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The Architecture of Hybrid Platforms in ASR Family: ASR1002-HX & ASR1001-HX

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BRKARC-3603

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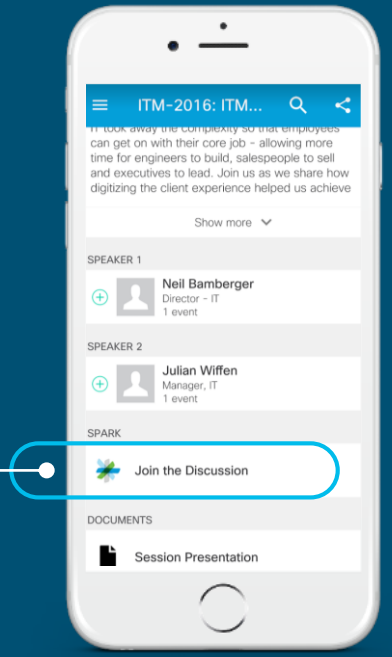

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Agenda

- Challenges with Datacenter & WAN Aggregation
- Platform Overview
- Software Overview
- All About Licensing
- Network Clocking
- Basic Troubleshooting
- Key Takeaways
- Q & A

Session Objectives

This session focuses on:

- The Rise of a New Era of Hybrid/High-End Platforms in the ASR1000 Family.
- The Architectural deep dive on the components being used to make these Hybrid Models.

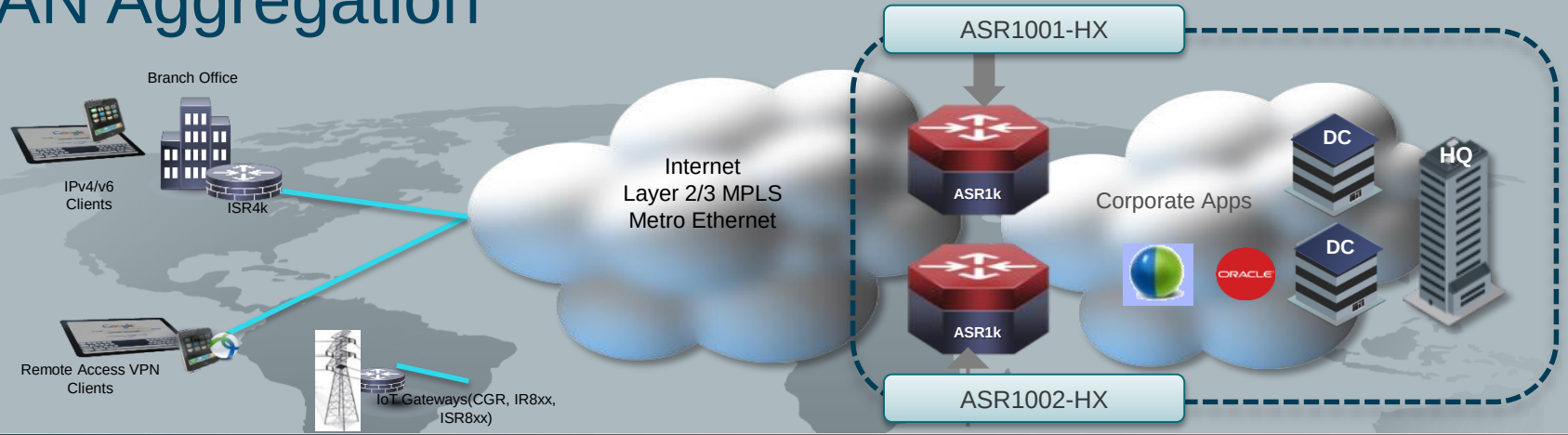
By the end, I expect each of us in this room to get a better understanding on the architecture of this device and how we can put it for the betterment of our networks.

What this does not include

- In depth Feature analysis.
- Feature Parity comparison.
- Any design or deployment scenarios.

Challenges with Datacenter & WAN Aggregation

WAN Aggregation



WAN Aggregation connecting Branches, Remote Users, IoT Gateways

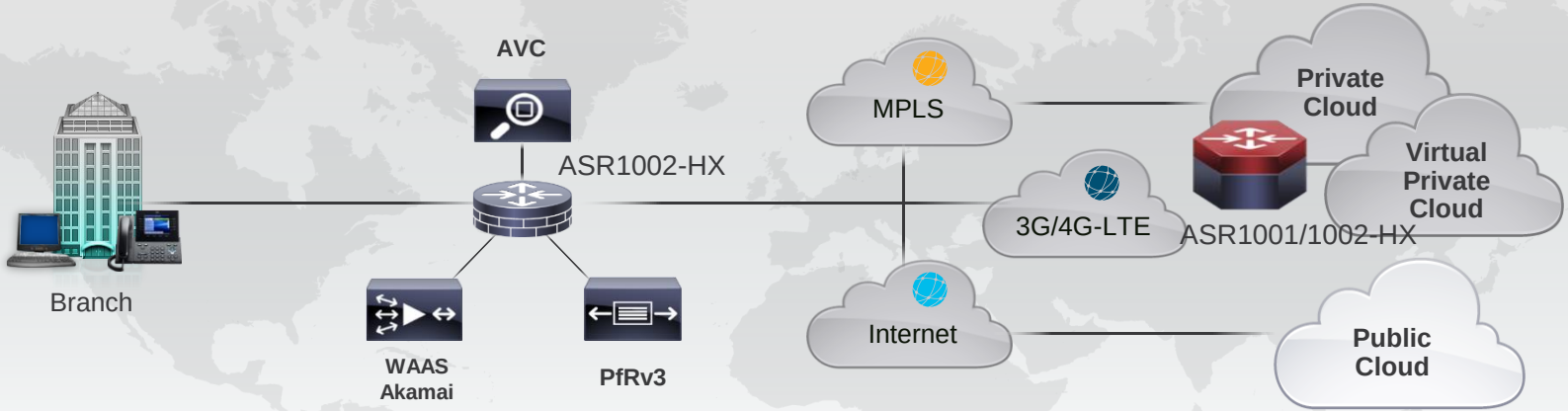
Problem Statement/Customer Needs

- Application Driven Bandwidth Usage
- Security and Segmentation
- Application acceleration, visibility and control
- 1GE, 10GE connectivity

Solution Characteristics

- L2-L3 VPN: MPLS, VPLS, GRE, LISP, EoMPLS
- Crypto VPN Solutions: DMVPN, GETVPN, FlexVPN, SSLVPN
- App: AppNav, NBAR2, FNF, PfR for Load Balancing.

