Er dit WAN klar til din cloudstrategi?

Lars Granberg
Systems Engineer
4. April 2019
Connecting Users to the Data Center was the Priority
Applications Moving to Not One Cloud, But Many

Devices & Things

WAN

Campus & Branch Users

Mobile Users

DC/Private Cloud

SaaS

IaaS
Resulting a highly complex and dynamic network

Internet connectivity becomes business critical

More user, things and applications, everywhere
Cisco SD-WAN: Cloud SDN Architecture

Management Plane
- Single pane of glass
- Monitoring and Troubleshooting
- RBAC and APIs

Control Plane
- SDN Architecture
- Routing and Security Distribution
- Horizontal Scale, Low Complexity

Data Plane
- Physical of Virtual
- Zero Touch Provisioning
- On-Premise or Cloud

Analytics
- Machine Learning
- Carrier Performance
- Bandwidth Forecasting

APIs
3rd Party Automation

vManage
vAnalytics

vSmart Controllers

MultiCloud OnRamp
Security (+Cloud)
Application QoE

Cloud, Data Center, CoLo, Campus, Branch

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Solution Elements and Overview
Orchestration Plane

- Orchestrates control and management plane
- First point of authentication (white-list model)
- Distributes list of vSmarts/vManage to all WAN Edges
- Facilitates NAT traversal
- Requires public IP Address [could sit behind 1:1 NAT]
- Highly resilient

Cisco vBond
Management Plane

Cisco vManage

- Single pane of glass for Day0, Day1 and Day2 operations
- Multitenant with web scale
- Centralized provisioning
- Policies and Templates
- Troubleshooting and Monitoring
- Software upgrades
- GUI with RBAC
- Programmatic interfaces (REST, NETCONF)
- Highly resilient with clustering
Control Plane

- Facilitates fabric discovery
- Dissimilates control plane information between WAN Edges
- Distributes data plane and app-aware routing policies to the WAN Edges
- Implements control plane policies, such as service chaining, multi-topology and multi-hop
- Dramatically reduces control plane complexity
- Highly resilient
Data Plane

Cisco WAN Edge

- Cisco ISR1K, ISR4K, ASR1K, IOSv, CSR1Kv and WAN Edge
- Provides secure data plane with remote WAN Edges
- Establishes secure control plane with vSmart controllers (OMP)
- Implements data plane and application aware routing policies
- Exports performance statistics
- Leverages traditional routing protocols like OSPF, BGP and VRRP
- Supports Zero Touch Deployment
Secure Segmentation

- End-to-end segmentation
- Local internet breakout
- Secure Cloud Gateway
Critical Applications SLA

- WAN Edge Routers continuously perform path liveliness and quality measurements

App Aware Routing Policy
App A path must have:
- Latency < 150ms
- Loss < 2%
- Jitter < 10ms

Path1: 10ms, 0% loss, 5ms jitter
Path2: 200ms, 3% loss, 10ms jitter
Path3: 140ms, 1% loss, 10ms jitter

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Cloud-Networking-as-a-Service With SLA - IaaS & SaaS

Cloud On-Ramp IaaS

Cloud On-Ramp SaaS
Better Path Selection for SaaS Application
Regional Cloud onRamp Gateways and DIA

- Quality probing toward popular SaaS applications from all configured exits
- Cloud Edge routers choose best performing path toward popular SaaS applications
Cloud onRamp for IaaS – AWS / AZURE

- VGW for host VPCs
- Gateway VPC per-region
  - Multiple for scale
- Standard based IPSec
  - Connectivity redundancy
- BGP across IPSec tunnels for route advertisement
  - Active/active forwarding
  - BGP into OMP redistribution
    Advertise default route to host VPCs/VNET’s
- Optional Direct Connect/Express Routes
Challenges balancing security and user experience

1. Continue Backhauling
   Pro: Security is simple
   Con: Poor user experience

2. DIA via Cloud Security
   Pro: Improves user experience
   Con: Limited control

3. DIA via UTM
   Pro: Improves user experience
   Con: Complex to manage

4. Security Everywhere
   Pro: Efficient traffic flows for experience
   Con: Difficult to maintain policy

How can IT maintain choice and control connecting a cloud first world?
Right Security, Right Place. Simplified

