Cisco SDN Strategy And Cisco ONE Services

Szabó Gábor
mérnök-tanácsadó
gabszabo@cisco.com

Cisco Magyarország

Agenda

- What is the problem and why is everyone excited about SDN?
- Understand the difference
  - Virtual Networking
  - Network Functions Virtualization
  - Software Defined Networking
- What is SDN and OpenFlow for that matter?
- What is Cisco One and onePK?
- Open discussion

What's the problem?

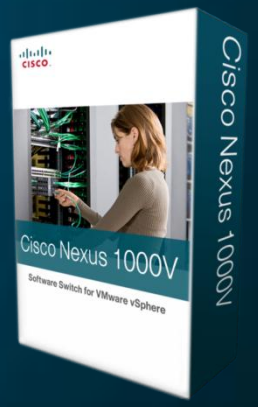
- The network has become the perceived barrier to cloud. It has become operationally burdensome for our customers which leads to increased adoption of public clouds.
- Mastering the complexity created a job market (i.e. CCIE). The complexity is reaching a tipping point for customers wanting an alternative.
- The network does not lend it self to programmatic control in the way that compute has. Customers want the network to be viewed as a pooled resource and provisioned, maintained & de-provisioned as such.
- Traditional networking-centric solutions are increasingly difficult for customers to adopt & implement.
- We (traditional networking vendors) have focused on making our customers horses faster instead of building a car.
- Software companies can innovate at a much more rapid rate than HW vendors

What is NOT

Software Defined Networking

Virtual Networking

- Use case: Server / Desktop Virtualization
- Networking for the Virtual Machines
- Virtual (software) Ethernet switch embedded in Hypervisor
- Originally software component of the hypervisor vendor
- Today: 3rd-party Virtual switches
- Cisco implementation: Nexus 1000V / Nexus 5500 VM-FEX
- Nexus 1000V for:
  - Vmware vSphere
  - Microsoft Hyper-V
  - Linux KVM, XEN



