Tech Update
SDWan & Routing

Søren D. Andreasen & Lars L. Granberg
Technical Solution Architect - Systems Engineer
4. September 2018
• SD-WAN
  • Hvad er det nu lige SD-Wan er?
  • Cisco SD-Wan Intro
  • cEdge med demo
  • Nyt i Viptella 18.3

• Routing nyt
  • ISR 1100
    • Recap & Performance tests
    • De nye 1101 small formfactor + hardned
    • Demo af gui
  • ISR 4461 – the big fat box
  • vEdge Hardware platforme
SD-Wan-for-no’et?
Cisco SDWAN Benefits

**TRUE ENTERPRISE CLASS**
Scale, Brownfield, Extensible Architectures

**VIPTELA FABRIC – NG OVERLAY**
SD-WAN, Network-as-a-service, IoT, Cloud

**CLOUD NATIVE ARCHITECTURE**
IaaS/SaaS, Hosted, Delivered, Managed

**FLEXIBLE MODEL**
Physical/Virtual, Cloud/On-Premise, SW Consumption
Second Wave of SDN Is Coming to the WAN

Apps are moving to the cloud

New devices
New challenges

Internet edge moving to the branch

Managing the network is getting more complex
Customers want to...

- Simplify WAN/Branch management
- Reduce WAN and operating costs
- Optimize user experience
Cisco SD-WAN intro
SDWAN

Management Plane
Multi-tenant or Dedicated Cloud or on-prem

Control Plane
Cloud or on-prem

Data Plane
(Physical or Virtual)
Viptela SD-WAN Functions and Capabilities

Connectivity Aspects

Hybrid WAN

Segmentation/VPNs

Dynamic Redundancy

Connectivity

Applications Services

Operations

Security

Bandwidth On Demand
Fast Convergence

Dynamic Per-VPN Topologies

Ubiquitous Data Plane

© 2018 Cisco and/or its affiliates. All rights reserved. Cisco Public
Viptela SD-WAN Functions and Capabilities

Operations Aspects

- Centralized Operations
- Distributed Execution

- Template-based Configurations

- Programmatic APIs
  - Open Object Model
  - NetConf

- Zero Touch Provisioning
- Ad-Hoc
  - Adds/Moves/Changes

Connectivity - Applications Services
Operations - Security

© 2018 Cisco and/or its affiliates. All rights reserved. Cisco Public
Viptela SD-WAN Functions and Capabilities

Security Aspects

- Embedded Security
- Centralized Device Auth-DB
- Authenticated/Encrypted Control Plane

Connectivity

Applications Services

Operations

Security

Secure Bring-up

Scalable Data-Plane Encryption

Automatic Key Rollover

© 2018 Cisco and/or its affiliates. All rights reserved. Cisco Public
Viptela SD-WAN Functions and Capabilities
Applications and Services Aspects

Carrier-style Portfolio
Transport SLA Monitoring
Application-Aware Routing

Connectivity
Applications Services

Operations
Security

Central Orchestration
Application Layer Analytics
Cloud Services Integration

© 2018 Cisco and/or its affiliates. All rights reserved. Cisco Public
Application Aware Topologies
Arbitrary VPN Topologies

- Full-Mesh
- Hub-and-Spoke
- Partial Mesh
- Point-to-Point

Unified Communications
Security Compliance
Regional Services
Partner Connectivity

- Leverage control policies to influence per-VPN topology
Policy Driven WAN Infrastructure
Policy Augmented Dynamic Routing

1. vManage GUI – Policy Orchestration
   - Control Policy: Routing and Services
   - App-Route Policy: App-Aware SLA-based Routing
   - Data Policy: Extensive Policy-based Routing
   - Combine and Apply per Site
   - Execute Control Policy
   - Advertise AAR/Data Policies to Sites
   - Execute AAR and Data Policy as received
   - Dynamic Routing and Policies Combine to dictate behavior

2. vSmart controller – Policy Enforcement/Advertisement

3. vEdge WAN router
   - Access Layer
   - Branch/DC

© 2018 Cisco and/or its affiliates. All rights reserved. Cisco Public
Application Visibility

- Cloud
- Data Center
- Small Office
- Home Office
- Branch
- Campus
- Secure SD-WAN Fabric
- App 1
- App 2
- App 3,000
- vEdge Router

Deep Packet Inspection

- ✓ App Firewall
- ✓ Traffic prioritization
- ✓ Transport selection
Critical Applications SLA
Application Aware Routing

- Enforce SLA compliant path for applications of interest
- Other applications will follow fabric routing across all paths

Path 1: 10ms, 0% loss, 5ms latency
Path 2: 200ms, 3% loss, 10ms latency
Path 3: 140ms, 1% loss, 10ms latency
Regional Secure Perimeter
Single Service Insertion

- vEdge router with connected L4-L7 service makes advertisement
  - Service route OMP address family
  - Service VPN label
- Service is advertised in specific VPN
- Service can be L3 routed or L2 bridged
- Service can be singly or dually connected (Firewall trust zones) to the advertising vEdge
- Control or data policies are used to insert the service node into the matching traffic forwarding path
  - Match on 6-tuple or DPI signature
  - Applied on ingress/egress vEdge

* For data policy only. Control policy enforced on vSmart.

© 2018 Cisco and/or its affiliates. All rights reserved. Cisco Public
Regional Secure Perimeter
Multiple Services Chaining

- vEdge routers with connected L4-L7 service make advertisement
  - Service route OMP address family
  - Services VPN labels

- Services are advertised in specific VPN
- Services can be L3 routed or L2 bridged
- Services can be singly or dually connected to the advertising vEdges
- Control or data policies are used to insert the service nodes into the matching traffic forwarding path
  - Match on 6-tuple or DPI signature
  - Applied on ingress/egress/service vEdge

* For data policy only. Control policy enforced on vSmart.
Services-on-a-Stick

Return traffic from overlay is policy routed (data policy from-tunnel) to Cisco Router for symmetric flow to services.

