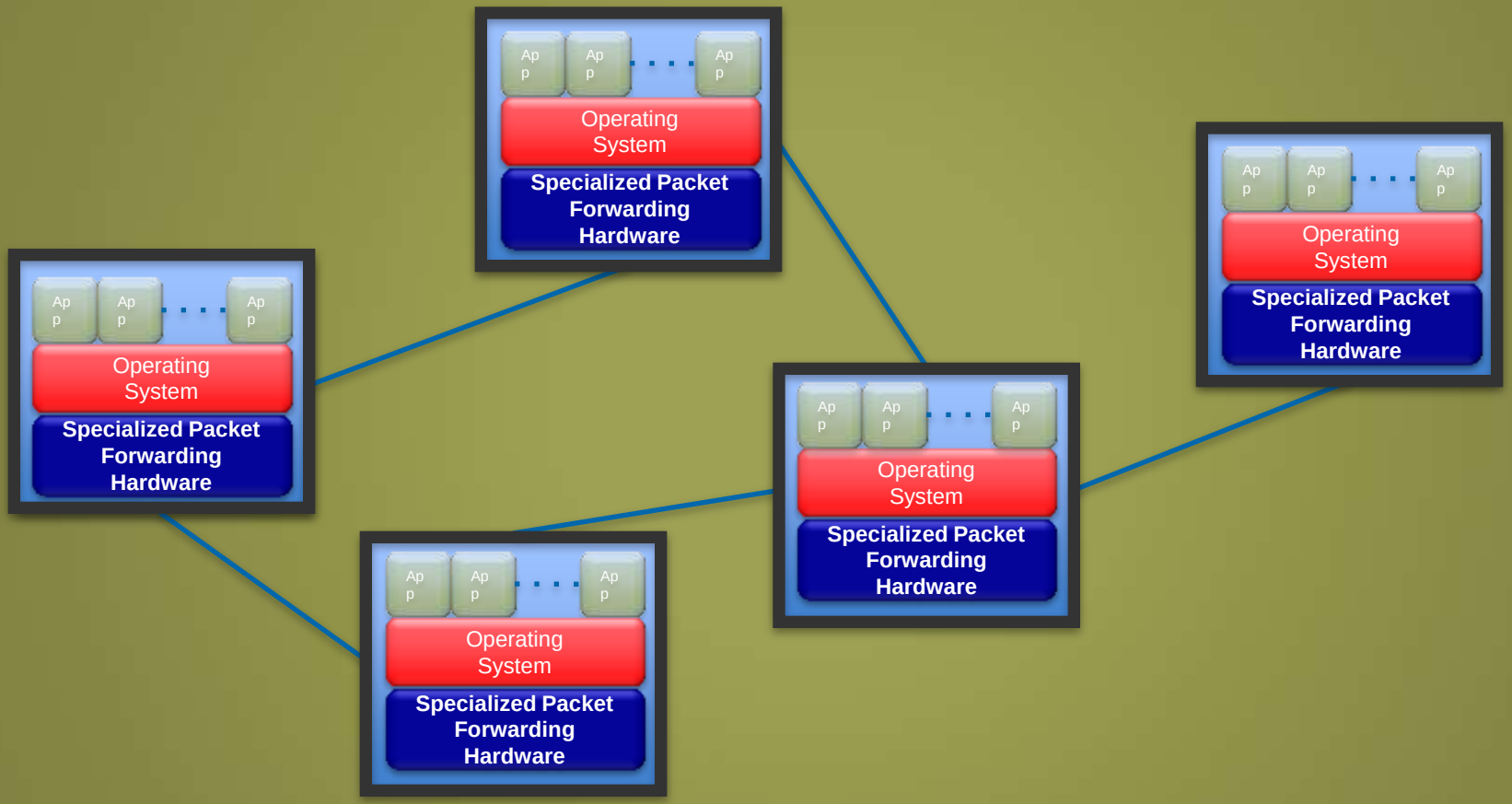
Openflow y SDN

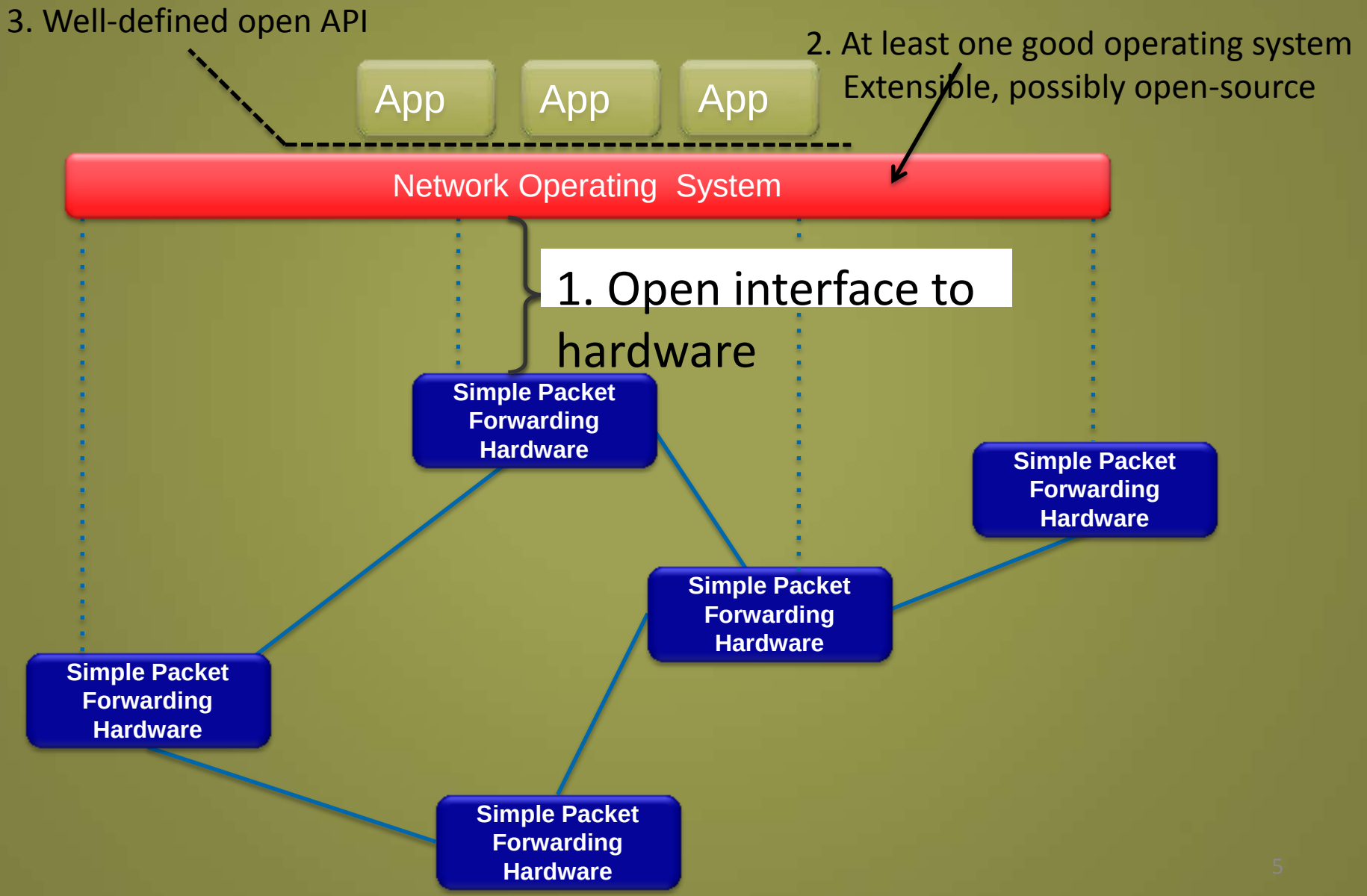
ARQUITECTURA SDN

En la actualidad:Cajas cerradas y Protocolos distribuidos



Un Acercamiento a “Software Defined Networking”

