EN Routing Innovation

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Cisco Enterprise Routing Portfolio

Branch

ISR 900

- Fixed and fanless
- IOS Classic based

ISR 1000

- Integrated wired and wireless access
- PoE/PoE+

ISR 4000

- WAN and voice module flexibility
- Compute with UCS E
- Integrated Security stack
- WAN Optimization

vEdge 100

- 4G LTE & Wireless

vEdge 1000 & 2000

- Fixed/Pluggable Module

Aggregation

ASR 1000

- Hardware and software redundancy
- High-performance service with hardware assist

vEdge 5000

- Modular
- RPS

SD-WAN

Virtual and Cloud

Cisco ENCS

- Service chaining virtual functions
- Options for WAN connectivity
- Open for 3rd party services & apps

CSR 1000V

- Cisco DNA virtualization
- Extend enterprise routing, security & management to cloud

ISR 900 & ISR 1000

Introducing Cisco ISR 900 Series

ISR 900

DSL SKUs

Ethernet only & Ethernet + LTE SKUs

Tailored for the SOHO segment

- Replacing ISR 880 series
- Higher throughput at attractive price points
- Feature richness of IOS Classic with simplified packaging
- Reduced form factor
- Internal power supply – Ethernet & Ethernet + LTE SKUs
- Fan-less

Orderability dates

- Ethernet SKUs – ISR 921/931 [Orderable]
- DSL SKUs – ISR 927/926 [Orderable]
- LTE SKUs targeted for April 2019 (Tentative)

Cisco ISR 1000 Series

NEW

‖‖‖‖ SD-WAN		‖‖‖‖ DSL [G.FAST/35b]	
‖‖‖‖ SD-WAN Security		‖‖‖‖ Wifi [ME]	
‖‖‖‖ LTE Advanced		‖‖‖‖ PoE/PoE+	

ISR 1111X-8P
Up to 350 Mbps*
● ● ○

ISR 1109-4P
Up to 200 Mbps*
● ● ●

ISR 1101-4P
Up to 250 Mbps*
● ● ●

ISR 111x-8P
Up to 350 Mbps*
● ● ● ● ○

ISR 1109-2P
Up to 200 Mbps*
● ●

ISR 111x-4P
Up to 250 Mbps*
● ● ● **●** ○

*CEF IMIX on IOS-XE
**VDSL2, ADSL2+ only

M2M (ATM/KIOSK/POS) Extended temperature & Dual Modem	Remote Workers	MSP CPE	Branch in a box

C1109 M2M platforms

Compact form factor

1 x WAN, 2 x LAN, Cat4 LTE

Dual Pluggable slot

1 x WAN, 4 x LAN, Cat4/6 LTE & Wifi 802.11 ac

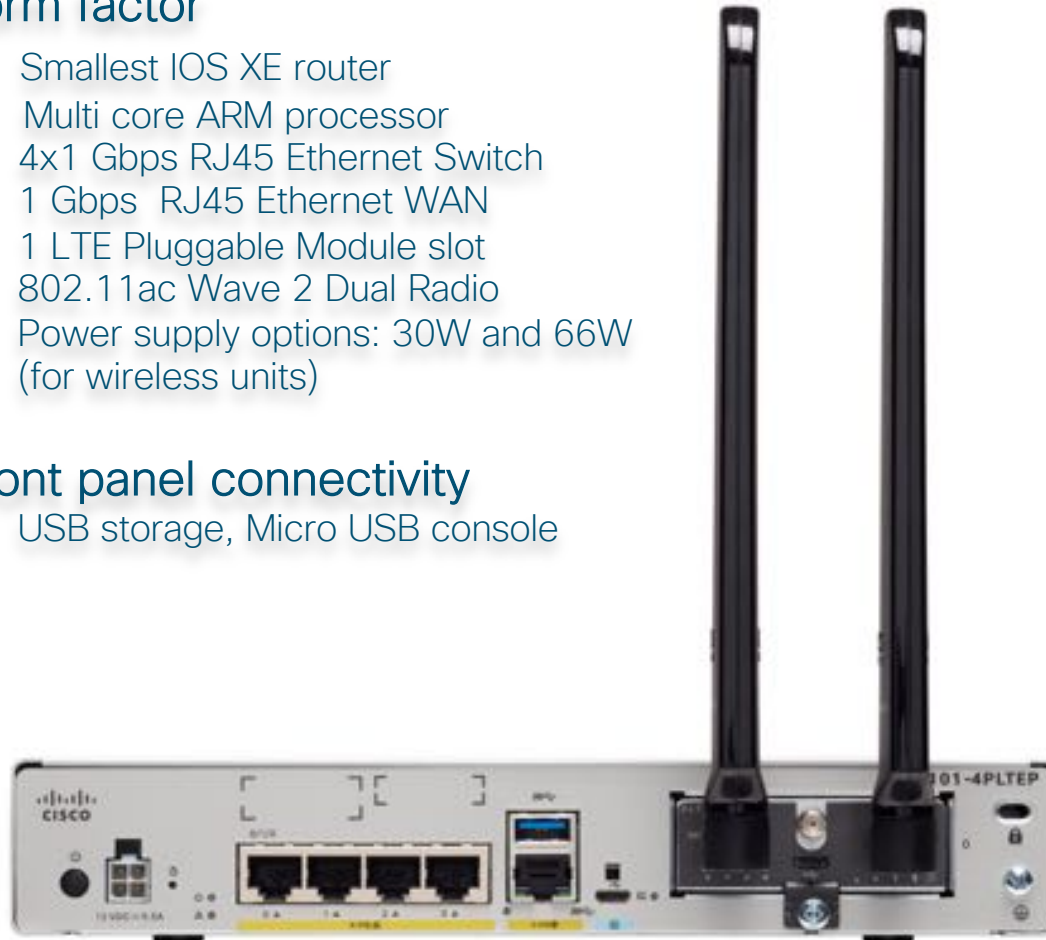| C1101	0 to 45 °C
C1109-2P	0 to 50 °C
C1109-4P	-20 to 55 °C
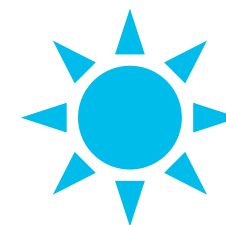
Extended temperature support

