



Nexus 7000  
Nexus 5000  
ASR 1000  
Empowered Branch 4  
Overview



**Cisco Technology Solutions**  
**March/April 2008**

# Note

- Due to release dates of certain products this presentation has had additional information added which may not have been present at time of viewing

# Agenda

- Nexus 7000 Overview
- Nexus 5000 Overview
- ASR 1000 Overview
- Empowered Branch 4
- Summary



# Cisco Nexus 7000 Series



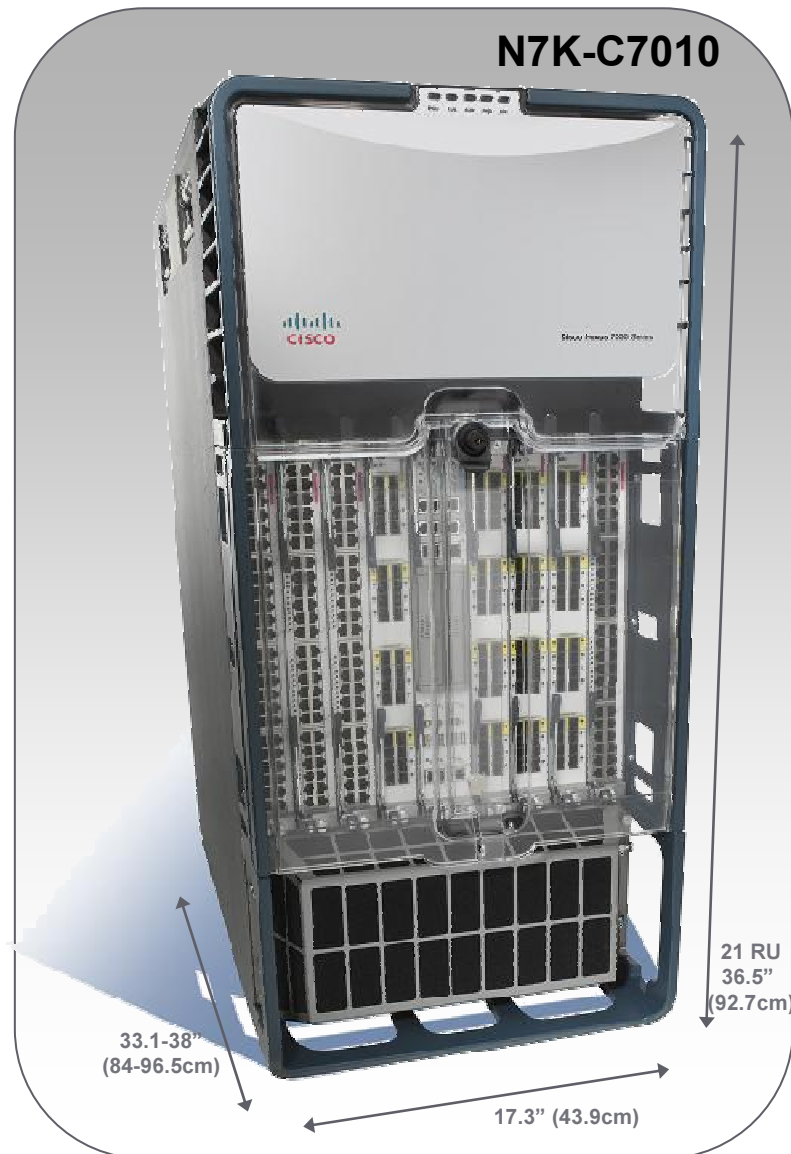
# Nexus 7000 Series

## Purpose Built for the Data Center

- **Modular data center class** line of switches designed for highly scalable end-to-end 10 Gigabit Ethernet Networks.
- Cisco Nexus fabric architecture **scales beyond 15 Tbps** with future support for 40 Gbps and 100 Gbps Ethernet
- Designed for **exceptional scalability, continuous system operation & transport flexibility**
- Powered by **Cisco NX-OS**, a state-of-the-art data center class operating system

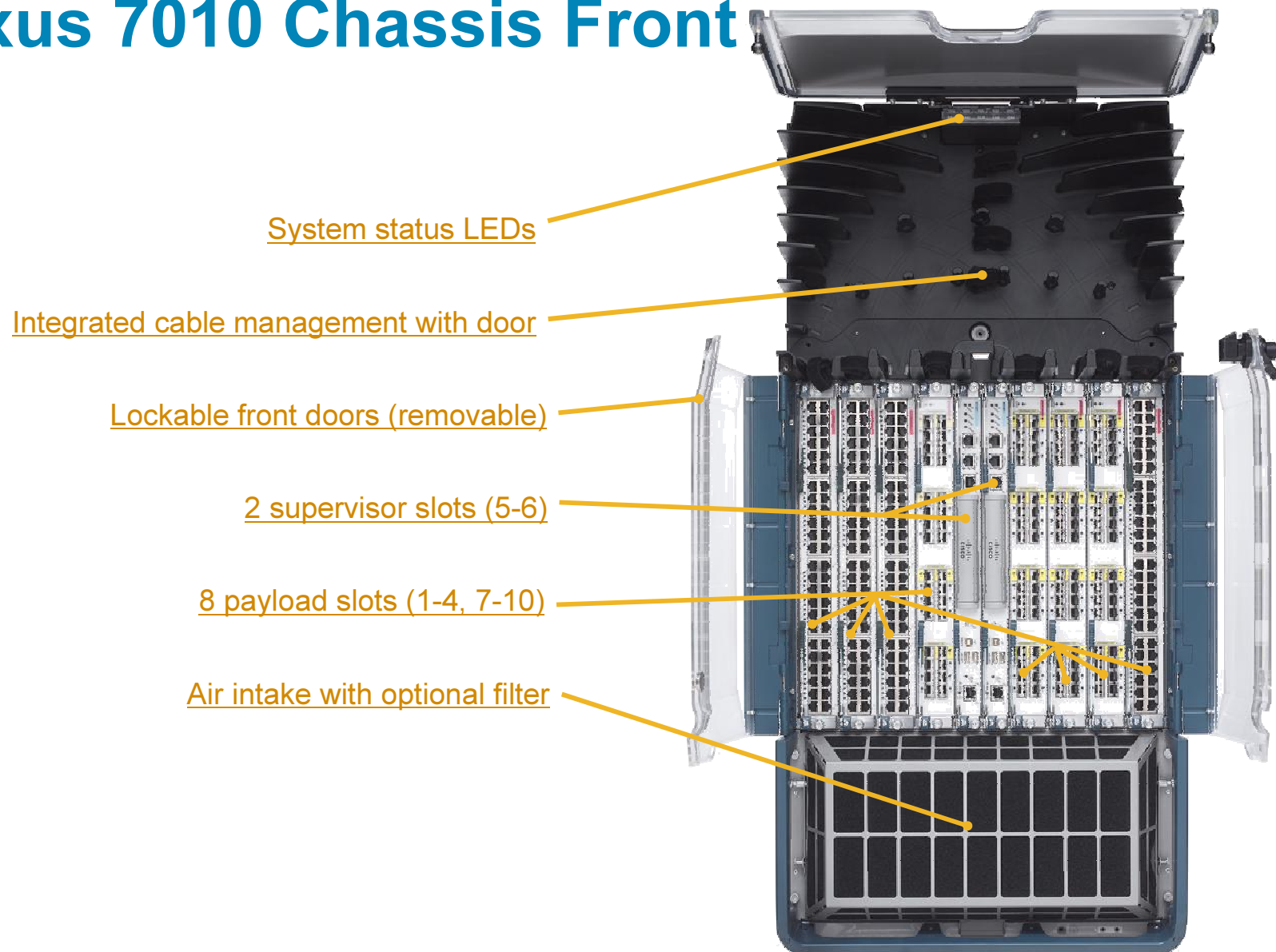


# Cisco Nexus 7010 – 10-Slot Chassis

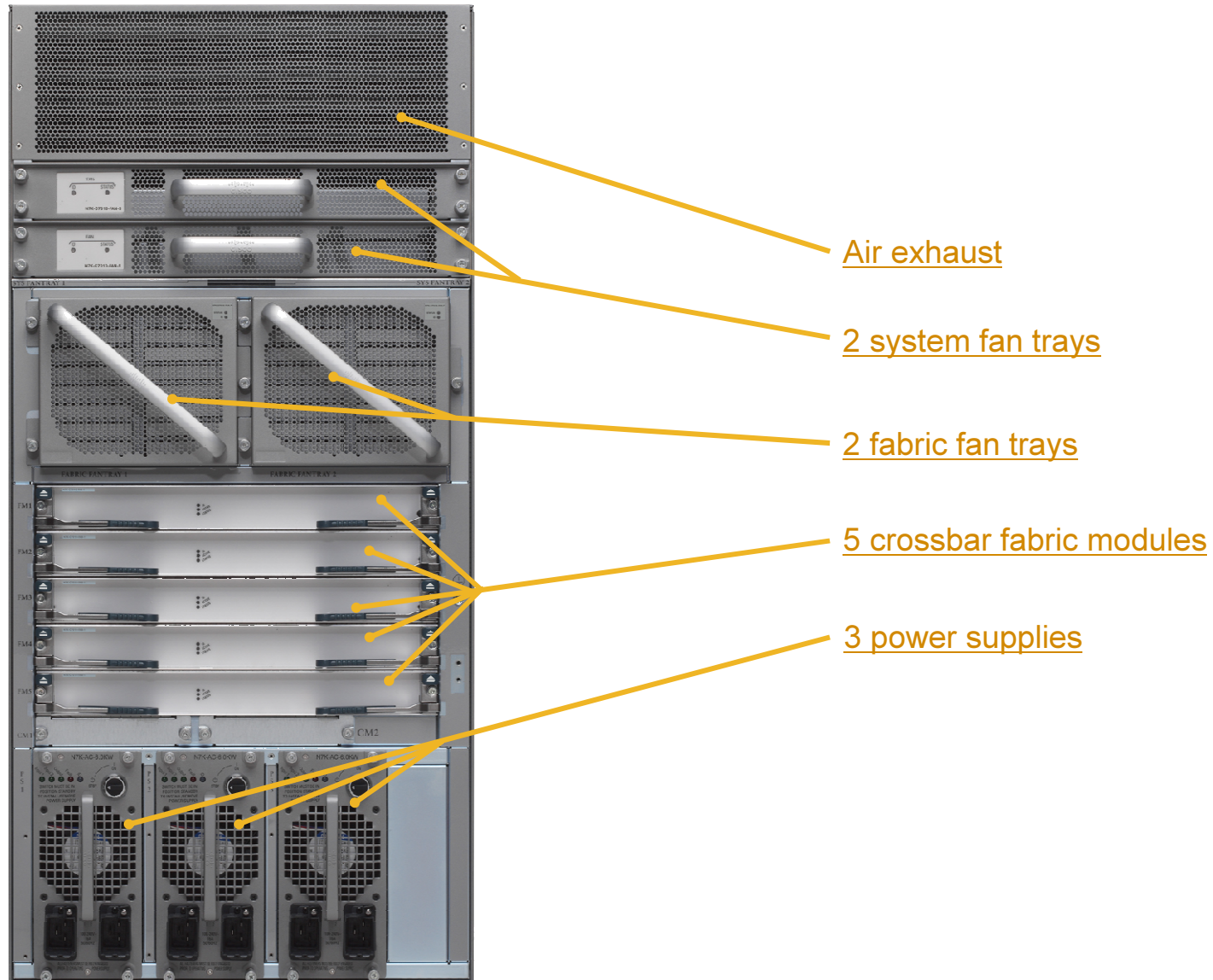


- First chassis in Nexus 7000 family
- **Optimized for data center environments**
- High density
  - Up to 256 10GbE interfaces, 384 1GbE interfaces
- High performance
  - Up to 1.2Tbps total system bandwidth at release
  - Up to 80Gbps per slot bandwidth at release
  - Up to 480Mpps total system throughput
  - Up to 60Mpps per slot throughput
- Future proof
  - Up to 4.1Tbps system bandwidth (230G per slot) with initial fabric modules
  - Scaleable to 9+Tbps system bandwidth (500+G per slot) with future fabric
- True front-to-back airflow
- Redundancy for all components
- Network cabling separated from common equipment
- 21 RU to allow two per 7' rack