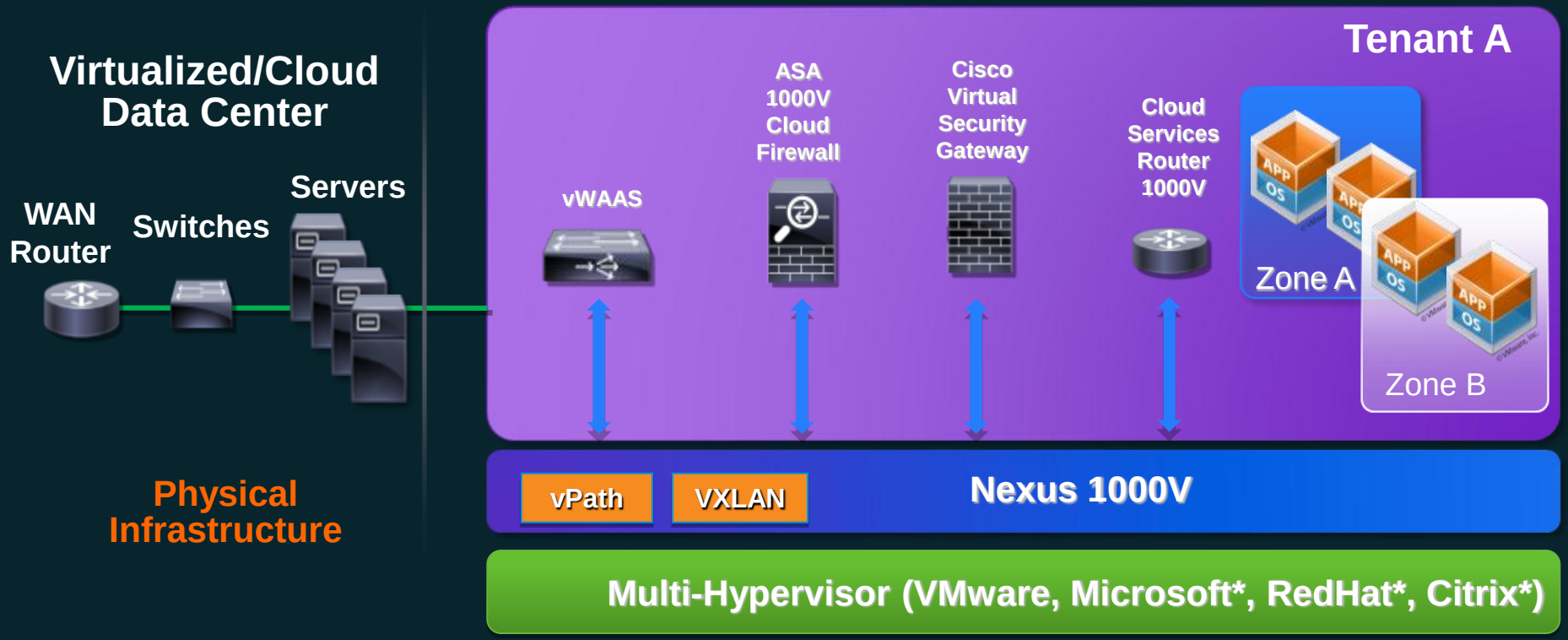
Network Functions Virtualization

- Virtualizing networking hardware appliances
- Consolidate many network equipment types onto industry standard high volume servers, switches and storage
- Networking and Service functions are in Virtual Machines
- Firewalls, load balancers, WAN optimizers, PE routers, BRAS routers, CPEs, Set-Top-Boxes…
- Benefits:
  - Reduced equipment costs / power consumption
  - Increased speed of Time-To-Market
  - Elastic capacities: scale down / scale up based on demand
  - Open virtual appliance market -> new entrants, competition, innovation
- Complimentary to SDN

Network Functions Virtualization
Challenges

- Portable virtual networking appliances with high performance
- Co-existence with hardware-based appliances
- Proliferation of the Virtual Appliances -> increasing operation complexity
- Resilience to hardware and software failures
- Requires automation and orchestration
- Multi-vendor integration complexities
  - Virtual Appliances
  - Hipervisors
  - Servers, storage

Network Functions Virtualization
Cisco Implementation

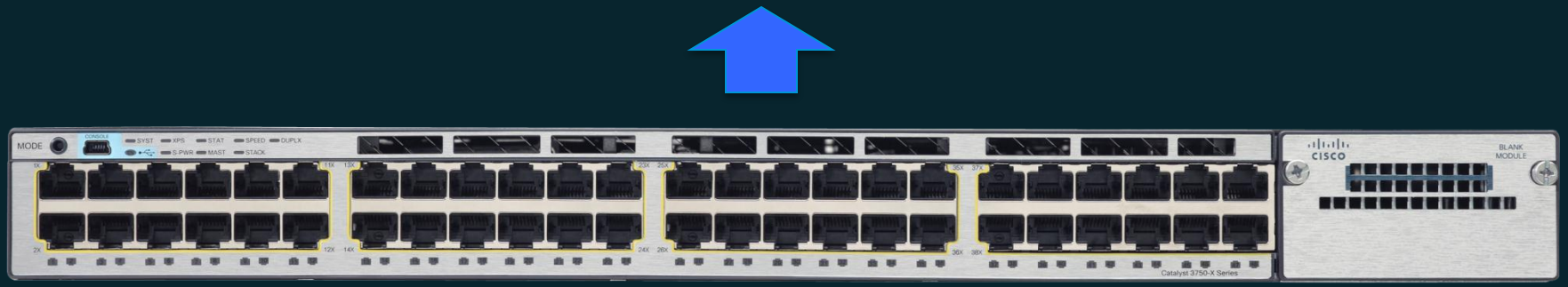


Nexus 1000V	VSG	ASA 1000V	vWAAS	CSR 1000V (Cloud Router)
• Distributed switch • NX-OS consistency	• VM-level controls • Zone-based FW	• Edge firewall, VPN • Protocol Inspection	• WAN optimization • Application traffic	• WAN L3 gateway • Routing and VPN