El Concepto “Software-defined Network”

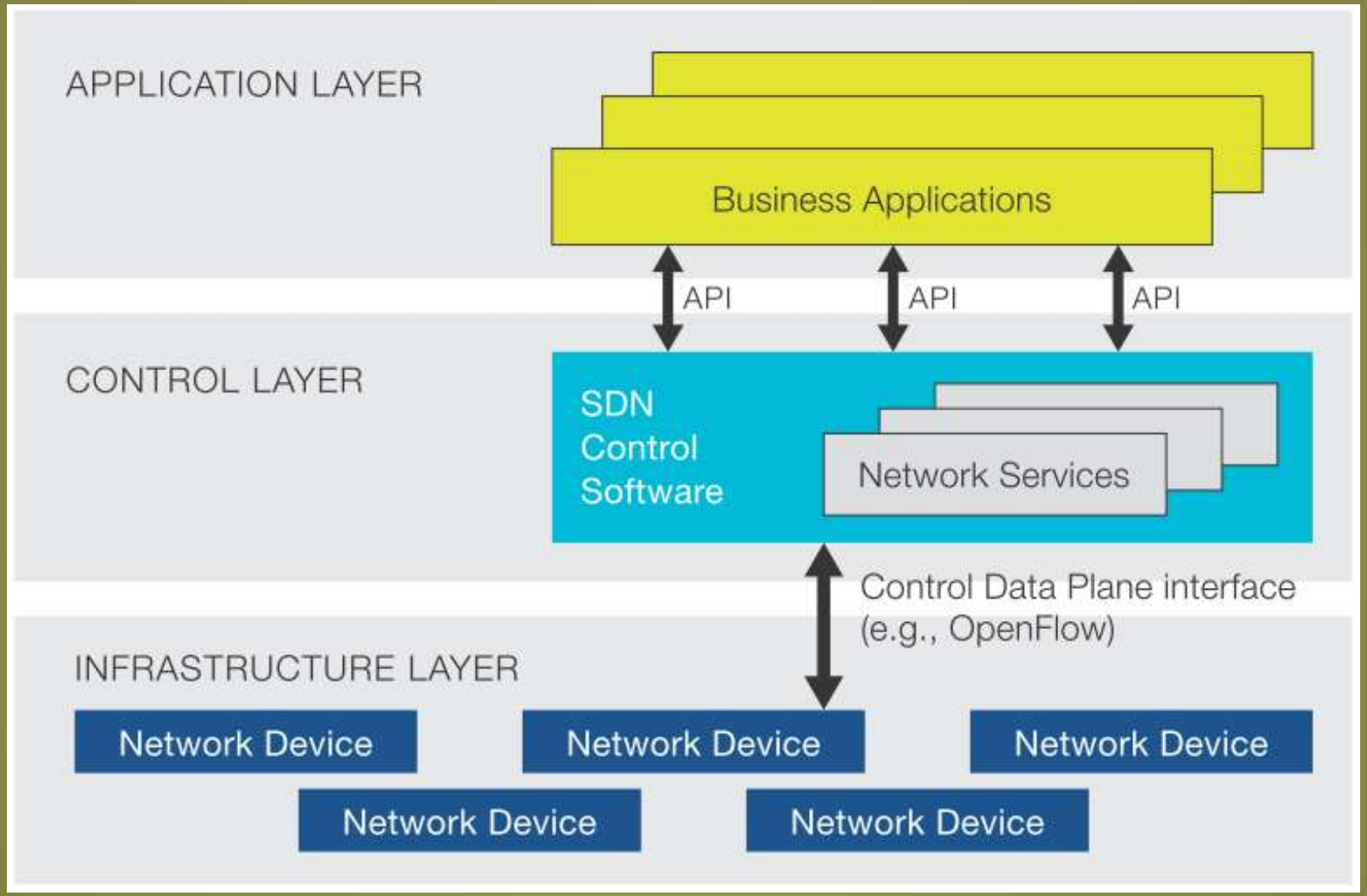


Software Defined Networking (SDN)

- Los principales objetivos de SDN
  - Abstraer los elementos de la Red desde las Aplicaciones.
  - Control y Gestión centralizadad de los dispositivos de red de diferentes fabricantes.
  - Tener una Red abierta que permita ser programable y crear servicios de forma sencilla.
  - SDN es una arquitectura que divide el plano de conmutación y permite que sea programable de una forma directa.

LAS REDES ABIERTAS ADOPTARAN MAYORES INNOVACIONES.

