Agenda

- Software-Defined Networking (SDN) Market Drivers
- Cisco® APIC-EM
  Automate Network Configuration & Setup
- APIC-EM Applications
- Network Function Virtualization for Enterprise
- Customer Use Case
- Summary
SDN Market Drivers
Digital Business Demands Operational Agility

“...While other components of IT infrastructure have become more programmable and allow for faster, automated provisioning, installing network circuits is still a painstakingly manual process...”

— Andrew Lerner, Gartner Research

Network Expenses

<table>
<thead>
<tr>
<th>CAPEX</th>
<th>OPEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>33%</td>
<td>67%</td>
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Source: Forrester

Deployment Speed

<table>
<thead>
<tr>
<th>Seconds</th>
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<tbody>
<tr>
<td>0</td>
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<tr>
<td>10</td>
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<tr>
<td>100</td>
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<tr>
<td>1000</td>
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Computing | Networking

Source: Open Compute Project

80% Time IT spends on operations

57% CEOs are worried about IT strategy not supporting business growth
Cisco Digital Network Architecture

**Principles**

- **Open and Programmable | Standards-based**

**Network-enabled Applications**

- **Cloud Service Management**
  - Policy | Orchestration
- **Automation**
  - Abstraction and Policy Control from Core to Edge
- **Analytics**
  - Network Data, Contextual Insights
- **Virtualization**
  - Physical and Virtual Infrastructure | App Hosting

**Benefits**

- Automation and Assurance
- Security and Compliance
- Insights and Experiences

Cloud-enabled | Software-delivered

Cloud-enabled | Software-delivered

Virtualization

Network Data, Contextual Insights

Analytics

Abstraction and Policy Control from Core to Edge

Automation

Policy | Orchestration

Cloud Service Management
Network-Wide Abstractions Simplify the Network

The SDN Ideal: Controller as the Application Platform

Applications

- Orchestration
- Automation
- Collaboration
- Security
- Virtualization

REST API

SOUTHBOUND ABSTRACTION LAYER

- CATALYST®
- CISCO NEXUS®
- ISR
- ASR
- ASA
- WIRELESS
- OTHER

Netwerk Virtualization
APIC-EM
Automate Network Configuration and Setup
APIC-EM

Resolves declarative business intent
Renders into domain-specific language

Application, User, and Business-Driven Policies

“Only corporate-owned devices in Group:FinExec can access quarterly results DB”

Network-Specific Control

Cisco® ISE + TrustSec + ACL Configuration Commands

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APIC-EM Delivers IT Flexibility

Enabling Automation Through Innovative Management Principles
Common Policy Model from Branch to Data Center

**POLICY**

**DATA CENTER**
- Application Network Flow Profile
  - SLA, Security, QoS, Load Balancing
  - Cloud
  - Data Center

**WAN AND ACCESS**
- User and Things Network Profile
  - QoS, Security, SLA, Device, Location, Role
  - WAN
  - Access

**CISCO® ADVANTAGE**
- BROWNFIELD AND GREENFIELD
- END TO END
- POLICY FRAMEWORK: FOCUS ON APPLICATION AND USER ENABLEMENT
Cisco APIC-EM Applications
Application Ecosystem Using Open APIs

CISCO® Applications
- IWAN
- Path Trace
- PnP
- Easy QoS
- ESA

Third-Party Applications
- IBM
- Nectar
- ITALTEL
- Hyperglance
- Citrix
- Sparkle
- Telekom
- Nectar
- ESA

RESTful APIs

153 APIC-EM DevNet Companies

20 Average Growth per Month
Accelerate Branch
Faster Time to Market at Remote Sites

DNA Automation & Virtualization
Roll out 10 clicks; Network redirects traffic in real-time

Before DNA
- 3-6 months Roll-out
- Application Visibility
- Costly WAN links
- Costly onsite visits

After DNA
- 3-6 days roll-out
- App Visibility & Security
- Internet link to save cost
- No on-site Visits

Cisco APIC-EM with Plug and Play | Cisco Intelligent WAN | Meraki SD-WAN
Mobilize the Workforce
Employee Productivity for Collaboration and Training

Before DNA
- Up to 4 months for manual changes on QoS
- Varied user experience

After DNA
- 250 milliseconds for dynamic network update
- 300% lower jitter
- 50% improved video

Cisco APIC EM with Easy QoS | Meraki MR
Network Functions
Virtualization for Enterprise
What Enterprise NFV Can Do for You

- Simplify day-to-day operations
- Quickly roll out new services and locations
- Gives you flexible deployment options
# Customized Network Services for Your Network

## Select your network functions
- ✔ vRouter
- ✔ vFirewall
- ❔ vWAN optimization
- ❔ vWLAN controller
- ✔ Third-party services

