Cisco TechAdvantage Webinars

Unleash the Power of Your Network with One Platform Kit (onePK)
Comprehensive. Extensible. Any Platform.

John Voss, Product Line Manager, onePK

www.cisco.com/go/getyourbuildon

February 2013

We'll get started a few minutes past the top of the hour.

Note: you may not hear any audio until we get started.
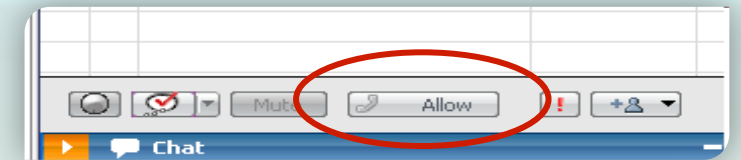
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Housekeeping

- Submit questions in Q&A panel and send to "All Panelists"
  Avoid CHAT window for better access to panelists

- For Webex audio, select COMMUNICATE > Join Audio Broadcast

- For Webex call back, click ALLOW phone button
  at the bottom of participants side panel

- Where can I get the presentation?
  Or send email to: ask_techadvantage@cisco.com

- Please complete the post-event survey

- Join us March 6th for our next TechAdvantage Webinar:
  Advanced Multicast Resiliency
  www.cisco.com/go/iosadvantage

Speaker & Panelists Introduction

Speaker

John Voss
Product Line Manager
One Platform Kit (onePK)
jovoss@cisco.com

Panelists

David Lin
Product Manager
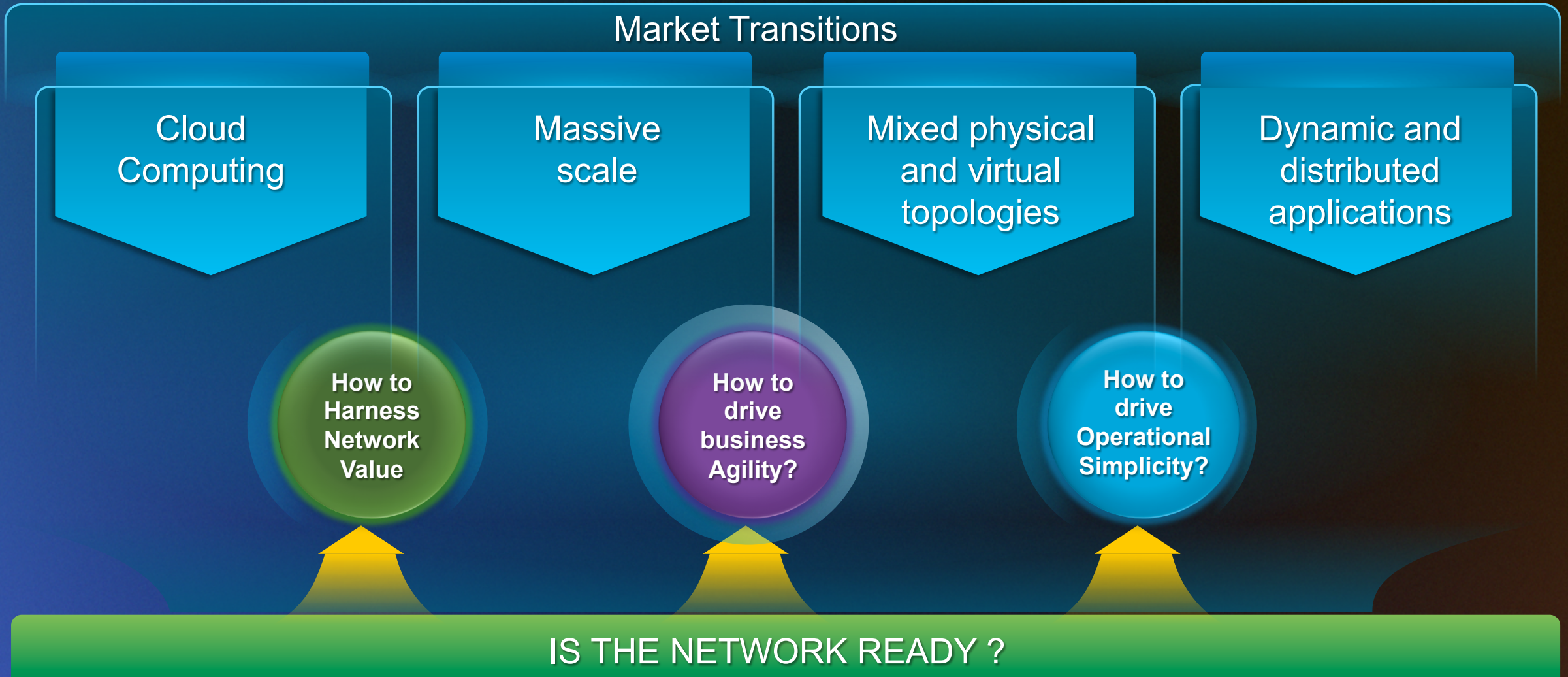One Platform Kit (onePK)
dalin@cisco.com

Shelly Cadora
Technical Marketing Engineer
NOSTG Technical Marketing
scadora@cisco.com

Agenda

- Network Programmability and Software Defined Networking Trends

- Cisco One Platform Kit (onePK) Overview

- onePK Examples and Use Cases

- Summary and Q&A

Market Transitions Driving Greater Demands on the Network

Market Transitions

Cloud Computing	Massive scale	Mixed physical and virtual topologies	Dynamic and distributed applications

How to Harness Network Value

How to drive business Agility?

How to drive Operational Simplicity?

IS THE NETWORK READY ?

Customer Insights

| Research/Academia	Massively Scalable Data Center	Cloud	Service Providers	Enterprise
▪ Experimental OpenFlow/SDN components for production networks	▪ Customize with Programmatic APIs to provide deep insight into network traffic	▪ Automated provisioning and programmable overlay	▪ Policy-based control and analytics to optimize and monetize service delivery	▪ Virtualization of workloads, VDI, Orchestration of security profiles
➢ **Network "Slicing"**	➢ **Network flow management**	➢ **Scalable Multi-tenancy"**	➢ **Agile service delivery**	➢ **Private Cloud Automation**

Diverse Functionality Required Across Segments

Programmability at multiple layers of the network
Flexibility in deriving abstractions

Application Developer Environment

Management and Orchestration

Analysis and Monitoring, Performance and Security

Network Services

Control Plane

Forwarding Plane

Network Elements and Abstraction

Transport

Harvest Network Intelligence

Program for Optimized Experience

Cisco Approach

OpenFlow/ SDN
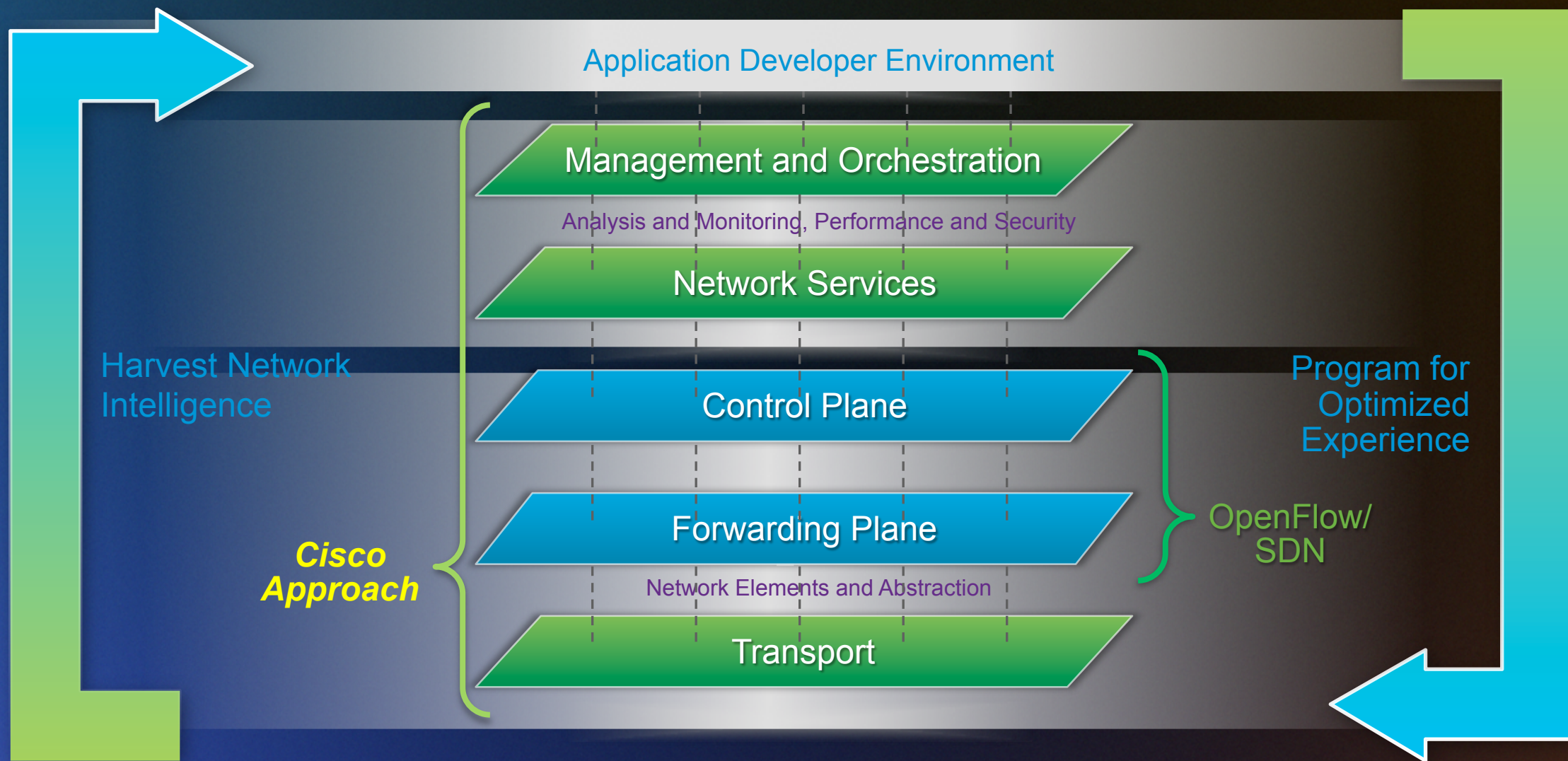
Cisco's Approach Enables Programmability…
+ Provides Hooks to Harvest Network Intelligence, To Inform Policy