SD-WAN + Security

Security Architecture Powered by Talos

*Roadmap Mar '19
Combining Best of Breed in Security and SD-WAN

Enterprise Firewall
+1400 layer 7 apps classified

Intrusion Protection System
Most widely deployed IPS engine in the world

URL-Filtering
Web reputation score using 82+ web categories

Adv. Malware Protection*
With File Reputation and Sandboxing

Simplified Cloud Security
Easy Deployment for Cisco Umbrella

Cisco Security

Cisco SD-WAN

Hours instead of weeks and months

*Roadmap Mar ‘19
The best threat protection requires the best threat intelligence

**TALOS**

- **100 TB** Of Data Received Daily
- **1.5 MILLION** Daily Malware Samples
- **600 BILLION** Daily Email Messages
- **16 BILLION** Daily Web Requests
- **250+** Full Time Threat Intel Researchers
- **MILLIONS** Of Telemetry Agents
- **4** Global Data Centers
- **Over 100** Threat Intelligence Partners

24/7/365 Operations

Global scanning

30 years building the world’s networks

The largest threat detection network in the world
# Cisco SD-WAN Edge Platform Options

## Branch Services
- **ISR 1000**
  - 200 Mbps
  - Next-gen connectivity
  - Performance flexibility
- **ISR 4000**
  - Up to 2 Gbps
  - Modular
  - Integrated service containers
  - Compute with UCS E
- **ASR 1000**
  - 2.5–200Gbps
  - High-performance service w/hardware assist
  - Hardware & software redundancy

## vEdge Appliances
- **vEdge 1000**
  - Up to 1 Gbps
  - Fixed
- **vEdge 100**
  - 100 Mbps
  - 4G LTE & Wireless
- **vEdge 2000**
  - 10 Gbps
  - Modular
- **vEdge 5000**
  - ~30 Gbps
  - Modular

## Virtualization
- **ENCS 5100**
  - Up to 250Mbps
- **ENCS 5400**
  - 250Mbps – 2GB
- **ISRv, vEdgeCloud**

## Private & Public Cloud
- **Microsoft Azure**
- **Amazon Web Services**
- **vEdge Cloud – CSR1000v**

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Demo
SD-WAN a practical view

Cisco on Cisco

Campbell Taylor
Regional IT Leader (EMEAR North)
April 04, 2019
Cisco – a peek inside

- **506** Offices globally
- **over 200** acquisitions since 1993
- **992,412** Webex Meetings per month
- **74,000** Employees
- **60,000** Partners
- **7,198** routers
- **8,693** LAN switches
- **7.6 billion** DNS queries daily
Cisco IT SD-WAN Beta Highlights (Jan 2019)

- 4 Hubs (ASR1002-HX)
- 10 Offices (vEdge1000 2 Box Solution)
- 4 Countries
- 93 Multipurpose Rooms (Video Conferencing & Interactive Whiteboard)
- 1200 End user endpoints
- 10 Fully Immersive TP (IX5000, 5200)

Fully Operational NOW
Drivers and Technology

- Security
- Software
- Configuration
- App Routing
- Bandwidth Augmentation
- Cloud Express
- Cloud Controllers

- vManage
- Netflow (Cflowd)
- REST API

- vManage Policy
- Day 0 - PnP/ZTP
- Day 2 - Templates
- Rest API

Compliance • Data Insights

RISK ↓ TCO ↓

ROI ↑ TTM ↓

Efficiency • Speed • Agility

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## Our internal value metrics