Form factor

- Smallest IOS XE router
- Multi core ARM processor
- 4x1 Gbps RJ45 Ethernet Switch
- 1 Gbps RJ45 Ethernet WAN
- 1 LTE Pluggable Module slot
- 802.11ac Wave 2 Dual Radio
- Power supply options: 30W and 66W (for wireless units)

Front panel connectivity

- USB storage, Micro USB console

Performance and Capability

- Comparable to C1111-4P
- 1.2 Gbps CEF IMIX
- 250 Mbps IPSEC
- 4 GB DRAM, 4 GB FLASH

SD-WAN CAPABLE

Pluggable LTE Modules

Traditional c800

Multiple routers for different integrated modems

No dying gasp

CAT3/CAT4 (100 Mbps/50)(150 Mbps /50)

Lengthy carrier cutover

C1101

Flexibility to use multiple modems in a single chassis

Dying gasp feature sends pre-configured text

CAT6 (300 Mbps /50)

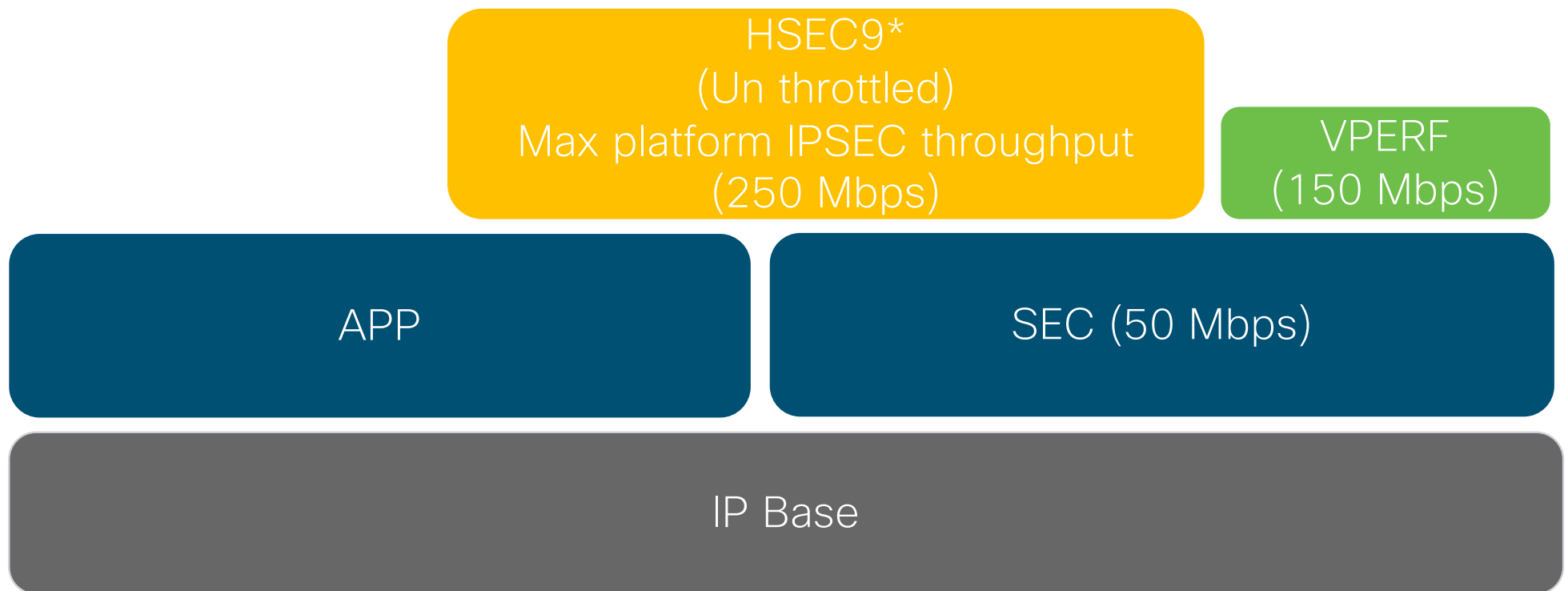SIM switchover is faster

Carrier Aggregation

Pluggable LTE Modules

Dual SIM Slots **

KEY FEATURES

❑ Comparable feature set to ISR4K NIM–LTE
❑ Choice of CAT6 and CAT4 modems
❑ CAT6 : P–LTE–EA, P–LTE–LA
❑ CAT4 : P–LTE–GB , P–LTE–VZ , P–LTE–US
❑ MICRO SIM (3 FF)
❑ SMA–D Antenna

** CAT 4 (WP-7601) P-LTE-VZ has single SIM slot only

License Packaging Model for C1101

HSEC9*
(Un throttled)
Max platform IPSEC throughput
(250 Mbps)

VPERF
(150 Mbps)

APP

SEC (50 Mbps)

IP Base

* Available from IOS XE 16.8.1

Cisco ISR 1000 Expansion

Tailored for the Cisco SD-WAN deployment