Software Defined Networking

Processes performed in software by the Switch CPU

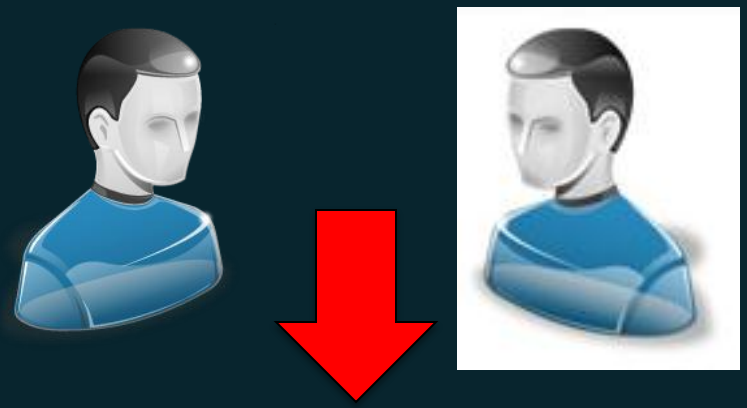
Control Plane



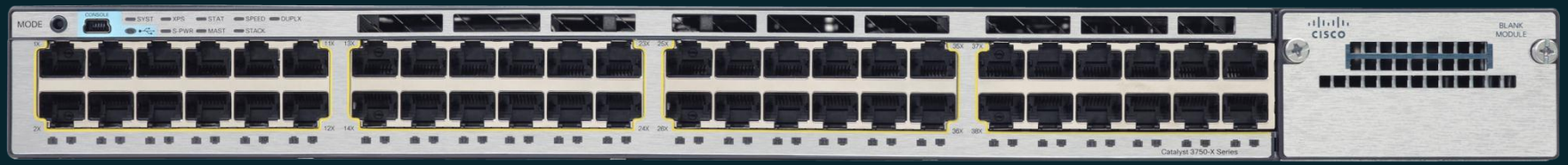
Data Plane

Processes performed in hardware by dedicated Switch ASIC's

Software Defined Networking (SDN) is a network design concept in which the network control plane is centrally accessible through an API to administrators or users of the network…

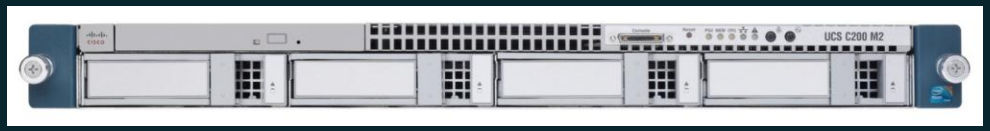


CONTROL PLANE API



In one instance of SDN, the network control plane hardware can be physically decoupled from the data forwarding plane hardware…

Openflow is a communications protocol that gives access to the forwarding plane of a network switch or router over the network.…



Openflow Controller

Openflow Protocol

Openflow Switch

OpenFlow 1.1 basics

- Flow classification
  - Port + Ethernet + MPLS + IP + UDP/TCP parameters
- Required Actions
  - Forward packet to port(s)
  - Encapsulate and forward to controller
  - Drop packet
  - Send to normal processing pipeline
- Optional Actions
  - Set-Queue (egress queuing)
  - Push/pop (VLAN tag, MPLS label)
  - Set-Field (L2/L3/L4 header fields)
- Statistics
  - Packet and byte counters

Extend or Replace/Add?

- Extend the functionality of the existing embedded Control Plane?

- Replace or add Control Plane to a Hardware device?