# Nexus 7010 Chassis Front



# Nexus 7010 Chassis Back



# Power Redundancy

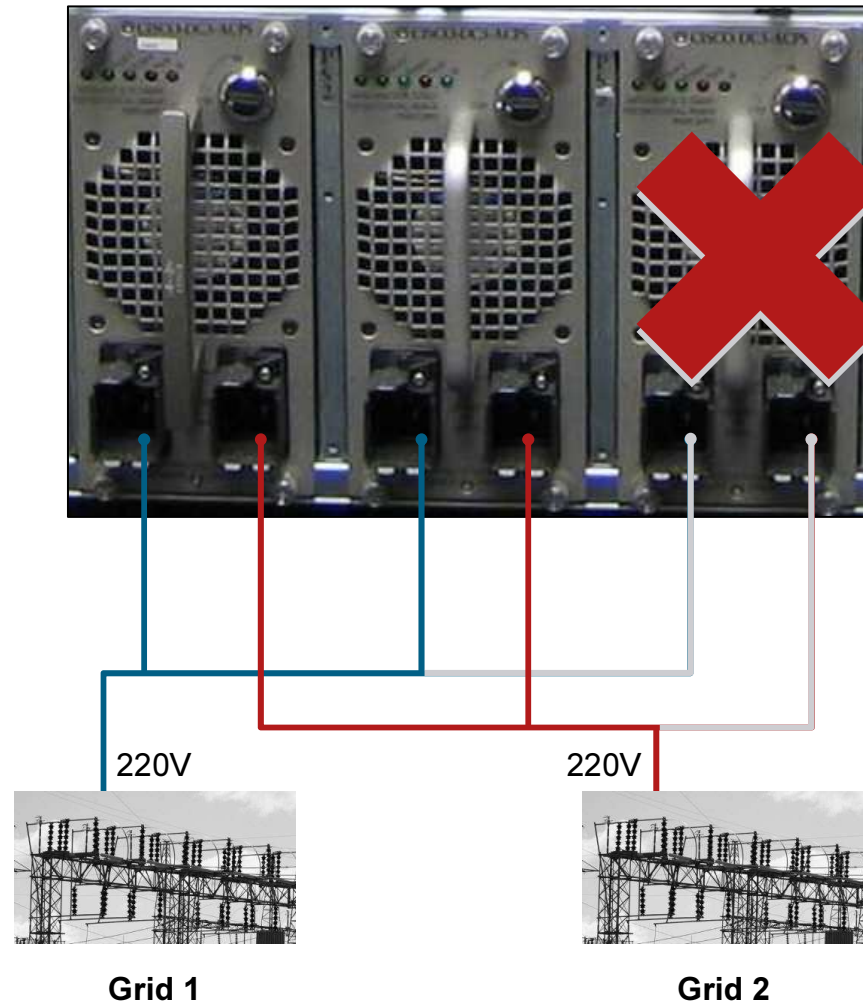
Power redundancy mode dictates how system budgets power

- **N+1 redundancy** – Reserves capacity equal to sum of lowest two power supplies

**N+1 redundancy**

Available Power

**12kW**



# Grid redundancy

Available Power

**9kW**

## Power Redundancy

**Power redundancy mode dictates how system budgets power**

- **N+1 redundancy** – Reserves capacity equal to sum of lowest two power supplies
- **Grid/input source redundancy (default)** – Reserves capacity equal to sum of half capacity of each power supply



Grid 1



Grid 2

# Power Redundancy

**Power redundancy mode dictates how system budgets power**

- **N+1 redundancy** – Reserves capacity equal to sum of lowest two power supplies
- **Grid/input source redundancy** (default) – Reserves capacity equal to sum of half capacity of each power supply
- **Full redundancy** – Provides capacity equal to the lesser of N+1 and grid redundancy capacity

**System can provide full power redundancy for loaded 10G system (two supervisors, eight 10G I/O modules)**

## Full redundancy

Available Power

**9kW**



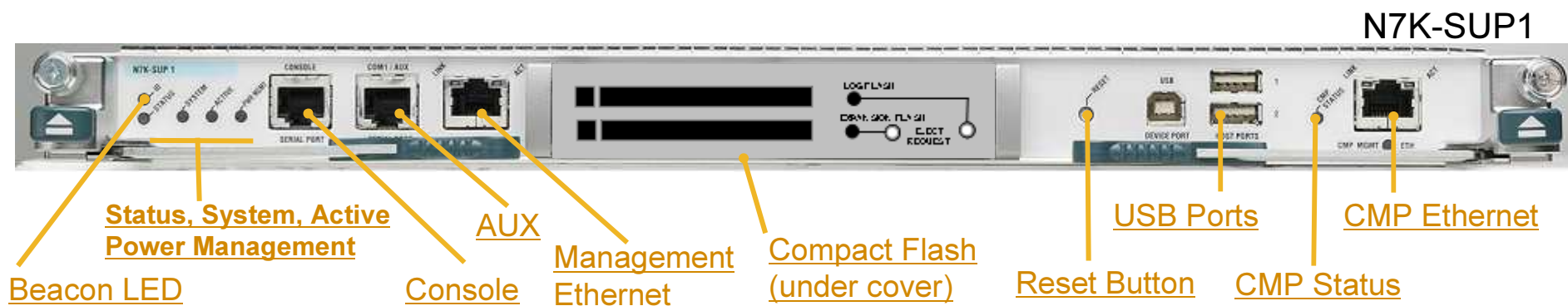
Grid 1



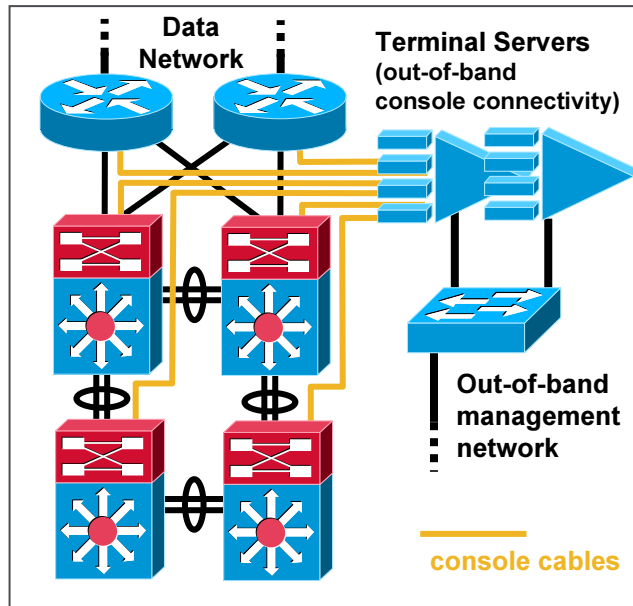
Grid 2

# Supervisor Engine 1

- Dual-core 1.66GHz Intel Xeon processor with 4GB DRAM
- Connectivity Management Processor (CMP) for lights-out management
- 2MB NVRAM, 2GB internal bootdisk, 2 external compact flash slots
- 10/100/1000 management port with 802.1AE LinkSec
- Console & Auxiliary serial ports
- USB ports for file transfer
- Blue beacon LED for easy identification



# Connectivity Management Processor (CMP)



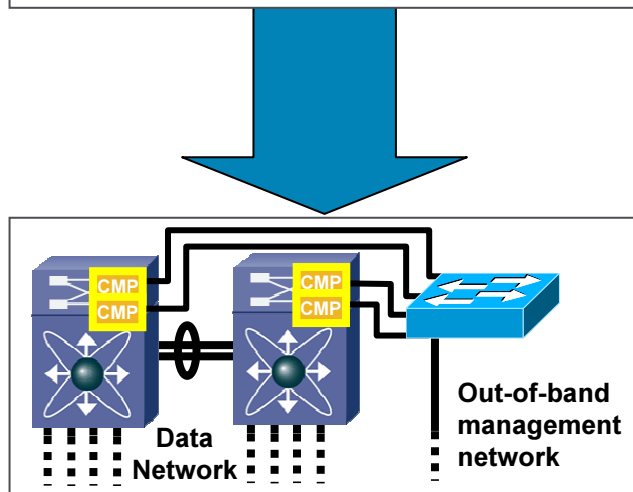
- Standalone, always-on microprocessor on supervisor engine
- Provides 'lights out' remote management and disaster recovery via 10/100/1000 interface

Removes need for terminal servers

- Monitor supervisor and modules, access log files, power cycle supervisor, etc.

Runs lightweight Linux kernel and network stack

Completely independent of NX-OS on main CPU



# Fabric Module 1



- Provides 46 Gbps per I/O module slot

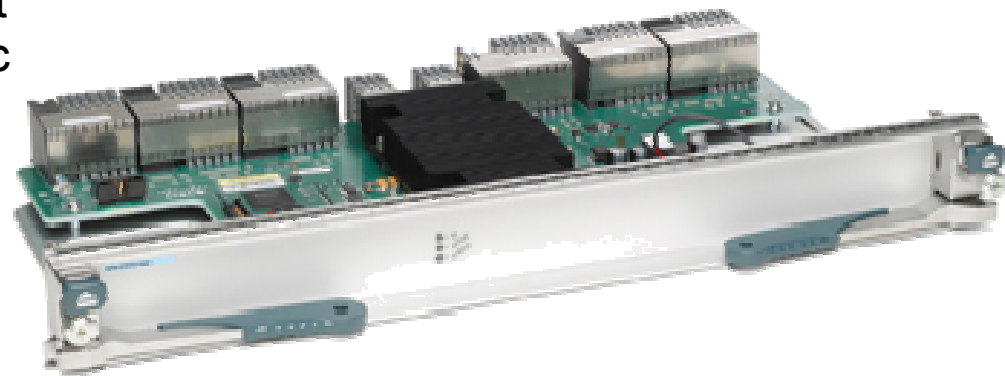
Also provides 23 Gbps per supervisor slot

- Up to 230 Gbps per I/O module slot when 5 fabric modules are installed in system

Forwarding Engine on initial shipping I/O modules cannot leverage full 230 Gbps fabric bandwidth

Future modules will be capable of leveraging full bandwidth

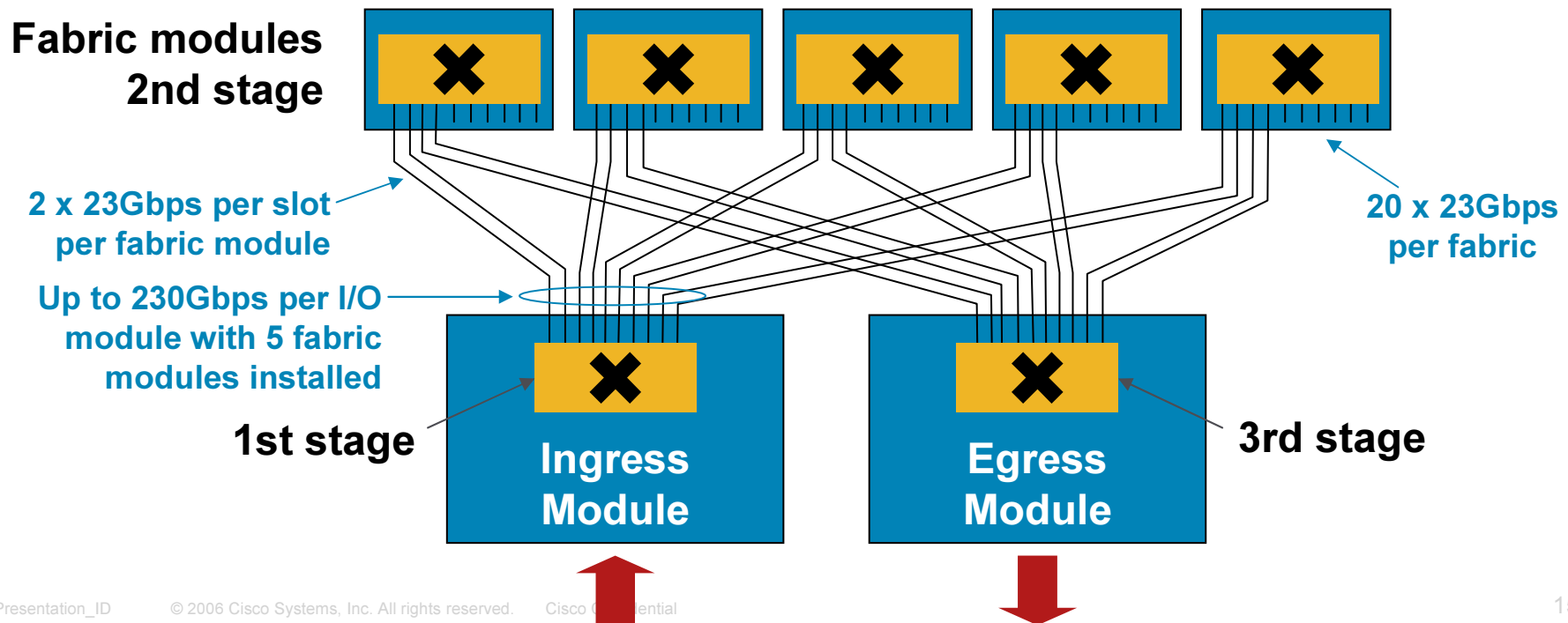
- Load-sharing across all fabric modules in chassis
- Multilevel redundancy with graceful performance degradation
- Non-disruptive OIR
- Blue beacon LED for easy identification