Egress traffic is policy routed (local policy) to Cisco Routers for services.
Cloud onRamp for SaaS

SaaS Optimization
Cloud onRamp for IaaS

1. Direct branch to cloud connectivity
2. Homogenous solution and policy management across branch & cloud
3. Resilient & hybrid access from cloud
4. Application steering
Viptela Integration Roadmap: Cisco SDWAN

Phase 1
No Integration

Phase 2 (Mar/Jul 2018)
Platform Integration

Phase 3 (Aug 2018+)
Management Integration

Deployment Scenarios

<table>
<thead>
<tr>
<th>Details</th>
<th>Phase 1</th>
<th>Phase 2 (Mar/Jul 2018)</th>
<th>Phase 3 (Aug 2018+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platform:</td>
<td>vManage vSmart</td>
<td>vManage vSmart</td>
<td>DNA Center + SD-WAN</td>
</tr>
<tr>
<td>Management:</td>
<td>vEdge</td>
<td>ISR4K + vEdge SW</td>
<td>vEdge</td>
</tr>
<tr>
<td>Benefits</td>
<td>Support and Scale the current sales motion</td>
<td>Viptela SD-WAN on strategic ISR platform</td>
<td>Deliver end-to-end experience with full DNA integration</td>
</tr>
<tr>
<td>Details</td>
<td>As-is</td>
<td>vEdge capabilities integrated into all IOS-XE platforms (ISR, CSR, ENCS, ASR1K)</td>
<td>Cloud hosted DNA Center integrates vManage capabilities</td>
</tr>
<tr>
<td>Management:</td>
<td>vSmart</td>
<td>Full DNA Center capabilities (Assurance, Integrated workflows for SD-Access and SD-WAN)</td>
<td></td>
</tr>
</tbody>
</table>
Hardware
Cisco ASR 1000 series aggregation services routers:
   ASR 1001-HX and ASR 1001-X
   ASR 1002-HX and ASR 1002-X
Cisco ISR 1000 series integrated services routers:
   C1111-8P, C1111-8P LTE EA, and C1111-8P LTE LA
   C1117-4P LTE EA and C1117-4P LTE LA
Cisco 4000 series integrated services routers:
   ISR 4221
   ISR 4321
   ISR 4331
   ISR 4351
ENCS 5406 / 5408 / 5412 with T1/E1 and 4G NIM modules:
   ISRv
## 16.9.1 (July) : Supported Platforms and Modules

<table>
<thead>
<tr>
<th>Platform/Modules</th>
<th>ISR1K (1111-8P, 1117-4P)</th>
<th>ISR4K (4221, 4321, 4331, 4351)</th>
<th>ENCS (ISRv on 5412)</th>
<th>ASR1K (1001X/HX, 1002X/HX)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIM-1/2/4/8MFT-T1/E1</td>
<td>NA</td>
<td>Now</td>
<td>Yes</td>
<td>NA</td>
</tr>
<tr>
<td>NIM-VAB-A, NIM-VAB-M</td>
<td>Now Built-in</td>
<td>Now</td>
<td>Nov 2018</td>
<td>NA</td>
</tr>
<tr>
<td>NIM-LTEA-EA/LA</td>
<td>Now Built-in</td>
<td>Now</td>
<td>Now</td>
<td>NA</td>
</tr>
<tr>
<td>NIM-ES2-4/8</td>
<td>Now Built-in</td>
<td>Now</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>NIM-1GE-CU-SFP</td>
<td>NA</td>
<td>Now</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>NIM-2GE-CU-SFP</td>
<td>NA</td>
<td>Now</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>SM-X-4X1G-1X10G</td>
<td>NA</td>
<td>Now</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>SM-X-6X1G</td>
<td>NA</td>
<td>Now</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>
Software
Software capabilities available in July 16.9.1

**Protocols**
- OMP
- BGP
- OSPF
- VRRP

**Security**
- Segmentation
- Umbrella Branch
- Zone-Based Firewall
- DIA (NAT, Split Tunnel, etc.)

**AppExperience**
- DPI (NBAR2), M&T
- App route policy
- Cloud-Onramp for IaaS
- QoS
  - 8 Queues (1 priority & 7 B/W)
  - Interface shaper
Software capabilities not available in July 16.9.1

<table>
<thead>
<tr>
<th>Protocols</th>
<th>Security</th>
<th>AppExperience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eigrp</td>
<td>Umbrella auto-registration</td>
<td>WAAS</td>
</tr>
<tr>
<td>HSRP</td>
<td>Local domain bypass for DIA</td>
<td>TCP Optimization</td>
</tr>
<tr>
<td>Multicast</td>
<td></td>
<td>Cloud Onramp for SaaS</td>
</tr>
<tr>
<td>Ipv6</td>
<td></td>
<td>UC- SRTST</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PSTN GW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIP GW</td>
</tr>
</tbody>
</table>
Zone based firewall

• Prevent lateral movements of threats (e.g. printing service should not create new connections to employee network)

• PCI compliance
Cisco Umbrella DNS-layer Enforcement

- Threat protection against malware, phishing, and unacceptable requests by blocking based on DNS requests
Monitoring & Troubleshooting

Application visibility

Monitoring – BFD stats

Real time troubleshooting
Licensing
Routing offer structure

DNA Essentials
- Basic connectivity, security & application visibility

DNA Advantage
- Flexible connectivity, advanced security & enhanced application experience

DNA Premier
- Advanced application policy & experience using analytics & assurance

Network Essentials* (Perpetual)
- vEdge, ENCS 5000, ISR 1000, ISR 4000**, ASR 1000

Network Advantage* (Perpetual)
- vEdge, ENCS 5000, ISR 1000, ISR 4000**, ASR 1000

Software Support included in all subscriptions
Management flexibility: On-prem or cloud based
### DNA Essentials

**Connectivity**
- VPN Overlay, Topology: Hub-n-spoke, NAT, Split tunnel, 2 VPNs: 1 transport, 1 service side
- VPN with L2 or L3

**Security**
- Encryption: AES-256,
- Policy support: Local ACL only, Data policy

**Application Experience**
- QoS (classification, policing, remarking, scheduling), App-aware routing (5 tuple only), DPI for visibility, App visibility (name, throughput)

**Management**
- Viptela vManage platform, Zero Touch Provisioning, Day 0, day 1, day N Changes

### DNA Advantage (Include DNA Essentials)

**Connectivity**
- Service-side routing, Mesh topology, Multicast
- VPNs: 5 (1 transport, 4 service side)

**Security**
- Control policy
- Advanced policies: Service chaining, extranet

**Application Experience:**
- DPI for app-aware routing and policies
- SaaS on-ramp (was CloudExpress)
- TCP Optimization

**Management & Orchestration**
- End to end SD-WAN policy orchestration, network and application trouble shooting

### DNA Premier (Include DNA Essentials & DNA Advantage)

**Connectivity:**
- VPNs: Up to system scale

**Advanced Application Experience**
- WAN Full stack WAAS

**Analytics:**
- VAnalytics platform

---

**Platforms Supported**
- Now: vedge
- Platforms Support Post July: ISR, ASR, ENCS
Migration
Config tool

Upload XE config

Config Validation

List features/modules not supported

Convert into SD-WAN config

Export to vManage
Upload

Upload a file

Manually select a file below or
Drag and drop it here.