- Smaller size with PIM Slot

- Faster processor option

- 8GB memory & 8GB Flash (on X-SKU's)

- Available for Early Field Trial (EFT)

- LTE Pluggable Option [5G Roadmap]

- First Customer Ship [FCS] – Q2CY19*`

SD-WAN	DSL [G.FAST/35b]
SD-WAN Security	Wifi [ME]
LTE Pluggable	PoE/PoE+

ISR 1120-8P
Up to 350 Mbps
● ● ○ ● ●** ●

ISR 1160-8P
Up to 500 Mbps
● ● ○ ● ●

*FCS dates are current tracking dates

**VDSL2, ADSL2+ only

ISR 4000

Cisco ISR 4000 Series Router

SD-WAN w/ Security	
LTE Advanced	
Unified Communications	
Compute UCS-E	
10G WAN & Macsec	

ISR 4351
Up to 2 Gbps*

ISR 4461
Up to 10 Gbps*

ISR 4331
Up to 2 Gbps*

ISR 4451
Up to 4 Gbps*

ISR 4221
Up to 1.2 Gbps*

ISR 4321
Up to 1.5 Gbps*

ISR 4431
Up to 4 Gbps*

*CEF IMIX on IOS-XE

Unified Communications	Proactive Security	Application Assurance	Virtualization
Voice survivability & High quality Video	Branch Threat Defense	App. Optimization	App hosting & VNFs

Introducing ISR 4461

The most scalable, highest performing ISR to-date

NEW

All in one Platform

- Network
- Security
- Compute
- Storage
- Unified Communications

| Highest Module Density | 10G WAN Connectivity | Power Supply Redundancy | MACSec |

Shipping since Oct '18

Addressing these use cases: 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
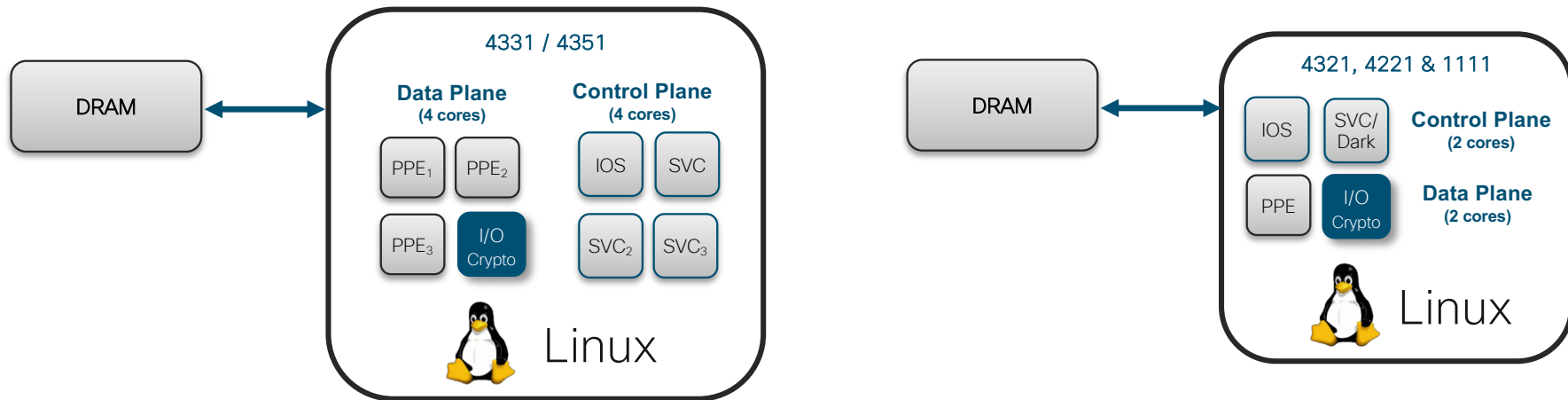- Full WAN MACSec on all ports