Arquitectura SDN



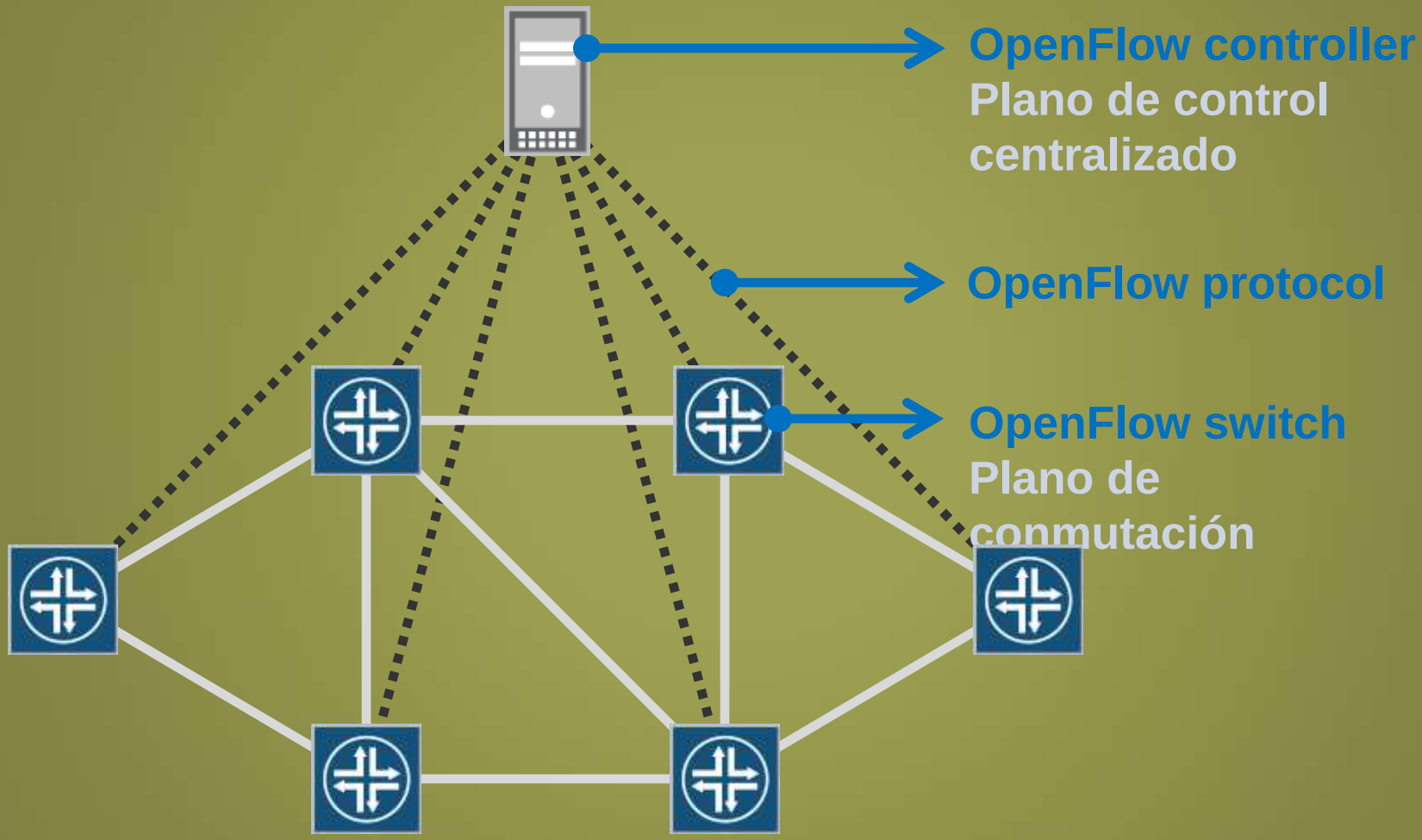
Introducción a Openflow

Aproximación a openflow

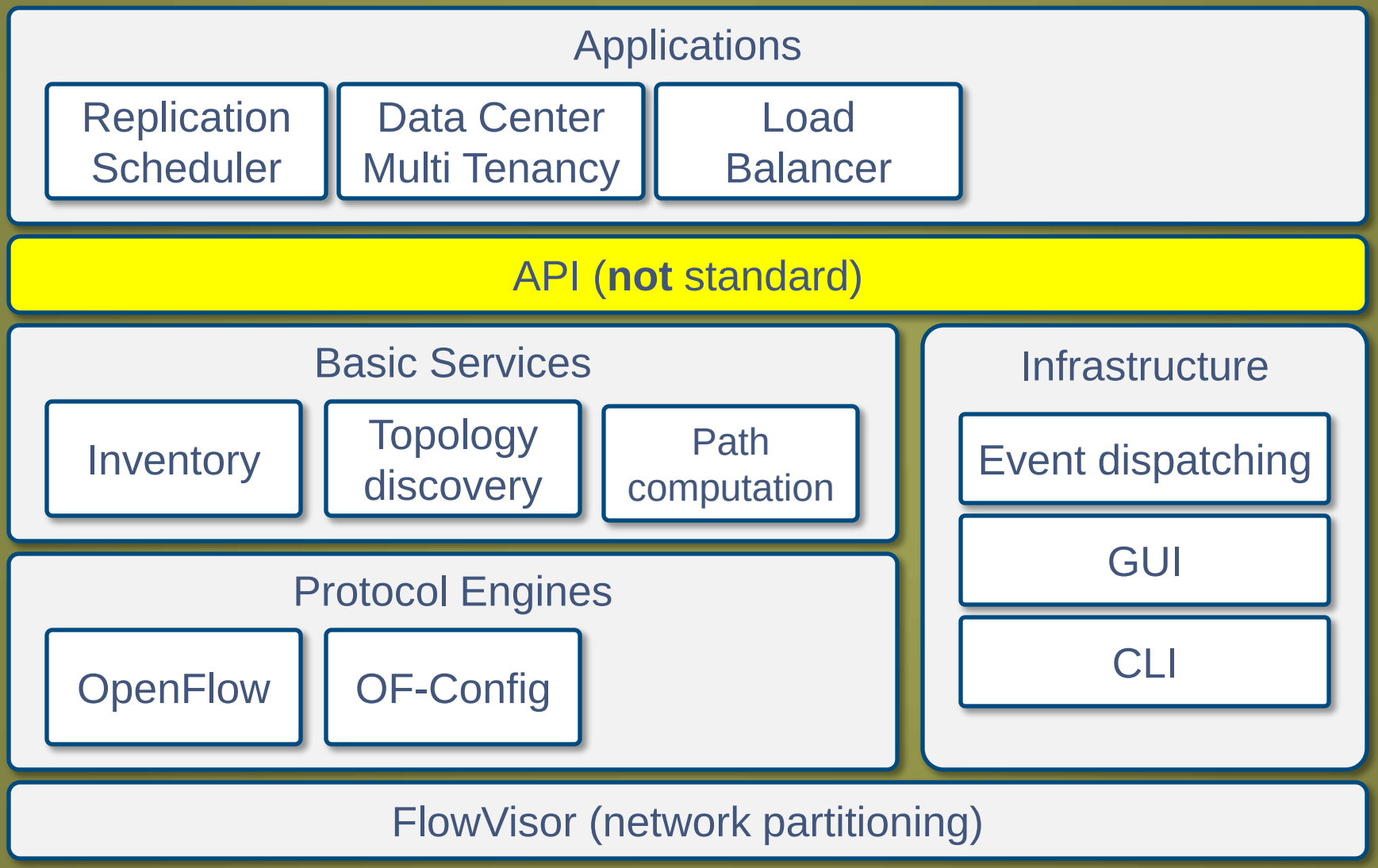
- **Plano de Control separado del plano de conmutación**
- **Plano de Control Centralizado.**
  - OpenFlow controller(La plataforma).
  - Lógicamente centralizada y fisicamente distribuida.

- **Plano de conmutación distribuido.**
  - OpenFlow switches (Pueden ser routers,firewalls).
  - No es necesario tener protocolos de routing .
  - Software (kernel, hypervisor, userspace),
  - Hardware (merchant silicon, ASICs, OpenFlow optimized ASICs)
- **OpenFlow es el protocolo entre el plano de control y de conmutación.**

Plano de Control centralizado y conmutación distribuido.