Cisco Intelligent WAN (IWAN)



APIC **Management & Orchestration**

Application Optimization

- Performance monitoring
- Optimization and Caching

AVC, WAAS, Akamai

Intelligent Path Control

- Optimal application routing
- Efficient use of bandwidth

Performance Routing

Transport Independence

- IPSec WAN Overlay
- Consistent Operational Model

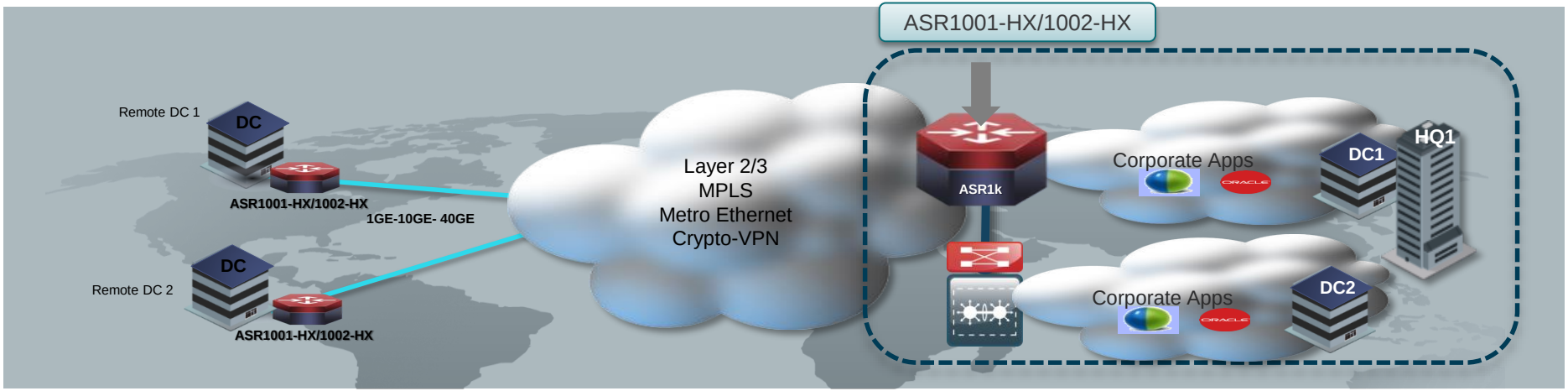
DMVPN

Secure Connectivity

- NG Strong Encryption
- Threat Defense

Suite-B, CWS, ZBFW

Data Center Interconnect with MACsec/GETVPN



Connecting multiple private datacenters

Problem Statement/Customer Needs

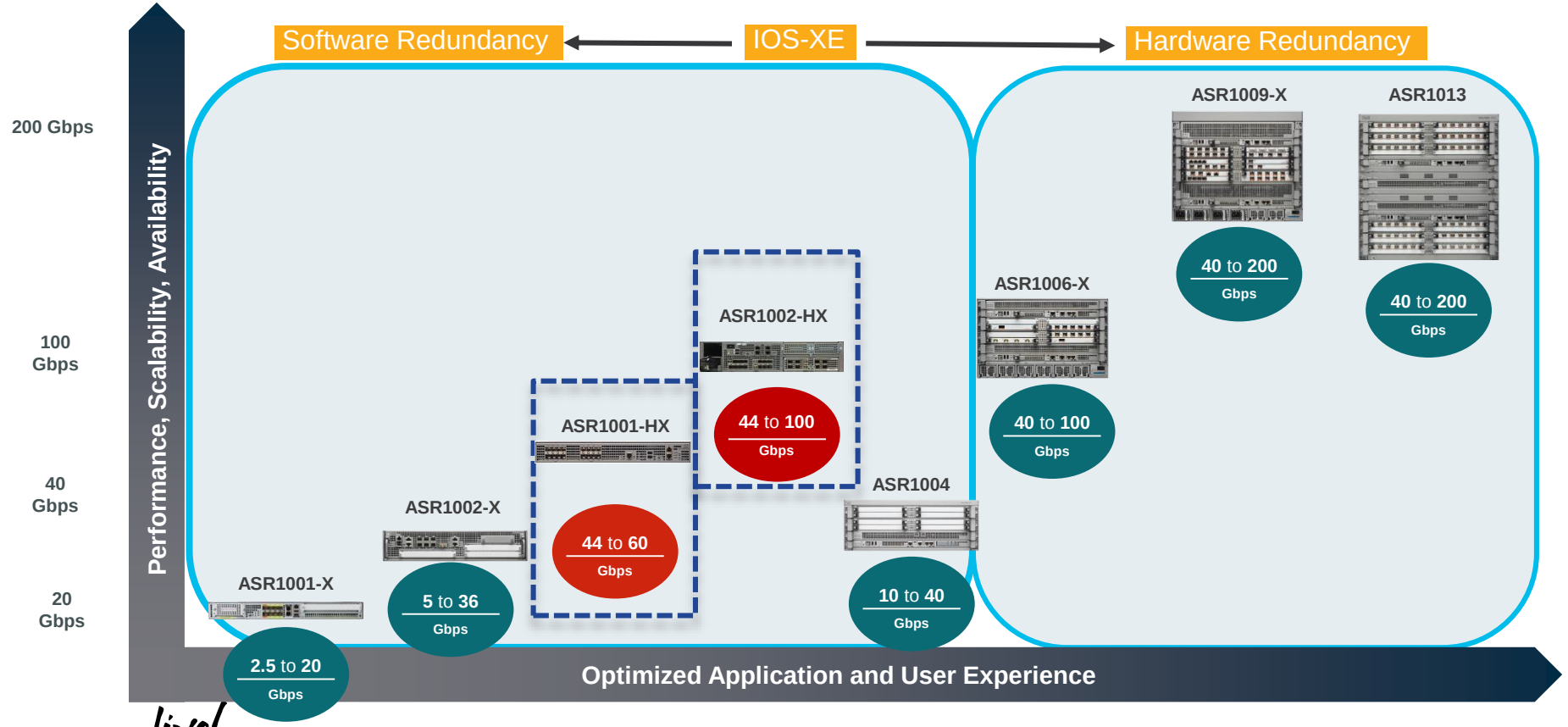
- Geographical dispersed Application Clusters
- High Availability and Disaster Avoidance/Recovery