N7K-C7010-FAB-1

# Multistage Crossbar Switch Fabric

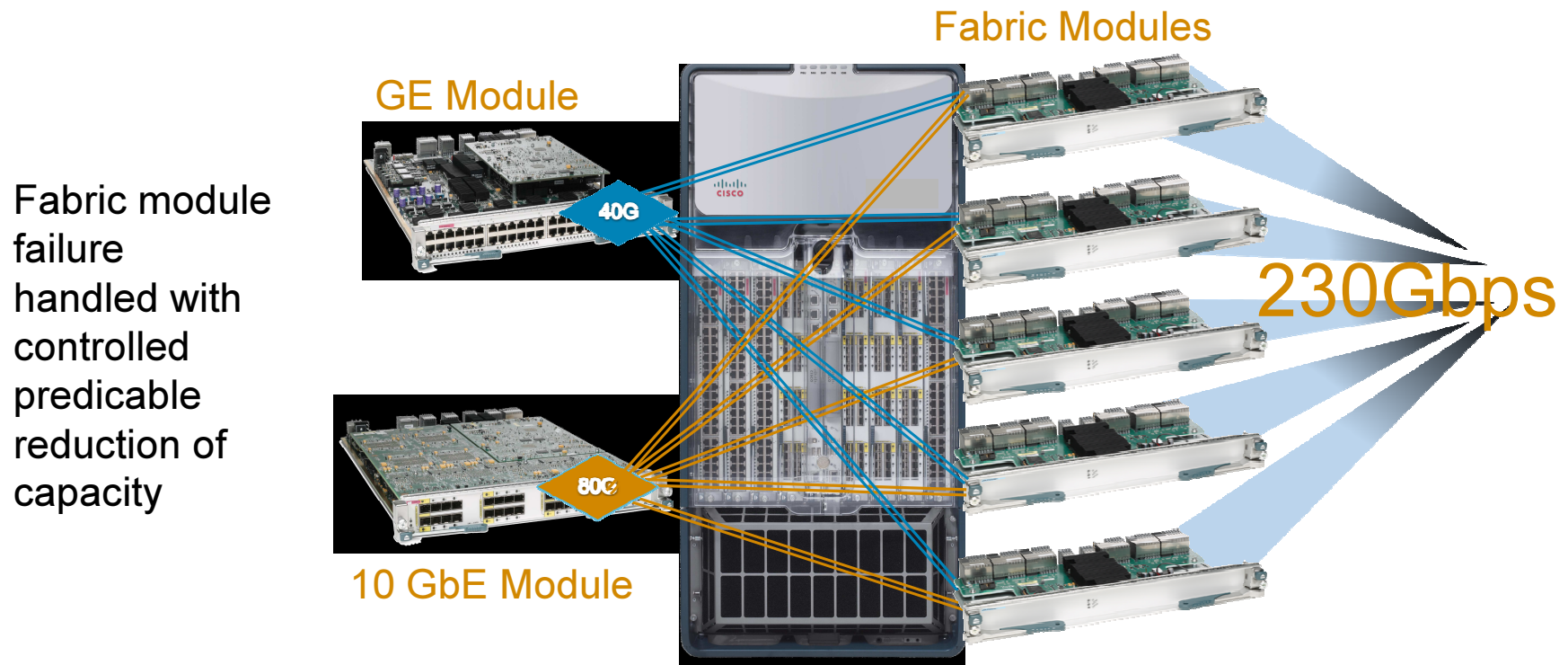
- Three-stage crossbar switch fabric
  - Stages 1 and 3 on I/O modules
  - Stage 2 on fabric modules
- Every fabric module present carries traffic
- Fabric ASICs have 3X overspeed internally



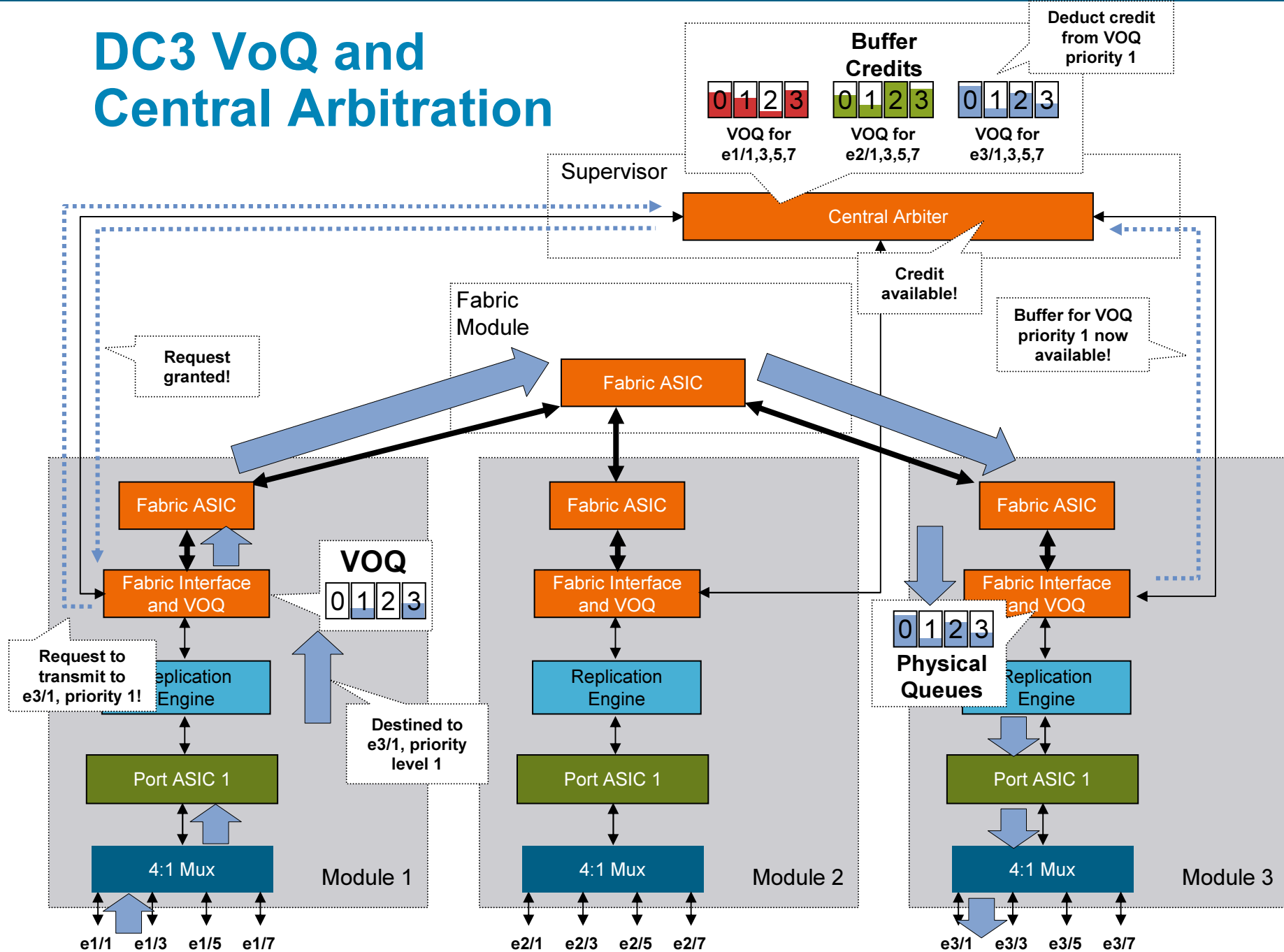
# Fabric Design and Capacity

## Designed to handle tomorrow's bandwidth needs

- Per-slot bandwidth capacity increases with each fabric module
- Graceful Fabric failure/removal
- Day one Fabric Modules provide investment protection for future higher speed modules – scaling to multi-port 40G and 100G?

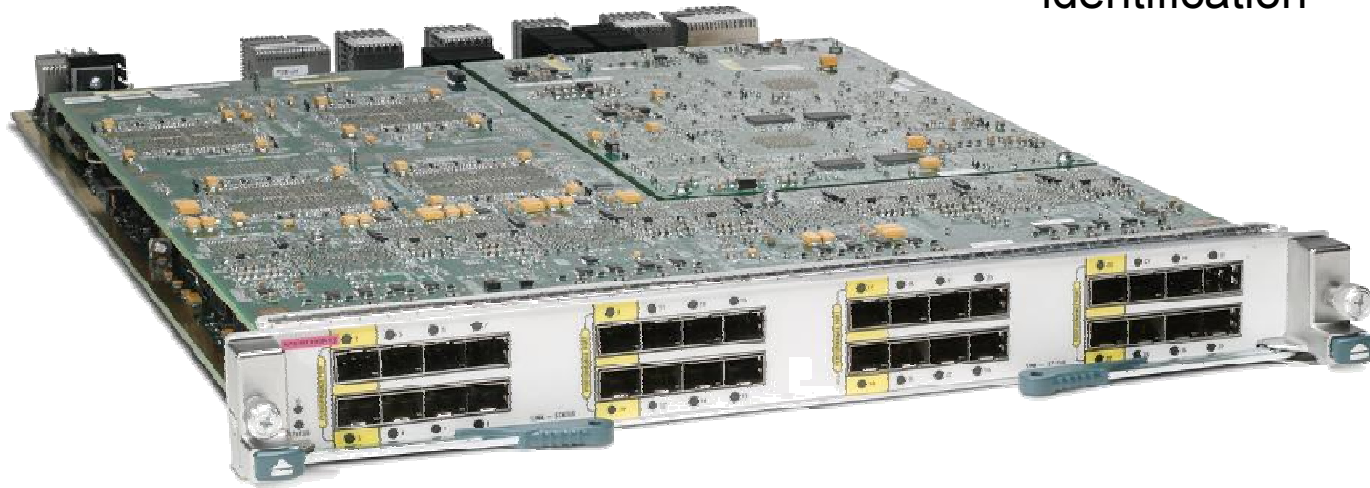


# DC3 VoQ and Central Arbitration



# 32-Port 10GE I/O Module

- 32 10GE ports with SFP+ transceivers
- 80G full duplex fabric connectivity
- Integrated 60Mpps forwarding engine for fully distributed forwarding
- 4:1 oversubscription at front panel
- Virtual output queueing (VOQ) ensuring fair access to fabric bandwidth
- 802.1AE LinkSec on every port
- Buffering: 1MB ingress, 80MB egress
- Queues: 8q2t ingress, 1p7q4t egress
- Blue beacon LED for easy identification

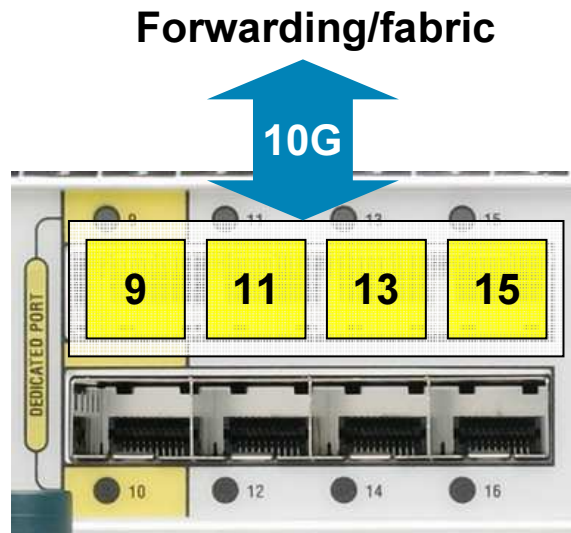


N7K-M132XP-12



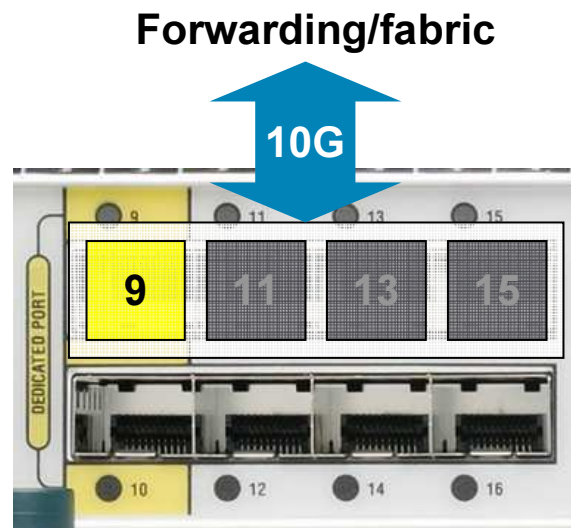
SR at initial release – 300m over MMF  
LR post-release – 10km over SMF