SD-WAN READY

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

For comparison
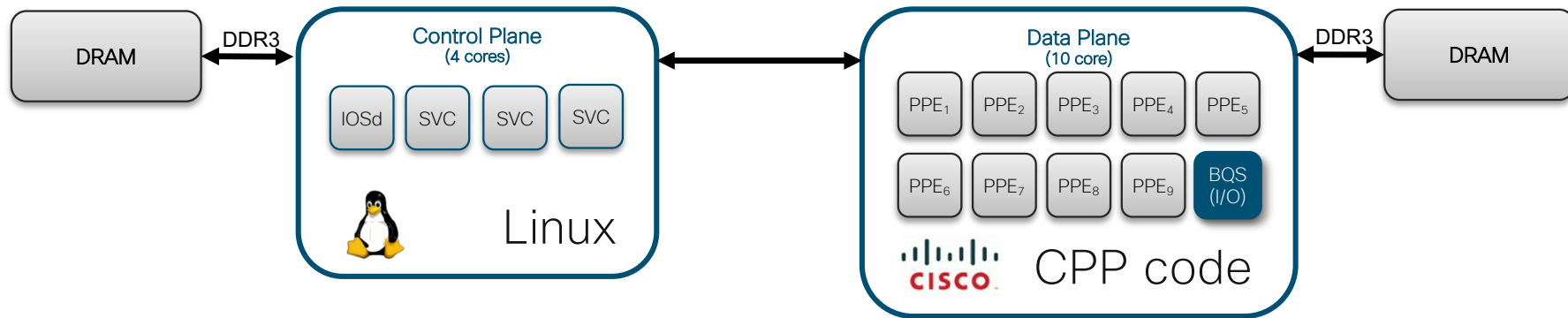# ISR4300, ISR4200 & ISR1100 architecture

4331 / 4351

| DRAM | ⟷ | Data Plane (4 cores) | Control Plane (4 cores) |

Data Plane (4 cores): PPE₁, PPE₂, PPE₃, I/O Crypto

Control Plane (4 cores): IOS, SVC, SVC₂, SVC₃

Linux

4321, 4221 & 1111

| DRAM | ⟷ | | |

IOS, SVC/Dark — **Control Plane (2 cores)**

PPE, I/O Crypto — **Data Plane (2 cores)**

Linux

- Unified architecture – Single socket CPU
- Multiple CPU cores providing the distributed control plane
- Control & Dataplane cores run by Linux 3.10
- Dedicated forwarding, crypto and scheduling resources
- Same base function as ASR1K
- Service Core not yet used on Cisco 1100

ISR4400 architecture

| DRAM | ←DDR3→ | Control Plane (4 cores) | | Data Plane (10 core) | ←DDR3→ | DRAM |

Control Plane (4 cores): IOSd, SVC, SVC, SVC — Linux

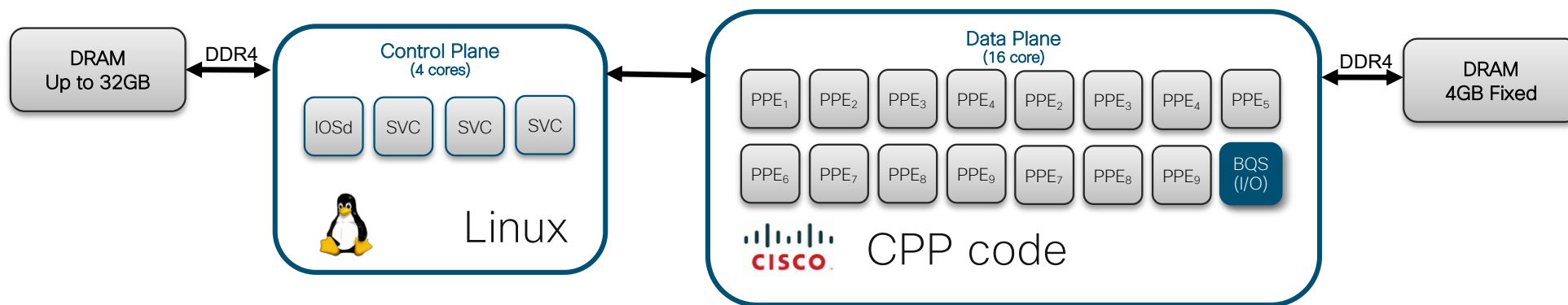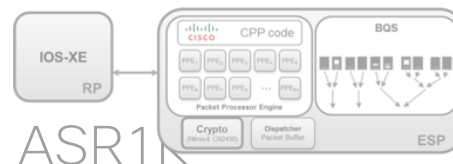Data Plane (10 core): PPE$_1$, PPE$_2$, PPE$_3$, PPE$_4$, PPE$_5$, PPE$_6$, PPE$_7$, PPE$_8$, PPE$_9$, BQS (I/O) — CPP code