Browse for a file

Upload
Verify
Modify
Convert
Export

Next
Validate & Show
Demo
Konverterer ISR4331 til SDWAN-XE
Check Rommon version, minimum 16.7(3r)

Router#sh rom-monitor 0

System Bootstrap, Version 15.4(3r)S1, RELEASE SOFTWARE (fc1)
Copyright (c) 1994-2014 by cisco Systems, Inc.

Router#copy http://dulong.dk/cisco/isr4200_4300_rommon_167_3r_SPA.pkg flash:
Destination filename [isr4200_4300_rommon_167_3r_SPA.pkg]?
Accessing http://dulong.dk/cisco/isr4200_4300_rommon_167_3r_SPA.pkg...
Loading http://dulong.dk/cisco/isr4200_4300_rommon_167_3r_SPA.pkg !!!!!!!!!!
2606028 bytes copied in 2.150 secs (1212106 bytes/sec)
Router#
Upgrade Rommon version

Router#**upgrade rom-monitor file bootflash:isr4200_4300_rommon_167_3r_SPA.pkg R0**

ROMMON upgrade complete.
To make the new ROMMON permanent, you must restart the RP.
Router#
Download SDWAN Rootcert og software

Router#
Router# copy http://dulong.dk/cisco/RootCert.crt flash:
Destination filename [RootCert.crt]?
Accessing http://dulong.dk/cisco/RootCert.crt...
Loading http://dulong.dk/cisco/RootCert.crt
1294 bytes copied in 0.037 secs (34973 bytes/sec)
Router#
Router# copy http://dulong.dk/cisco/isr4300-ucmk9.16.9.1.SPA.bin flash:
Destination filename [isr4300-ucmk9.16.9.1.SPA.bin]?
Accessing http://dulong.dk/cisco/isr4300-ucmk9.16.9.1.SPA.bin...
Loading http://dulong.dk/cisco/isr4300-ucmk9.16.9.1.SPA.bin !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
421341703 bytes copied in 332.159 secs (1268494 bytes/sec)

Check at der er 1.5 GB ledig space til XE SD-WAN!
Find Router Serial#, PID, Certificate Serial#

Router# `show crypto pki certificates CISCO_IDEVID_SUDI`
Certificate
  Status: Available
  Certificate Serial Number (hex): 021C35FD
  Certificate Usage: General Purpose
Issuer:
  cn=ACT2 SUDI CA
  o=Cisco
Subject:
  Name: ISR4331-B/K9
  Serial Number: PID: **ISR4331-B/K9** SN: FDO2147333K
  cn=ISR4331-B/K9
Demo, SDWAN redirect på Cisco cloud PnP server
Nyt i Viptela 18.3/SDWAN-XE 16.9.1
**Viptela Integration Roadmap: Cisco SDWAN**

### Phase 1
**No Integration**
- **Platform:** vManage vSmart
- **Deployment Scenarios:**
  - vEdge
- **Benefits:** Support and Scale the current sales motion
- **Details:**
  - **Platform:** As-is
  - **Management:** vManage

### Phase 2 (Mar/Jul 2018)
**Platform Integration**
- **Platform:** vManage vSmart
- **Deployment Scenarios:**
  - vEdge
  - ISR1K, ISR4K, ASR1K
- **Benefits:** Viptela SD-WAN on strategic ISR/ASR platform
- **Details:**
  - **Platform:** vEdge capabilities integrated into all IOS-XE platforms (ISR, CSR, ENCS, ASR1K)
  - **Management:** vManage for SD-WAN capabilities on IOS-XE

### Phase 3 (Aug 2018+)
**Management Integration**
- **Platform:** DNA Center + SD-WAN
- **Deployment Scenarios:**
  - vEdge
  - ISR1K, ISR4K, ASR1K
- **Benefits:** Deliver end-to-end experience with full DNA integration
- **Details:**
  - **Management:**
    - Cloud hosted DNA Center integrates vManage capabilities
    - Full DNA Center capabilities (Assurance, Integrated workflows for SD-Access and SD-WAN)
Cisco SD-WAN Platform Diversity

- **ISR1K**
  - 1111-8P, 1117-4P and more
- **ISR4K**
  - 4221, 4321, 4331, 4351
- **ASR1K**
  - 1001X, 1001HX, 1002X, 1002HX
- **ENCS 5406/5408/5412**
  - IOSv
- **Interfaces**
  - NIM-1/2/4/8MFT-T1/E1
  - NIM-VAB-A, NIM-VA-B, NIM-VAB-M
  - NIM-LTEA-EA/LA
  - NIM-ES2-4/8

Note: vEdges must run 17.2.1 code or newer
### Software Capabilities NOT Available in 16.9.1

<table>
<thead>
<tr>
<th>Protocols</th>
<th>Security</th>
<th>App Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>EIGRP</td>
<td>Umbrella Auto-Registration</td>
<td>WAAS</td>
</tr>
<tr>
<td>HSRP</td>
<td>Local Domain Bypass for DIA</td>
<td>TCP Optimization</td>
</tr>
<tr>
<td>Multicast</td>
<td></td>
<td>Cloud Onramp for SaaS</td>
</tr>
<tr>
<td>IPv6</td>
<td></td>
<td>Voice Features</td>
</tr>
</tbody>
</table>
Local Service Tracking
Local Service Tracking

• Pre-18.3, when service insertion was defined using local service node, traffic would blackhole in case the interface toward the service node went down.