# Shared versus Dedicated Mode



## Shared mode

- Four interfaces share 10G bandwidth

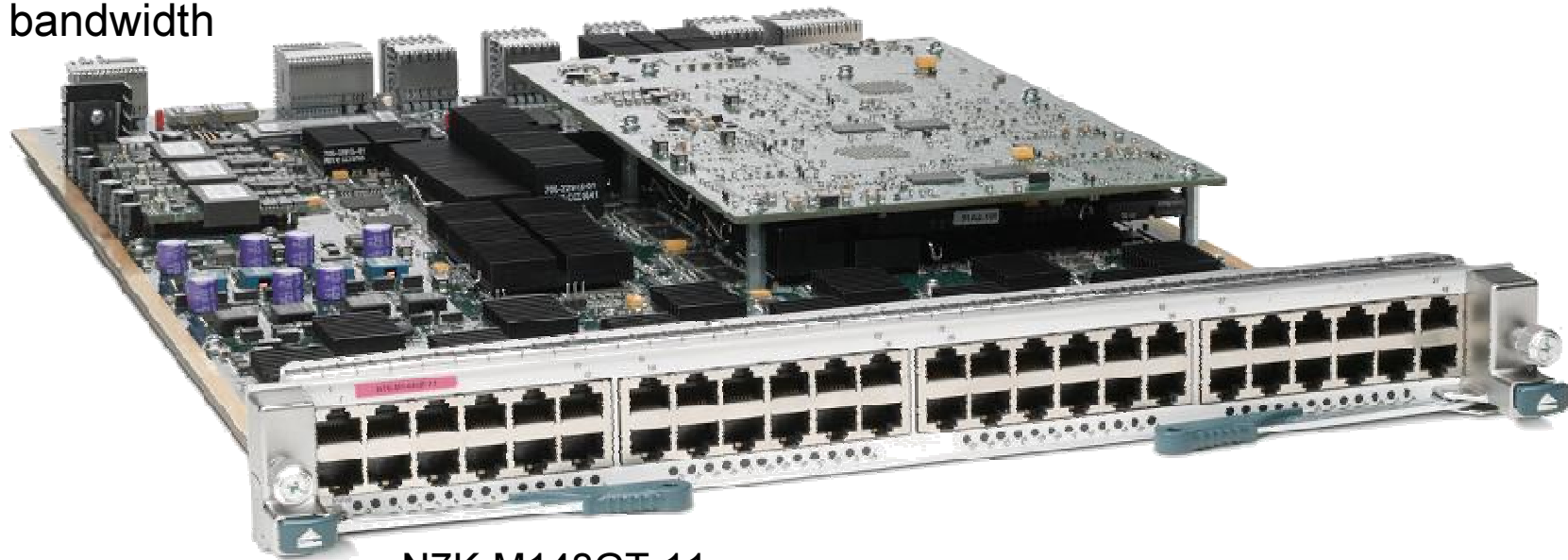


## Dedicated mode

- One interface gets 10G bandwidth
- Three interfaces disabled

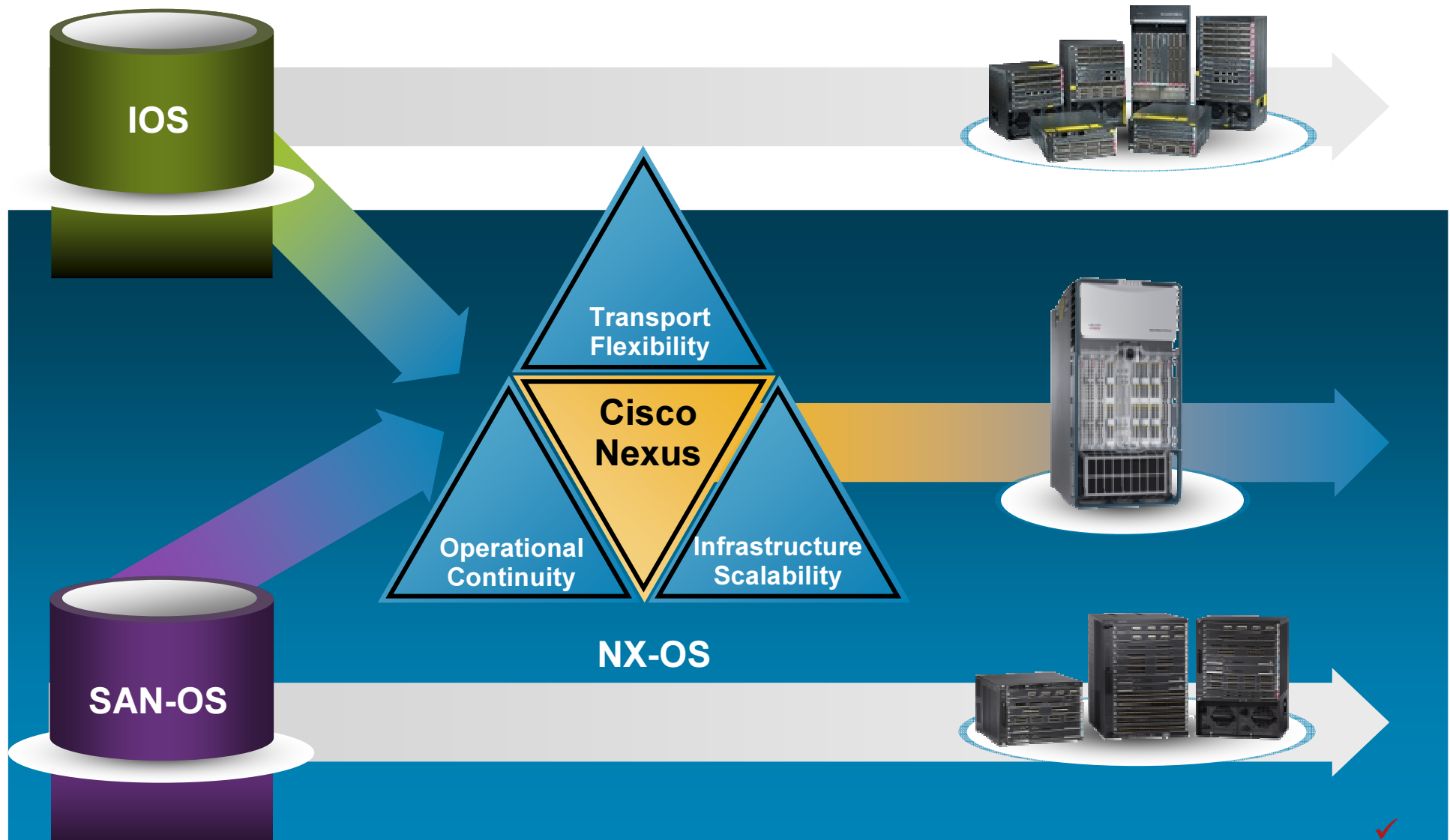
# 48-Port 1GE I/O Module

- 48 1GE 10/100/1000 RJ-45 ports
- 40G full duplex fabric connectivity
- Integrated 60Mpps forwarding engine for fully distributed forwarding
- Virtual output queueing (VOQ) ensuring fair access to fabric bandwidth
- 802.1AE LinkSec on every port
- Buffer: 7.5MB ingress, 6.2MB egress
- Queues: 2q4t ingress, 1p3q4t egress
- Blue beacon LED for easy identification



N7K-M148GT-11

# NX-OS: Purpose Built for the Data Center



# NX-OS Design Feature Highlights

- **Highly granular modularity in software components**

  - Provides better fault isolation and control

  - Provides streamlined feature sets and resource usage

- **Granular in-service software upgrades**

  - Provides better flexibility in upgrades and minimizes service interruption

- **Control-Plane / Data-plane functional separation**

  - Non-Stop Forwarding for each of the 3 fundamental technologies

  - Helps minimize data forwarding disruption

- **Integrated Virtualization support for L2 and L3**

  - Better manageability in complex environments

- **Easy Licensing**

  - Provides flexibility in deployments and growth

- **IOS command-line look-and-feel**

  - Low learning curve

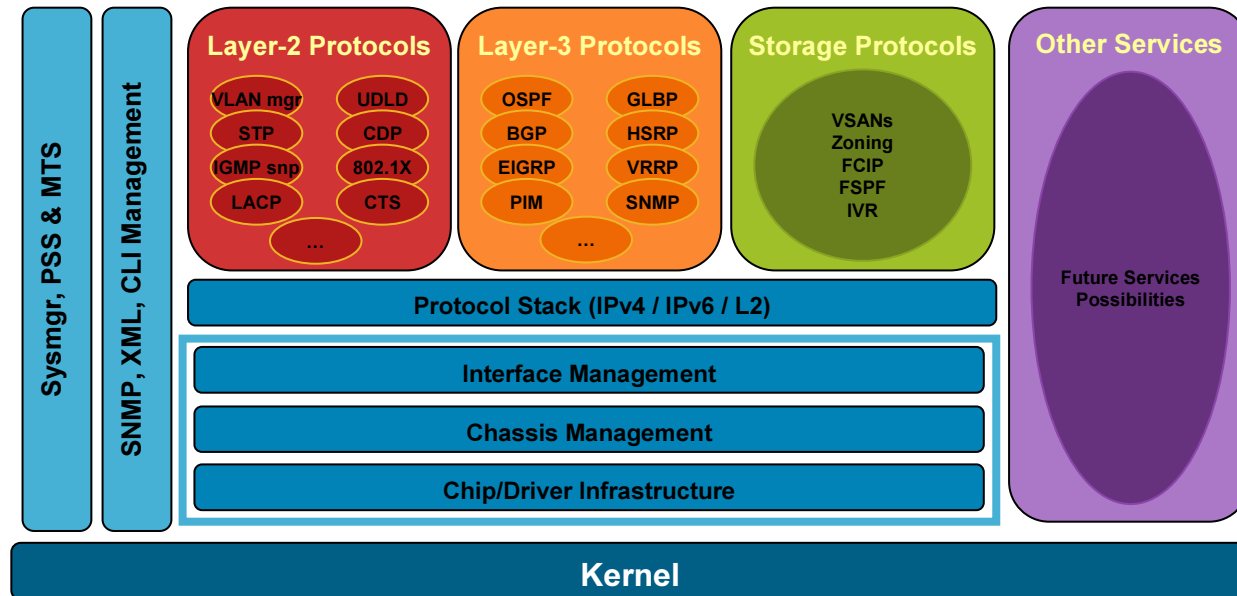
- **SNMP (read) & XML (read/write) based network management**

  - Integrates with current management systems and provides scalable future management path

- **Scalable control-plane by use of SMP-based CPUs**

  - Provides scalability and long term flexibility

# NX-OS Software Architecture



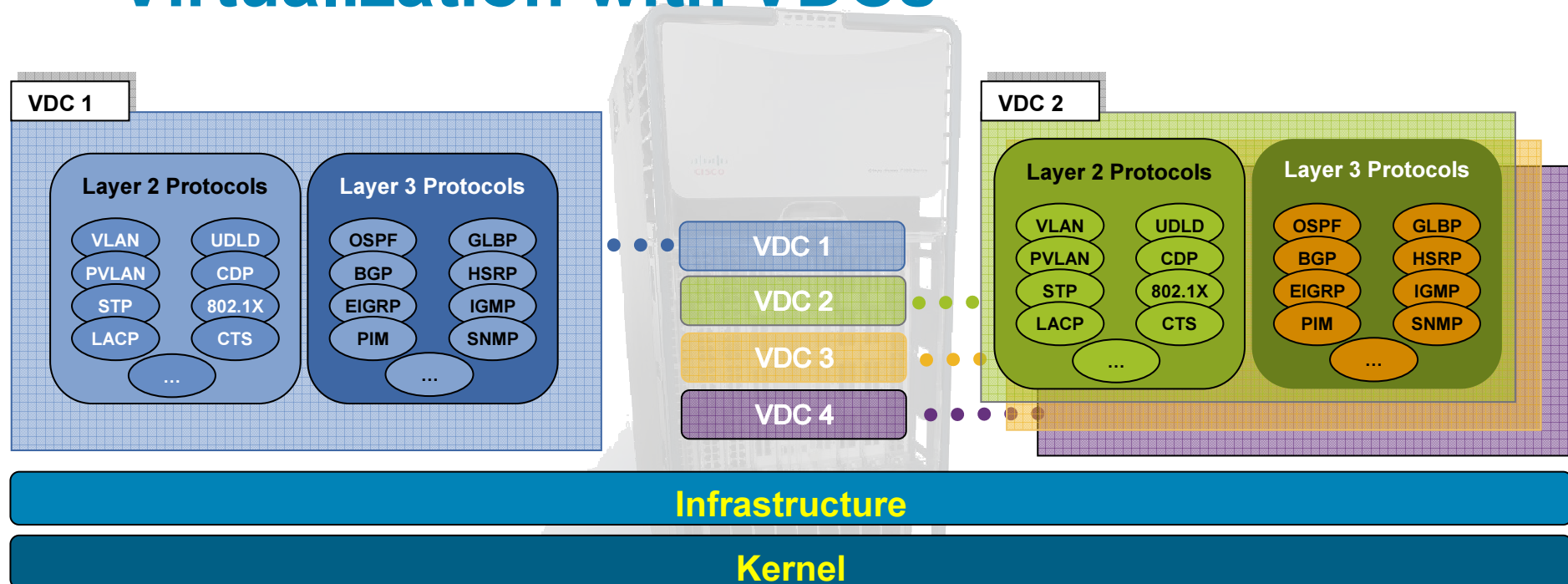
- **'NeXt-generation' Operating System that brings 3 fundamental technologies into a single platform:**
  - Layer-2 classical (now) and **unified I/O** switching (future)
  - Layer-3 multi-protocol routing (now)
  - **Storage protocols** and **SAN switching** (future)
- **Design Philosophy**
  - Invest in sophisticated software infrastructure so that multiple features can leverage it
  - Dealing with software complexity that is growing all the time
  - **Focus on Serviceability**
  - Provide comprehensive management that extends well beyond CLI using a Wizard-based GUI
  - **Modularity is paramount**

# Nexus 7000 / NX-OS High Availability

- Hardware provides redundancy at every component level:
  - Supervisors      Fabrics
  - Power              Fans
- Software offers multi-layered, multi-faceted resiliency:
  - Stateful process restarts
  - Graceful restart for routing protocols
  - Stateful supervisor engine switchovers
  - True in-service software upgrades
- Hardware and software combine to deliver data-center class high availability
  - **zero service disruption**