Solution Characteristics

- VPN: VPLS, E-VPN, VXLAN, OTV, OTV+LISP
- Other: ACL, ERSPAN, Firewall, SGT

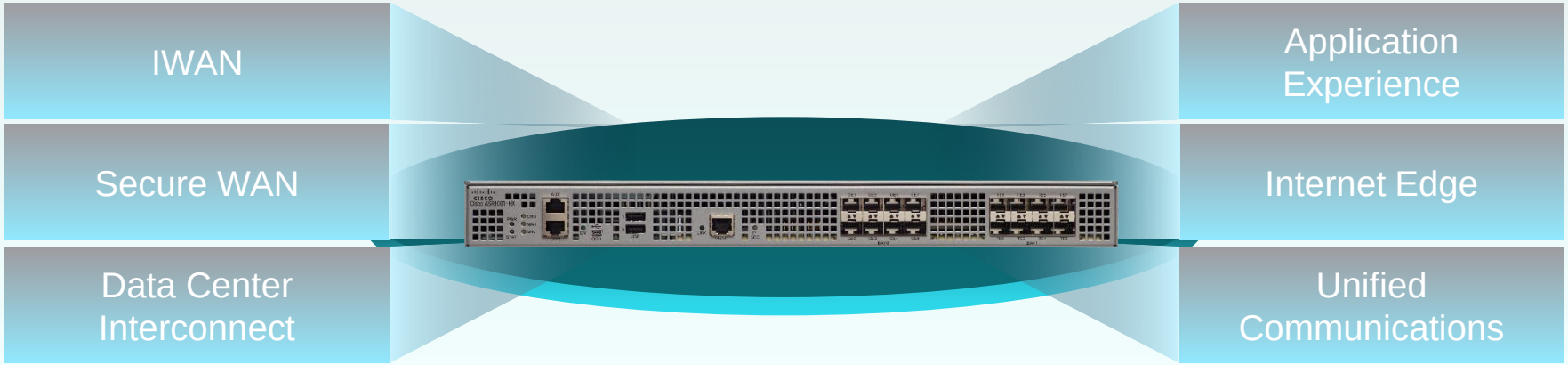
Platform Overview

Cisco ASR1000 Series Routers



Building a Next Gen Platform for Enterprises

ASR 1001-HX All-in-One Device for High Performance Edge Services



Broadest Set of Advanced Network Services

ASR 1001-HX
System Components

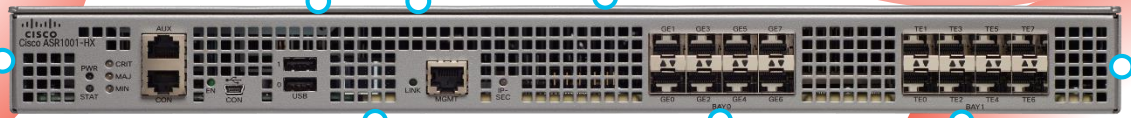
Control plane
- CPU: Quad Core @ 2.5 GHz
- Memory: 8GB DDR3 default memory, upgradeable to 16GB

Pay as you grow
- 60 Gbps system performance
- Port on demand performance (based on I/O licenses)

Multi-Core Network Processor
- 62 Cores
- 4 Packet Threads / Core
- 248 simultaneous threads

Miscellaneous
- RJ45 & mini-USB console
- Secure Boot

System management
- Cisco Prime
- Glue Networks



Crypto module
- Field upgradeable

Application level service performance
- 30M Packets Per Second
- Diverse VPN security solutions, up to 16G IMIX
- 2M Firewall and traditional NAT Sessions

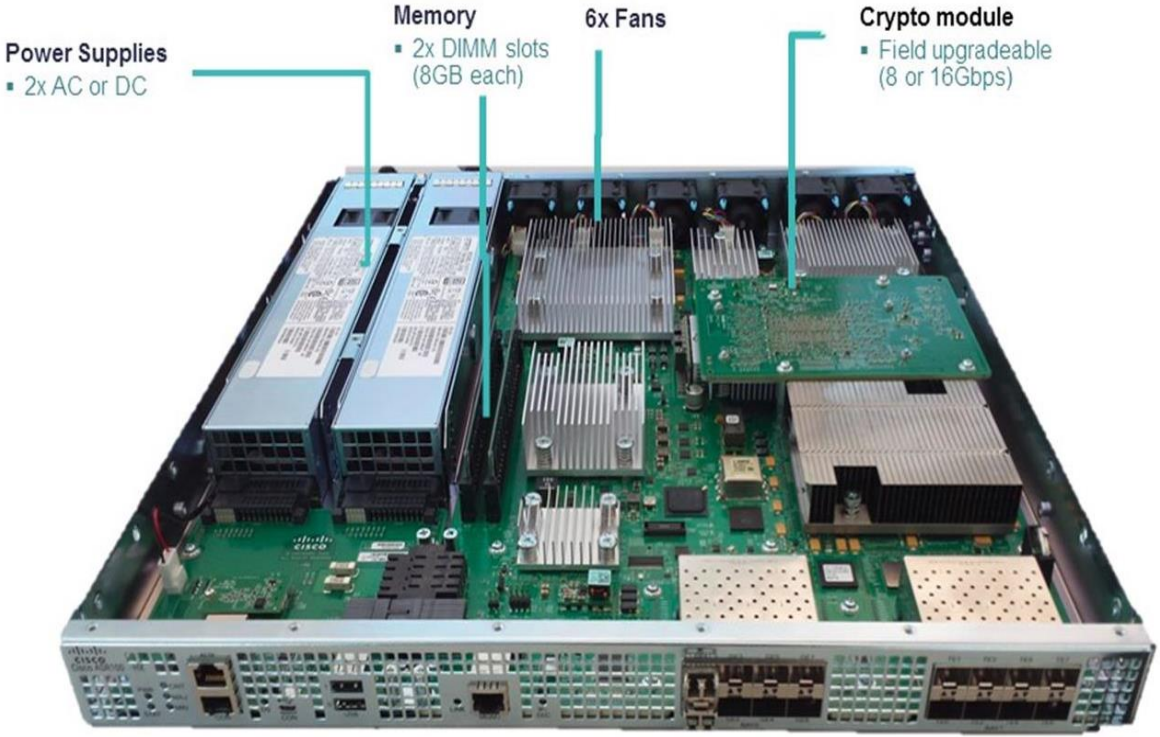
Built in I/O
- 4x 1GE enabled by default
- 4x1GE enabled by port licenses
- Multipoint MACSEC for linerate encryption

Built in I/O
- 4x 10GE enabled by default
- 4x configurable 10GE/1GE enabled by port licenses
- Multipoint MACSEC for linerate encryption