• With 18.3 local service tracking, when service insertion is defined using local service node, traffic can bypass the service node (follow routing) in case the interface toward the service node goes down. It can also be forced to blackhole in this case.
Local Service Tracking

Service defined in the VPN1 on the WAN Edge

Match: <Address|Port|Application>
Action: Set Service <Service ID> Local

Default - If WAN Edge interface toward service is down, fallback to routing
Restrict - If WAN Edge interface toward service is down, blackhole
Note: No service monitoring
Local Service Tracking Configuration

Data Policy Local Service Insertion
CoS (802.1p) Marking
COS (802.1p) Marking and Re-marking

• Pre-18.3, in case of Layer 2 transports, all frames are marked with COS 0
• With 18.3 COS (802.1p) marking, frames can be marked with custom COS value before being sent to Layer 2 transports
COS (802.1p) Marking and Re-marking

- Comply with service providers provisioned classes of service for Layer 2 transports
- 802.1p Class of Service value is set using re-write rules applied to the egress tunnel interface
  - Define with local data policy, apply with configuration templates
- Can co-exist with DSCP markings/re-markings of inner and outer IP headers
802.1p COS Marking Configuration

Add Re-Write Rule

Local Data Policy

Name: RewritePolicy
Description: Rewrite 802.1p on Egress

Add Rewrite Rule

<table>
<thead>
<tr>
<th>Class Name</th>
<th>Priority</th>
<th>DSCP</th>
<th>Layer 2 Class of Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>StrictPriority</td>
<td>High</td>
<td>--</td>
<td>5</td>
</tr>
<tr>
<td>HighPriority</td>
<td>High</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>LowPriority</td>
<td>Low</td>
<td>--</td>
<td>0</td>
</tr>
</tbody>
</table>
# 802.1p COS Marking Configuration

## WAN Edge Configuration Template

<table>
<thead>
<tr>
<th>ACL/QOS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shaping Rate (Kbps)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>QoS Map</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Rewrite Rule</strong></td>
<td><strong>RewritePolicy</strong></td>
</tr>
</tbody>
</table>
NAT Pool for Direct Internet Access
Supported NAT Types Prior to 18.3

- **Service Side NAT**: Subnet A ----> Subnet B
- **DIA NAT**: Subnet A ----> Internet
- **Port Forwarding**: Subnet A ----> DMZ
  - Internet ----> DMZ
NAT Pool for Direct Internet Access

- NAT Pool is defined on vEdge router DIA interface
  - Should be routable from Internet
- For each DIA connection using different host source IP address, vEdge router chooses new IP address from the NAT Pool
  - Can statically map to one of the NAT Pool IP addresses
- When NAT Pool IP addresses are exhausted, vEdge router performs “overload” into the first NAT Pool IP address
  - Port Address Translation
NAT Pool for Direct Internet Access Configuration

NAT Pool Range

Static Mapping (optional)

Transport Side Interface Configuration Template
Cloud onRamp for IaaS Multi Account
Cloud onRamp for IaaS – Multi Account

- Pre-18.3, Gateway VPCs/VNets and host VPCs/VNets must reside in the same AWS/MS-Azure account
- With 18.3 Multi Account, Gateway VPCs/VNets and host VPCs/VNets can reside in a different AWS/MS-Azure accounts
Cloud onRamp for IaaS – Multi Account

Account2

AWS Region

Account1

Gateway VPC

AZ1

AZ2

Host VPC

Account2

Azure Region

Account1

Host VNET

VNET Gateway

AS1

AS2

AZ1

AZ2

WAN Edge

VPN GW

Account3

VPC

Account3

VPC

Account2

WAN Edge

VGW

Account3

VPC

© 2018 Cisco and/or its affiliates. All rights reserved. Cisco Public
Cloud onRamp for IaaS – Multi Account Configuration

Cloud onRamp for Azure

Cloud onRamp for AWS
Custom Gateway VPC/VNet
CIDR
Custom Gateway VPC/VNet CIDR

- Pre-18.3, Gateway VPCs/VNets were instantiated with an assigned CIDR of 10.0.0.0/16
- With 18.3 custom gateway VPCs/VNets CIDRs, each Gateway VPC/VNet can be instantiated with its own CIDR block. Could be used in conjunction with VPC/VNet peering.
Custom Gateway VPC/VNet CIDR Configuration

Cloud onRamp Gateway VPC Wizard
SSO Integration
SSO Integration

• Pre-18.3, authentication into vManage GUI was controlled by either local user database or external authentication system linked to through RADIUS/TACACS. Did not support multitenant authentication with RADIUS/TACACS.

• With 18.3 SSO support, authentication into vManage GUI can now be integrated with a corporate SSO servers. Supports multitenant authentication.
SSO Integration Configuration

1. Administrator enables SSO via the vManage settings page
2. Administrator gets metadata from identity provider and uploads it to vManage
3. Administrator downloads vManage metadata and uploads it to the identity provider
vManage Alarms Email Notifications
vManage Alarms Email Notifications

- Pre-18.3, Cisco vManage did not support any email notifications
- With 18.3 vManage alarms emails notification, vManage can initiate email notifications for alarms with different severity and for devices of choice
vManage Alarms Email Notifications

vManage Settings

Alarm Severity and Alarm Name Selection
vManage Alarms Email Notifications

Select Devices

- All Devices
- Custom

Attach device from the list below

Available Devices

<table>
<thead>
<tr>
<th>Host Name</th>
<th>Device IP</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWS-Direct</td>
<td>1.1.2.5</td>
</tr>
<tr>
<td>AWS-Gateway-East</td>
<td>1.1.1.11</td>
</tr>
<tr>
<td>AWS-Gateway-East</td>
<td>1.1.1.10</td>
</tr>
</tbody>
</table>

Webhook Callback

Device Selection

- Webhook

Username

Password

WebHook URL
More Performance, More Platform options and More Simplicity on the ISR

More Performance

Booster license takes the shaper of ISR 4000

Booster speed (Gbps)

<table>
<thead>
<tr>
<th>Model</th>
<th>1.00</th>
<th>2.00</th>
<th>3.00</th>
<th>4.00</th>
<th>5.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISR 4221</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISR 4321</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISR 4331</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISR 4351</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISR 4431</td>
<td>3.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISR 4451</td>
<td>3.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

More XE Platforms

C110x - New fixed configuration & fanless XE routers

More XE Platforms

ISR4461 – Multigig 3RU

ISR4k

More Simplicity

SDWAN XE integration on IOS XE
## ISR 4000 Boost

What performance level are you looking for?