# Virtualization with VDCs

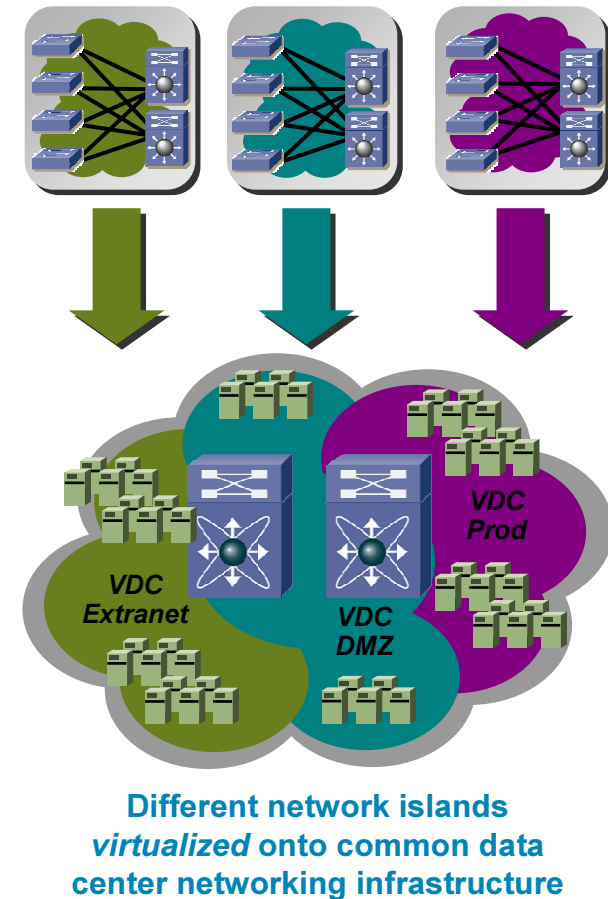


## VDC – Virtual Device Context

- Flexible separation/distribution of hardware resources and software components
- Complete data plane and control plane separation
- Complete software fault isolation
- Securely delineated administrative contexts
- Forwarding engine scalability with appropriate interface allocation

# VDC Use Cases

- Enables collapsing of multiple logical networks into single physical infrastructure while maintaining strong security, administration, and fault isolation
- Appropriate for typical silo/stovepipe designs such as:
  - Production, Development, Test
  - Intranet, Internet, DMZ, Extranet
  - Organization A, Organization B, Organization C
  - Application A, Application B, Application C
  - Customer A, Customer B, Customer C
- Helps scale physical resources of device:



System Capacity...	...with 1 VDC on 1 I/O module	...with 1 VDC on 8 I/O modules	...with 8 VDCs, 1 VDC per I/O module
FIB TCAM	128K	128K	1M (8 x 128K)
MAC table	128K	128K	1M (8 x 128K)
Classification TCAM	64K	64K	512K (8 x 64K)
Policers	16K	16K	128K (8 x 16K)



# NX-OS Licensing



Simple, flexible licensing model

- Three levels of enforced licensing
- Base, Enterprise Services, and Advanced Services
- Grace periods enable feature testing/trials without buying a license (e.g. 120 days), with some restrictions
- Time-bound licenses allow feature use during sales cycle etc. (after expiration date, feature will continue to run if grace period has not been exhausted)

<b>Base</b>	ISSU	PVRST+	MSTP+	802.1Q	LACP	PVLANs	CDP	SPAN	QoS
	RIP/RIPng	IGMP snooping	DHCP helper	uRPF check	Port Security	SSHv2	RBAC	SNMP	RADIUS
	HSRP	GLBP	VRRP	VRF lite	CoPP	DHCP snooping	DAI	IPSG	802.1x
	Jumbo Frames	UDLD	Storm control	EEM	GOLDS	Call home	NAC	TACACS+	ACLs
<b>Enterprise Services</b>	OSPF	EIGRP	IS-IS	BGP	Graceful Restart	PIM-SM	PIM-Bidir	PIM-SSM	IGMP
	MSDP	PBR	GRE	NetFlow					
<b>Advanced Services</b>	VDCs	CTS							

Note: Enterprise Services is NOT included with Advanced Services license

# Summary

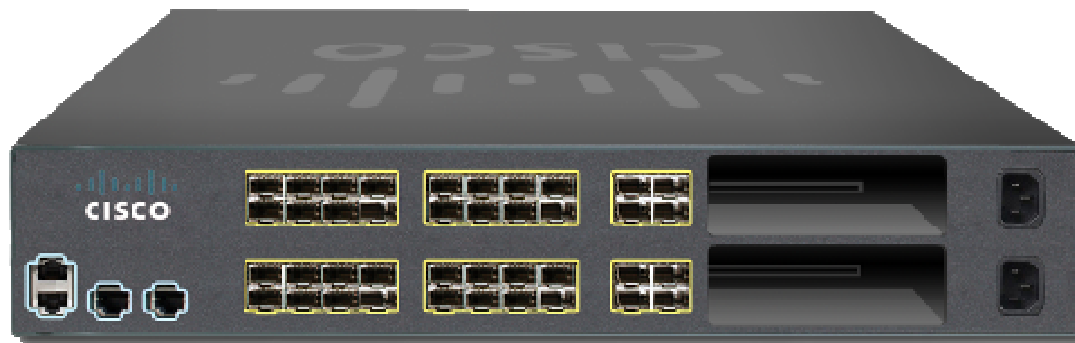
## Cisco Nexus 7000 and NX-OS: “Data Center Class” switching platform

- Designed from the ground up for Data Centers
- Targeted, feature-rich hardware platform
- Provides high-performance, high-density 10GbE connectivity at initial release
- Architected for 10G now, 40G, 100G, and Unified I/O in the future
- 1.2Tbps system bandwidth (80G per slot) with initial shipping I/O modules
- Nexus 7010 switch scales to 4.1Tbps system bandwidth (230Gbps per slot) with initially shipping fabric modules
- Series architecture that will scale to 15+ Terabits system bandwidth (500+Gbps per slot)





# Cisco Nexus 5000 Series



# Nexus 5000 Family

## Multi-Protocol Server Switch

*Industry's First I/O Consolidation Virtualization Fabric for Enterprise Data Center*

### Switch Family

**NX5020**



**56-Port L2 Switch**

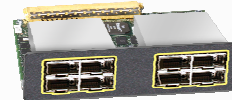
- 40 Ports 10GE fixed
- 2 Expansion Modules

### Expansion Modules



**Fibre Channel**

- 8 Ports 1/2/4G FC



**FC + Ethernet**

- 4 Ports 10GE
- 4 Ports 1/2/4G FC



**Ethernet**

- 6 Ports 10GE

### Partners



**CNA**

- 2 Port 10GE/FCoE



**Server Adapter**

- FCoE SW stack

**OS**

**Cisco NX-OS**

**Mgmt**

**Cisco Fabric Manager and Cisco Data Center Network Manager**

All 10GE switch/module ports are FCoE/Data Center Ethernet capable

# Data Center Access Switch Portfolio

Unified Fabric

## Nexus 7000 10 Slot



384P (768P future) 10/100/1000  
256P (512P future) 10GbE  
L2/L3/CTS (FCoE/DCE future)