Cisco Open Networking Environment

The Open Network Environment
Approaching a Definition

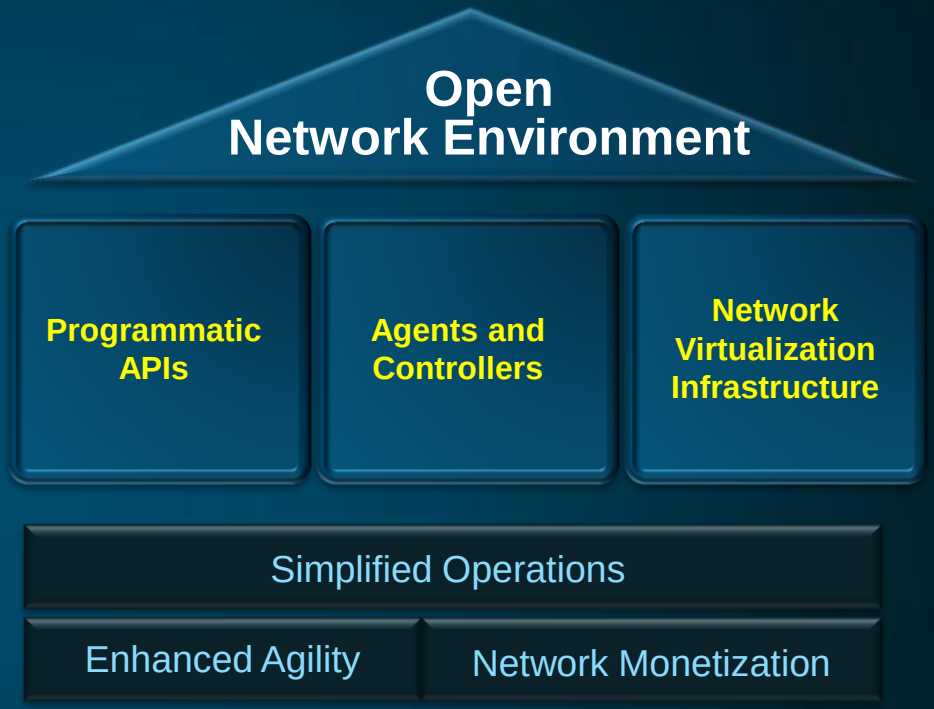
- Open Network Environment – Complementing the Intelligent Network

  Preserve what is working:
  Resiliency, Scale and Security, Comprehensive feature-set

  Evolve for Emerging Requirements:
  Operational Simplicity, Programmability, Application-awareness