<table>
<thead>
<tr>
<th>Platform</th>
<th>Factory Default</th>
<th>Performance License</th>
<th>Boost License</th>
</tr>
</thead>
<tbody>
<tr>
<td>4451</td>
<td>1Gbps</td>
<td>2 Gbps @ 19% CPU</td>
<td>4 Gbps* @ 35% CPU</td>
</tr>
<tr>
<td>4431</td>
<td>500Mbps</td>
<td>1 Gbps @ 18% CPU</td>
<td>4 Gbps* @ 62% CPU</td>
</tr>
<tr>
<td>4351</td>
<td>200Mbps</td>
<td>400 Mbps @ 17% CPU</td>
<td>2 Gbps* @ 45% CPU</td>
</tr>
<tr>
<td>4331</td>
<td>100Mbps</td>
<td>300 Mbps @ 16% CPU</td>
<td>2 Gbps* @ 53% CPU</td>
</tr>
<tr>
<td>4321</td>
<td>50Mbps</td>
<td>100 Mbps @ 8% CPU</td>
<td>2 Gbps* @ 68% CPU</td>
</tr>
<tr>
<td>4221</td>
<td>35Mbps</td>
<td>75 Mbps @ 8% CPU</td>
<td>1.4 Gbps @ 94% CPU</td>
</tr>
</tbody>
</table>

* Test results for IP Routing @ IMIX
  Clocked interface speed was the limit.
  Tested with one onboard interface pairs on 4300 = 2 Gbps
  Tested with two onboard interface pairs on 4400 = 4 Gbps
  Room for higher throughput with more interfaces or additional services with maintained throughput

• Throughput gains when previously hitting the Performance license limit**
  • IPSec 256 AES with IMIX in Boost
    • 4331 @ 565 Mbps = 2x throughput compared to 300 Mbps Perf license
    • 4451 @ 1.6 Gbps = Same throughput as with 2 Gbps Perf license

** Applicable to most ISR4k platforms and test cases. Exceptions exist for 4331 and 4351 in that Boost repurposes cores on 4331 & 4351
Boost License: Unthrottling the performance

stefs_Sword(config)#platform hardware throughput level ?
100000  throughput in kbps
300000  throughput in kbps
boost   Enables unthrottled throughput traffic

stefs_Sword#sh pla ha throughput level
The current throughput level is unthrottled
## ISR4k – Dataplane core allocation

<table>
<thead>
<tr>
<th></th>
<th>Factory Default</th>
<th>With Performance License</th>
<th>With Boost License</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dataplane Cores</strong></td>
<td><strong>Max Throughput</strong></td>
<td><strong>Dataplane Cores</strong></td>
<td><strong>Max Throughput</strong></td>
</tr>
<tr>
<td>4221</td>
<td>1 x PPE + 1 x I/O</td>
<td>35 Mbps</td>
<td>1 x PPE + 1 x I/O</td>
</tr>
<tr>
<td>4321</td>
<td>1 x PPE + 1 x I/O</td>
<td>50 Mbps</td>
<td>1 x PPE + 1 x I/O</td>
</tr>
<tr>
<td>4331</td>
<td>2 x PPE + 1 x I/O</td>
<td>100 Mbps</td>
<td>3 x PPE + 1 x I/O</td>
</tr>
<tr>
<td>4351</td>
<td>2 x PPE + 1 x I/O</td>
<td>200 Mbps</td>
<td>3 x PPE + 1 x I/O</td>
</tr>
<tr>
<td>4431</td>
<td>3 x PPE + 1 x I/O</td>
<td>500 Mbps</td>
<td>5 x PPE + 1 x I/O</td>
</tr>
<tr>
<td>4451</td>
<td>5 x PPE + 1 x I/O</td>
<td>1 Gbps</td>
<td>9 x PPE + 1 x I/O</td>
</tr>
</tbody>
</table>

- **PPE**
  - Packet Processing Engine = Packet Forwarding Core
- **I/O Core**
  - In/Out Scheduling, Buffering & Queueing + Crypto Assist on 4300/4221
- **Encryption**
  - 4400
    - Each PPE holds crypto assist resource
  - 4300/4221
    - Crypto assist centralized to I/O core
ISR1000 recap
Introducing the Cisco 1100 Series Integrated Services Routers

**Robust Performance**
- Dedicated core for data plane
- Separate crypto engine

**Innovation**
- Multi-core architecture
- LTE Advanced
- 802.11ac Wave 2 & Mobility Express
- Next-generation DSL

**Future Proof Architecture**
- IOS XE
- High performance for future bandwidth needs
- Support for the latest WAN and LAN technology
C1100-8P Ethernet + LTE + WLAN
Back Panel
C1100-4P/8P
Front Panel

Illuminated Cisco logo

GPS
LTE DATA/SIM

PWR
RSSI/Mode

VPN
Portfolio Overview
# Product Overview

<table>
<thead>
<tr>
<th>Feature</th>
<th>C1100-4P</th>
<th>C1100-8P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WAN Ethernet</strong></td>
<td>1 GE/SFP*</td>
<td>1GE/SFP+</td>
</tr>
<tr>
<td></td>
<td>1GE/SFP &amp; 1GE</td>
<td>1GE/SFP+ &amp; 1GE</td>
</tr>
<tr>
<td><strong>LTE Advanced</strong></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>SFP/SFP+</strong></td>
<td>Yes/No</td>
<td>Yes/Yes</td>
</tr>
<tr>
<td><strong>VDSL2/ADSL2/2+</strong></td>
<td>Yes</td>
<td>Roadmap</td>
</tr>
<tr>
<td><strong>802.11ac Wave 2 Dual Radio</strong></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Managed Switch Ports</strong></td>
<td>4 GE</td>
<td>8 GE</td>
</tr>
<tr>
<td><strong>Voice</strong></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>VLANs (Wired and Wireless)</strong></td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td><strong>Switching Capacity</strong></td>
<td>Line-rate</td>
<td>Line-rate</td>
</tr>
<tr>
<td><strong>Internal PoE Option</strong></td>
<td>1 PoE+ / 2 PoE</td>
<td>2 PoE+ / 4 PoE</td>
</tr>
</tbody>
</table>