## Nexus 5020



52P 10GbE  
L2/CTS  
FCoE/DCE/FC

Fibre Channel

## MDS 9500



528P 1/2/4/8GFC

## MDS 9124 and 9134



24-34P 1/2/4G FC

## MDS 9124e



24P 1/2/4G FC

Ethernet

## Catalyst 6500



384P 10/100/1000  
130P 10GbE  
L2 -7/CTS

## Catalyst 4948-10GE Catalyst 4900M



48P 10/100/1000  
2P 10GbE  
L2/L3



40P 10/100/1000  
8-24P 10GbE  
L2/L3

## CBS 3100



10GbE Uplinks  
Stacking L2/L3

End-of-Row

Rack

Blade



# Cisco ASR 1000 Series Aggregation Services Router



# New Enterprise WAN Requirements

**High-Performance Services**



**Integrated Security**



**Redefined  
WAN**

**Non-Stop Communications**

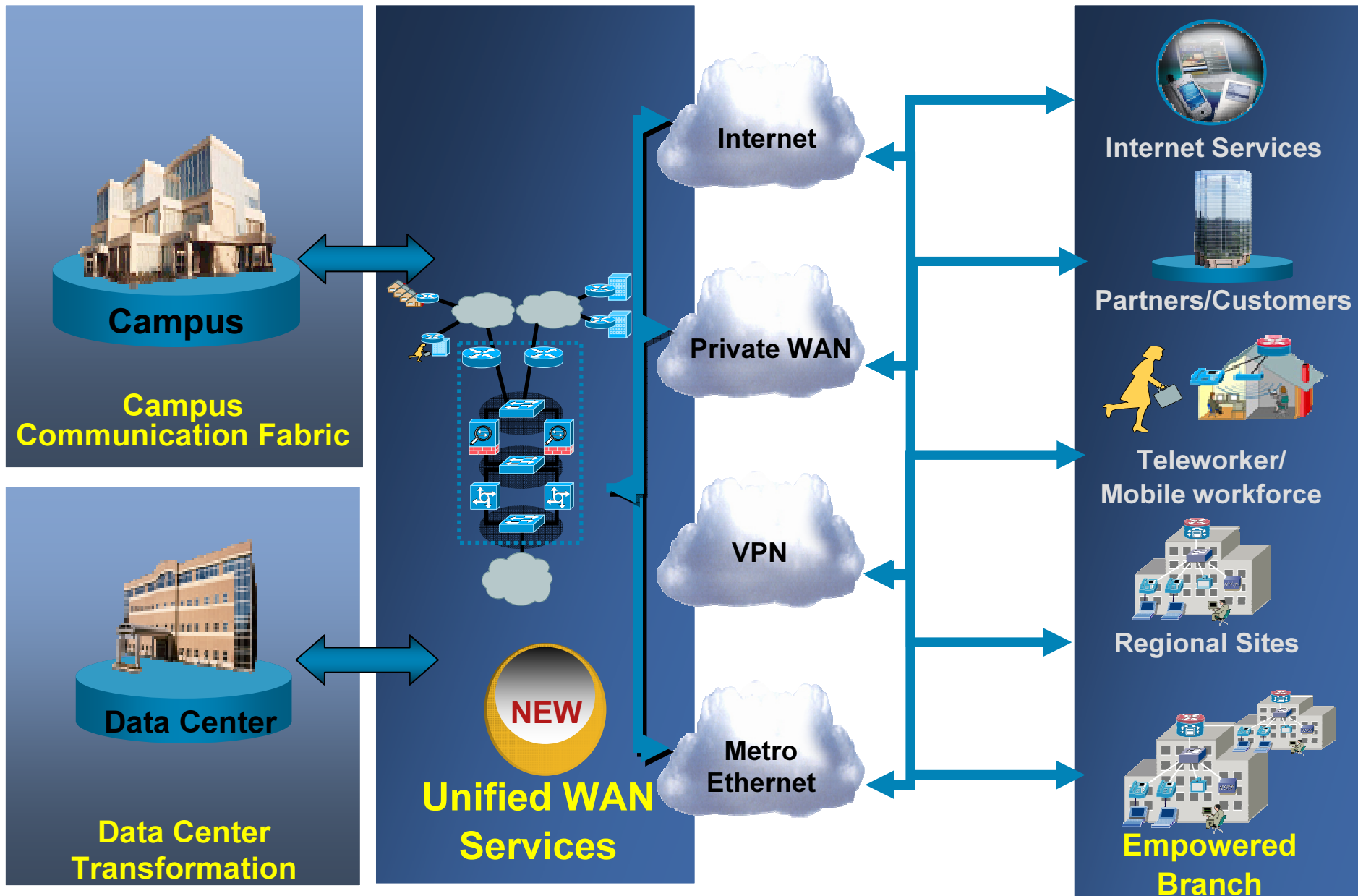


**Application Intelligence**



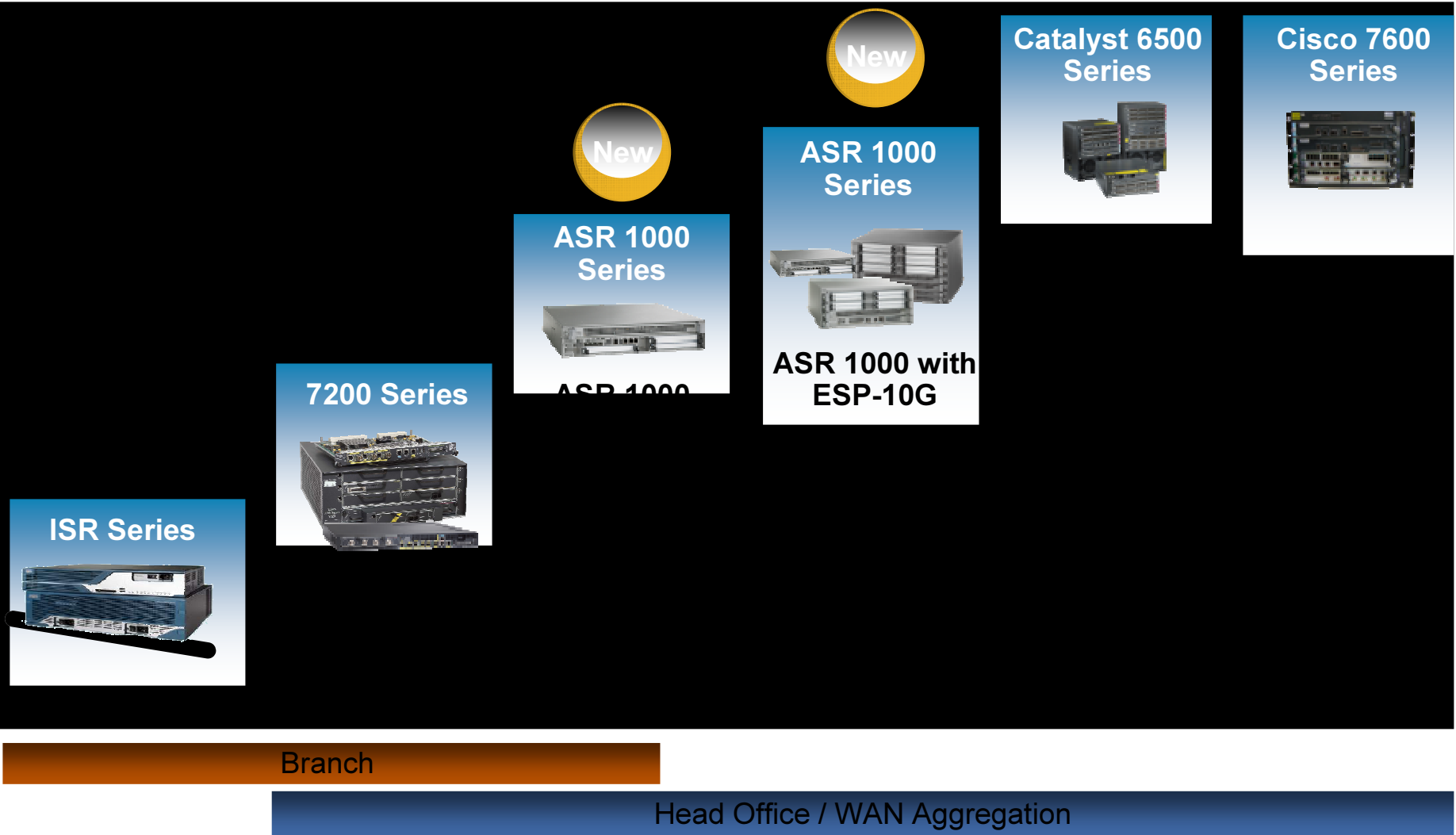
**Operational Efficiency**

# ASR1000: Enterprise Places in the Network



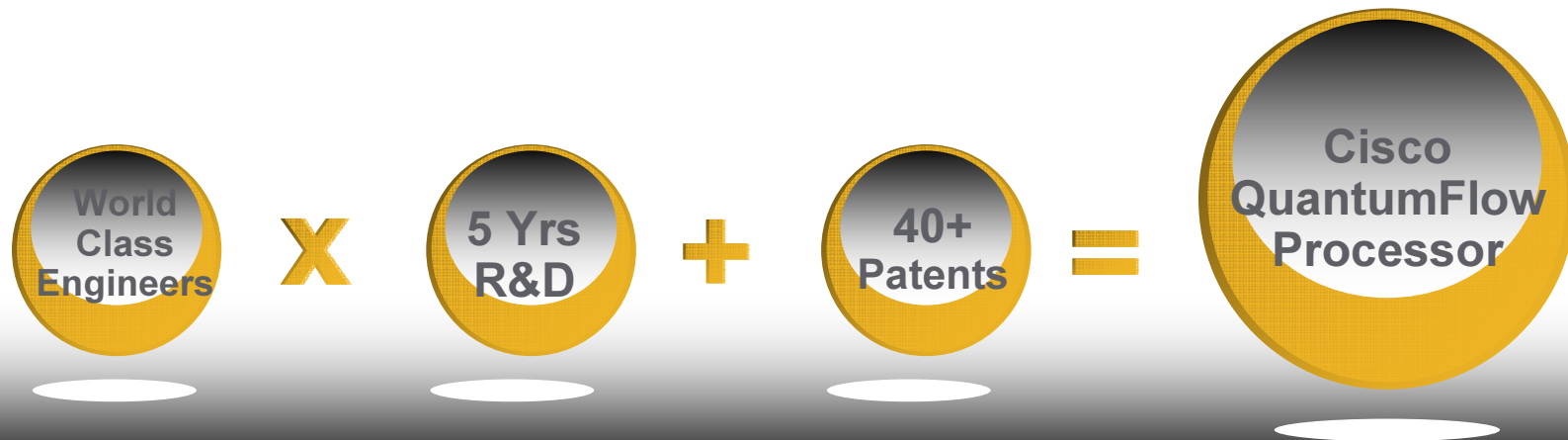
# Cisco Enterprise Routing Portfolio

Performance and Services Scalability



# ASR 1000 Series Innovations

## Cisco QuantumFlow Processor (QFP)



### World's Most Advanced Piece of Networking Silicon

Performance	40Gbs Services
Scale	Over 1.3 Billion Transistors
Availability	Customized QoS
Services	Integrated and Programmable



Instant-on Service Delivery
Low Touch Deployment
Faster Qualification
Future Ready Technology

# QFP Summary

- **Packet Processing Engine (QFP-PPE)**
  - 40 Packet Processors – 4 Contexts (threads) each
  - Up to 1.2GHz (Tensilica ISA) processors + DRAM packet memory
  - Single TCAM4 I/F (can cascade 1-4 devices)
  - C-language for feature development (extensive development support tools)
  - HW assist for flow-locks, look-ups, stats, WRED, policers, range lookup, crypto, CRC
- **Buffer/queue subsystem (QFP-Traffic Manager)**
  - HW hierarchical 3-parameter (min, max & excess) scheduler
  - Fully configurable # of layers based on HQF
  - Priority propagation through the multiple layers

# Cisco ASR 1000 Series- Overview

ASR 1006

ASR 1004

ASR 1002



## SPA Slots

### 3-slot

### 8-slot

### 12-slot

# of ESP Slots  
 # of RP Slots  
 # of SIP Slots  
 IOS Redundancy  
 Built in GigE  
 Height  
 Bandwidth  
 Performance  
 Air Flow  
 Power Supply (Watts)  
 On Chassis Services

1  
 Integrated (RP1)  
 Integrated (SIP-10G)  
 S/W  
 4  
 3.5" (2RU)  
 5-10 Gbps  
 4 to 8 Mpps  
 Front to Back  
 470

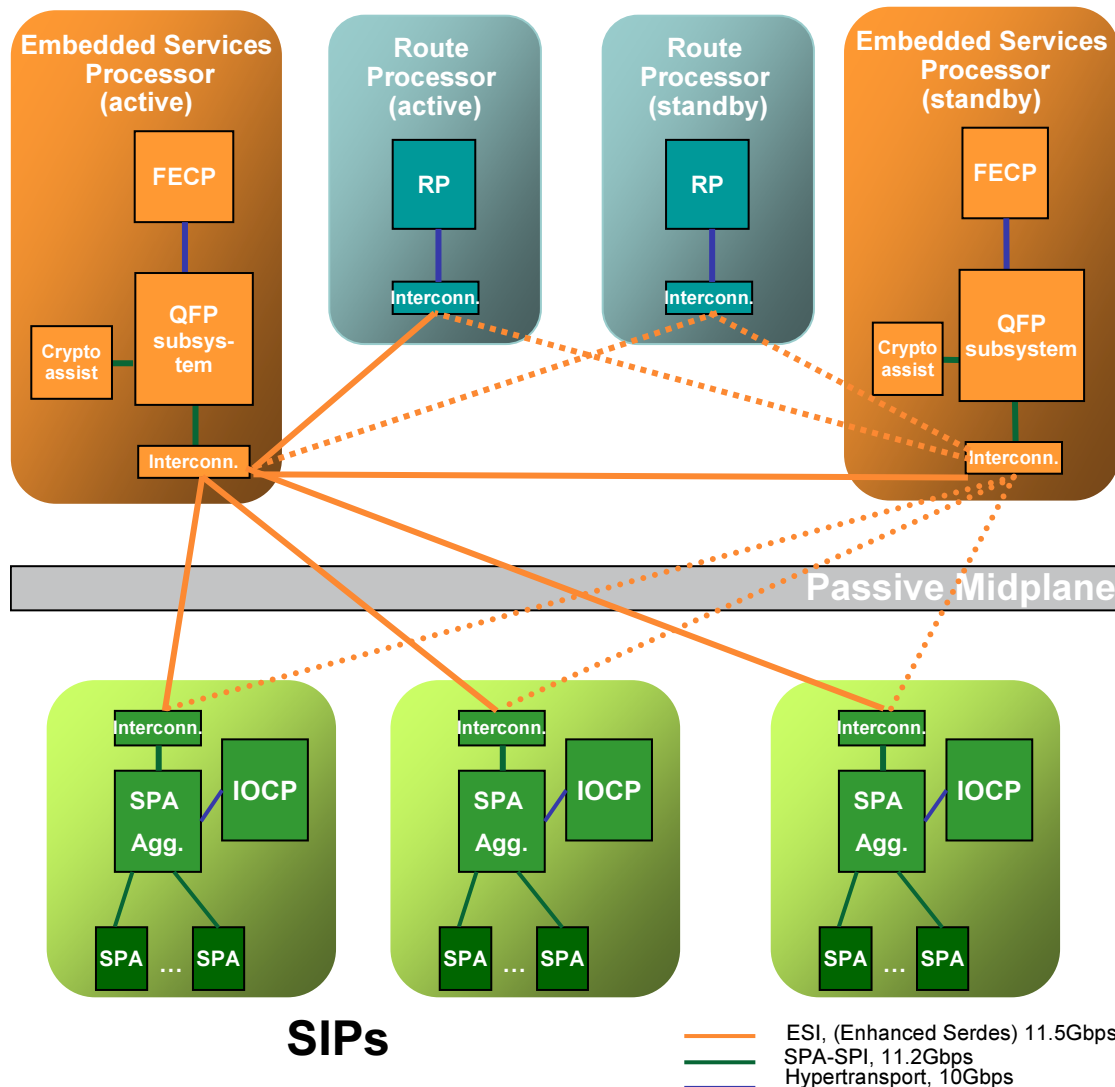
1  
 1  
 2  
 S/W  
 n/a  
 7" (4RU)  
 10-40+ Gbps  
 8 Mpps  
 Front to Back  
 765

2  
 2  
 3  
 H/W  
 n/a  
 10.5" (6RU)  
 10-40+ Gbps  
 8 Mpps  
 Front to Back  
 1275

IPSec, FW, FPI, BB, SBC etc.

Aggregated Services & Scale

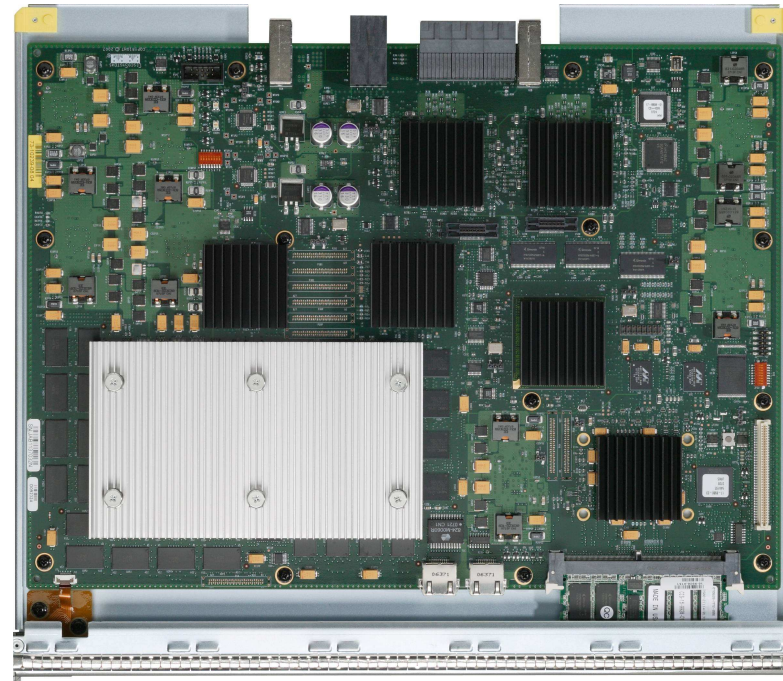
# ASR 1000 Series Building Blocks



- **RP (Route Processor)**  
Handles control plane traffic  
Manages system
- **ESP**  
Handles forwarding plane traffic
- **SPA Interface Processor**  
Shared Port Adapters provide interface connectivity
- **Centralized Forwarding Architecture**  
All traffic flows through the active ESP, standby is synchronized with all flow state with a dedicated 10Gbps link
- **Distributed Control Architecture**  
All major system components have a powerful control processor dedicated for control and management planes