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compliance</strong></td>
<td>Secure Patch / OS Management</td>
</tr>
<tr>
<td><strong>Projected</strong></td>
<td>70% Reduced time to meet compliance using software version enforcement and Templates</td>
</tr>
<tr>
<td><strong>Data Insights</strong></td>
<td>Contextual Analytics &amp; Insights</td>
</tr>
<tr>
<td><strong>Projected</strong></td>
<td>10% Data allow teams to reduce MTTR and switch WAN paths in real-time</td>
</tr>
<tr>
<td><strong>Speed</strong></td>
<td>Day 0 Provisioning</td>
</tr>
<tr>
<td><strong>Projected</strong></td>
<td>90% Reduction in provisioning times using PnP and ZTP</td>
</tr>
<tr>
<td><strong>Agility</strong></td>
<td>Day 2 Change Management</td>
</tr>
<tr>
<td><strong>Projected</strong></td>
<td>80% Less time to push new features/config changes by using Controllers</td>
</tr>
<tr>
<td><strong>Efficiency</strong></td>
<td>Telco Spend</td>
</tr>
<tr>
<td><strong>Actual</strong></td>
<td>30% Load balancing and split tunneling allows us to be more efficient with bandwidth</td>
</tr>
</tbody>
</table>

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DNA Ready underlay network topology

**Business requirement**

- **Platinum**
  - TAC/24x7 Contact Centre/CCIE
  - Lab/IT DC/CBC/Campus

- **Gold**
  - Regional TAC/Regional head office/Eng. DC/Innovation center

- **Silver**
  - Non-critical business functions/Occasional customer visit

- **Bronze**
  - Light weight/Service office space

**Current Target**

- **Extranet**
- **Employee**
- **Labs**
- **Internet**
- **Employee**

**Overlay Segments**

- **Macro-Segments(VN)**
  - Extranet
  - Employee
  - Labs
  - Internet
  - Employee

- **Micro-Segments(SGT)**

**Network Options**

- Private Line (2nd SP)
- MPLS / Private Line
- Internet (DIA)
- SIP
- Direct Internet
- Landlord Internet
- 9500
- 9404/7
- 9300
- 4451
- WLC3504
- 9800
- 4800
- Meraki
SDWAN Aggregation Design (Hub & Spoke)
Central Internet Access with Cloud OnRamp and SDWAN Overlay

Internet Access

90% Offices (318 Gold/Silver)
75% Employees

Corp Internet

ASR1002-HX
ASR1006

Corp Backbone

L2VPN

Private1 (Tunnel)
Biz-Internet (Tunnel)

IOS-XE SDWAN Router

Direct Internet Access

GOLD(126)

SILVER(192)
### SD-WAN Timeline

<table>
<thead>
<tr>
<th>Phases</th>
<th>Initial State</th>
<th>Current State</th>
<th>Target State</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase 1 – FY18</strong></td>
<td><strong>Exploratory – Parallel Infrastructure</strong></td>
<td><strong>Phase 2 – Q2/Q3 FY19</strong></td>
<td><strong>Phase 3 – Future</strong></td>
</tr>
<tr>
<td><strong>Deployment Scenarios</strong></td>
<td><strong>vManage - vEdge</strong></td>
<td><strong>vManage - vEdge/ISR4K, ASR1K-HX</strong></td>
<td><strong>Cisco DNA Center + SD-WAN</strong></td>
</tr>
<tr>
<td><strong>Benefits</strong></td>
<td>Explore Controllers and vEdge Features for Integration</td>
<td>Prepare Hubs with IOS-XE SDWAN</td>
<td>IOS-XE SDWAN end-to-end with full Cisco DNA integration</td>
</tr>
<tr>
<td><strong>Platform</strong></td>
<td>vManage, vBond, vSmart &amp; vEdge1000 (2-Box Solution)</td>
<td>vManage, vBond, vSmart ASR1002-HX (Hub) vEdge1000/ISR4K (Spoke)</td>
<td>Cisco DNA-C, vManage, vBond, vSmart ASR1002-HX (Hubs) ISR4K (Spokes)</td>
</tr>
</tbody>
</table>
Why Cisco SD-WAN?

**Unified** architecture with no compromise
Leadership in SD-WAN and Security with the best threat intelligence stops threats faster without impacting user experience.

**Security** at enterprise scale
Protect all users, devices and applications by deploying the right security, on-premise or cloud delivered, in the right place, quickly.

**Choice** of any cloud and any connectivity
No matter where you applications are hosted Cisco SD-WAN delivers the best user experience, securely across any cloud.

Designed for Intent-Based Networking end-to-end