* All C1100-4P with DSL offer only one WAN port with 1GE/SFP
## Product Overview

<table>
<thead>
<tr>
<th></th>
<th>C1100-4P</th>
<th>C1100-8P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU</strong></td>
<td>4 cores*</td>
<td>4 cores**</td>
</tr>
<tr>
<td><strong>Flash (fixed)</strong></td>
<td>4GB</td>
<td>4GB</td>
</tr>
<tr>
<td><strong>DRAM (fixed)</strong></td>
<td>4GB</td>
<td>4GB</td>
</tr>
<tr>
<td><strong>USB Ports</strong></td>
<td>1 (USB 3.0)</td>
<td>1 (USB 3.0)</td>
</tr>
<tr>
<td><strong>Console</strong></td>
<td>RJ45 + Micro USB</td>
<td>RJ45 + Micro USB</td>
</tr>
<tr>
<td><strong>Dimension</strong></td>
<td>12.7” (W) x 9.0” (D) x 1RU (H)</td>
<td>12.7” (W) x 9.0” (D) x 1RU (H)</td>
</tr>
<tr>
<td><strong>Operating Temperature</strong></td>
<td>0-40°C</td>
<td>0-40°C</td>
</tr>
<tr>
<td><strong>Rack/Wall Mounting</strong></td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* The C11000-8P is clocked at a higher CPU rate than the C1100-4P
** Only three cores in use at the moment. More details will follow on the unused core
ISR 1100 Naming Convention

1. Prefix
   “C” = Standard Product ID (PID) prefix

2. Product Number
   The second portion of Product ID after the hyphen identifies the number of LAN ports:
   • “-4P” = 4 LAN ports
   • “-8P” = 8 LAN ports

   The last digit on the first portion of Product ID identifies the onboard GE and DSL WAN interfaces:
   • “1111” = Two GE WAN interfaces
   • “1116” = One GE WAN Interface and One DSL Interface with VDSL/ADSL2+ Annex B & J over ISDN
   • “1117” = One GE WAN Interface and One DSL with VDSL/ADSL2 + Annex A or M over POTS

3. Product Capabilities
   Wireless LAN:
   • “WE” = -E Wireless Domain
   • “WB” = -B Wireless Domain
   • “WA” = -A Wireless Domain
   • “WZ” = -Z Wireless Domain
   • “WN” = -N Wireless Domain
   • “WQ” = -Q Wireless Domain
   • “WH” = -H Wireless Domain
   • “WR” = -R Wireless Domain
   • “WF” = -F Wireless Domain
   • “WD” = -D Wireless Domain

   Wireless WAN:
   • “LTEEA” = LTE for US, Europe, Canada and Middle East
   • “LTELA” = LTE for APJ and some providers in LATAM

© 2018 Cisco and/or its affiliates. All rights reserved. Cisco Public
<table>
<thead>
<tr>
<th>Feature</th>
<th>C880</th>
<th>C890</th>
<th>C1100-4P</th>
<th>C1100-8P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>IOS Classic</td>
<td></td>
<td>IOS XE</td>
<td></td>
</tr>
<tr>
<td>Dual Ethernet WAN</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>LTE Advanced</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>SFP/SFP+</td>
<td>No</td>
<td>Yes/No</td>
<td>Yes/No</td>
<td>Yes/Yes</td>
</tr>
<tr>
<td>VDSL2</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Roadmap</td>
</tr>
<tr>
<td>ADSL2/2+</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Roadmap</td>
</tr>
<tr>
<td>G.SHDSL</td>
<td>Yes</td>
<td>Yes</td>
<td>Roadmap</td>
<td>Roadmap</td>
</tr>
<tr>
<td>G.FAST/VDSL2 35b</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Roadmap</td>
</tr>
<tr>
<td>802.11ac Wave 2</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>LAN Ports</td>
<td>4 FE</td>
<td>8 GE</td>
<td>4 GE</td>
<td>8 GE</td>
</tr>
<tr>
<td>VLAN</td>
<td>25</td>
<td>25</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>Internal PoE Option</td>
<td>2 PoE</td>
<td>4 PoE</td>
<td>1 PoE+ / 2 PoE</td>
<td>2 PoE+ / 4 PoE</td>
</tr>
</tbody>
</table>
Hardware Overview
C1100 Hardware Diagram

4-Core SoC

- CP
- DP₁
- DP₂
- Crypto Engine

4GB DRAM
4GB Flash
WAN GE Phy

WLAN AP
Ethernet Switch
PoE

1Gbps Connection

- VDSL SoC
- LTE Modem

FPGA

- C1100-8P: 2.5 Gbps / 2.5 Gbps
- C1100-4P: 1 Gbps / 1 Gbps
C1100 PoE Overview

- PoE is supported only on the designated ports

- A PoE daughter card and appropriate power supply are required
  - C1100-4P: ISR-1100-POE2 with 115W Power Supply
  - C1100-8P: ISR-1100-POE4 with 125W Power Supply*

* PoE is not orderable in the US for the C1100-8P due to some compliance issue. Please wait for further notice

© 2018 Cisco and/or its affiliates. All rights reserved. Cisco Public
Licensing Overview
Licensing Packaging Model

APP

SEC

IP Base

HSEC9*

Performance

* Available from IOS XE 16.7.1
Licensing Packaging Overview

- Feature Licensing Packaging Structure
  - Feature parity with the ISR 4000 on IP Base, APP, and SEC

- Non-crypto traffic has no shaper and requires no additional license to increase performance
- IPsec Crypto throughput shaped at 50 Mbps without Performance License
- It's either Performance License or HSEC9 license
- Performance License raises the bar on the shaper for crypto throughput beyond 50 Mbps
  - C1100-4P: Crypto throughput shaped at 150 Mbps with Performance License
  - C1100-8P: Crypto throughput shaped at 250 Mbps with Performance License
- HSEC9 License will allow the maximum throughput levels by disabling the shaper on crypto traffic
  - C1100-4P & C1100-8P: Crypto throughput up to 350 Mbps with HSEC9
# Licensing Packaging Overview