ASR 1001-HX Power Supplies – Power Entry Modules and Fans

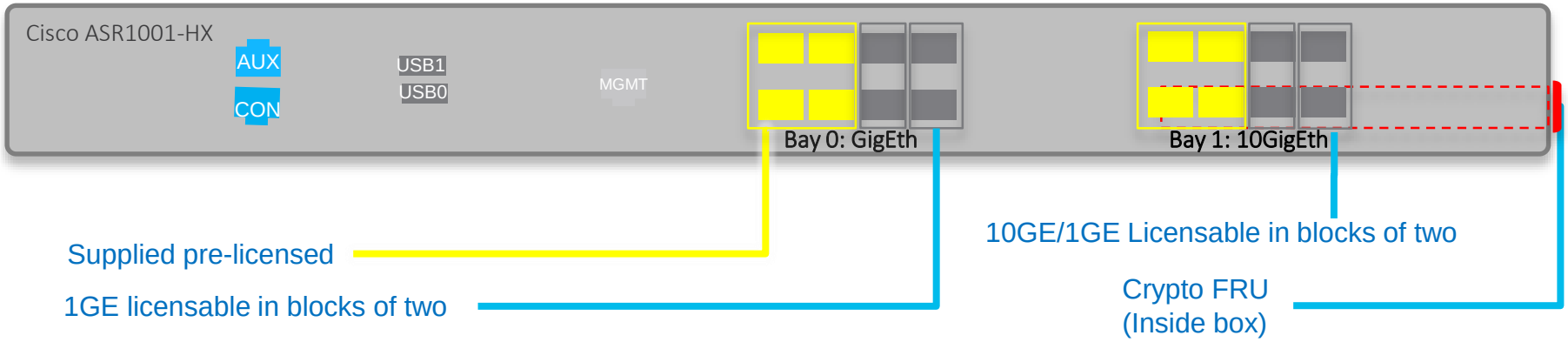
- The two Power Entry Modules (PEM) are separated from fans
- Redundant PEMs
- Six fans
- Router will continue to operate indefinitely if a single fan fails
- If more than one fan fails then the router may shut down, if the temperature exceeds a threshold