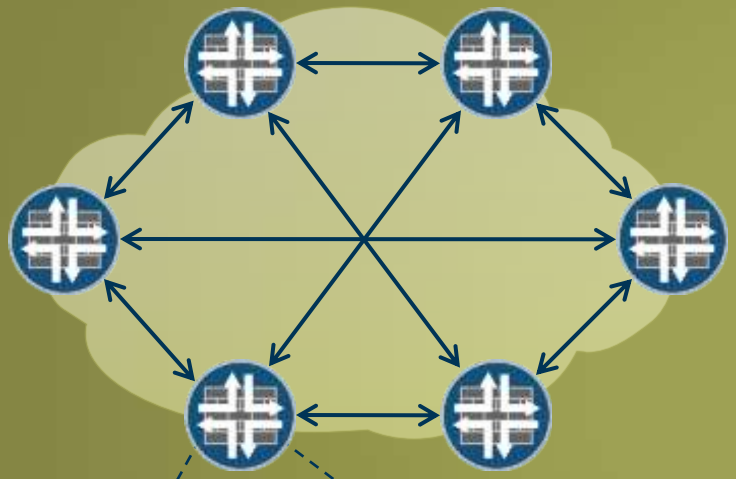


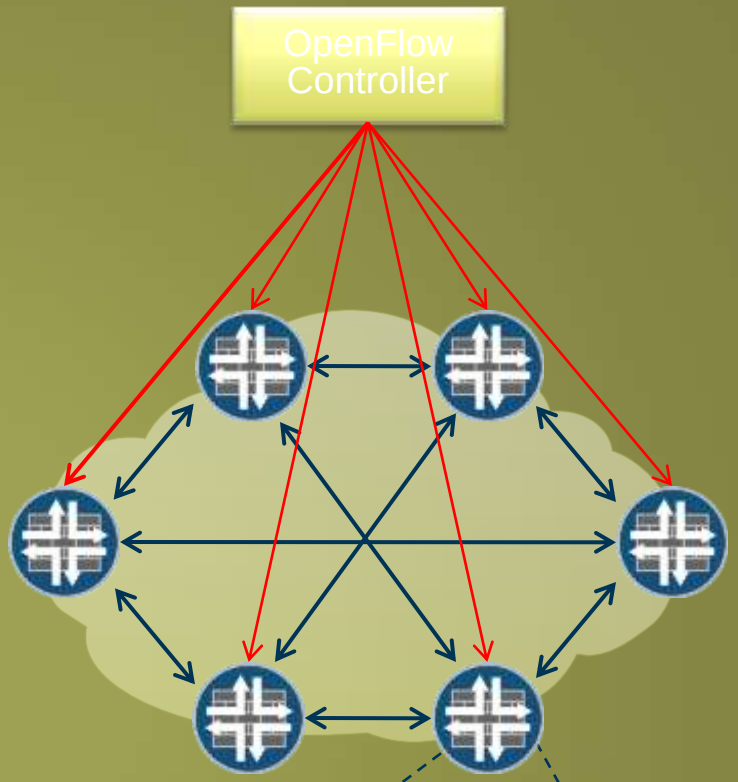
Arquitectura de un openflow controller

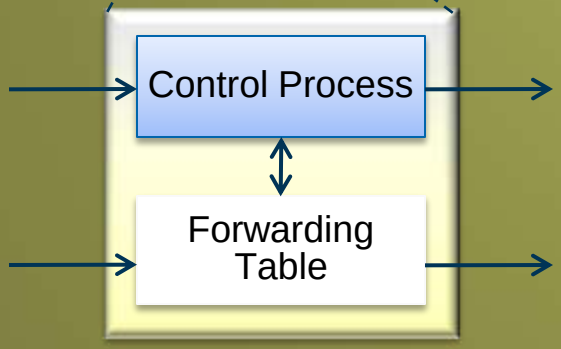


EVOLUCION A OFN

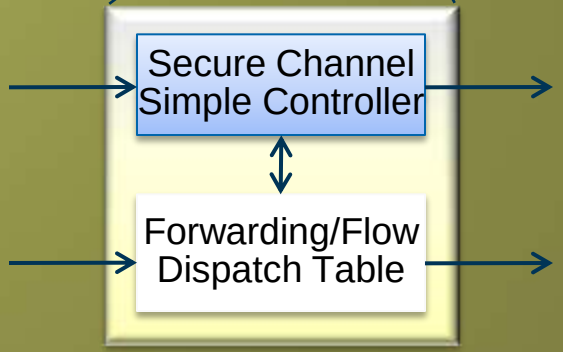
Distributed control plane







Traditional Router/Switch



OpenFlow Router/Switch

Ejemplo de OpenFlow

Controller

Software Layer

OpenFlow Client

Hardware Layer

Flow Table

MAC src	MAC dst	IP Src	IP Dst	TCP sport	TCP dport	Action
*	*	*	5.6.7.8	*	*	port 1

port 1 port 2 port 3 port 4

5.6.7.8

1.2.3.4

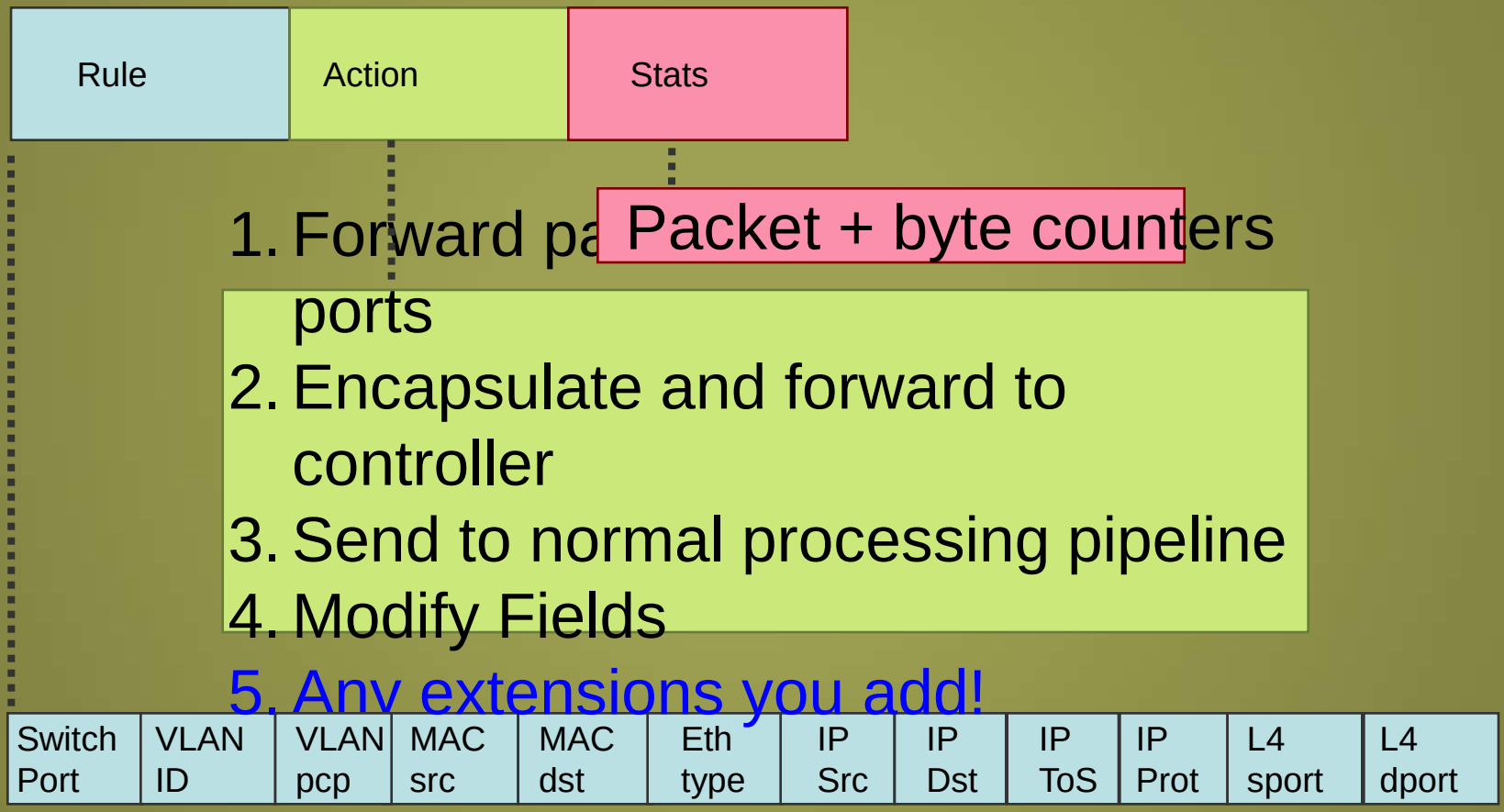
TIPOS DE MENSAJES

Tres tipos de mensajes y cada mensaje con múltiples subtipos.:, controller-to-switch, asynchronous y symmetric.