- Physical processing separation as on ASR1K
- Dedicated CPU sockets for Control Plane & Data Plane
- Control Plane run by Linux 3.10 on 4 core X86 platform
- Data Plane run by micro code on 6 or 10 cores
- Dedicated forwarding, crypto and scheduling resources
- Architecture, albeit smaller scale, identical to ASR1k

ISR4461 Architecture

ASR1K

Control Plane (4 cores): IOSd, SVC, SVC, SVC — Linux
DRAM Up to 32GB — DDR4

Data Plane (16 core): PPE$_1$, PPE$_2$, PPE$_3$, PPE$_4$, PPE$_2$, PPE$_3$, PPE$_4$, PPE$_5$, PPE$_6$, PPE$_7$, PPE$_8$, PPE$_9$, PPE$_7$, PPE$_8$, PPE$_9$, BQS (I/O) — CPP code
DDR4 — DRAM 4GB Fixed

- Same physical processing separation as on ASR1K / ISR4400
- Control Plane 4-core Intel Xeon architecture
- Control Plane DDR4 DRAM – 8GB default, up to 32GB
- Data Plane 16-core Cavium SoC architecture
- Data Plane DDR4 DRAM – 4GB Fixed
- SDWAN Capacity targeted for 1st half, CY 2019

Boost license update

- All ISR4000, IOS 16.7.1

- Enforced Boost License

  - 60 day Boost Eval available (also enforced)

- Once installed...performance is in the wild

```
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
```

Platform	Performance License	Boost License
4451	2 Gbps @ 19% CPU	4 Gbps* @ 35% CPU
4431	1 Gbps @ 18% CPU	4 Gbps* @ 62% CPU
4351	400 Mbps @ 17% CPU	2 Gbps* @ 45% CPU
4331	300 Mbps @ 16% CPU	2 Gbps* @ 53% CPU
4321	100 Mbps @ 8% CPU	2 Gbps* @ 68% CPU
4221	75 Mbps @ 8% CPU	1.2 Gbps @ 94% CPU

*
- 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

Unified Communications Modules

VG450 (High Density Analog Voice Gateway)

IOS-XE based 3RU Analog voice gateway for centralized deployments

SM-X-8FXS/12FXO

SM-X-24FXS/4FXO

SM-X-16FXS/2FXO

ISR 4461 w/ Voice Gateways

SM-X-72FXS

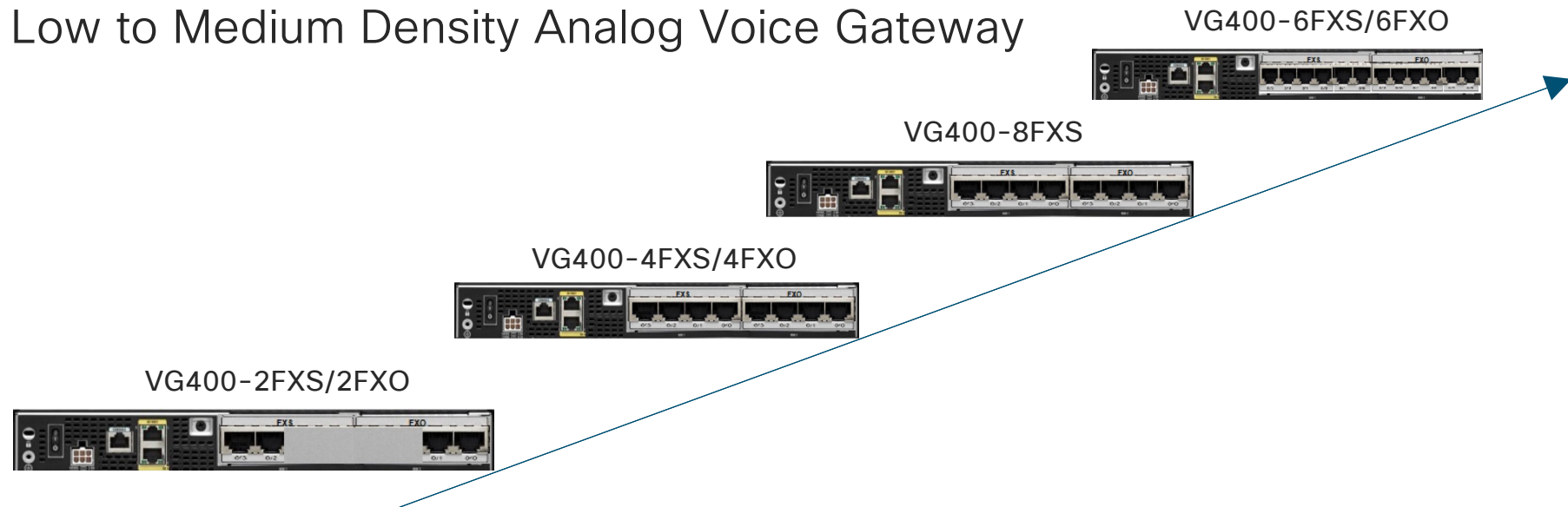| Highest Module Analog 144P FXS	On-Board DSP with IOS-XE	FXO Failover Bypass	FXE-E Extended Loop Length	Native Audio Media Recording