## Select your preferred platform
- ❔ Cisco® ISR, UCS® E-Series
- ✔ Cisco ENCS
- ❔ Cisco® UCS C-Series

## Orchestrate and automate services
- APIC-EM with Enterprise Service Automation

## Elastic Services
- Run on Any Platform
- Deploy in Minutes
What is Enterprise NFV?

- **Freedom of choice**
- **Hardware Platform**
- **Hardware and software independence**
- **Virtualization Layer**
- **Consistent, trusted network services across all the platforms**
- **Virtual Network Functions (VNFs)**
- **Centralized orchestration and management**
- **SDN Applications**

**Cisco Enterprise NFV Architecture**

Network services in minutes, on any platform

- **Enterprise Service Automation (ESA) | Network Services Orchestrator (NSO)**
  - Virtual Router (ISRv)
  - Virtual Firewall (ASA & NGFWv)
  - Virtual WAN Optimization (vWAAS)
  - Virtual Wireless LAN Controller (vWLC)
  - 3rd Party VNFs

- **Network Functions Virtualization Infrastructure Software (NFVIS)**
  - ISR 4000 + UCS E-Series
  - UCS C-Series
  - Enterprise Network Compute System

**New!**

**Orchestration, Provisioning & Management**

**VNFs and Apps**

**Virtualization Layer**

**Host Platform**
Customer Success Story
“QoS rollouts were once 6-month projects costing over $200,000. With Cisco APIC-EM EasyQoS, we will go from months to minutes with minimal costs.”

Brian McEvoy, Senior Network Engineer, Symantec
Summary
Cisco DNA Delivers…

- **Simplicity**
  - Network-wide abstraction that supports both greenfield and brownfield installations

- **Automation**
  - OpEx reduction through adoption of Cisco® best practices

- **Open Programmability**
  - Open, northbound REST APIs with agnostic southbound interfacing

- **Business Outcomes**
  - Dynamic network that adapts to business intent policy
DNA Advisor Program
Helping You Navigate Your Digital Transformation Journey
www.cisco.com/go/dnaadvisor

Where Are Your Peers
Get your network ready for digital
IDC Digital Network Readiness and Benefits Survey Research

Where Are You
Map your own network readiness and next steps
Cisco DNA Readiness Advisor Brief On-line Self Assessment

Get Started
Plan your journey
Cisco DNA Readiness Planner Assessment and Report

Cisco Digital Network Readiness Model
5 Stages from Best Effort to Self-Driving
Challenges Facing IT in the Digital World

- Take too long to change: 95%*
- Can’t measure user and application experience: 14%*
- Can’t stop what you can’t see: 76%*

Network changes performed manually | Productivity loss due to network errors | Lack of visibility is top reason threats are missed

Traditional Networking CANNOT Keep Pace with the Demands of Digital Business
Automated Orchestration, Management, Policy
Cisco Enterprise Service Automation (ESA)

- Create standard profiles for different types of branches
- Cisco® tested and validated designs
- Embedded approval process and versioning

- Zero-touch deployment
- Automated orchestration of platform and VNFs
- Service chaining and licensing

- Health monitoring
- Dynamic scaling of services
- Operational SLA management
VNF and Application Layer: Deploy Best-in-Class Services from Cisco & 3rd Party Across Physical and Virtual

- **ISRv**
  - High performance
  - Rich features
  - End-to-end support

- **NGFWv**
  - Harden virtual services
  - Enable secure access
  - On-premises or cloud management

- **Third-Party VNFs**
  - VNF program
  - Tested and certified
  - Streamlined support from Cisco and third party

- **vWAAS**
  - ISR WAAS: Leader in Gartner MQ
  - Superior caching with Akamai Connect

- **vWLC**
  - Survivability and scale
  - Built for small and medium-sized branches

- **ASAv**
  - Comprehensive protection
  - Full DC class Featured functionality
  - Designed for NFV

- **Applications**
  - Microsoft Windows
  - Custom applications
Virtualization Layer: Enterprise NFV Infrastructure Software (NFVIS) Optimized for Network Services

**Network Hypervisor**
- Supports segmentation of virtual networks
- Abstract CPU, memory, and storage resources

**Zero-Touch Deployment**
- Automatic connection to PnP server
- Highly secure connection to the orchestration system
- Easy day-0 provisioning

**Lifecycle Management**
- Provisioning and launch of VNFS
- Failure and recovery monitoring
- Stop and restart services
- Dynamically add and remove services

**Service Chaining**
- Elastic service insertion
- Multiple independent service paths based on applications or user profiles

**Open API**
- Programmable API for service orchestration
- Rest and NETCONF API
Simplification Creates Agility

DO-IT-YOURSELF ASSEMBLY AND INTEGRATION

READY TO GO

Faster Time to Market and Lower OpEx

Applications Are the Vehicle for Digital Business
SDN Priorities for Enterprise Customers
Buy or Develop the Apps You Need, at Your Own Pace