<table>
<thead>
<tr>
<th>Licensing Package</th>
<th>Features*</th>
<th>Use case</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP Base</td>
<td>NAT, DHCP, BGP, QoS</td>
<td>Basic internet connectivity</td>
</tr>
<tr>
<td>IP Base + APP</td>
<td>MPLS, IP SLA Probes, PfR, AVC</td>
<td>Branch on MPLS</td>
</tr>
<tr>
<td>IP Base + SEC</td>
<td>IPSec, DMVPN, ZBFW</td>
<td>Branch over the internet</td>
</tr>
<tr>
<td>IP Base + SEC + Performance</td>
<td>Faster IPsec throughput up to 250 Mbps</td>
<td>VDSL2 or higher internet connection</td>
</tr>
<tr>
<td>IP Base + SEC + APP</td>
<td>IWAN</td>
<td>Dual WAN with application load-balancing</td>
</tr>
<tr>
<td>IP Base + SEC + APP + Performance</td>
<td>IWAN throughput up to 250 Mbps</td>
<td>IWAN branch with high throughput</td>
</tr>
<tr>
<td>IP Base + SEC + HSEC</td>
<td>IPsec throughput beyond 250 Mbps</td>
<td>Branch with Ethernet or Fiber</td>
</tr>
<tr>
<td>IP Base + SEC + APP + HSEC</td>
<td>IWAN throughput beyond 250 Mbps</td>
<td>IWAN branch with ultrafast throughput</td>
</tr>
</tbody>
</table>

*Please refer to Appendix A for more on software features
Performance
## Performance Overview

<table>
<thead>
<tr>
<th>LAN to WAN Traffic Profiles</th>
<th>C1100-4P</th>
<th>C1100-8P</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEF IMIX</td>
<td>1,200 Mbps</td>
<td>1,730 Mbps</td>
</tr>
<tr>
<td>IPsec (AES256) IMIX*</td>
<td>240 Mbps</td>
<td>340 Mbps</td>
</tr>
<tr>
<td>NAT IMIX</td>
<td>660 Mbps</td>
<td>960 Mbps</td>
</tr>
<tr>
<td>HQoS IMIX</td>
<td>670 Mbps</td>
<td>960 Mbps</td>
</tr>
<tr>
<td>ACL+NAT+HQoS</td>
<td>355 Mbps</td>
<td>510 Mbps</td>
</tr>
</tbody>
</table>

* IPsec (AES256) IMIX is measured with HSEC installed on the router
Introducing C1101 family

Super Compact Form Factor

Single Pluggable slot

Pluggable WWAN

LTE-Main SMA

LTE-Div SMA

GPS SMA

Micro USB Debug Port
Introducing C1101

Single Pluggable slot

Super Compact Form Factor

<table>
<thead>
<tr>
<th>SKU</th>
<th>Description</th>
<th>Target FCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1101-4P</td>
<td>Super compact format – No LTE</td>
<td>July 2018</td>
</tr>
<tr>
<td>C1101-4PLTEP</td>
<td>Compact - Single Pluggable Slot</td>
<td>Aug 2018</td>
</tr>
<tr>
<td>C1101-4PLTEPWX</td>
<td>As C1101-4PLTEP + Embedded 802.11ac WiFi</td>
<td>Aug 2018</td>
</tr>
</tbody>
</table>
C1101 at a glance

- Multi-core architecture and IOS code base same as C1111-4P
  - Same performance and scaling
  - Same License & SW Tech package structure
  - Same CAT6 LTE Advanced EM7XX technology and features

- KEY Differences from C1111-4P
  - Interface: One GE WAN, No PoE on ports, No SFP option
  - Smaller form factor with WWAN LTE Pluggable Technology
  - uPOE power injector splitter option
  - Micro USB to RJ45 console port
On popular request:

C1k M2M Series
Extended temperature range
C1109 M2M Series platforms

Compact form factor

1 x WAN, 2 x LAN, Cat4 LTE
0C to +50C

Up to +55 C

Dual Pluggable slot

1 x WAN, 4 x LAN, Cat4/6 LTE & Wifi 802.11 ac
-15C to +55C

Down to -15 C
## C1109 M2M Series Roadmap

<table>
<thead>
<tr>
<th>SKU</th>
<th>Description</th>
<th>Target FCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1109-2PLTEXX</td>
<td>Compact form factor Fixed Embedded CAT4 LTE 0–50°C extended temperature</td>
<td>Sep 2018</td>
</tr>
<tr>
<td>C1109-4PLTE2P</td>
<td>Dual Pluggable slots -15 to 55°C extended temperature</td>
<td>Sep 2018</td>
</tr>
<tr>
<td>C1109-4PLTE2PWX</td>
<td>Dual Pluggable slots Embedded 802.11ac WiFi -15 to 55°C extended temperature</td>
<td>Sep 2018</td>
</tr>
</tbody>
</table>
C110x family at a glance

- C110x belongs to the C1100 family and uses the same architecture and code base.
- C1101-4P and C1109-4P SKUs support pluggable modules which can be replaced in the field by the customer.
- Dual LTE pluggable modules supported on C1109-4PLTE2P SKUs
- Supported pluggables in the pipeline
  - LTE (Cat 6 (EM74xx) and Cat 4 (WP76xx))
- Wifi SKUs support Wifi 802.11 ac module as an alien module. Same as C111x
- Interface Numbering same as C111x
- C1101 and C1109 can both be powered by uPoE – uPoE Splitter on the roadmap
- Micro USB console - C1101 and C1109 will support only micro-USB console interface.
Management Tool Demo
ISR 4461
ISR 4461
The most scalable, highest performing ISR to-date

Key specs

Performance and capability
- Multi Gbps Throughput
- 1.5 / 3Gbps / Boost (10+)
- Up to 7 Gbps IPSec
- 8 GB RAM, 16GB Flash
- IOS-XE or SD-WAN

Form factor and scalability
- 3RU and 19” depth
- 2 x 10Gbps + 4 x 1Gbps
- 2 x PoE ports (on the 1G ports)
- 3xSM slots (3SW, 2DW, 2SW + 1DW)
- 3xNIM slots
- Power supply options: 1000W, 650W and 450W DC
- Support for redundant power supply

Front panel connectivity
- USB storage, RJ45 console, Aux
- WAN MACSec on all ports

Branch in a Box with Network, UC, Security, Compute and Storage all in one platform
Enterprise NFV running 10+VNFs on 24 cores of UCS E-Series and NFVIS

EFT started
FCS targeted for October time frame
Cisco vEdge HW platforms
SD-WAN Platforms