ASR 1001-HX Top View

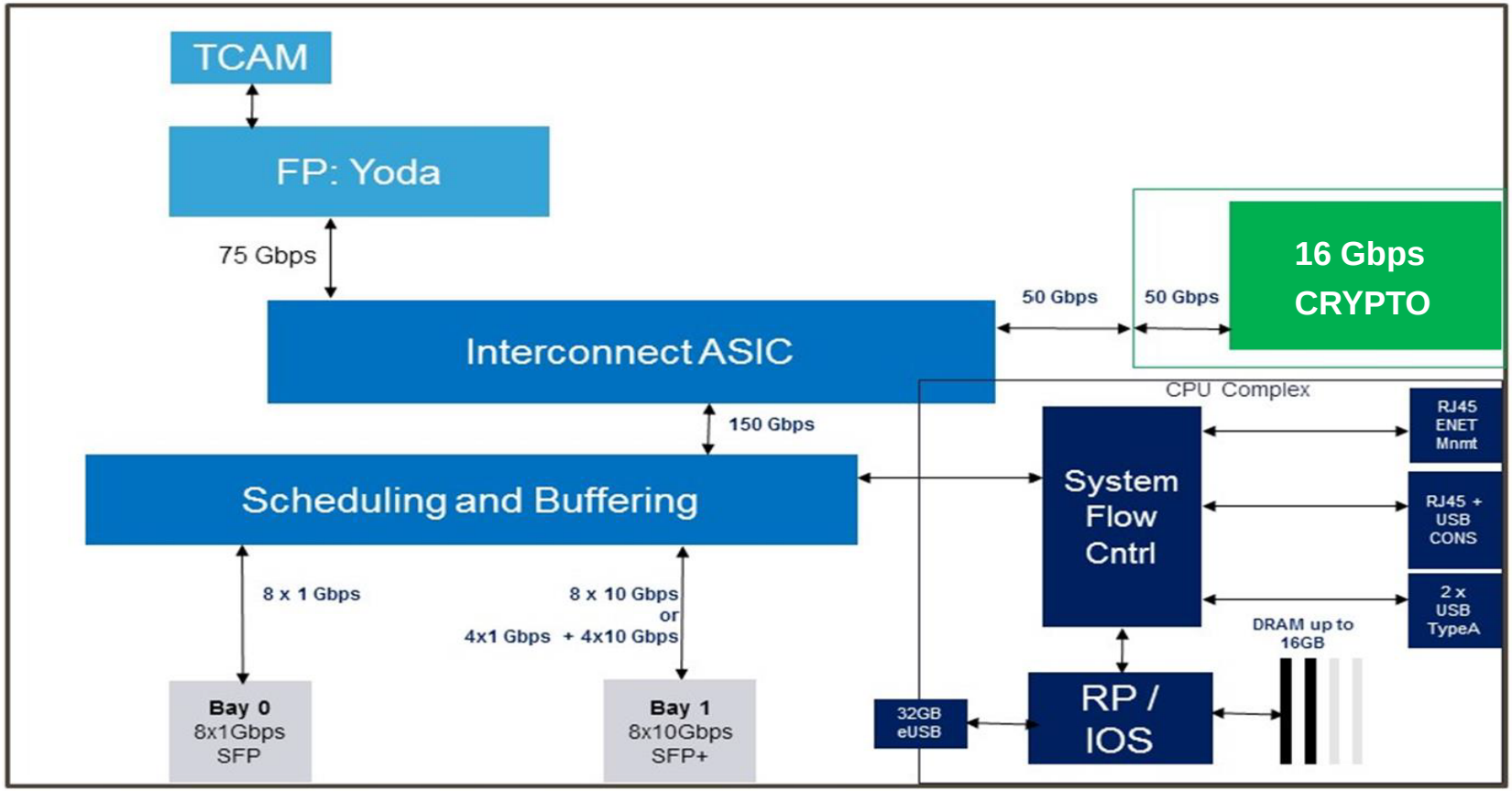


ASR 1001-HX Front Panel and Ports

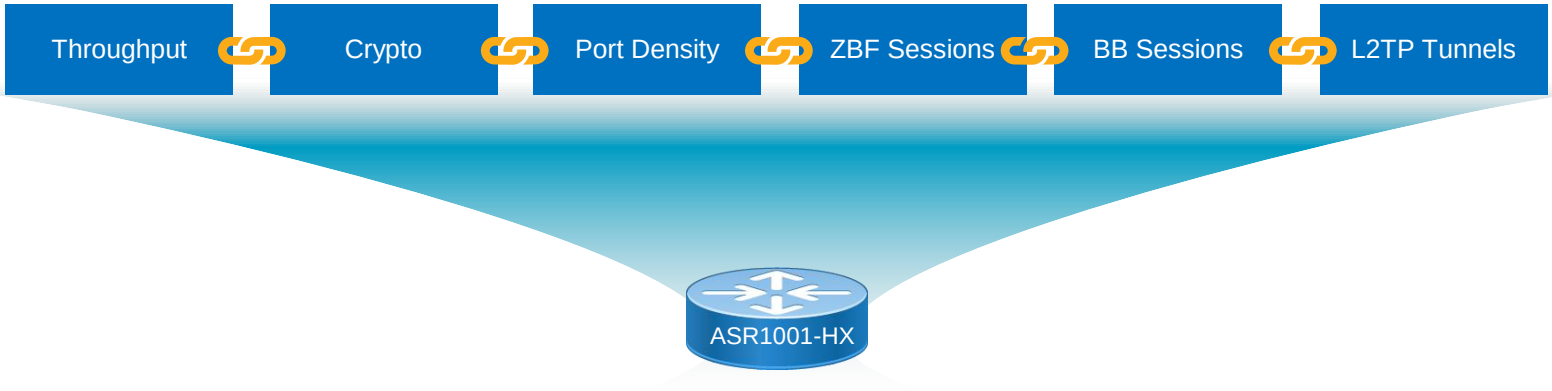
- Ports to the front panel are divided into “bays”
- Bays are logical divisions used in the system configurations
- Two bays supported on ASR1001-HX (0-1)
- Router throughput is not licensed, you just need enable existing interfaces on the router
- Crypto throughput is licensed, through a field-replaceable unit



ASR1001-HX Hardware Block Diagram



Performance That Matters(ASR1001-HX) …



System Throughput is 3x times higher than ASR1001-X at 44-60 Gbps

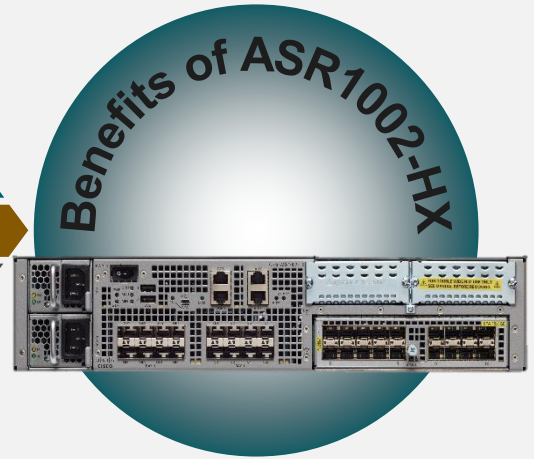
Up to 8x10GE+8x1GE or 4x10GE+12x1GE ports connectivity

16 Gbps crypto throughput

One Size Does Not Fit All
Pay as you grow with on-demand scale and performance Crypto/10GE/1GE Ports.

Better Business outcomes
Run multiple services concurrently and simplified Deployment.

Lower CapEx & OpEx
Savings from Power, Cooling. Lower Maintenance & Deployment costs.



ASR 1002-HX
System Components

Control plane
- CPU: Quad Core @ 2.5 GHz
- Memory: 16GB DDR3 default memory, upgradeable to 32GB

Pay as you grow
- 100 Gbps system performance
- Port on demand performance (based on I/O licenses)

Multi-Core Network Processor
- 124 Cores
- 4 Packet Threads / Core
- 496 simultaneous threads

Miscellaneous
- RJ45 & mini-USB console
- SSD
- Secure Boot

Network Interface Module
- 1 double wide NIM slot or
- 2 single wide NIM slots
- NIM – Future Compatibility with ISR4400 and ASR1001-X

System management
- Cisco Prime
- Glue Networks

Crypto module
- Field upgradeable

Application level service performance
- 58M Packets Per Second
- Diverse VPN security solutions, up to 25G IMIX
- 13M Firewall and traditional NAT Sessions

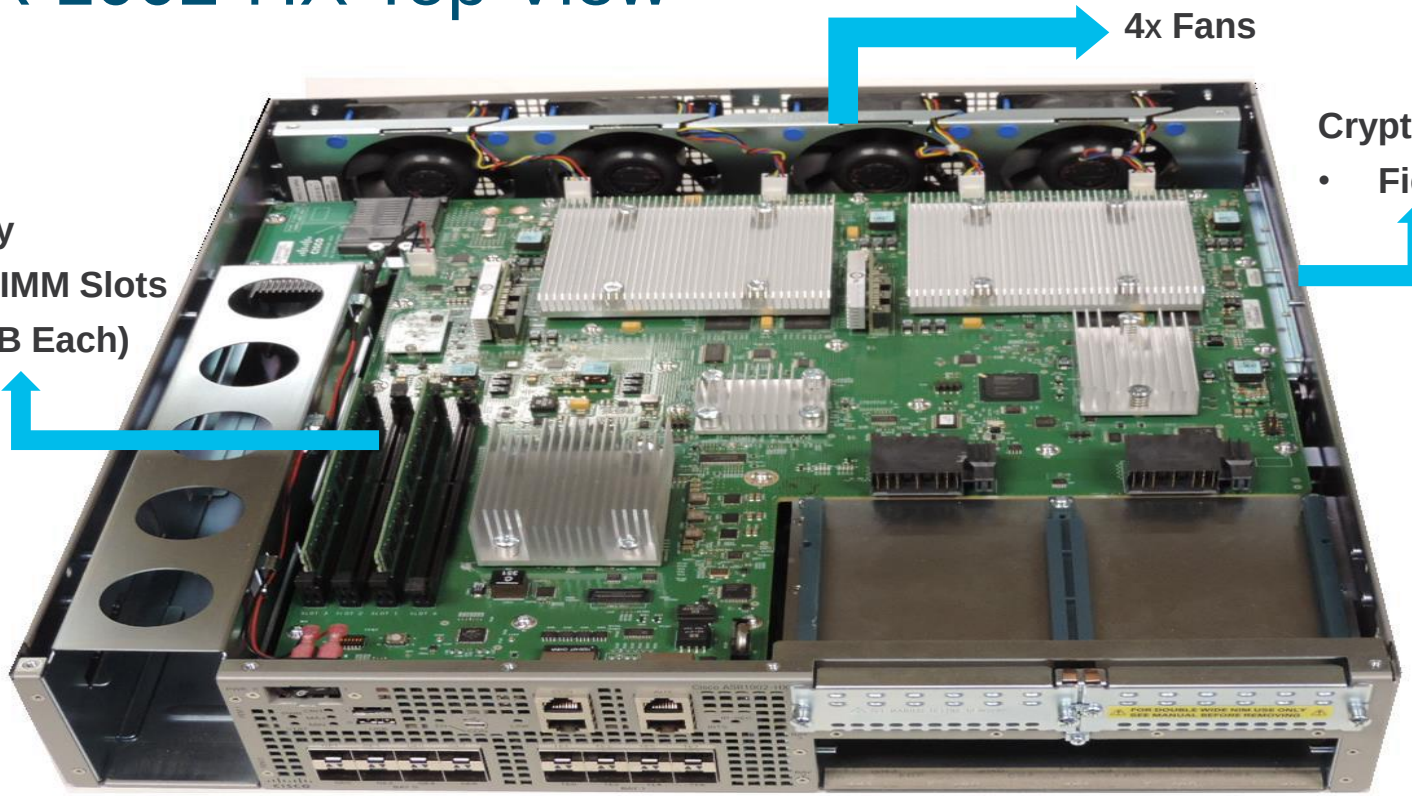
Built in I/O
- 8x Gigabit Ethernet interfaces in base
- 8x TenGigabit Ethernet interfaces enabled by license
- Multipoint MACSEC for linerate encryption (1G & 10G)