- Controller-to-switch messages are initiated by the controller and used to directly manage or inspect the state of the switch.
  - Features (query capabilities), modify-state(add/delete/modify flow/group entry), read-state, packet-out
- Asynchronous messages are initiated by the switch and used to update the controller of network events and changes to the switch state.
  - Such as flow-removed, packet-in, port-status
- Symmetric messages are initiated by either the switch or the controller and sent without solicitation.
  - hello, echo (request/reply), experimenter

OpenFlow Basics

Flow Table Entries (1.0)



+ mask what fields to match

Examples (1/2)

Switching

Switch Port	MAC src	MAC dst	Eth type	VLAN ID	IP Src	IP Dst	IP Prot	TCP sport	TCP dport	Action
*	*	00:1f:..	*	*	*	*	*	*	*	port6

Flow Switching

Switch Port	MAC src	MAC dst	Eth type	VLAN ID	IP Src	IP Dst	IP Prot	TCP sport	TCP dport	Action
port3	00:20..	00:1f..	0800	vlan1	1.2.3.4	5.6.7.8	4	17264	80	port6

Firewall

Switch Port	MAC src	MAC dst	Eth type	VLAN ID	IP Src	IP Dst	IP Prot	TCP sport	TCP dport	Action
*	*	*	*	*	*	*	*	*	22	drop

Examples (2/2)

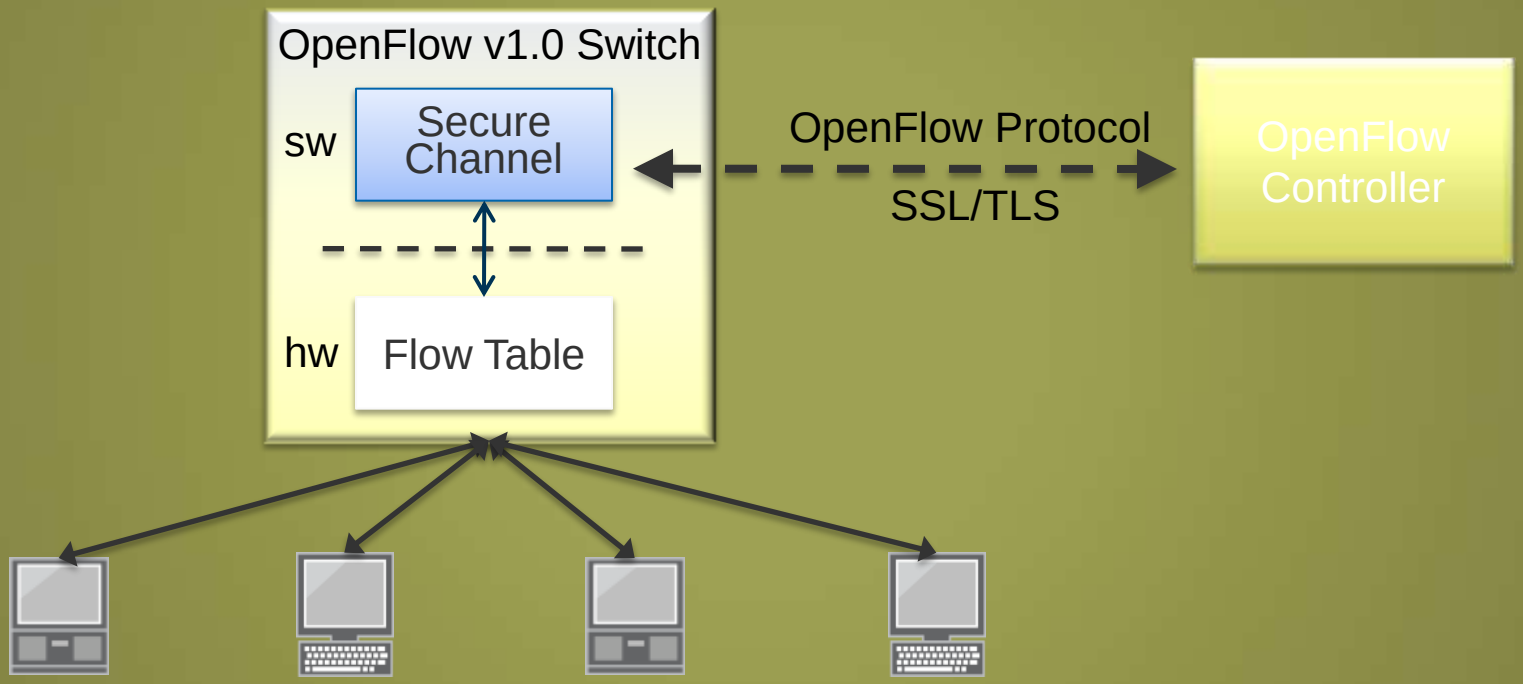
Routing

Switch Port	MAC src	MAC dst	Eth type	VLAN ID	IP Src	IP Dst	IP Prot	TCP sport	TCP dport	Action
*	*	*	*	*	*	5.6.7.8	*	*	*	port6

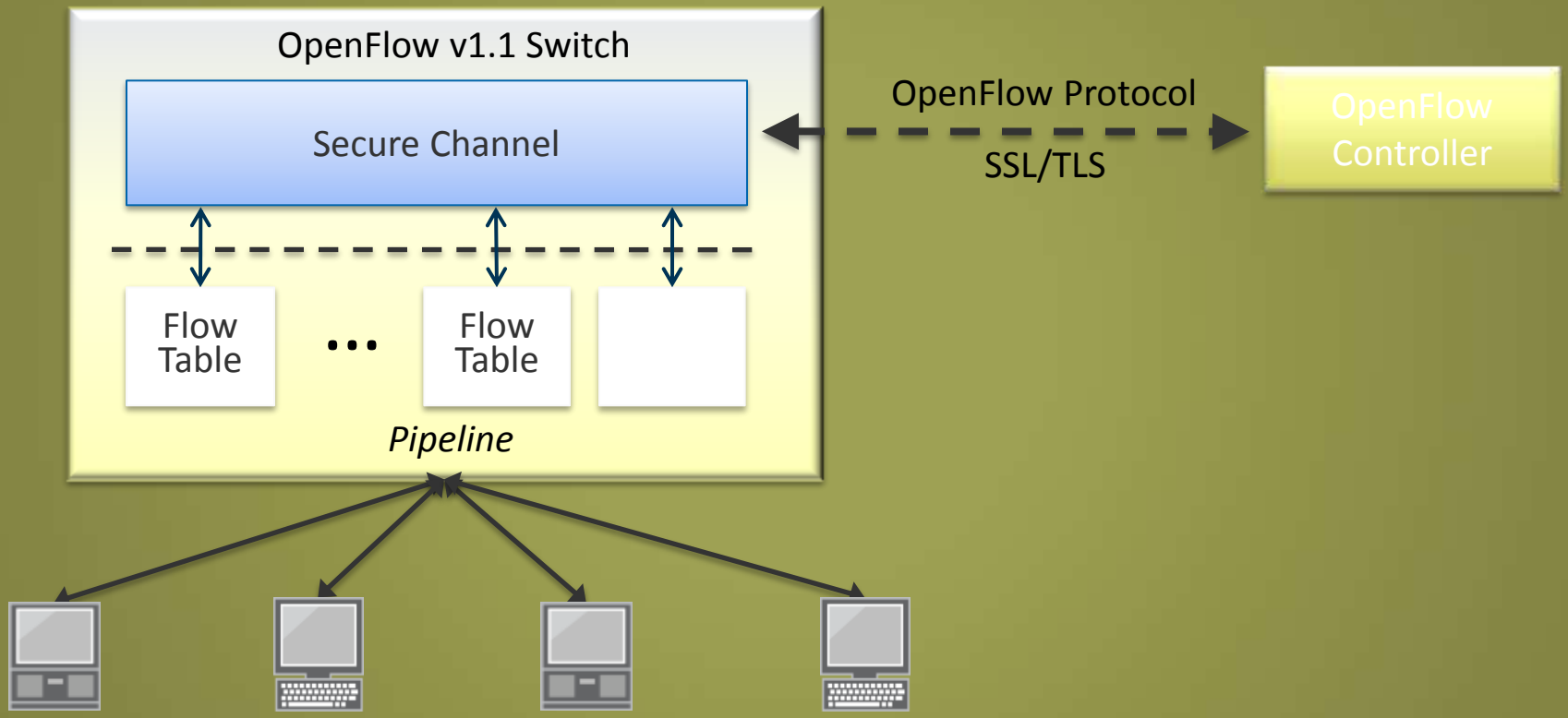
VLAN Switching

Switch Port	MAC src	MAC dst	Eth type	VLAN ID	IP Src	IP Dst	IP Prot	TCP sport	TCP dport	Action
*	*	00:1f..	*	vlan1	*	*	*	*	*	port6, port7, port9