POLICY

Orchestration

ANALYTICS

Programmability

Intelligence

Program for Optimized Experience

Harvest Network Intelligence

Network

8
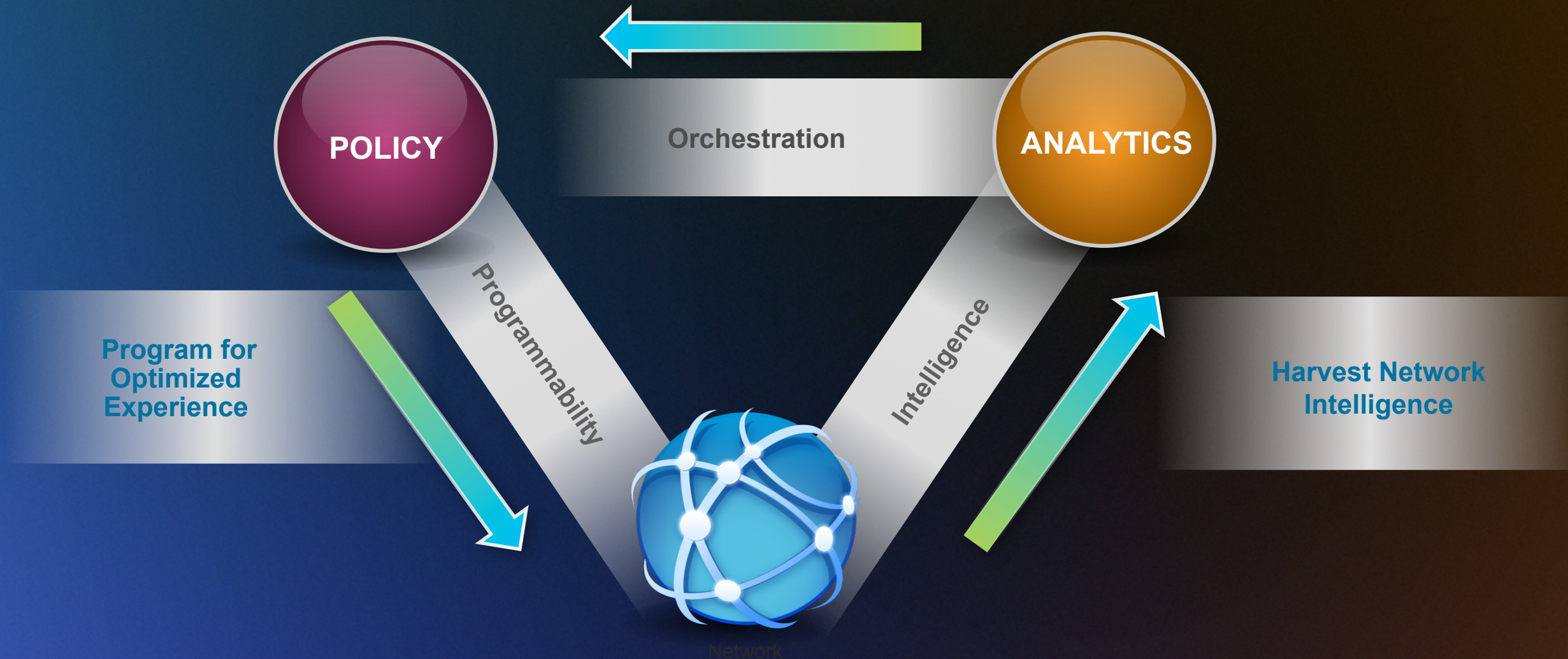
Evolution of the Intelligent Network

Preserve What's Working

- Resiliency
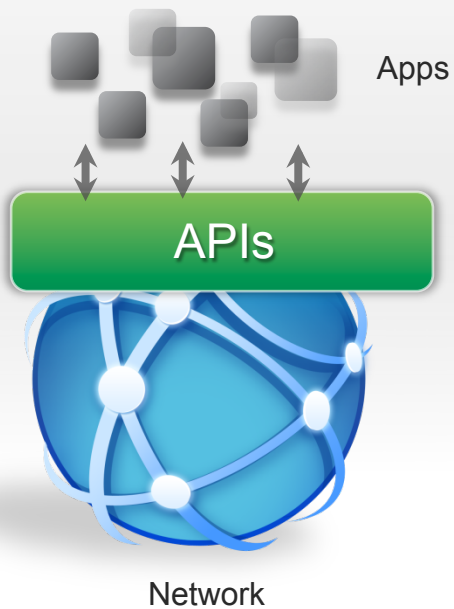- Scale and Security
- Rich feature-set

Evolve for Emerging Requirements

- Operational Simplicity
- Programmability
- Application aware

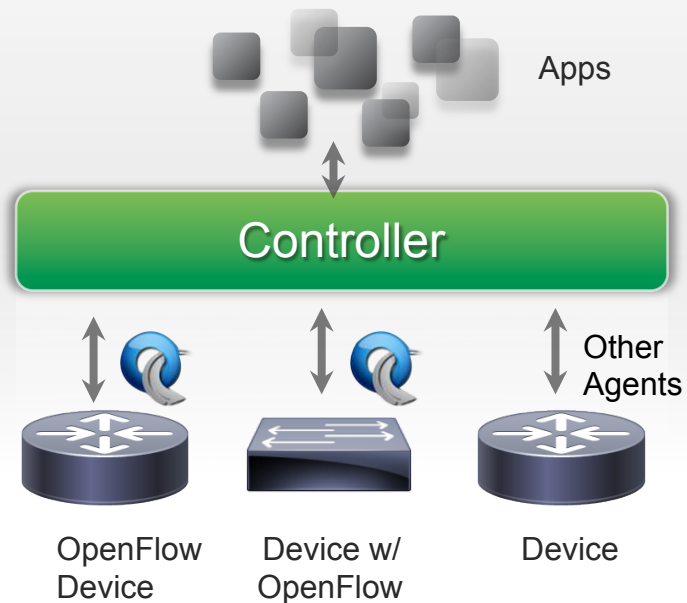**Evolve the Network for the Next Wave of Application Requirements**
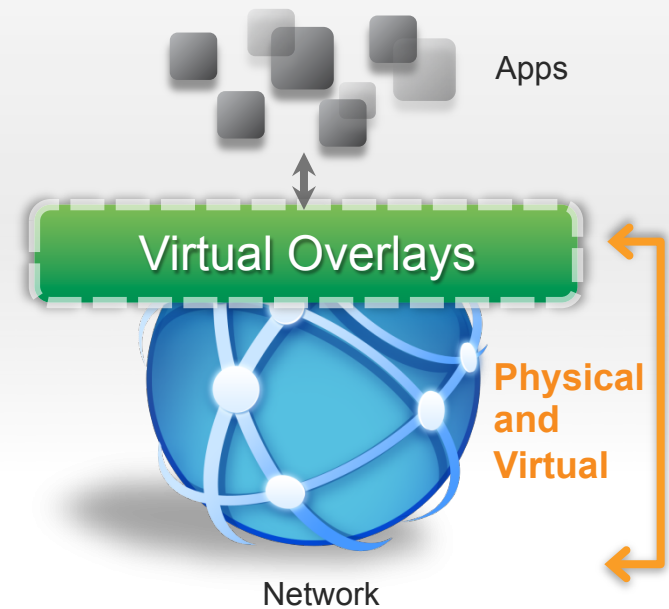
Evolution Demands Flexibility