VG450 Datasheet

VG350 EoS Notice

VG400 Series (Analog Voice Gateway)

Low to Medium Density Analog Voice Gateway

VG400-6FXS/6FXO

VG400-8FXS

VG400-4FXS/4FXO

VG400-2FXS/2FXO

| Fixed Port (4-12 Port) | IOS-XE Based | FXS/FXO in same Chassis | FXE-E with FXO By-pass | Native Media Recording |

ASR 1000

Cisco ASR 1000 Series Routers

2.5 Gbps to 200Gbps – Available Today

ASR1001-X
2.5 to 20
Gbps

ASR1001-HX
44 to 60
Gbps

ASR1002-X
5 to 36
Gbps

ASR1002-HX
44 to 100
Gbps

ASR1006-X
40 to 100
Gbps

ASR1009-X
40 to 200
Gbps

ASR1013
40 to 200
Gbps

Fixed Chassis ← IOS-XE → Modular Chassis
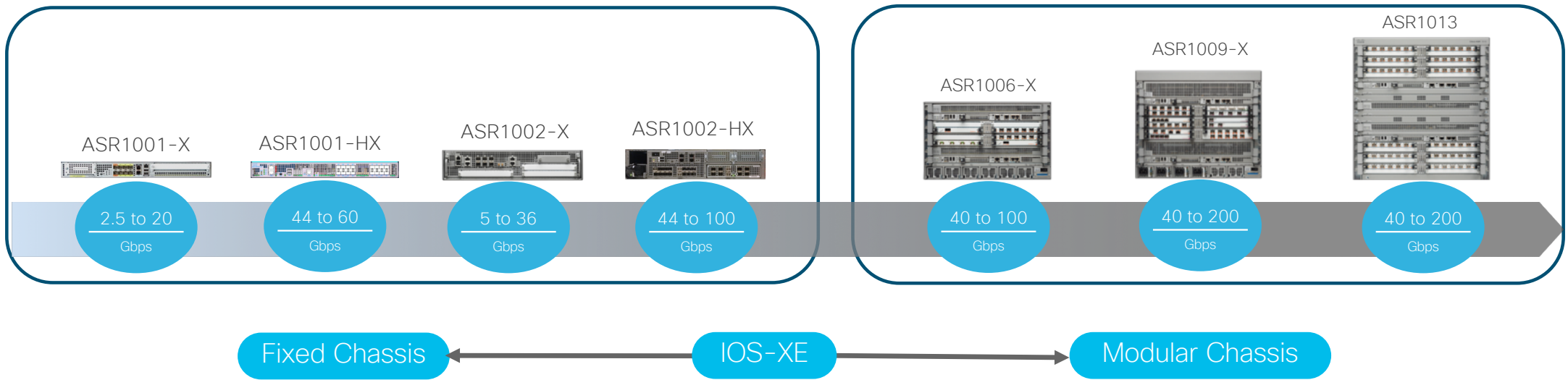
Compact, Power Router
High Services performance
Investment protection
Multiple form factors

Business Critical Resiliency
Separate control and forwarding planes
HW and SW redundancy

Instant On Service Delivery
Secure solutions
Optimal Application experience
Software consumption model