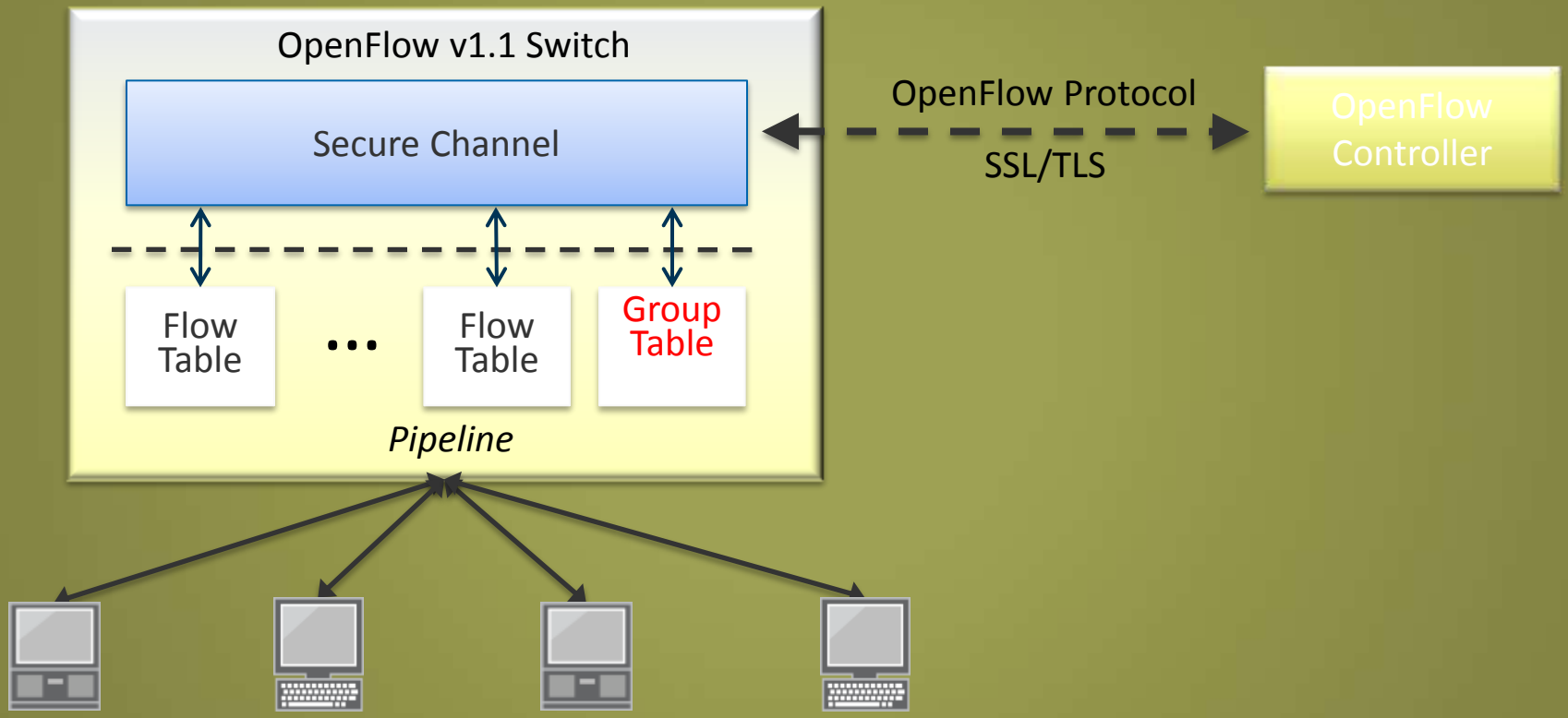
OpenFlow v1.0 Switch



OpenFlow v1.1 Switch

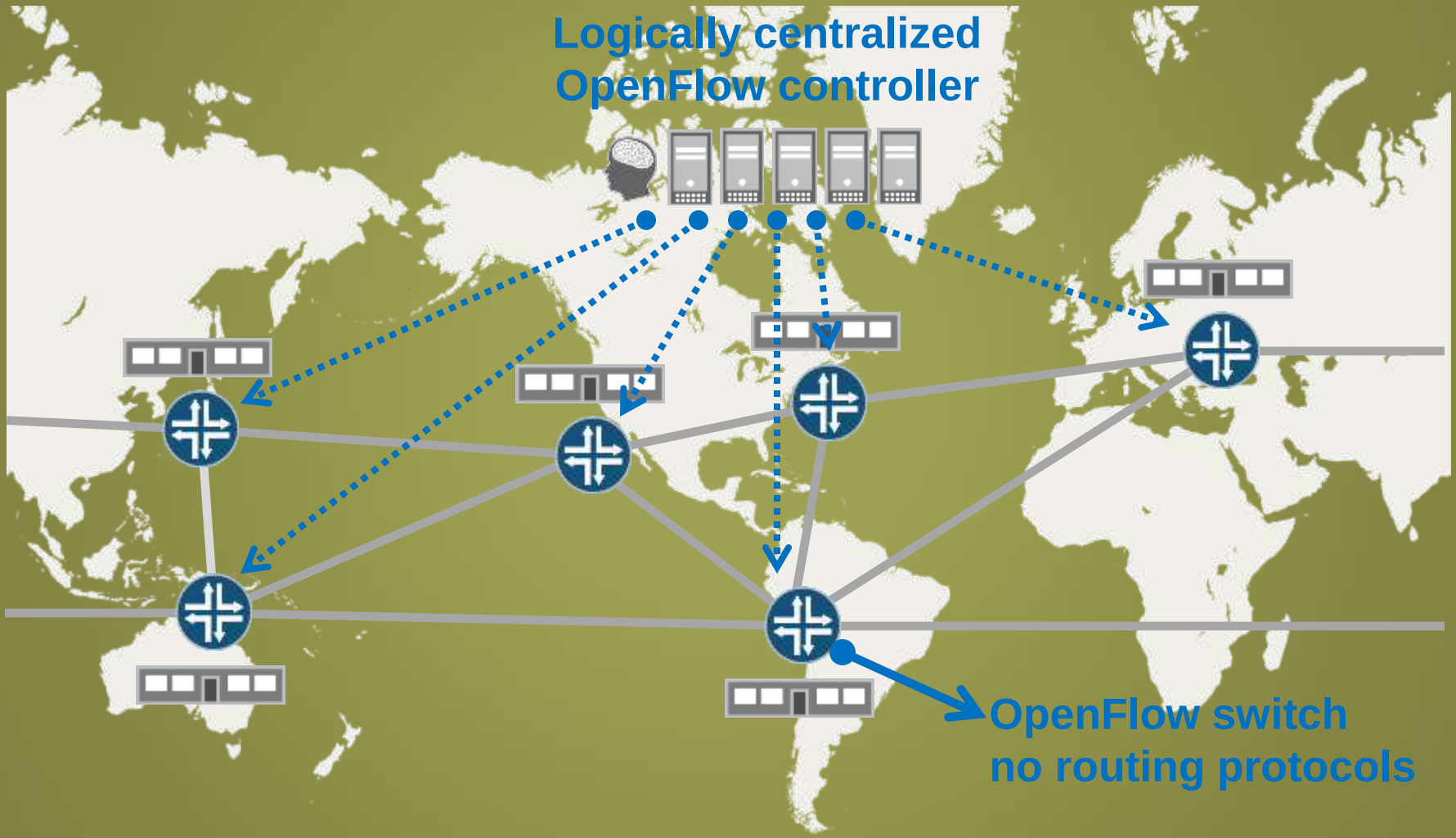


OpenFlow v1.1 Switch



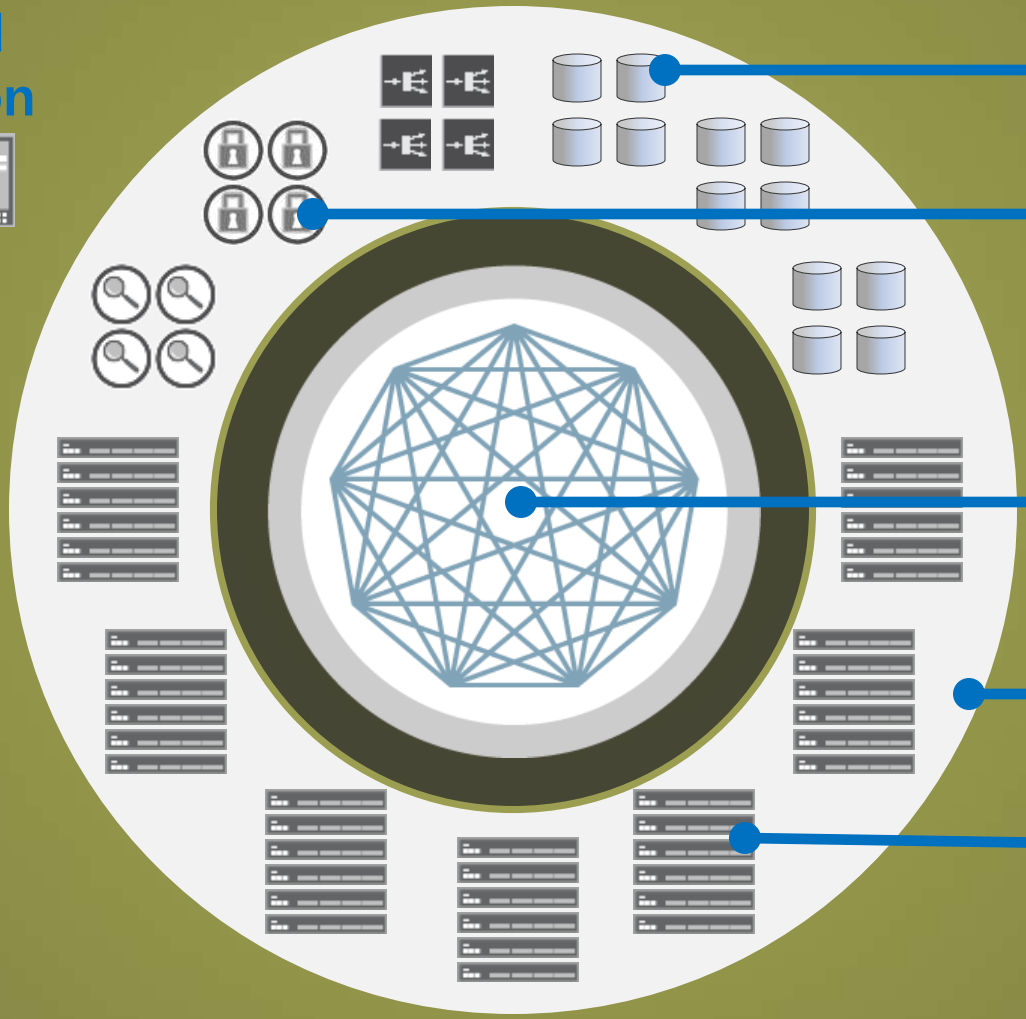
CASOS PRACTICOS

Data center interconnect wan