Approach 1

Apps

APIs

Network

Tightly-coupled HW & SW

Approach 2

Apps

Controller

OpenFlow Device   Device w/ OpenFlow   Device

Other Agents

Loosely-coupled HW & SW

Approach 3

Apps

Virtual Overlays

Physical and Virtual

Network

Logical/overlay Networks

Cisco Approach: Flexibility to Choose—The Power of "AND"

Network Programmability Models
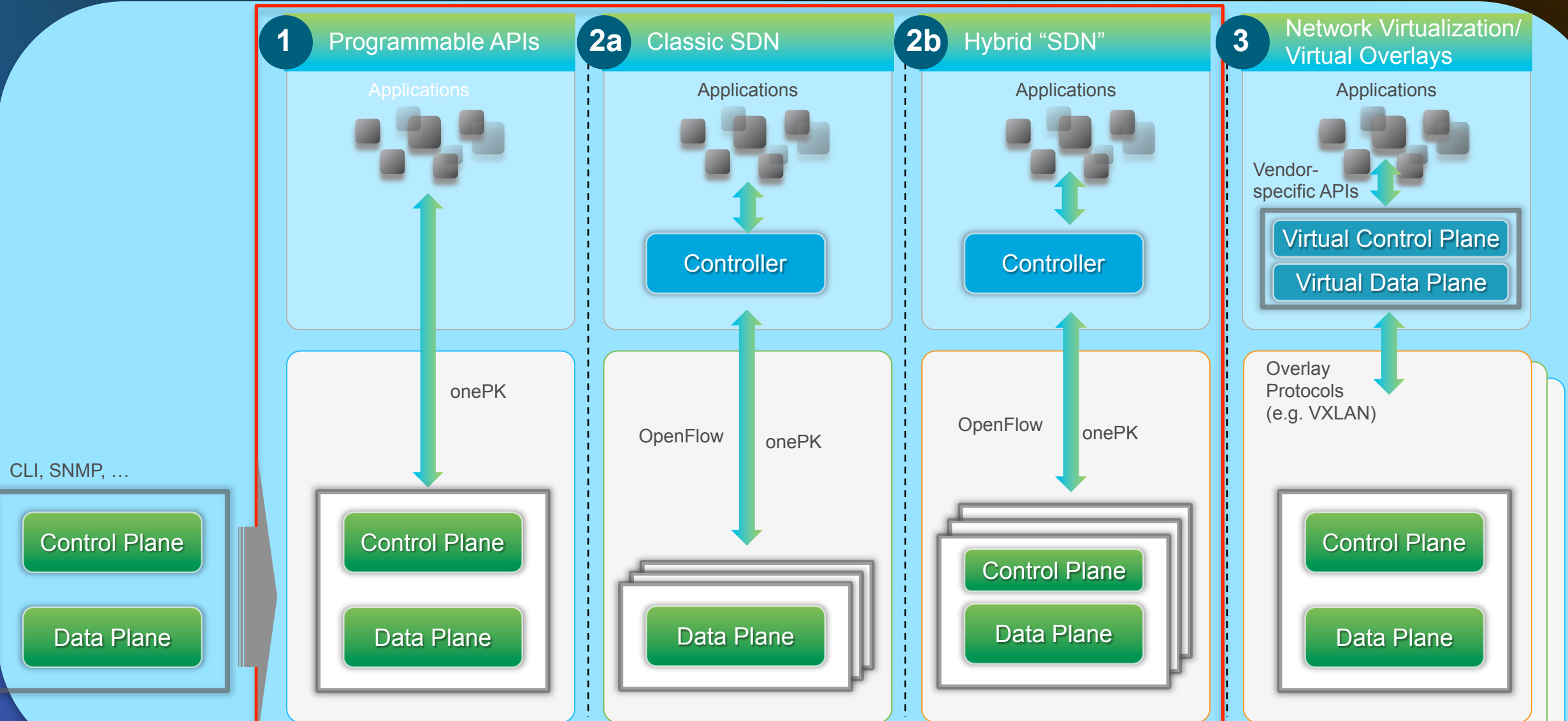
Cisco Innovations

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

Poll – Question 1

- Do you have plans to implement or evaluate SDN or Network Programmability in the next

a) 6 months?

b) 12 months?

c) 18 months?

d) No plans?

Introducing onePK: Get Your Build On.
(One Platform Kit)

BUILD, AUTOMATE, IMPROVE

SPEED & FASTER ADAPTABILITY

EXTEND TO NEW BUSINESS PLATFORMS

REVENUE & COST SAVINGS

SIMPLICITY, INTEGRATION & THE POWER OF CHOICE

C, JAVA, REST, Python Development

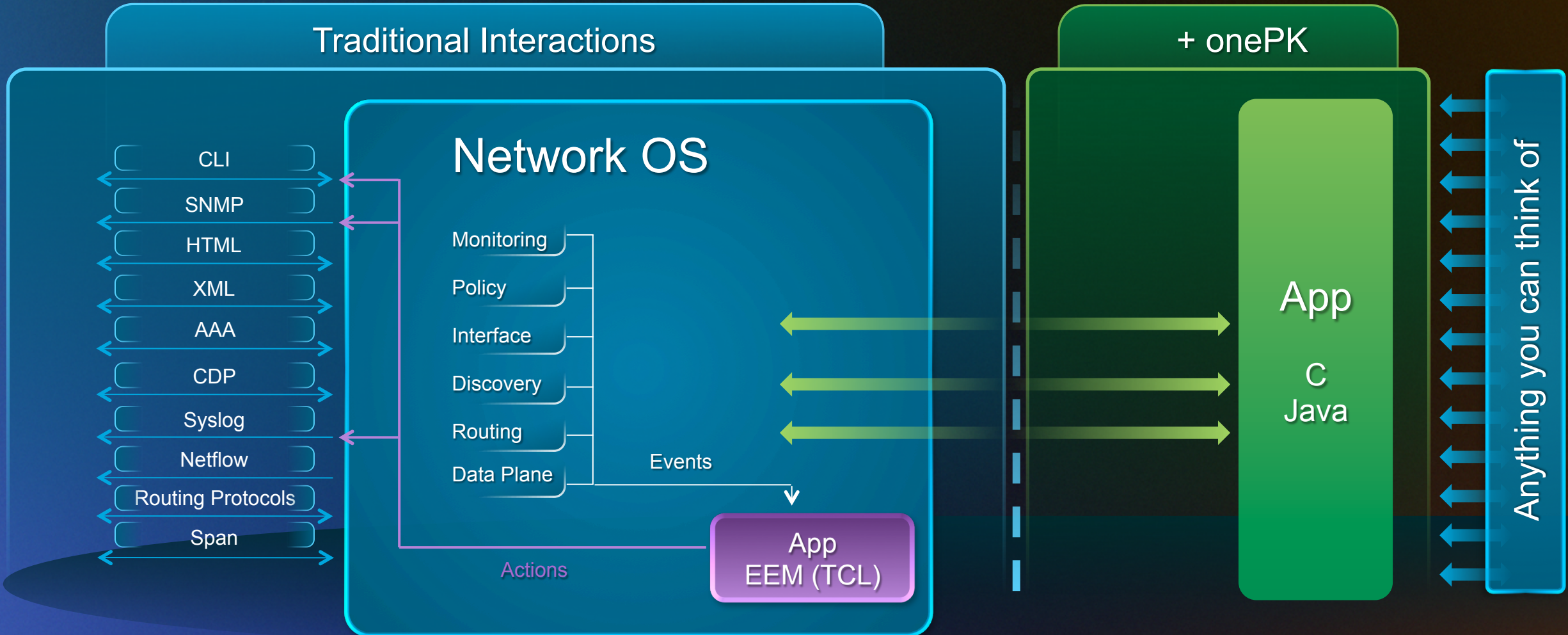API Presentation

OnePK

API Infrastructure

(IOS)

(NX-OS)

(IOS-XR)