ASR 1000 Modular Systems

Modular Chassis

Available Now

ASR1006-X

ASR1009-X
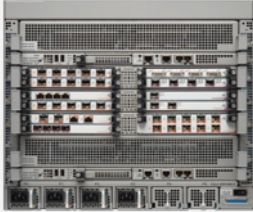
New EPAs with MACsec

Available Now

EPA-1X40GE

EPA-2X40GE

EPA-QSFP-1X100GE

Next-gen Data Plane

1HCY2019

ESP-100X
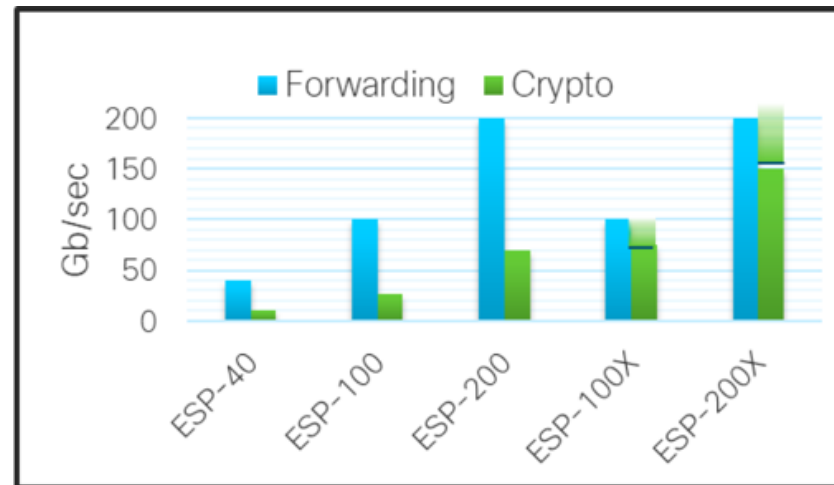
ESP-200X

| Full Modularity | Redundancy | Compatibility | Rich Services |

ASR1000 Next-Gen Data Plane – ESP-X

Targeting 1HCY2019

- Powered by 3rd generation QFP ASIC - Procyon
- 100 Gbps per Procyon, used standalone or in a matrix of 2 or 4 ASICs
- Complex services support with improved service performance.
- Services include:
  - AVC
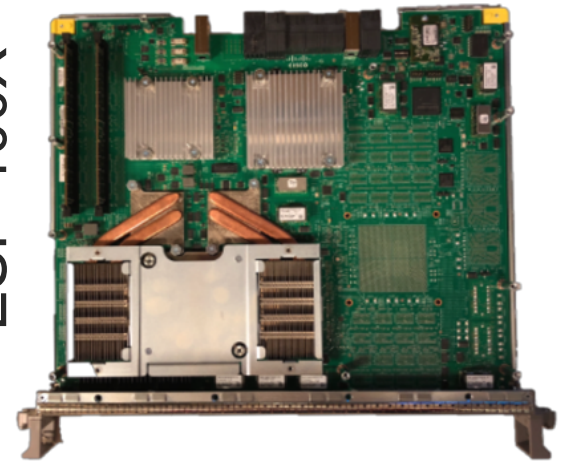 - Crypto
  - NAT
  - Firewall
  - QoS
  - AppNav

- IPSEC is now done on Procyon near full forwarding rate
  - Initial software will delivery near 75% line rate crypto
  - Subsequent updates may improve crypto performance

ESP-200X
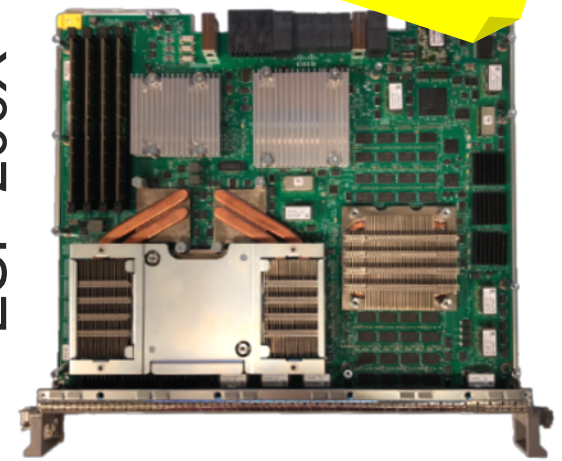
ESP-100X

ASR1000 Latest Fixed Chassis

ASR1002-HX

ASR1001-HX

| Compact | ASR1000 Rich Services | Pay-as-you-go Crypto | High Port Density |

CSR 1000V

Cisco Cloud Services Router (CSR) 1000V
Cisco IOS XE Software in a virtual network function form-factor

Software
Same IOS XE software as the ASR1000 and ISR4000

Infrastructure Agnostic
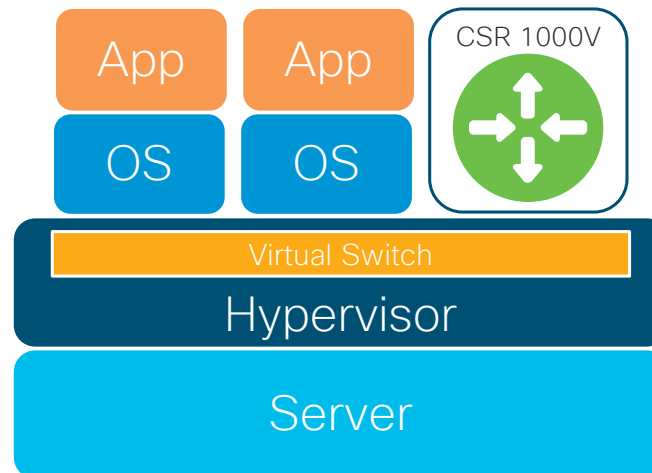Runs on x86 platforms