EPA - Ethernet Port Adapter
- 1x EPA slot

ASR 1002-HX Fan Tray

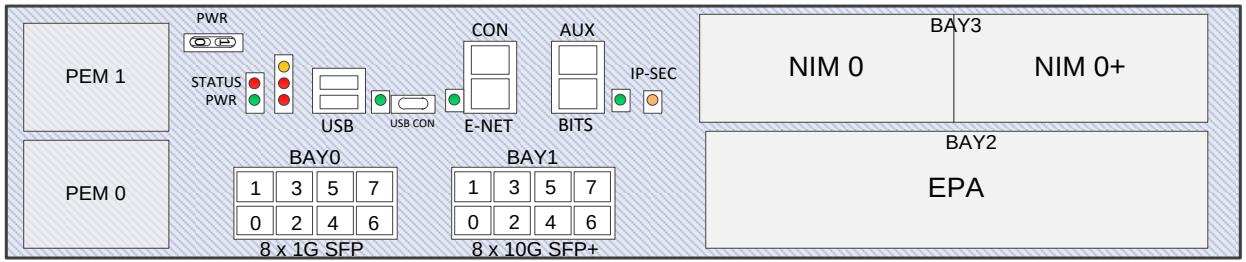
- Single Fan Tray – FRUable
- Includes 4 Fans
- Front to Back Airflow