Write Once, Run Anywhere

One Platform Kit (onePK)
Enhanced Interactions with the Network Operating System

Traditional Interactions

+ onePK

CLI
SNMP
HTML
XML
AAA
CDP
Syslog
Netflow
Routing Protocols
Span

Network OS

Monitoring
Policy
Interface
Discovery
Routing
Data Plane

Events

Actions

App
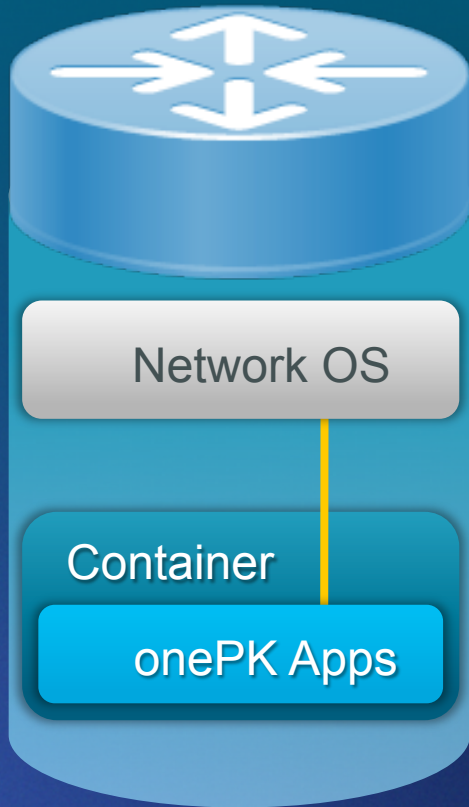**EEM (TCL)**

App
C
Java

Anything you can think of

Poll – Question 2

- Which of the following Programming Languages/APIs are you most interested?

a) C

b) Java

c) Ruby

d) Perl

e) Python

f) REST

onePK Application Hosting Options

Process Hosting

Network OS

Container

onePK Apps

Blade Hosting

Network OS

Blade

Container

onePK Apps

End-Point Hosting

Network OS

External Server

onePK Apps
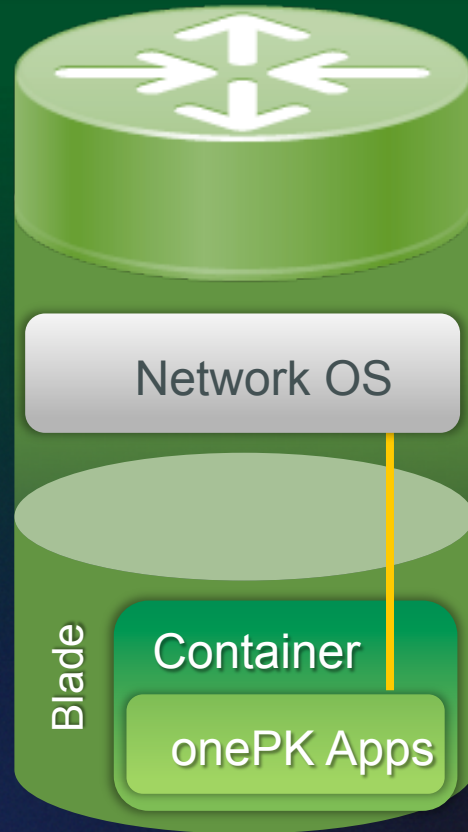
Write Once, Run Anywhere

Unleash the Power of Your Network

Applications That YOU Create

onePK

Any Cisco Router or Switch

Flexible development environment to:

• Reach into your network and extract the information you need.

• Directly manipulate flows and modify packets in real-time.

• Create customized services that seamlessly integrate into your network.

• Optimize routine operational tasks with improved automation.

Build, Automate, Extend, Scale… with Control.

- **BUILD, AUTOMATE, IMPROVE:** New or Improve Existing Applications & Services

- **SPEED & FASTER ADAPTABILITY:** Network flexibility for rapidly changing business needs

- **EXTEND WITH CONTROL:** Utilize data and analytics on network traffic to empower new business systems.

- **REVENUE & COST SAVINGS:** Monetization of new applications or services. Create services faster with code that you can write once and run anywhere.

- **SIMPLICITY, INTEGRATION & THE POWER OF CHOICE:**
  - Utilize with tools of choice.
  - Choose your implementation and compiler.
  - Run it on servers, services blades, or on the system processor.

Cisco Routers & Switches

On The Server or On the Blade

Virtual Environments And More Coming Soon

onePK for Rapid Application Development

Developer Environment
-**Language of Choice**
-**Programmatic Interfaces**
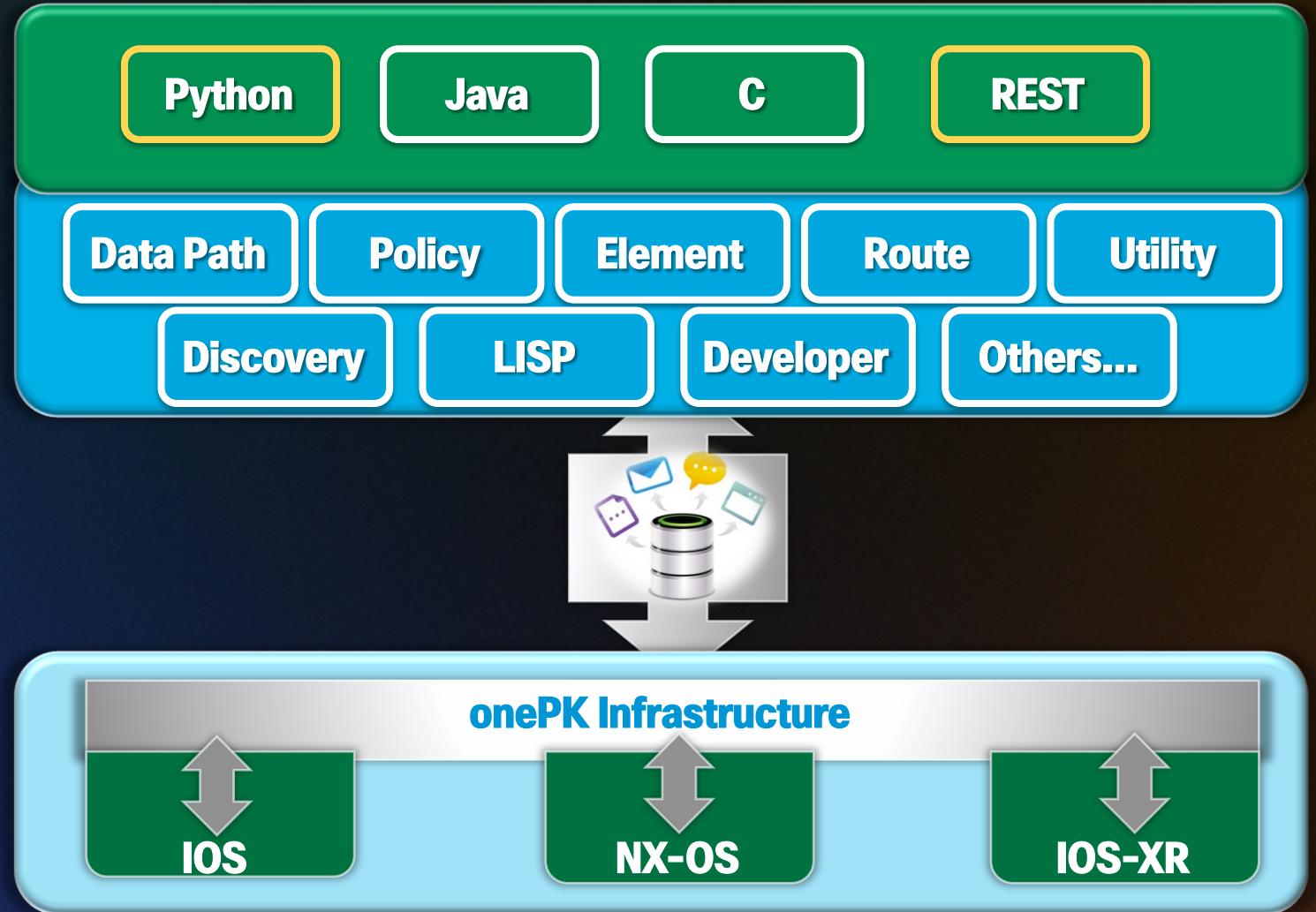-**Rich Data Delivery via APIs**

Comprehensive Service Sets
Better Apps; New Services
Monetization Opportunity

Deploy:
- **On a Service Blade**
- **On an External Server**
- **Directly on the Device**

onePK

Network Data
Control, Extend, Scale

Python	Java	C	REST

Data Path	Policy	Element	Route	Utility
Discovery	LISP	Developer	Others...	

onePK Infrastructure

IOS   **NX-OS**   **IOS-XR**

Agent Architecture on onePK

Agents

Openstack Agent	Chef Agent	OpenFlow Agent	Puppet Agent	Cisco PRIME agent	Custom Agent

ONE Agent Framework (proposed agents)

onePK Mgmt Apps

onePK Application

onePK SDK Libraries (C, Java, Python, ...)