- The Open Network Environment integrates with existing infrastructure

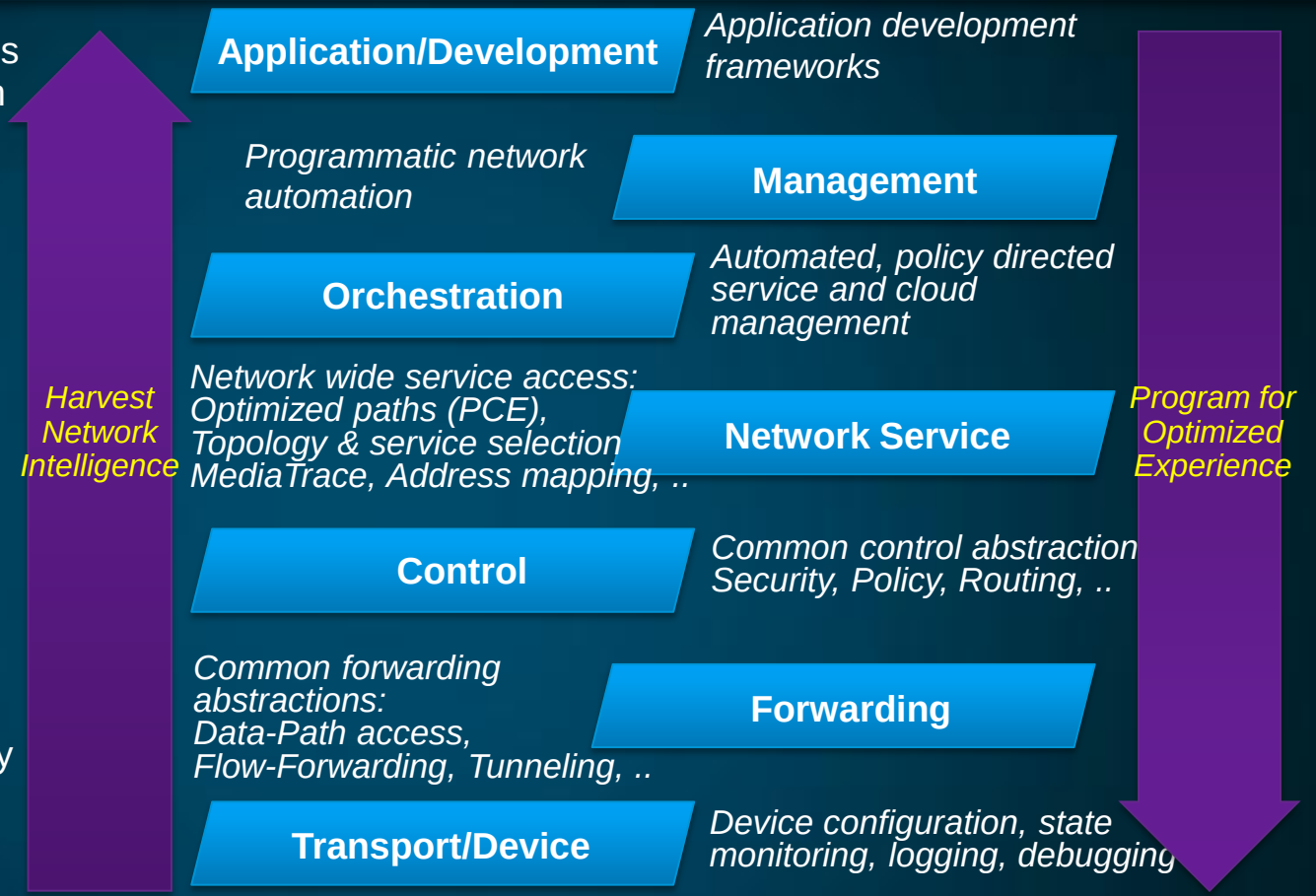
  Software Defined Network concepts are a component of the Open Network Environment



The OpenFlow protocol can be used to link agents and controllers, and as such is component of SDN as well

Programmatic Network Access
Multiple Layers and networking planes

- Enable API platform kit across all platforms, to integrate with development environments
- Accelerate development of network applications: Completely integrated stack from device to network
- Multiple deployment modes (local and remote APIs)
- Multiple Language Support (C, Java, …)
- Integrate with customer development environment to deliver enhanced functionality
- Reduced time to market by leveraging common platform for building services



Open Network Environment
Cisco Innovations Summary

onePK Developer Kit

- Complete developer's kit for multiple Cisco Platforms, Servers, Blades
- Rapidly develop test and deploy Applications.
- Phased availability across IOS, IOS-XR and NX-OS platforms

Programmatic APIs

Controllers + Agent Support

- Engage with universities & research for campus slicing use case
- OpenFlow experimental support on select Cisco platforms
- Controller SW for experimentation on production networks