# Embedded Services Processor – ESP-5G, ESP-10G, ESP-20G

- **Centralized, programmable forwarding engine (i.e. QFP subsystem (PPE) and crypto engine) providing full-packet processing**
- **Packet buffering and queuing/scheduling (Traffic Manager)**
  - For output traffic to SPA Interface Processors/SPA's
  - For special features such as input shaping, reassembly, replication, punt to RP, etc.
- **Interconnect providing data path links (ESI) to/from other cards over midplane**
  - Transports traffic into and out of QFP10
  - Input scheduler for allocating QFP10 BW among ESI's
- **FEC CPU managing QFP, crypto device, midplane links, etc**



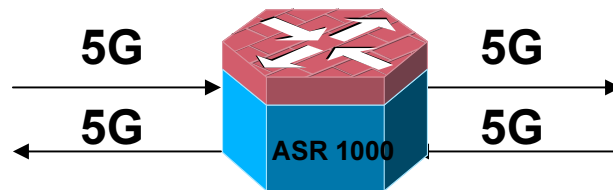
# ESP Generations

	ESP-5G	ESP-10G	ESP-20G
<b>Bandwidth</b>	5Gbps	10Gbps	20Gbps
<b>Based on</b>	QFP	QFP	QFP
<b># of Processors</b>	20	40	40
<b>Clock Rate</b>	900 Mhz	900 Mhz	1.2 Ghz
<b>Crypto Engine BW</b>	~1Gbps	3Gbps	8Gbps
<b>QFP Memory</b>	256MB	512MB	1GB
<b>Packet Buffer</b>	64MB	128MB	256MB
<b>TCAM</b>	10Mb	10Mb	40Mb

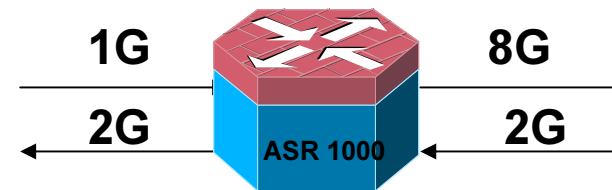
Roadmap

# What does the ESP Bandwidth mean?

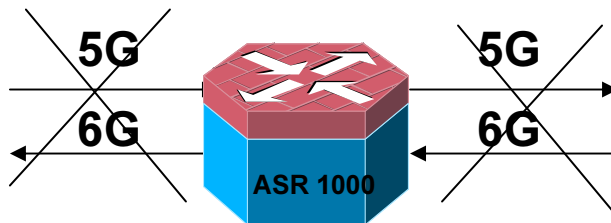
- ESP bandwidth denotes the total 'output' bandwidth of the system, regardless of the direction
- High priority traffic (as long as it is not over-subscribed - Example:  $\leq 10G$  for ESP-10G) will not be affected by this bandwidth limit
- ESP-10G Examples:



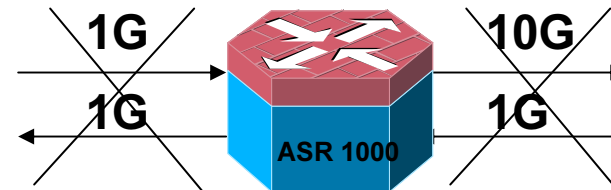
5G Unicast in each direction  
Total Output bandwidth  $5+5=10$



1G Multicast with 8X replication in one direction  
2G unicast in the other direction  
Total Output bandwidth  $8+2=10G$



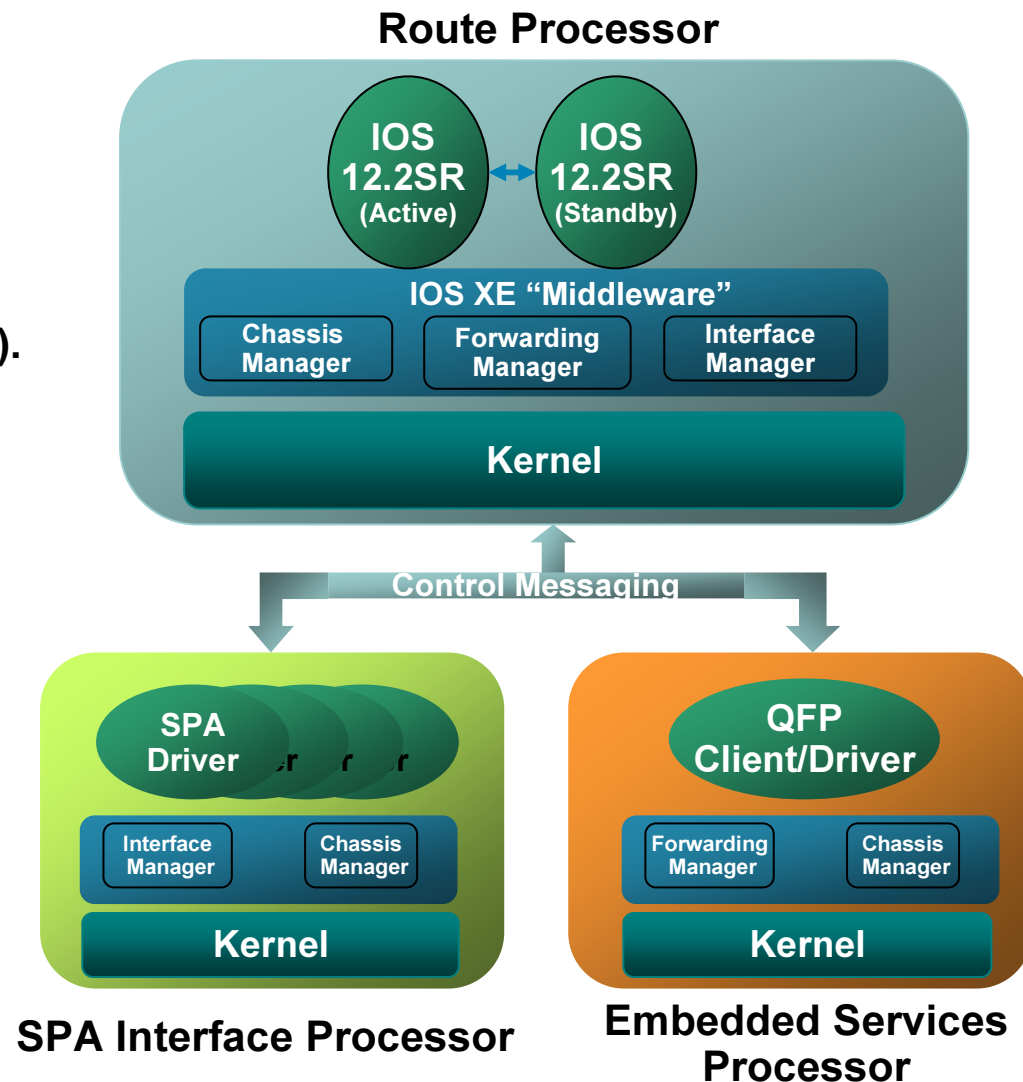
5G Unicast in one direction & 6G Unicast in the other direction  
Total output bandwidth  $(5+6=11)$  exceeds 10G; Only 10G will go through



1G Multicast with 10X replication in one direction  
1G Unicast in the other direction  
Total bandwidth  $(10+1=11)$  exceeds 10G; only 10G will go through

# Software Architecture – IOS XE

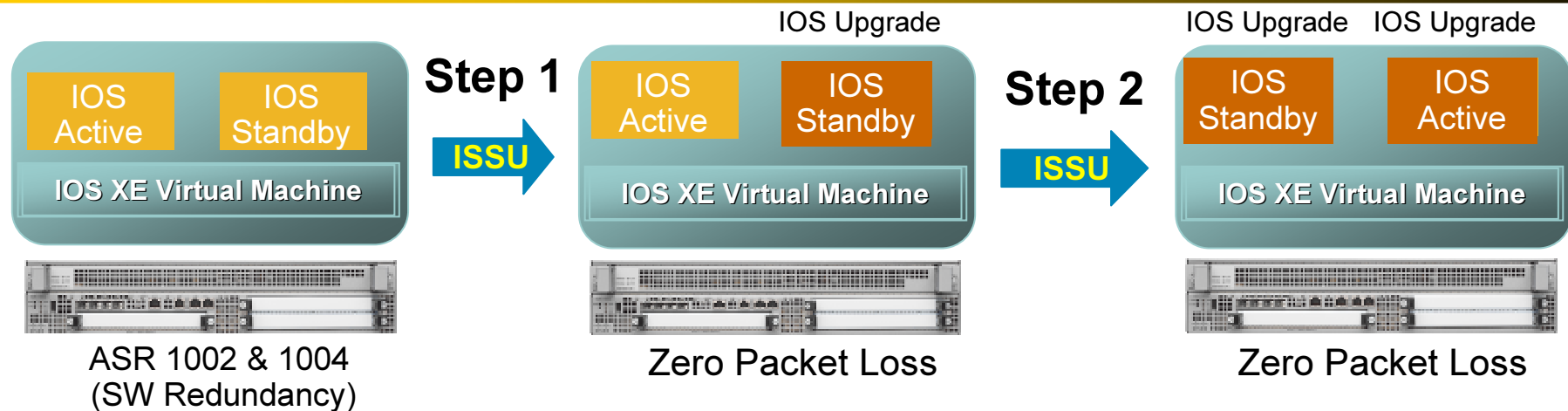
- IOS XE = IOS + IOS XE Middleware + Platform Software
- Operational Consistency - same look and feel as IOS Router
- IOS runs as its own Linux process for control plane (Routing, SNMP, CLI etc). 32bit and 64bit options.
- Linux kernel with multiple processes running in protected memory for
  - Fault containment
  - Re-startability
  - ISSU of individual SW packages
- ASR 1000 HA Innovations
  - Zero-packet-loss RP Failover
  - <50ms ESP Failover
  - “Software Redundancy”



# ASR 1000 Series Innovations

## IOS XE: Modular IOS for Compact Edge Routers

### Software Virtualization



**Industry first**, delivering hitless upgrades without costly hardware redundancy

### Feature

Combines rich edge feature set of IOS

Common look and feel to IOS

### Benefit

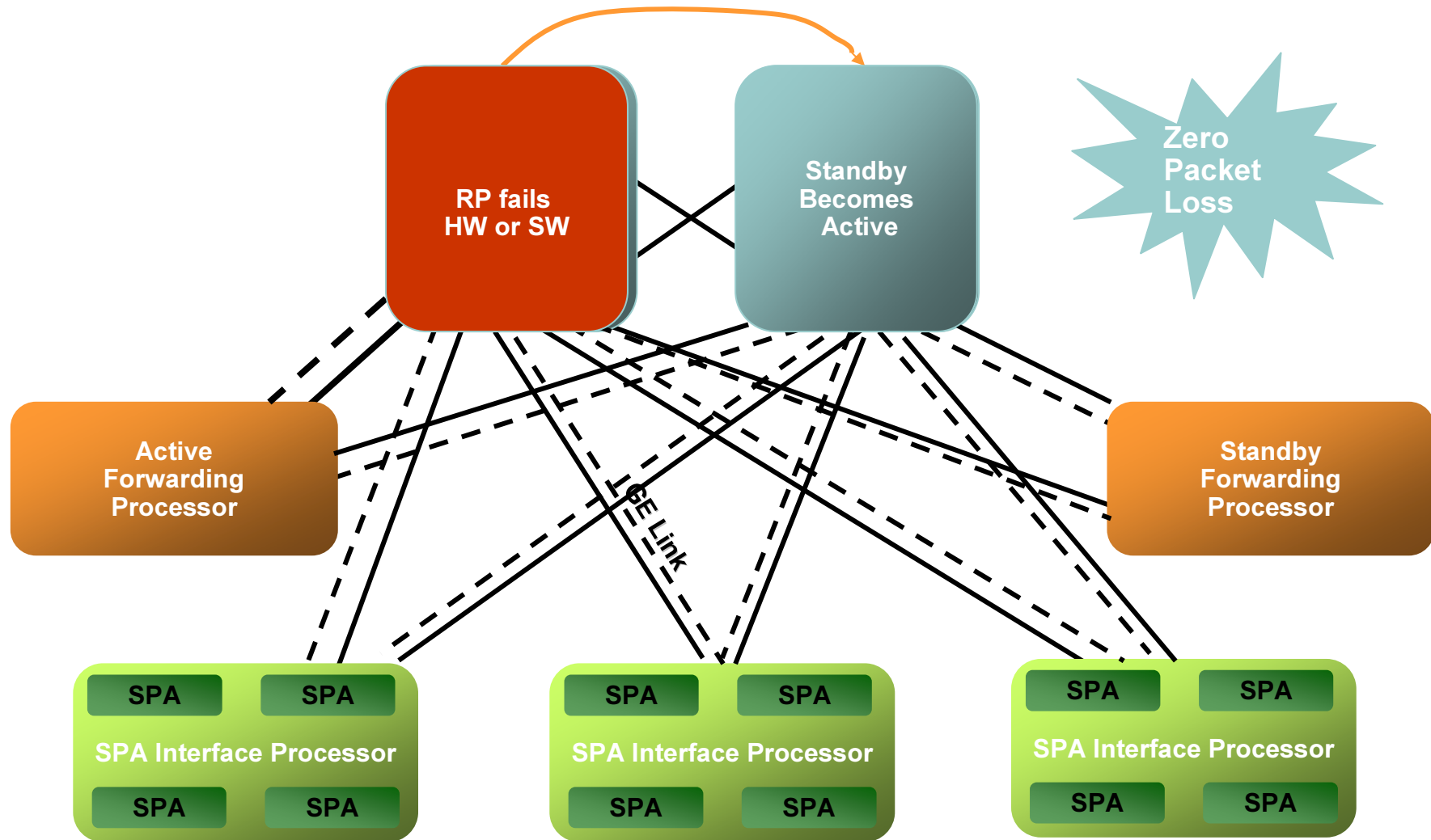
Broad services: Enterprise & SP, hosted or managed