Communication libraries

Process boundary

onePK Enabled Network Devices

Communication libraries

onePK Abstraction Layer

Element	Interface	Developer	Utilities	Discovery	Policy	Routing	Datapath	Ext...

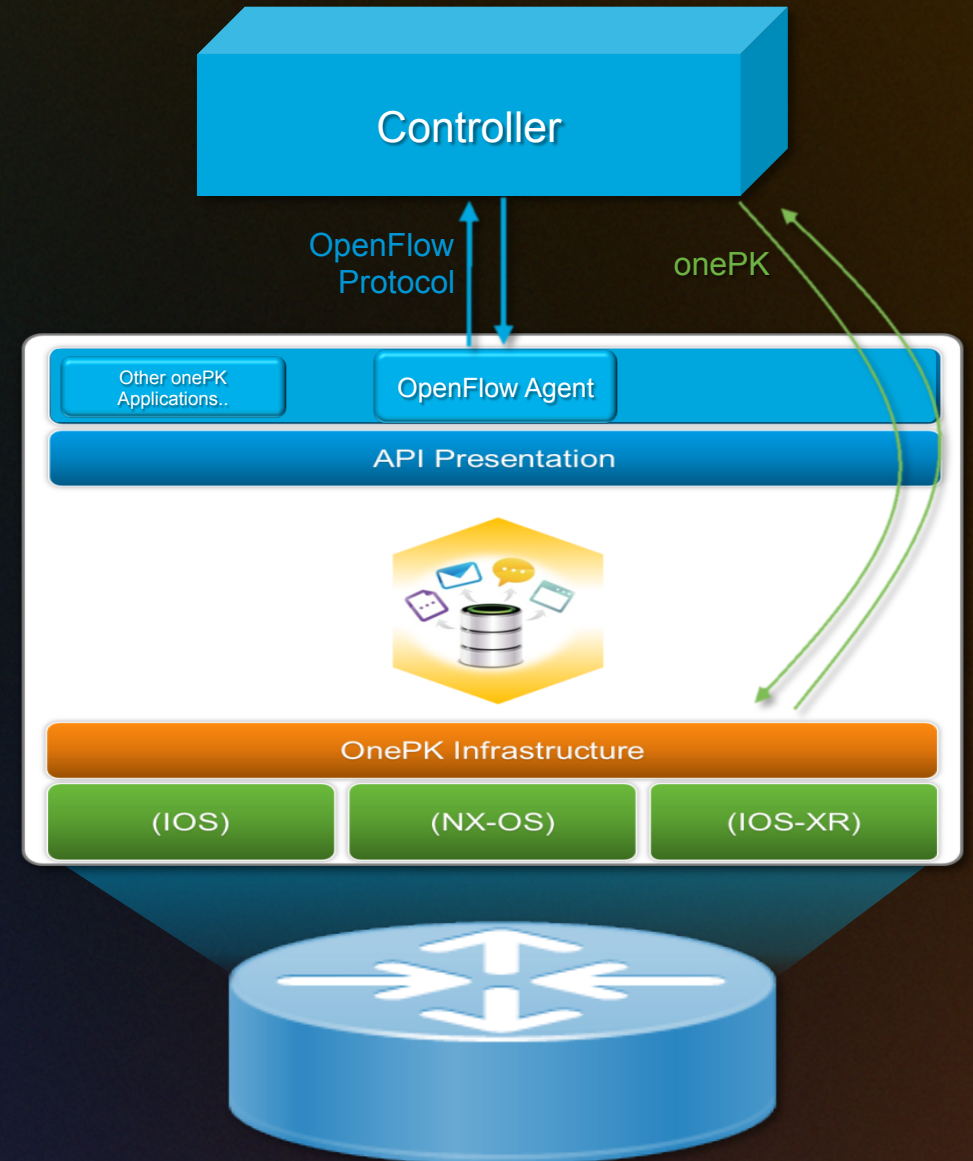**Cisco Network Operating System (IOS, IOS-XE, IOS-XR, NX-OS)**

Poll – Question 3

- Which of the following frameworks for automation/orchestration do you use or plan to use?

a)   Chef

b)   Puppet

c)   Openstack

d)   Cloudstack

e)   Other (e.g., Custom)

f)   None

onePK and OpenFlow

- onePK is Cisco's cross-OS programmability tool kit for innovative applications that expand the capability of our platforms

- OpenFlow is an industry-standard flow-control protocol sponsored by the ONF, that Cisco supports

- The Cisco ONE Controller gives users a network-wide view, leveraging onePK and OpenFlow on each network node

- Together, these three innovative new products give users or developer partners that ability to optimize the network operation for their particular application

- onePK and OpenFlow will be available on a wide variety of Cisco Platforms
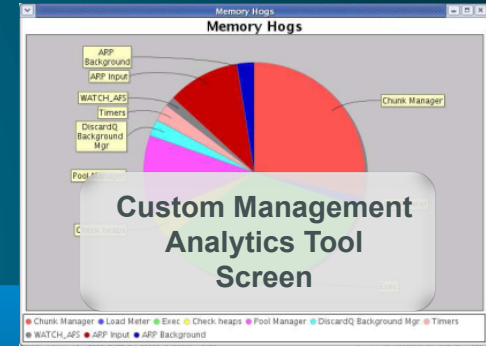
Controller

OpenFlow Protocol

onePK

Other onePK Applications..

OpenFlow Agent

API Presentation

OnePK Infrastructure

(IOS) (NX-OS) (IOS-XR)

onePK
Custom Management Application

Network Operations Center

Network Operator

Special Network Management System

Memory Hogs

ARP Background
ARP Input
WATCH_AFS
Timers
DiscardQ Background Mgr

Chunk Manager

Pool M

Custom Management Analytics Tool Screen

Chunk Manager ● Load Meter ● Exec ● Check heaps ● Pool Manager ● DiscardQ Background Mgr ● Timers ● WATCH_AFS ● ARP Input ● ARP Background

