Router and Switch Planes

- **Data (Forwarding) Plane**: Traffic which is forwarded through the device.

- **Control Plane**: Makes decisions about how to forward traffic. Control plane packets such as routing protocol or spanning tree updates are destined to or locally originated on the device itself.

- **Management Plane**: The device is configured and monitored in the management plane. For example at the CLI through Telnet or SSH, via a GUI using HTTPS, or via SNMP or an API (Application Programming Interface).

SDN - Data and Control Plane Separation

- Network infrastructure devices are responsible for their own individual control and data planes in a traditional environment.

- Software Defined Networking decouples the data and control planes.

- The network infrastructure devices are still responsible for forwarding traffic, but the control plane moves to a centralised SDN controller.

Data and Control Plane Separation

- Rules for packet handling are sent to the network infrastructure devices from the controller.

- The network infrastructure devices query the controller for guidance as needed, and provide it with information about traffic they are handling.

Pure SDN vs Hybrid SDN

- With a pure SDN the control plane runs purely on an SDN controller, and the data plane runs purely on the network devices.

- With a hybrid SDN the majority of the control plane intelligence is provided by an SDN controller, but the network devices retain some control plane intelligence as well as the data plane operations.

- Most implementations use a hybrid SDN.

SDN Architecture

Application Layer   SDN Business Applications

Northbound APIs ↕   typically REST

Control Layer   SDN Controller (Network Services)

Southbound APIs ↕   eg OpenFlow, SNMP, REST, NETCONF, RESTCONF, SSH

Infrastructure Layer

Cisco SDN Controllers: APIC

- APIC (Application Policy Infrastructure Controller)
- The main component of the Cisco ACI (Application Centric Infrastructure) solution
- Designed to manage data center environments with Nexus switches

Cisco SDN Controllers: DNA Center

- (DNA: Digital Network Architecture)
- Designed to manage enterprise environments – campus, branch and WAN
- You can think of it as an upgrade to the APIC-EM (Application Policy Infrastructure Controller – Enterprise Module)

FLACKBOX
www.flackbox.com