Supported Hypervisors:
VMware ESXi, RHEL Linux KVM, Suse Linux KVM, Citrix Xen, Microsoft Hyper-V, Cisco NFVIS and CSP2100

Supported Cloud Platforms:
Amazon Web Services, Microsoft Azure, Google Cloud Platform

App

App

CSR 1000V

OS

OS

Virtual Switch

Hypervisor

Server

Performance Elasticity
Available licenses range from 10 Mbps to 10 Gbps

CPU footprint ranges from 1vCPU to 8vCPU

Programmability
NetConf/Yang, RESTConf, Guest Shell and SSH/Telnet

License Options
Term based 1 year, 3 year or 5 year

Enterprise-class networking with rapid deployment and flexibility
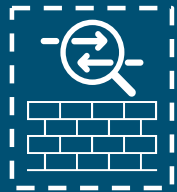
Branch Virtualization

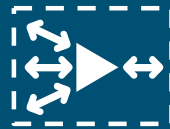# Network services on any platform

Cisco Enterprise NFV

Cisco Network Service Orchestrator (NSO) / Virtual Managed Services (VMS)

Virtual Router (ISRv,CSR,vEdge)

Virtual Firewall (ASAv, NGFWv)

Virtual WAN Optimization (vWAAS)

Virtual Wireless LAN Controller (vWLC)

Third-Party VNFs

Network Functions Virtualization Infrastructure Software (NFVIS)

Cisco ISR 4K Series+ UCS® E-Series

Enterprise Network Compute System (ENCS)

Cisco® UCS C-Series

Cisco® Secure Agile Exchange CSP 2100 Series

ENCS 5000 Series
Enterprise Network Compute System

	SD-WAN
	LTE Advanced
	Modularity
	RAID Storage

ENCS 5100 Series

ENCS 5400 Series

ENCS 5412
12Core(ISRv+5VNF)

ENCS 5408
8Core(ISRv+3VNF)

ENCS 5104
4Core (ISRv+1VNF)

ENCS 5406
6Core(ISRv+2VNF)

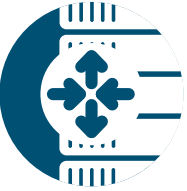| Routing and Compute	Virtualized Services	Open for 3rd party apps	NFVIS Hypervisor

SD-WAN Security

SD-WAN Security

FCS Now
Future

Manage in Cloud or On-Prem	Provisioning Managing Monitoring Reporting Troubleshooting
Full Edge Security	Branch Edge (Embedded) Branch Edge (Cloud) Enterprise FW App Aware DNS/web-layer security IPS URL filter Anti-Malware
Edge Router Flexibility	ISR 4/1K ENCS w/ISRv CSR ASR1K* vEdge**

* Only App Aware FW and DNS/web-layer security
** Only DNS/web-layer security

How much of this can I put on my router?

Be conscient of your CPEs DRAM configuration

- 8 GB = <u>Either</u> URL Filtering <u>or</u> Intrusion Detection/Prevention, IDS/IPS

- 16 GB = URL Filtering <u>and</u> IDS/IPS

- @16 GB, when running URL filtering it's just a matter of a few clicks to simply edit the current policy to also include IPS Inspection.

Cisco 1100, 4221 & 4321 – 8GB – Support **either-or**.

Cisco vEdge – No support on for onboard URL filtering or IDS/IPS

If you would like to take advantage of all security services Choose a platform which supports 16GB DRAM

SD-WAN Performance

vEdge Platform Perf/Scale

FYI

	Throughput* (361 Bytes)	Tunnel Scale	Route Scale
vEdge 100	112Mbps	250	25k
vEdge 1000	345Mbps	1500	128k
vEdge 2000	2.8Gbps	6000	128k
vEdge 5000	5.2Gbps	6000	256k
vEdge Cloud (2 vCPU)	472Mbps	256	
vEdge Cloud (4 vCPU)	739Mbps	1024	
vEdge Cloud (8 vCPU)	25k	6000	

* SDWAN Basic services include IPSec + Standard routing

XE SD-WAN Platform Perf/Scale

FYI

	Throughput* (361 Bytes)	Tunnel Scale
ISR 1111-8P	140Mbps	100
ENCS ISRv	500Mbps	100
ISR 4221	200Mbps	200
ISR 4321	230Mbps	200
ISR 4331	390Mbps	1000
ISR 4351	400Mbps	1100
ISR 4431	810Mbps	Not yet tested
ISR 4451	1.41Gbps	Not yet tested
ASR 1001-X	5.82Gbps	3000
ASR 1001-HX	11.43Gbps	6000
ASR 1002-X	3.93Gbps	3000
ASR 1002-HX	22.24Gbps	6000

* SDWAN Basic services include IPSec + Standard routing