onePK Enables Custom Management Application

Network

Switch with onePK and App

Custom Management Agent

Switch with onePK and App

Custom Management Agent
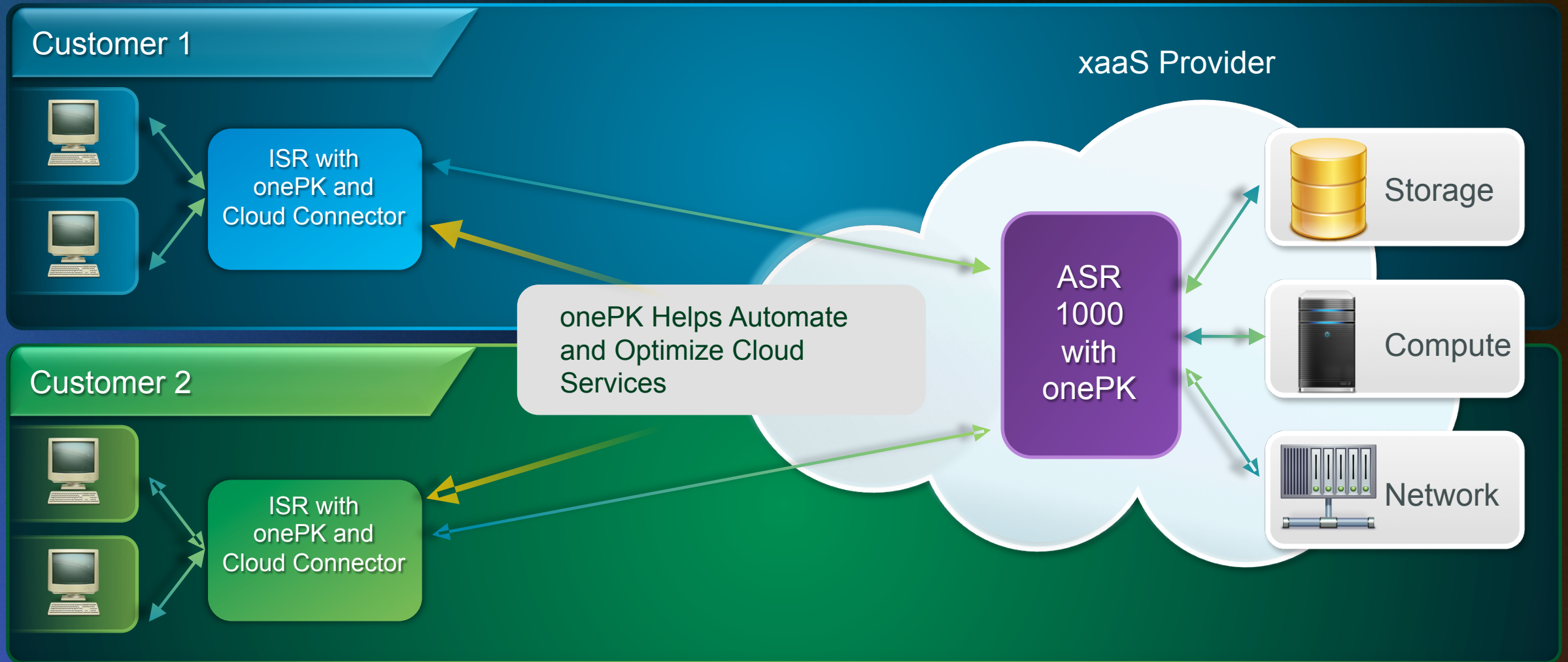
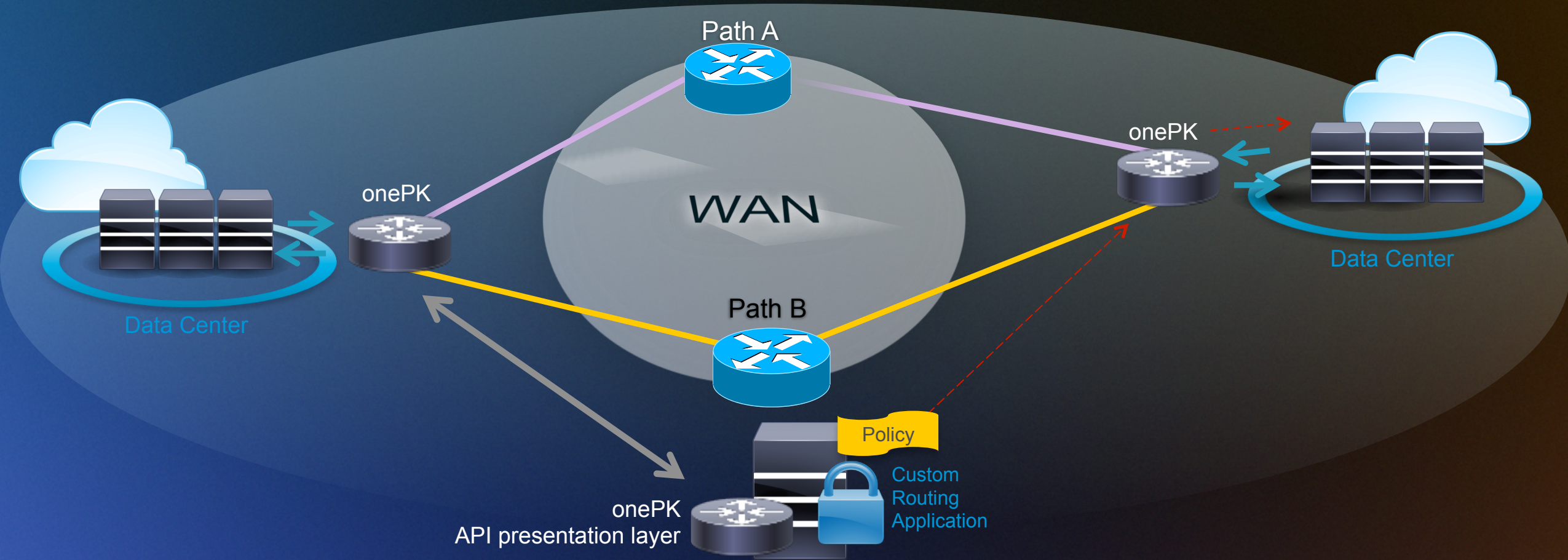Router with onePK and App

Custom Management Agent
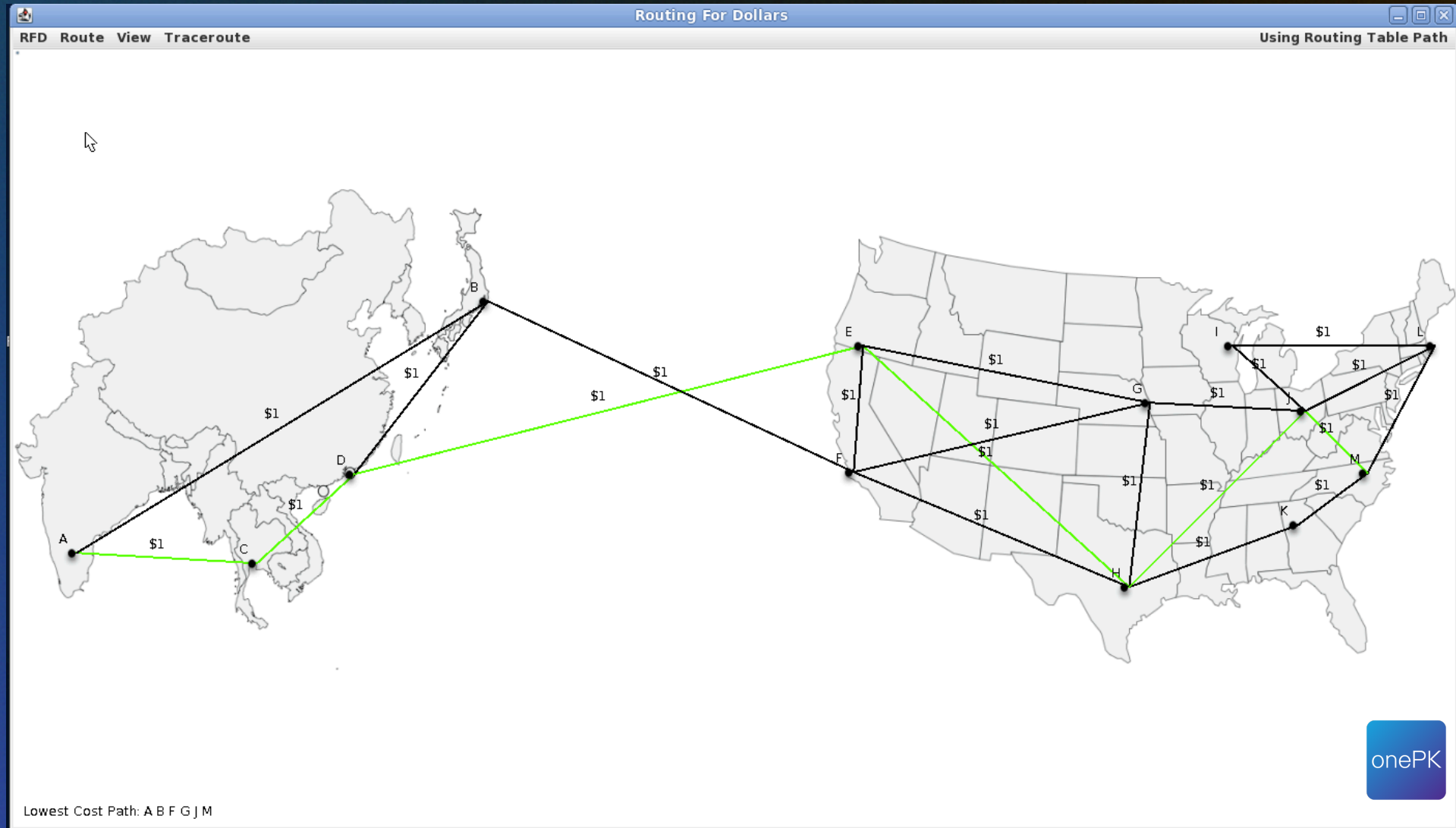
onePK
Cloud Services Automation