Openflow instead of routing protocols



Data center con Arquitectura de SDN

Centralized Orchestration



Virtualized storage

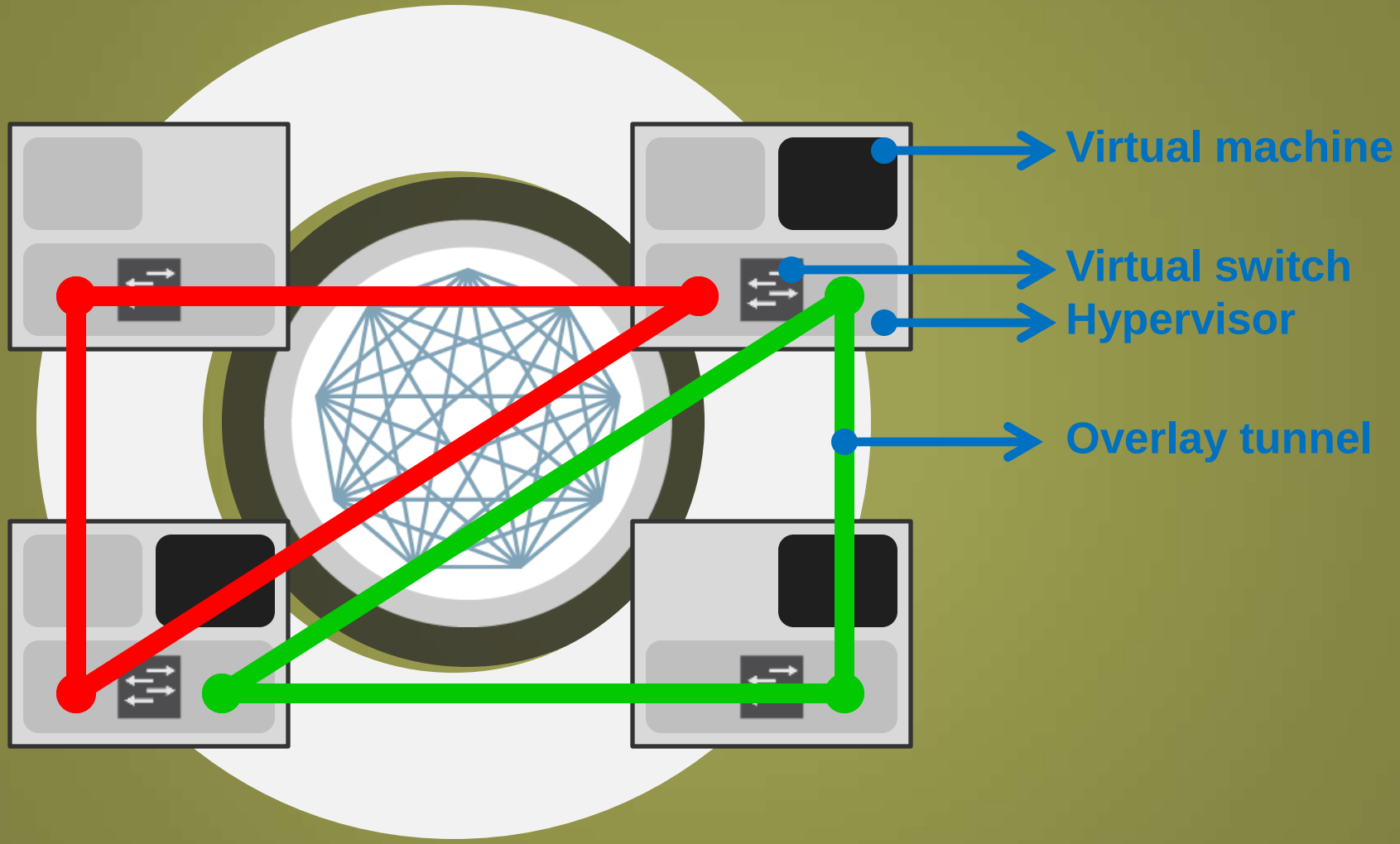
Virtualized services

Physical IP Fabric

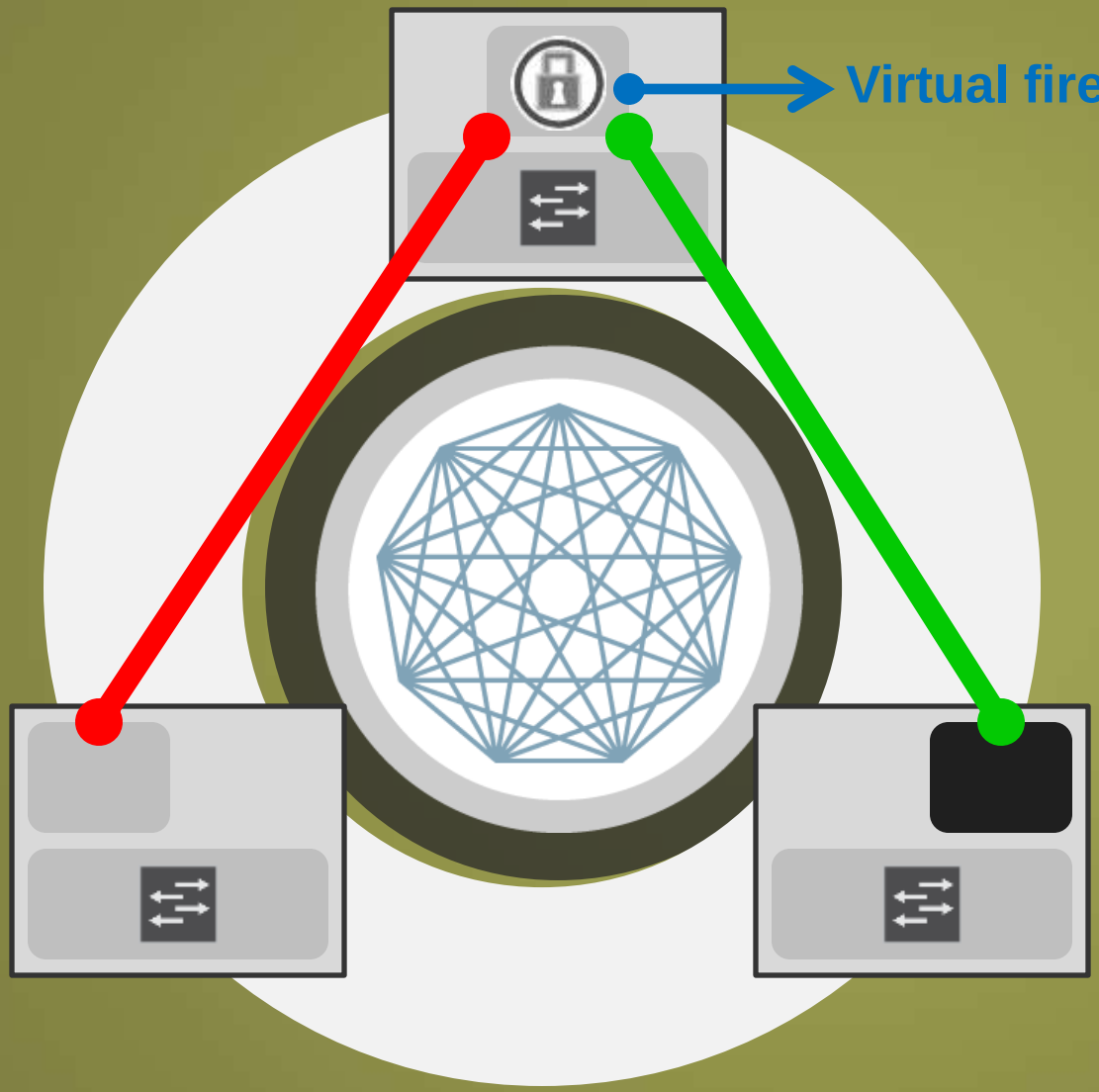