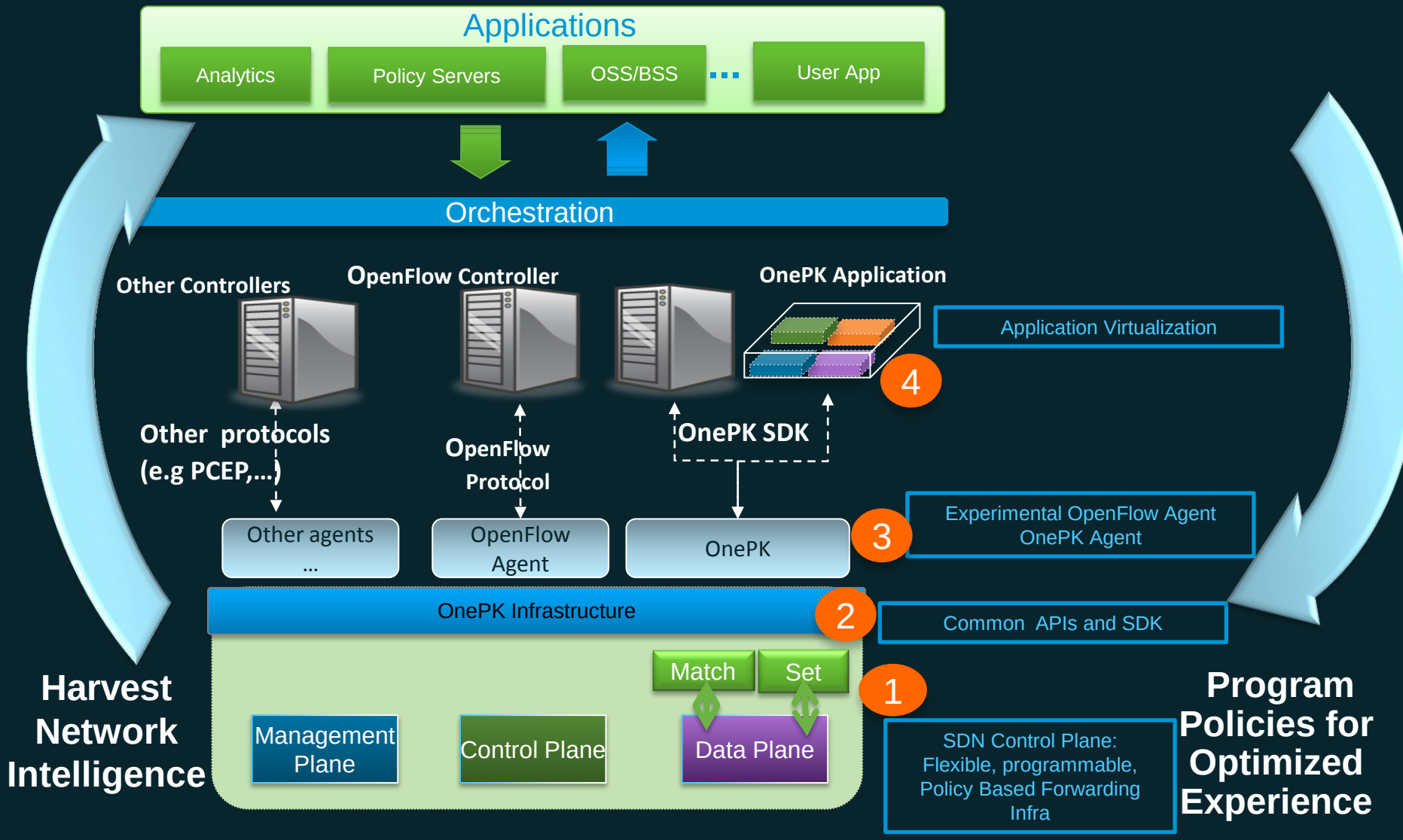
Controllers and Agents

Overlay Network Solutions

- Multi-hypervisor support on Nexus 1000V (incl. OpenSource hypervisor)
- OpenStack and REST APIs on N1KV for rapid tenant provisioning
- VXLAN-VLAN gateway (for bridging traditional environments)
- Virtual or Physical Network Services

Virtual Overlays

Cisco ONE Services and Strategy



Thank you.

Open Discussion