Customer 1

ISR with onePK and Cloud Connector

xaaS Provider

Storage

onePK Helps Automate and Optimize Cloud Services

ASR 1000 with onePK

Compute

Customer 2

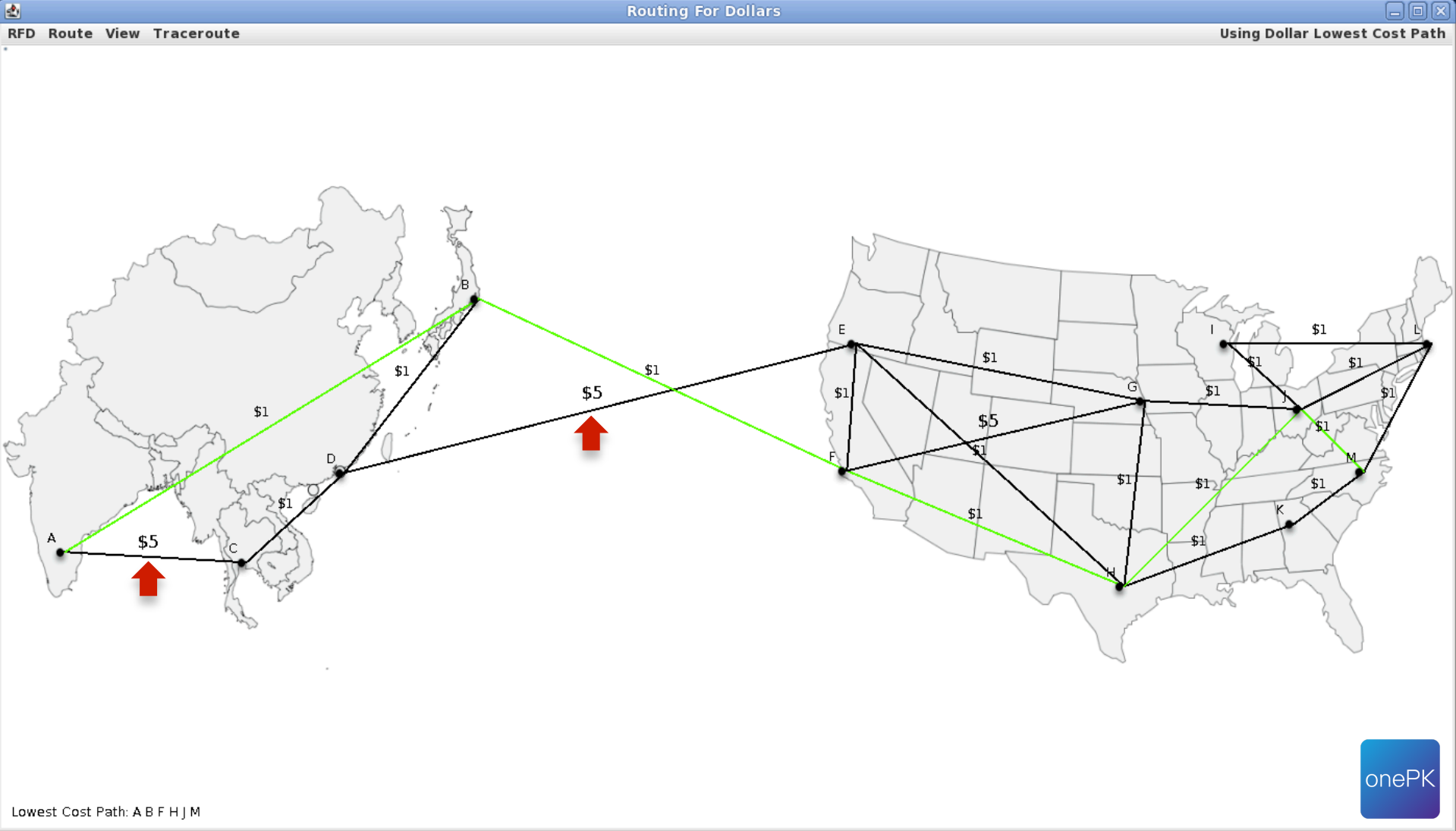ISR with onePK and Cloud Connector

Network

Custom Routing
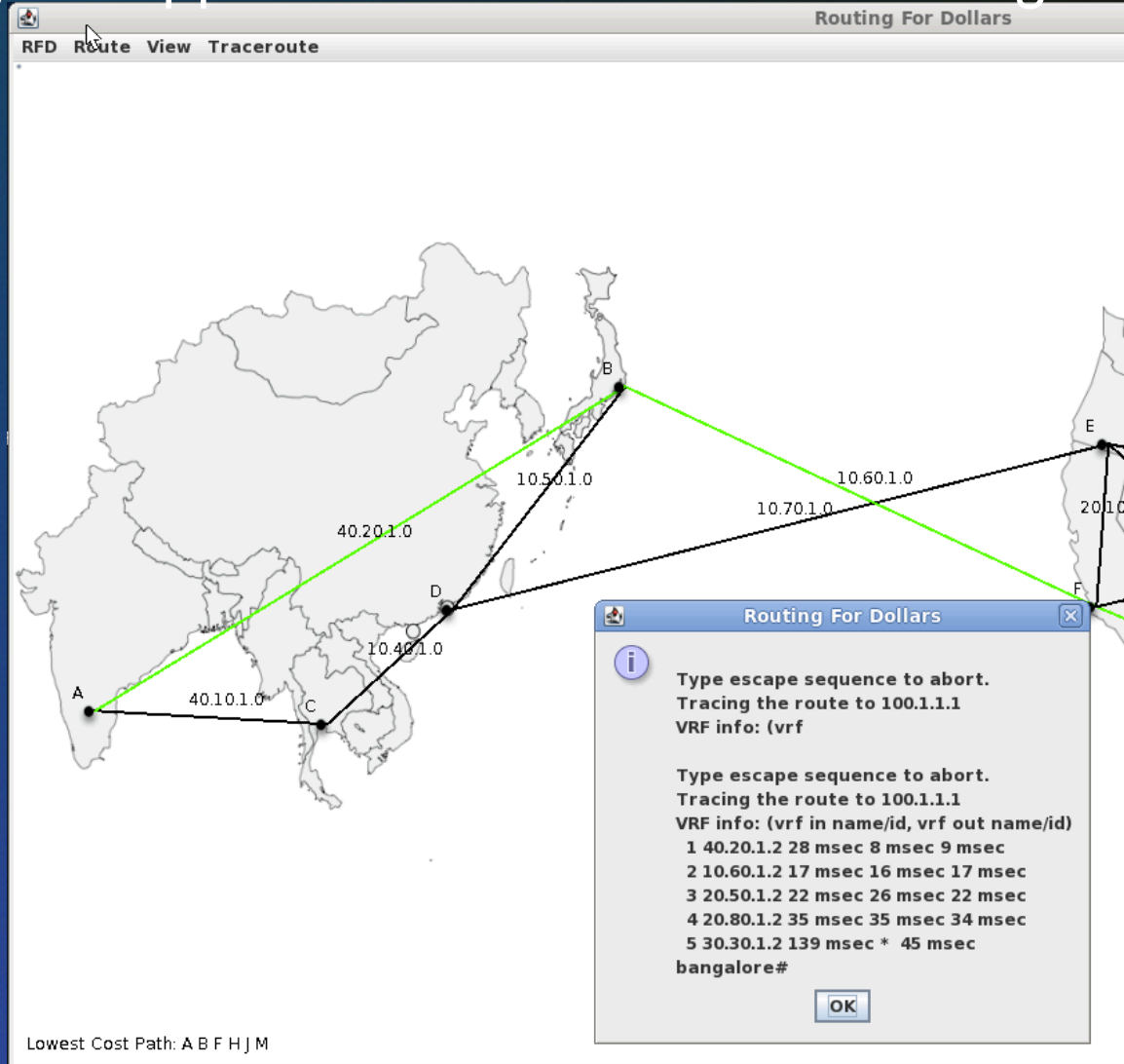## Initial Setup: Default routing using EIGRP

Custom Routing
Routing for Dollars: Application driven routes installed in network

Custom Routing
Tracing the application installed route – using the developer and element services

Routing For Dollars

RFD Route View Traceroute

10.50.1.0

10.60.1.0

10.70.1.0

40.20.1.0

10.40.1.0

40.10.1.0

Lowest Cost Path: A B F H J M

Routing For Dollars

Type escape sequence to abort.
Tracing the route to 100.1.1.1
VRF info: (vrf

Type escape sequence to abort.
Tracing the route to 100.1.1.1
VRF info: (vrf in name/id, vrf out name/id)
  1 40.20.1.2 28 msec 8 msec 9 msec
  2 10.60.1.2 17 msec 16 msec 17 msec
  3 20.50.1.2 22 msec 26 msec 22 msec
  4 20.80.1.2 35 msec 35 msec 34 msec
 5 30.30.1.2 139 msec * 45 msec
bangalore#