Virtualized Network

Virtualized Compute

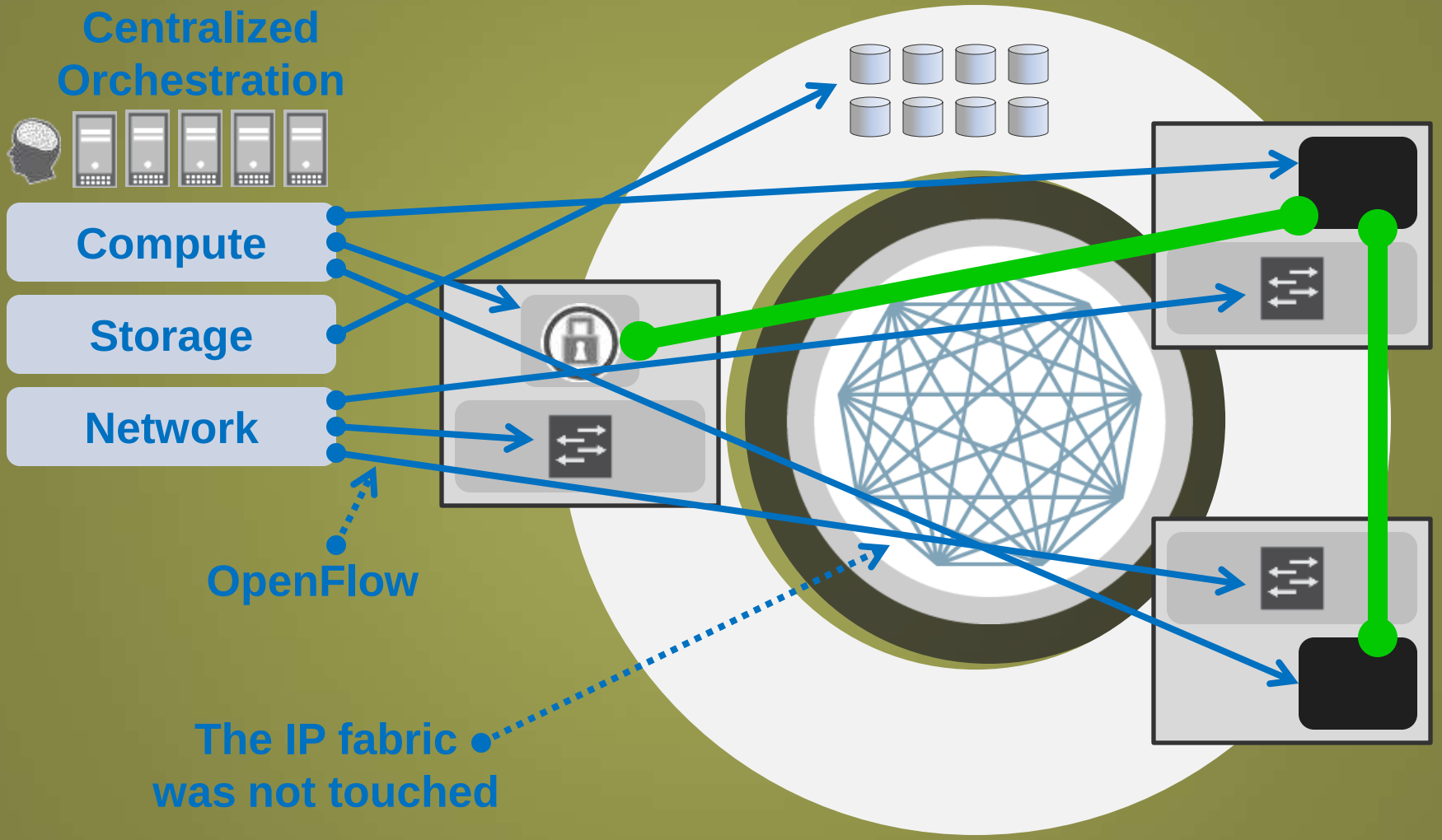
Multi-tenancy using overlay networks



Virtualized services



centralized orchestration
OF compute, storage, and network



Posicionamiento de SDN