**BUY**
“\[I need shrink-wrapped applications that solve a business need.\]”

**BUILD**
“I want to build custom applications and need APIs and open-source components.”

Move at Your Own Speed

- **Reduce OpEx**
  - Vendor Controller + Vendor Applications

- **OpEx and Agility**
  - Vendor Controller + Custom Applications

- **Custom Agility**
  - Open-Source Controller + Custom Applications
Cisco APIC-EM
An Application Platform for Enterprise WAN and Access Networks

- Virtual (ISO VM) or appliance-based
- Provides user policy abstraction and automation
- Simplification of complex network configuration with Cisco® application best practices
- Existing and new installations (Catalyst®, ISR, ASR, WLC)

Ready-to-deploy applications (February 2016):
- IWAN (with a license)
- Plug-n-Play (free)
- Path Trace (free)
- EasyQOS Beta (free)

BENEFITS:
Brownfield support
Ready-to-use-applications
Open, northbound API
Application Overview

Plug-and-Play App
Zero-touch deployment of routers, switches, and access points
Accelerated roll-out: Eliminates tech visits and shrinks deployment from months to minutes

Cisco IWAN App
Guided, fast auto-provisioning of the IWAN solution with Cisco® experts’ best practices
From 1000 CLI commands to 10 GUI clicks per branch

Path Trace App
Discover the path between two endpoints based on 5-tuple flow information
Rapidly troubleshoot network issues and lower OpEx for trouble-ticket processing by 98%

EasyQOS App
Provides End-to-End Orchestration of QoS for Enterprise Networks
Simple and Easy to Deploy, Business Intent Driven, Reduces time to onboard new applications
- **Business Outcomes**
  - Provide local IT with limited ability to implement dynamic network change
    - 40% customer satisfaction increase
  - Accelerated remote branch configuration from weeks to days

- **Disruptive Technology**
  - Cisco® APIC-EM
  - Performance Routing (PfR)
- **Business Outcomes**
  - Saved over 65% in circuit costs by implementing a highly secure hybrid SD-WAN with a Cisco® IWAN
  - Total Network Visibility
    - Accelerated troubleshooting
    - Improved cost planning
  - Network configured and maintained by a staff of 3 IT professionals
- **Disruptive Technology**
  - APIC-EM IWAN App
An Oil & Gas Company
Operational Efficiency

Challenge
• Lower cost in IT operations and infrastructure, especially for remote locations
• Slow and expensive service rollout that requires service calls

Solution
• One standard platform for all locations
• Services: Routing, Firewall, Wireless LAN Controller, WAN Optimization

Benefits
• Lower cost by utilizing x86 servers with Cisco® NFVIS
• Keep current operational standards with best-of-breed services
• Agile service deployment and monitoring with Cisco ESA
APIC-EM Plug-and-Play (PnP) Application
Auto-Discovery of Provisioning Template

**BENEFITS**

- Simple Workflow
- Zero-Touch Provisioning
- Open Architecture
- SDN
- Increased Security
- Decreased Chance of Misconfiguration

**IT**

New Router

New Switch

PnP Application

**NETWORK**

Zero-touch Deployment

Shortened Deployment Time

No Onsite Expert Needed
APIC-EM IWAN Application
Uses Cisco Best Practices and Knowledge for SD-WAN

BENEFITS

Simple Workflow
Zero-Touch Provisioning
Network, Applications Monitoring
Business-Level Policies
Open Architecture

From Weeks to Minutes
Over 1000 CLI Commands Reduced to 10 GUI Clicks

Note: Cisco® IWAN App Release 1 targets less than 500 sites, 2 links per branch with the 4000 Series ISR
APIC-EM Path Trace Application
Accelerate Trouble-Ticket Processing

**BENEFITS**

- Simple Workflow
- Network, Applications Monitoring
- Open Architecture

**Easy Visual Discovery of Trouble Spots in the Communication Path Based on 5-tuple**

| OpEx for Ticket Processing Decreased by 84% - from 1.4 hours to Approximately 4 minutes |
APIC-EM EasyQoS Application
Accelerate and Automate QoS Deployment Network-Wide

IT

Business Policy: App SLA

EasyQoS Application

NETWORK

BENEFITS

Simple Workflow – Select from Predefined Policies

Fast & Automated Deployment of QoS in 250 ms

300% Reduction in Voice Jitter

50% Improvement in Video Quality

Improved Application Experience

“The EasyQoS App reduces deployment times for network-wide QoS dramatically. We can now respond to changing application needs via policy-based automation within minutes or even seconds.”

Edeka Group, German’s largest supermarket company