OK

```
bangalore#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       A - application route
       + - replicated route, % - next hop override

Gateway of last resort is not set

      10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks
C        10.1.1.0/24 is directly connected, Ethernet0/0
L        10.1.1.4/32 is directly connected, Ethernet0/0
D        10.40.1.0/24 [90/2681856] via 40.10.1.2, 2w1d, Serial2/0
D        10.50.1.0/24 [90/3193856] via 40.10.1.2, 2w1d, Serial2/0
D        10.60.1.0/24 [90/3705856] via 40.10.1.2, 2w1d, Serial2/0
D        10.70.1.0/24 [90/3193856] via 40.10.1.2, 2w1d, Serial2/0
      20.0.0.0/24 is subnetted, 10 subnets
D        20.10.1.0 [90/3705856] via 40.10.1.2, 2w1d, Serial2/0
D        20.20.1.0 [90/4729856] via 40.10.1.2, 2w1d, Serial2/0
D        20.30.1.0 [90/3705856] via 40.10.1.2, 2w1d, Serial2/0
D        20.40.1.0 [90/4217856] via 40.10.1.2, 2w1d, Serial2/0
D        20.50.1.0 [90/4217856] via 40.10.1.2, 2w1d, Serial2/0
D        20.60.1.0 [90/4217856] via 40.10.1.2, 2w1d, Serial2/0
D        20.70.1.0 [90/4729856] via 40.10.1.2, 2w1d, Serial2/0
D        20.80.1.0 [90/4217856] via 40.10.1.2, 2w1d, Serial2/0
D        20.90.1.0 [90/6265856] via 40.10.1.2, 2w1d, Serial2/0
D        20.100.1.0 [90/4729856] via 40.10.1.2, 2w1d, Serial2/0
      30.0.0.0/24 is subnetted, 5 subnets
D        30.10.1.0 [90/5241856] via 40.10.1.2, 2w1d, Serial2/0
D        30.20.1.0 [90/4729856] via 40.10.1.2, 2w1d, Serial2/0
D        30.30.1.0 [90/4729856] via 40.10.1.2, 2w1d, Serial2/0
D        30.40.1.0 [90/5241856] via 40.10.1.2, 2w1d, Serial2/0
D        30.50.1.0 [90/5241856] via 40.10.1.2, 2w1d, Serial2/0
      40.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
C        40.10.1.0/24 is directly connected, Serial2/0
L        40.10.1.1/32 is directly connected, Serial2/0
C        40.20.1.0/24 is directly connected, Serial2/3
L        40.20.1.1/32 is directly connected, Serial2/3
      100.0.0.0/24 is subnetted, 1 subnets
A        100.1.1.0 is directly connected, 00:01:56, Serial2/3
bangalore#
```

All Specifications Subject to Change Without Notice

Custom Routing – Another Example
Alternate Metrics: Measured Link Delay – Using EEM/IPSLA Service Set
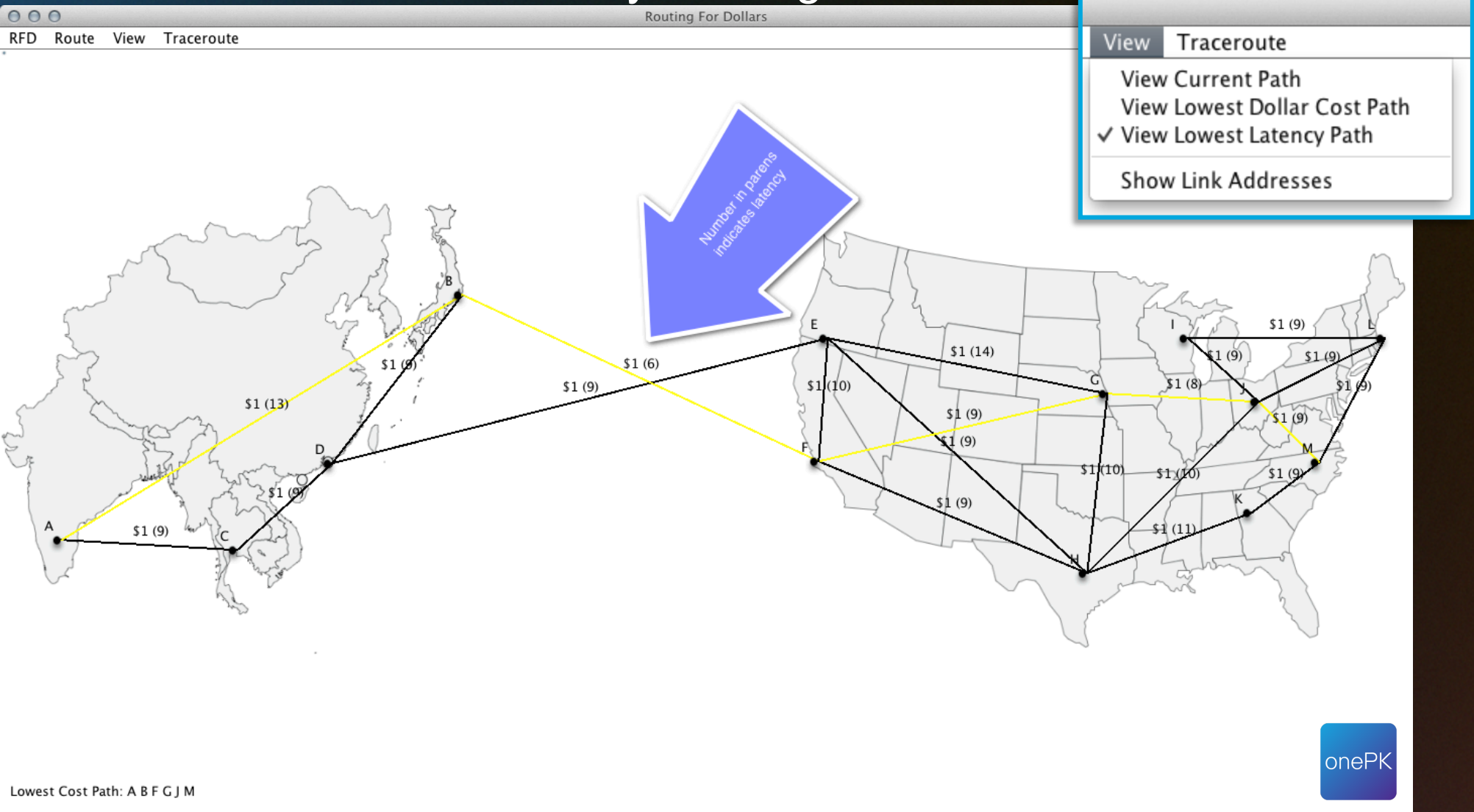
# onePK Enables New Operational Models

Using onePK, Applications can now understand and react to changing network conditions

onePK enables applications to
Gather, Analyze, Receive Requests
Make Decisions, Interact with Network Devices

onePK enables Network Devices to
Act, Observe, Notify
Applications can delegate rules to network to enable the network to take local decisions

Examples
Auto fix on MTU mismatch
Backup interface manipulation
Dynamically apply policy as needed
Provision new network services to meet demand

Cisco onePK

Observe

Notify

Gather

Analyze

Act

Application Logic
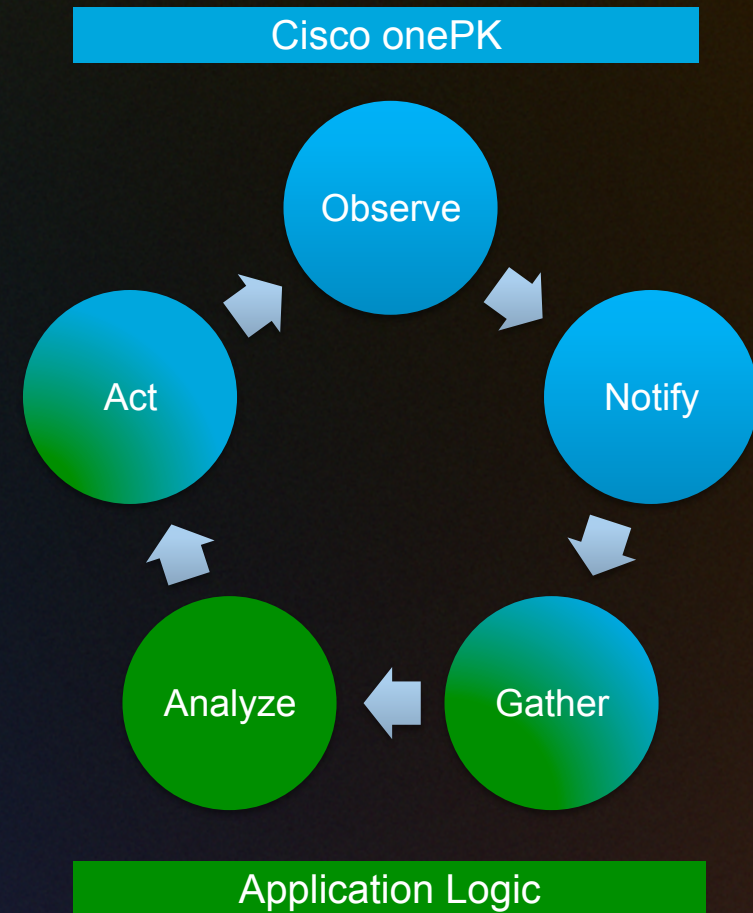
Get Involved
Early Trials. Demos. Forums. More.

http://www.cisco.com/go/onepk
http://developer.cisco.com/web/getyourbuildon

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