ASR 1002-HX Top View

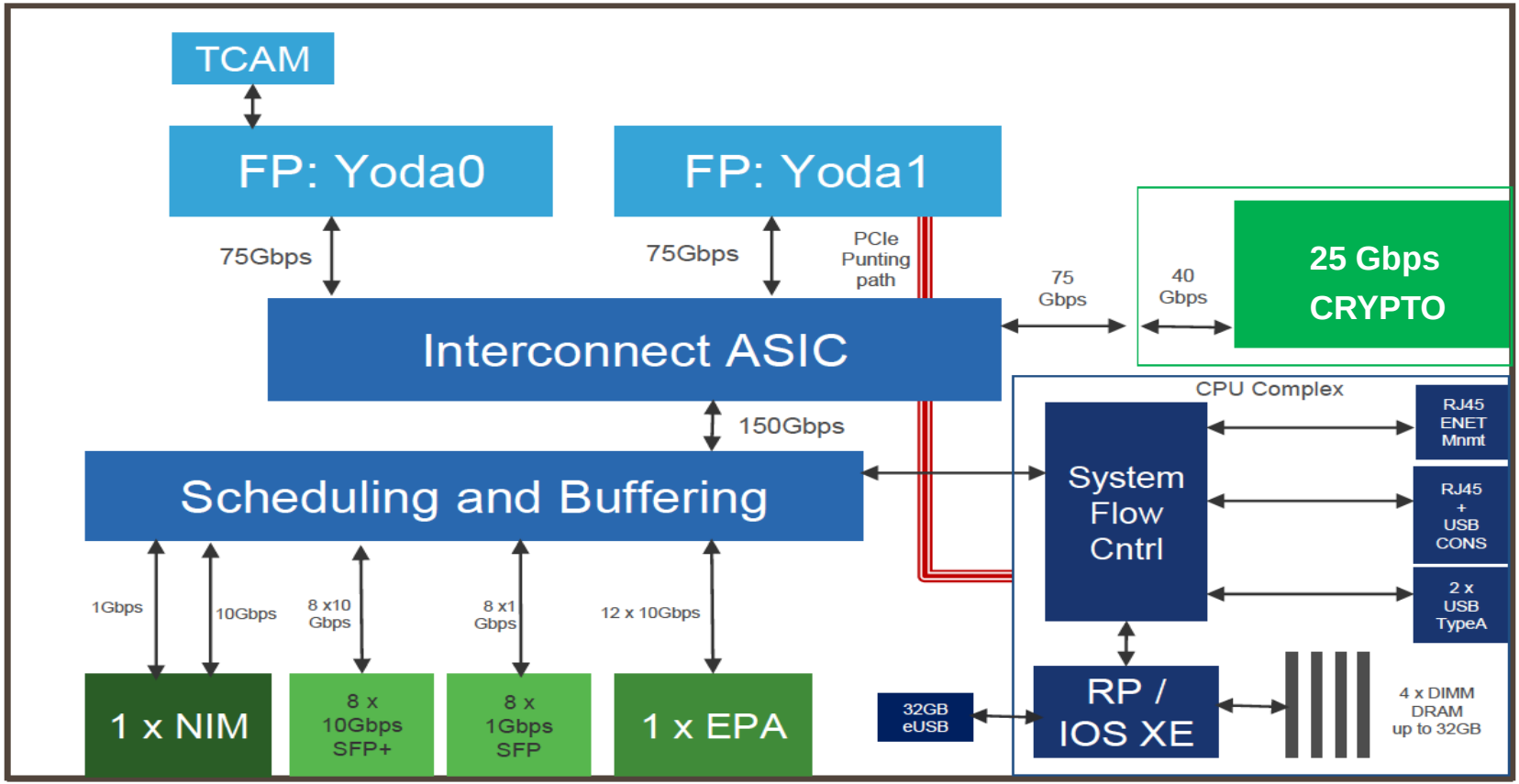


ASR 1002-HX Front Panel and Ports

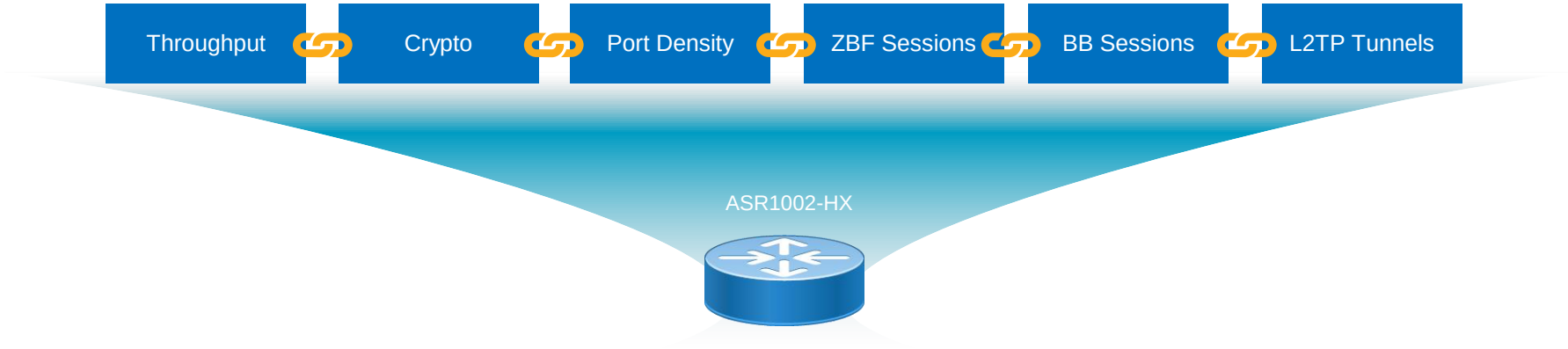
- Bays are Logical divisions used in system configuration
- Four Bays Are Supported (0-3)
- Fixed EPA Ports (Bay 0 and Bay 1)
- Modular EPA Port (Bay 2)
- NIM (Bay 3)



ASR1002-HX Hardware Block Diagram



Performance That Matters(ASR1002-HX) …



System Throughput comparable to ESP100 at 44-100Gbps

Better port density in the Fixed chassis along with the EPA(Ethernet Port Adapter) & NIM Modules

25 Gbps crypto throughput

High End/Hybrid Platform's – Capability Comparison

Platform	ASR1001	ASR1001-X	ASR1002-X	ASR1001-HX	ASR1002-HX
PAYG Bandwidth	2.5-5G	2.5-20G	5-36G	44-60G	44-100G
PPS Performance	7.5 Mbps	11 Mpps	30Mpps	30Mpps	58Mpps
IPv4 Routes	500K (4G)/IM (8G/16G)	1M (8G)/ 3.5M (16G)	500K (4G)/1M (8G)/ 3.5M (16G)	1M (8G) / 3.5M (16G)	3.5M (16G) / ?? (32G)
Built-in I/O	4x1GE	6x1GE; 2x10GE	6x1GE	8x1GE, 8x10GE	8x1GE, 8x10GE
Extensible I/O	1x SPA	1x SPA, 1x NIM	3x SPA	N/A	1x EPA, 1x NIM
Encryption Throughput	1G(IMIX)	5G (IMIX)	4G (IMIX)	16G (IMIX)	25G (IMIX)
Suite-B	Yes	Yes	Yes	Yes	Yes
MACsec	N/A	Point to Multipoint	N/A	Point to Multipoint	Point to Multipoint
ZB Firewall Sessions	250K	2M	2M	2M	6M
NAT Sessions	250K	2M	2M	2M	4M
AVC	5G	5G	18G	30G	52G
CUBE(Ent)	10K Subscribers	10K Subscribers	10K subscribers	10K subscribers	10K subscribers
BB	8K sessions	8K sessions	29K sessions	29K / 24K sessions	58K sessions
L2TP Tunnels	8K tunnels	8K tunnels	16K tunnels	16K / 24K tunnels	16K tunnels
QoS (Queues)	16K	16K	116K	116K	232K
High Availability	Yes (Redundant IOS)	Yes (Redundant IOS)	Yes (Redundant IOS)	Yes (Redundant IOS)	Yes (Redundant IOS)
TCAM	5Mbits	10Mbits	40Mbits	40Mbits	80Mbits

Software Overview

Software Requirements

- ASR1001-HX :

IOS-XE 16.3(1)

ROMMON: 16.2(2r) or later versions

- ASR1002-HX

IOS-XE 16.2

ROMMON: 16.2(1r) or later versions

ROMMON & FPGA Upgrade

- Shares the ASR family's IOS-XE feature content and roadmap.
- ROMMON and FPGA upgrade functionality/CLIs are same as other ASR's in X Series.

Crypto & Port Licenses

- On Demand Port license to for 1GE/10GE built-in ports.
- Crypto Throughput via License upgrade.

High Availability & ISSU

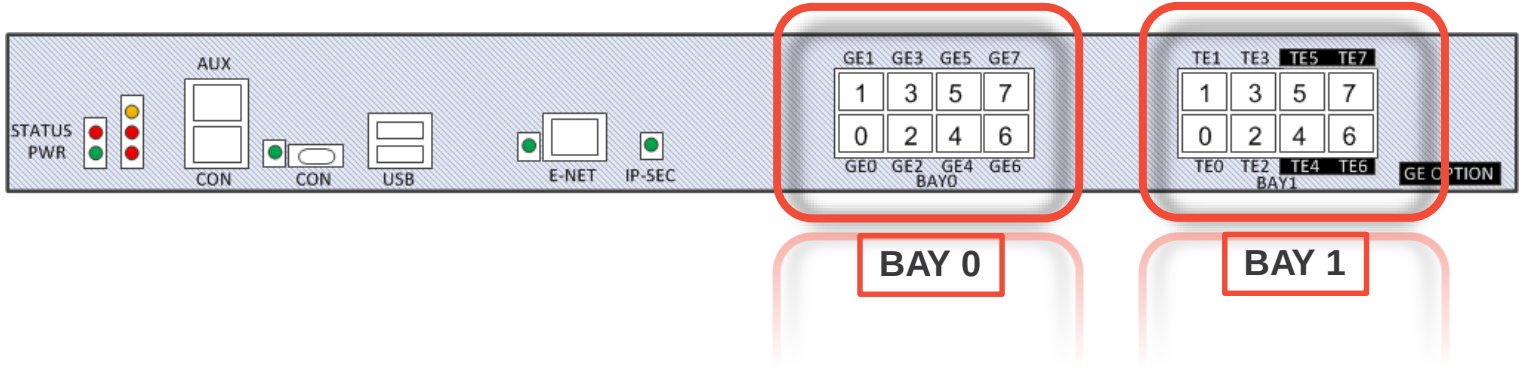
- HA is supported with all memory configurations. (IOS redundancy)
- ISSU with dual IOS image and only for rpios and rpcontrol packages

