult as the number of routers grows.
- Policies can be inconsistent because each router runs local protocols.
- SDN enables centralized control, network-wide visibility, and quick reconfiguration.

Core Components of SDN Architecture

- **SDN Controller:** the “brain” that maintains a global network view and computes decisions.
- **SDN Switches:** hardware devices that forward packets according to controller-installed rules.
- **Network Applications:** software that automates tasks like traffic engineering and security.
- **APIs:** northbound APIs connect apps to the controller, and southbound APIs connect the controller to switches.

Software Defined Networking (SDN)



SDN Diagram Explanation

- The SDN controller sits in the middle and acts like the “brain” of the network, making decisions about how traffic should be forwarded.
- Applications communicate upward with the controller to request information or apply network policies.
- The controller communicates downward to the switches, telling them exactly how to forward packets by installing flow rules in their forwarding tables.
- Switches in the data plane don’t make any decisions, they simply follow the rules set by the controller.

How Does SDN Operate?

- When a switch receives a packet without a matching rule, it forwards metadata to the controller.
- The controller analyzes the packet and determines what forwarding behavior should be applied.
- It installs a new flow rule onto the switch for future matching.
- Subsequent packets in the same flow are forwarded locally without controller involvement.

SDN Product Example: Cisco Meraki

- Cisco Meraki is a cloud-managed networking platform that applies SDN principles to real deployments.
- A centralized cloud controller manages switches, access points, security appliances, and IoT devices.
- Meraki exposes APIs for automation, integrations, and programmable network workflows.
- Provides analytics tools for monitoring LAN, WAN, and application performance across sites.

Sources

- Kurose, James, and Keith Ross. *Computer Networking: A Top-Down Approach*, 7th Edition.
- Spiceworks. “15 Best Software-Defined Networking (SDN) Solutions.”
<https://www.spiceworks.com/tech/networking/articles/best-sdn-solutions/>
- GeeksforGeeks. “Software Defined Networking (SDN).”
<https://www.geeksforgeeks.org/computer-networks/software-defined-networking/>