Branch virtualization
- ENCS 5100
  - Up to 250Mbps
- ENCS 5400
  - 250Mbps - 2GB

Public Cloud
- Microsoft Azure
- Amazon Web Services

SD-WAN
- vEdge 100
  - 100 Mbps
  - 4G LTE & Wireless
- vEdge 1000
  - Up to 1 Gbps
  - Fixed
- vEdge 2000
  - 10 Gbps
  - Modular

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

© 2018 Cisco and/or its affiliates. All rights reserved. Cisco Public
## vEdge-1000 and vEdge-2000 Routers

### Hardware Specification

#### vEdge 1000
- 1 Gbps AES-256
- 1RU, standard rack mountable
- 8x GE SFP (10/100/1000)
- TPM chip
- 3G/4G via USB (or) Ethernet
- Security, QoS
- Dual Power supplies (external)
- Low power consumption

#### vEdge 2000
- 10 Gbps AES-256
- 1RU, standard rack mountable
- 4x Fixed GE SFP (10/100/1000)
- 2 Pluggable Interface Modules
- 8 x 1GE SFP (10/100/1000)
- 2 x 10GE SFP+
- TPM chip
- 3G/4G via USB (or) Ethernet
- Security, QoS
- Dual Power supplies (internal)
- Redundant fans

#### vEdge 5000
- 20 Gbps AES-256
- 1RU, standard rack mountable
- 4 NIMs (Network Interface Modules)
- 8 x 1GE SFP (10/100/1000)
- 4 x 10GE SFP+
- TPM chip
- 3G/4G via USB (or) Ethernet
- Security, QoS
- Dual power supplies (internal)
- Redundant fans
vEdge-100 Routers
Hardware Specification

vEdge 100

- 100 Mbps AES-256
- 5x 1000Base-T
- TPM chip
- Security, QoS
- External AC PS
- Kensington lock
- Fan-less
- 9” x 1.75” x 5.5”
- GPS

vEdge 100m

- 100 Mbps AES-256
- 1RU
- 5x 1000Base-T
- 1x POE port
- 2G/3G/4G LTE
- Internal AC PS
- 1x USB-3.0
- TPM Board-ID
- Kensington lock
- Low power fan
- GPS

vEdge 100mw

- 100 Mbps AES-256
- 1RU
- 5x 1000Base-T
- 1x POE port
- 2G/3G/4G LTE
- 802.11a/b/g/n/ac
- Internal AC PS
- 1x USB-3.0
- TPM Board-ID
- Kensington lock
- Low power fan
- GPS
vEdge Cloud Virtual Routers
Deployment Methodology

On-Premise

vEdgeCloud

ESXi or KVM

Physical Server

Hosted

vEdgeCloud

AWS or Azure

Throughput:
2x vCPU 500Mb/s
4x vCPU 1Gb/s
8x vCPU 1.5Gb/s

VM
Mere SD-wan
Vil du vide endnu mere om SD-wan

Cisco Live US ‘18

- SD-WAN Routing Migrations - BRKRST-2095
- Migration to Next-Gen Cisco SD-WAN - BRKCRS-2111
- Serviceability for Next Generation SD-WAN - BRKCRS-2112
- Getting Poor Cloud performance? Cisco SD-WAN is Here for You - PSOEWN-1100
- Next-Gen SD-WAN (Viptela) Deployment, Monitoring, and Troubleshooting - BRKRST-2093
- Cisco SD-WAN (Viptela) Data Center and Branch Integration Design - BRKRST-2091
- Introduction to Next-Gen SD-WAN (Viptela) Architecture - BRKRST-2092
- Cloud-Ready WAN for IAAS and SAAS with Cisco Next-Gen SD-WAN - BRKCRS-2113
- Delivering Cisco Next Generation SD-WAN with Viptela - BRKCRS-2110

Naryan’s youtube channel.
https://www.youtube.com/channel/UCUnvcD6xXOc6rIb7MgR79RA/videos
dCloud

- Cisco 4D SD-WAN (Viptela) v2

*Kontakt os for at få adgang til et demo lab på dcloud.*
Kommende arrangementer
# CVU & Techupdates

## September

<table>
<thead>
<tr>
<th>Dato</th>
<th>Seminar/event</th>
<th>Målgruppe</th>
<th>Sted</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. og 6.</td>
<td>Cisco Tech Update – Routere og SDWAN</td>
<td>Slutkunder/Partnere</td>
<td>Aarhus &amp; København</td>
</tr>
<tr>
<td>12.</td>
<td>Cisco Virtual Update – Prime infrastructure migration til DNA Center</td>
<td>Slutkunder/Partnere</td>
<td>Online</td>
</tr>
<tr>
<td>18.</td>
<td>Cisco Virtual Update – Video Endpoints</td>
<td>Slutkunder/Partnere</td>
<td>Online</td>
</tr>
<tr>
<td>28.</td>
<td>Cisco Virtual Update – UCS Server</td>
<td>Slutkunder/Partnere</td>
<td>Online</td>
</tr>
</tbody>
</table>

## Oktober

<table>
<thead>
<tr>
<th>Dato</th>
<th>Seminar/event</th>
<th>Målgruppe</th>
<th>Sted</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. og 4.</td>
<td>Cisco Tech Update – ACI Anywhere design &amp; deployment samt Nexus hardware</td>
<td>Slutkunder/Partnere</td>
<td>Aarhus &amp; København</td>
</tr>
<tr>
<td>10.</td>
<td>Cisco Virtual Update – Wireless</td>
<td>Slutkunder/Partnere</td>
<td>Online</td>
</tr>
<tr>
<td>23.</td>
<td>Cisco Virtual Update – On-prem video conferencing</td>
<td>Slutkunder/Partnere</td>
<td>Online</td>
</tr>
<tr>
<td>24.</td>
<td>Cisco Virtual Update – Cisco ISE nye postura features og ISE PIC</td>
<td>Slutkunder/Partnere</td>
<td>Online</td>
</tr>
<tr>
<td>30.</td>
<td>Cisco Tech Update – Firepower 6.3 med Multi-instance og Cisco Visibility</td>
<td>Slutkunder/Partnere</td>
<td>Aarhus</td>
</tr>
</tbody>
</table>

Evaluering

Slut med papir

Kommer ud til jer på email i morgen.

HUSK at udfylde.