Decreases OpEx, increases training ROI

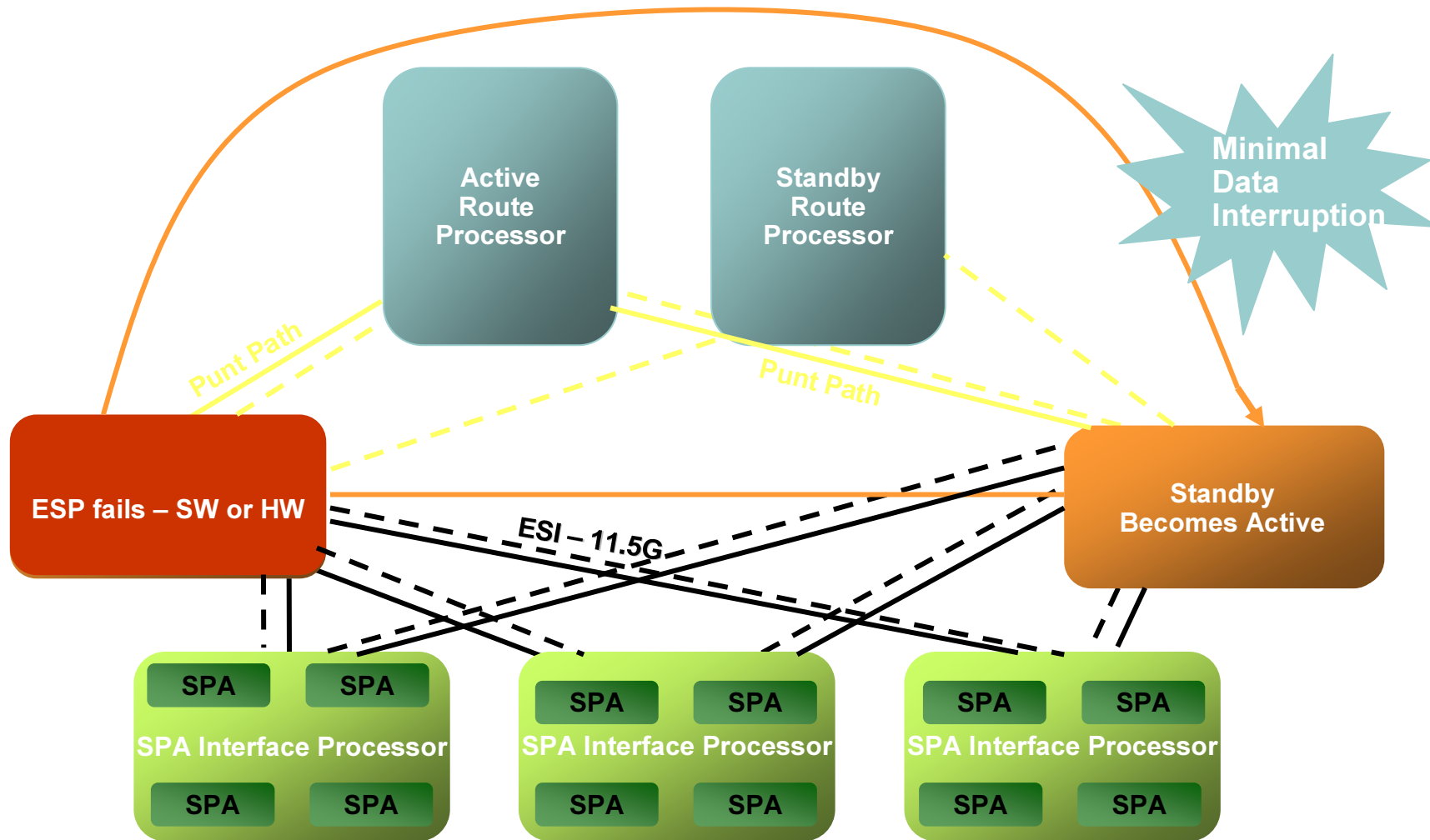
# ASR 1000 HA Highlights

- **ASR 1000 leverages Cisco IOS HA infrastructure – NSF/SSO, ISSU**
- **1+1 redundancy option for RP and ESP**
  - Active and standby
  - No load balancing
- **RP's are separate from ESP's**
  - Switchover of ESP does not result in switchover of RP
  - Switchover of RP/IOS does not result in switchover of ESP
- **Single RP may be configured with dual IOS for SW redundancy (single RP only)**
- **No redundancy for SIP or other I/O cards**
  - SPA plugs into a single SIP
- **Protection against SPA or SIP failure is via APS or Y-cable redundancy feature (Future: requires SPA support)**

# System Architecture – Distributed Control Plane



# System Architecture – Centralized Data Plane



# ASR 1000 – First Release (FCS\*)

## Software Features – High level

### 1000+ features at FCS

- IPv4 Unicast & Multicast
- IPv6 Unicast and IPv6 Multicast
- High Availability – NSF/SSO & ISSU
- BB Aggregation - Phase I
- QOS/NBAR phase I
- Security ACLs
- SBC – Session Border Controller – DBE function
- IPSLA/EEM
- Netflow v5/v9
- cRTP/LFI
- Security Features
  - NAT, IOS FW – Phase I
  - IPSec/DMVPN
- MPLS VPN – Phase I
- GRE

## Hardware Features

- 2/4/6 RU Systems
- ESP-5G, ESP-10G, SIP-10G, RP-1
- SPAs
  - 8-port GE
  - 1-port 10GE
  - 2-port GE and 5-port GE, 10-port GE
  - 8-port FE
  - 8-port T1/E1
  - 2&4-port T3/E3
  - 2&4-port OC-3/STM1 POS
  - 1-port OC12/STM4 POS
  - 2 & 4 –port Channelized T3

\*First Customer Ship

# ASR 1000 Hardware Architecture Summary

Hardware Feature	Benefit
<b>Multi-processor multi-threaded QFP</b> chip processing of up to 160 packets in parallel	Unmatched forwarding performance even with services enabled
QoS* done in hardware on the ESP, implementing state-of the art <b>3-parameter scheduler</b> (HQF) with capabilities for up to <b>128K queues</b> , 5+ levels of <b>hierarchical scheduling and priority propagation</b>	Enables sophisticated and scalable next generation triple play services with oversubscription
<b>Carrier-class Chassis Design</b> with redundant ESP, RP and IOS capabilities and designed for 40Gbps and beyond forwarding	Extends the longevity of the system and increases service availability
<b>Local control processors on SIP and ESPs</b> off-load CPU tasks on the RP	Provide more aggregate computing power
<b>Separate hardware modules</b> for RP and ESP	Providing additional level of resilience against hardware and software failures
<b>Built-in Timing support</b>	Allows deployment in timing-sensitive environments - IPRAN
Roadmap for <b>multi-core RP</b>	boosting control plane performance even further

# ASR 1000 QoS Benefits

QoS Feature	Benefit
Dedicated <b>state-of-the-art QoS chip</b> on ESP improving on the design from high-end routers	Allows for the support of flexible future proof QoS mechanisms
Full <b>HQF implementation</b> with hardware capabilities beyond 5 levels of scheduling without performance degradation	Enables new QoS-based services, in particular for broadband
Complete <b>3 parameter scheduling</b> throughout hierarchy with 99% accuracy	Allows for maximum and minimum bandwidth guarantees with oversubscription / bandwidth re-use
Classification and prioritisation support for over-subscription	Enables oversubscription management and thus increased efficiency and revenue potential.
Guaranteed <b>priority traffic propagation</b> through the entire system	Ensures that high-priority packets are transmitted with minimal latency
Designed to achieve <b>high scalability</b> by allowing backpressure mechanisms for up to 64K channels	Optimized for channelised SPAs / ATM SPAs / VLANs for broadband environment
Full <b>QoS functionality for control packets</b> and crypto packets	Provides full flexibility to protect control plane

# Security Services

Security Feature	Benefit
<b>Single data plane implementation with Built-in crypto chip that is used for bulk encryption/decryption</b>	<b>5K to 20K IPsec tunnels support 1G to 8G throughput Simpler configuration Saving of I/O slot Simpler &amp; better Integrated QoS (No caveats)</b>
<b>Integrated Firewall within QFP including ALGs</b>	<b>Multi-gigabit IOS Firewall in a Router Firewall supported in all interfaces in the Router Simpler configuration Saving of I/O slot Simpler &amp; better Integrated QoS (No caveats)</b>
<b>Secure Control Plane Protection implemented in QFP</b>	<b>Extensive QoS capabilities for Control Plane Protection</b>

# Summary

Cisco transforms and extends the Enterprise WAN & SP Edge

Cisco ASR 1000 Series Routers deliver instant-on, secure, and reliable services

Cisco ASR 1000 Series simplifies operation and delivers increased return on investment



**ASR 1000 Series Routers  
Services .. without compromise or complexity**



# Empowered Branch 4 Overview



# Empowered Branch 4: Collaboration, Applications, Innovation



Extending Consistent Services to Every Branch

# Application eXtension Platform

## Secure Network Integrated Infrastructure to host Branch Applications



### AIM-102

256MB, 1GB, Intel Celeron

**Embedded Light-Weight Apps**



### NME-302/522

512MB-2GB, 80/160GB  
Intel Celeron Pentium M

**General-Purpose  
Packet Services  
Advanced Services**

**Complete Ecosystem**

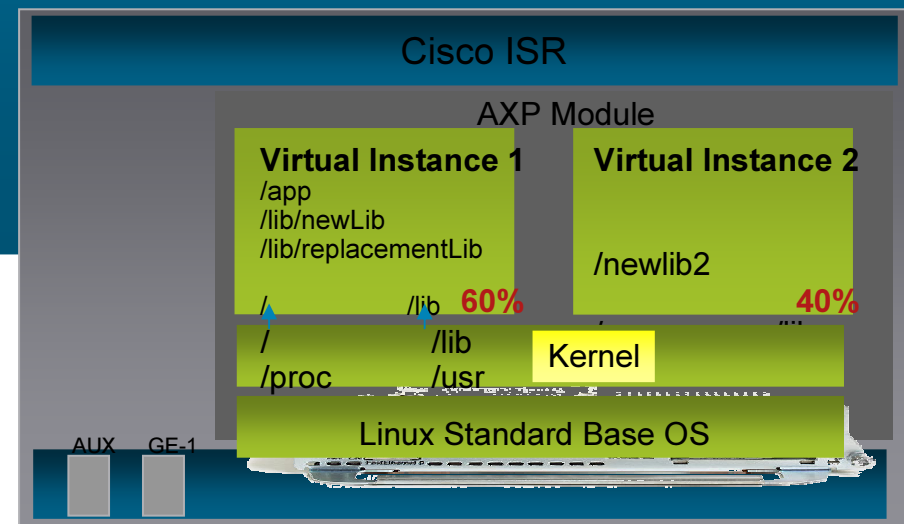
**SDK and Development Portal**

**AXP Partner Program**















**AXP Development Services**

**AXP Advanced Services**

- Linux-based integration environment
- Certified libraries to implement C, Python, Perl and Java applications
- Multi-app support with ability to segment and guarantee CPU, memory and disk resources
- Extensible Cisco CLI with Cisco IOS APIs
- Cisco ISR 1841, 2800, 3800 series support



# Solution Ecosystem

Vertical Solutions	UC Solutions	Network and Management Solutions
Healthcare 	   	   
Financial Services 		
Retail 		
Energy 		
Channel Partners and Reseller		 

Initial Target Markets: Healthcare, Financial Services, Retail and Energy

**“Build Your Own” or “Prepackaged” Applications**

Organizations with highly distributed branch locations and custom apps

# Summary

## Cisco Nexus 7000 and NX-OS:

- Designed from the ground up for Data Centers
- Provides high-performance, high-density 10GbE connectivity at initial release
- Architected for 10G now, 40G, 100G, and Unified I/O in the future
- 1.2Tbs →4.1Tbs →15+ Tbps
- 80Gbps/slot →230Gbps →500+ Gbps

## Cisco Nexus 5000:

- Designed from the ground up for Data Centers
- Wire-speed-10Gbps
- Low Latency- (3.2us across switch)
- Priority Flow- Control (PFC)
- Consolidated I/O- Single Switch for LAN, SAN, HPC

# Summary

## ASR 1000:

- High performance to cater for new services
- Rich QoS features
- Multi gigabit IOS Firewall
- 5 Gbps, 10 Gbps, 20 Gbps

## Empowered Branch 4:

- Video Surveillance Modules for ISR
- ISR 860 and 880
- AXP Platform
- Content Filtering