ASR1001-HX

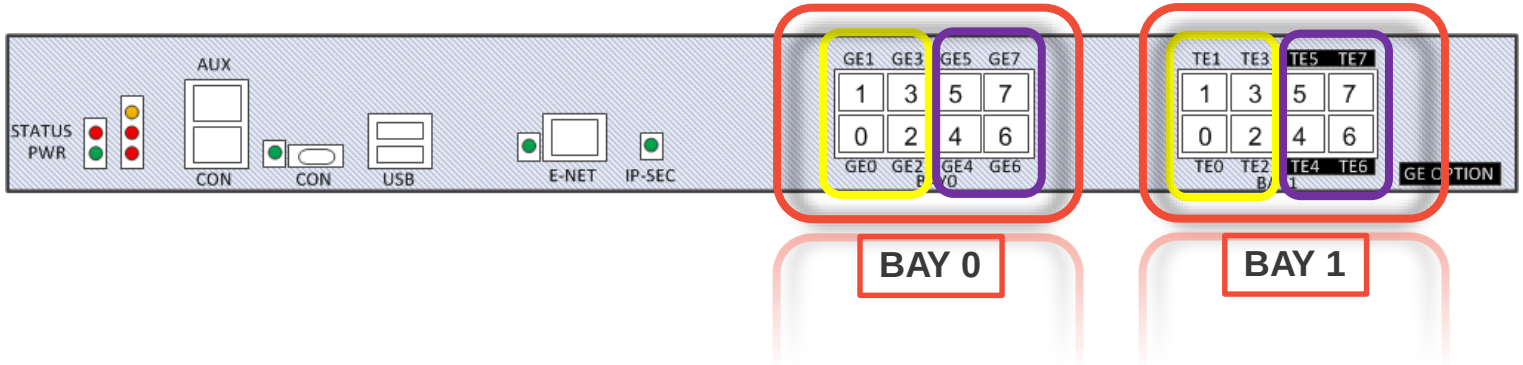
ASR1002-HX

All About Licensing

ASR 1001-HX Front Panel Schema



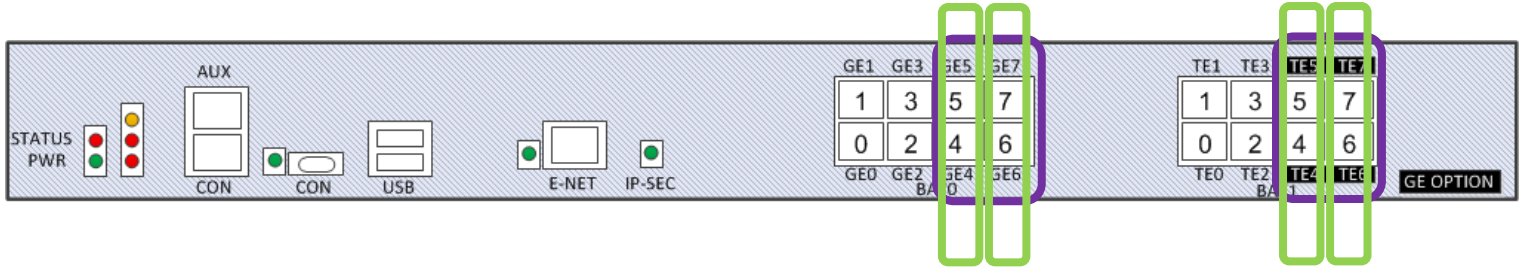
- **Bay 0 (Fixed Ethernet Port Adapter Hosting 8x1GE ports)**
- **Bay 1 (Fixed Ethernet Port Adapter Hosting 8x10GE ports)**



- **Ports 0-3 are Non-Licensed & Port 4-7 are licensed ones.**

Licensed Ports

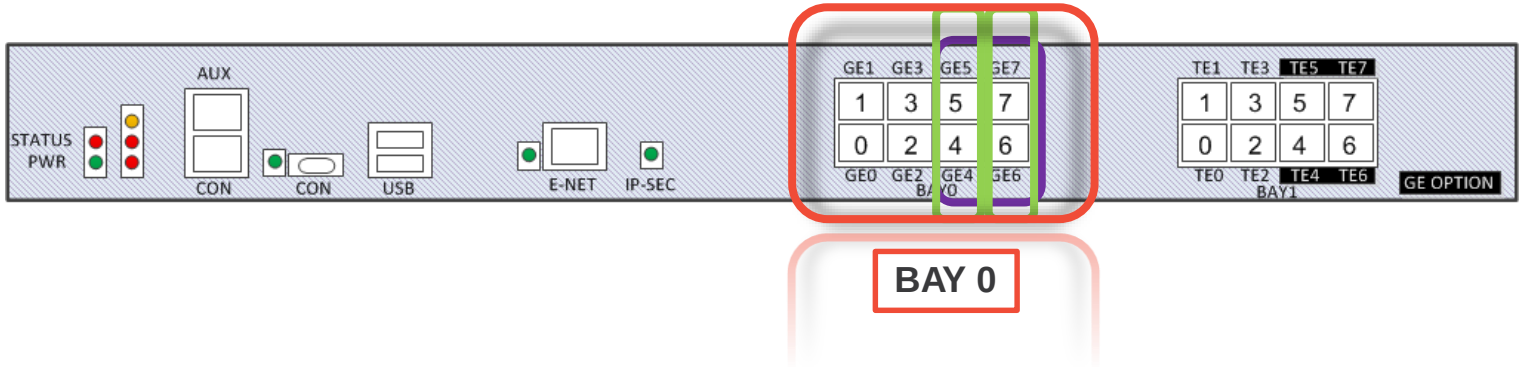
Non-Licensed Ports



They Work In Pairs

One single License is consumed by both the ports

BAY 0 : Licensing



- **Bay0** Paired license should be used only to bring up the ports defined in the port-groups, which is decided by first port enabled after fetching the license.

Example: If gig0/0/5 was brought up, then with the paired license we **should** enable only interface gig0/0/4, as they are one pair. Similar rule applies for gig0/0/6 & 7.

- Cross-combinations are invalid

“no shut” on GigabitEthernet0/0/4 and show license detail interface_1g

```
ASR1001-HX#sh ip in br
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0/4   unassigned      YES NVRAM  administratively down down
GigabitEthernet0/0/5   unassigned      YES NVRAM  administratively down down
GigabitEthernet0/0/6   unassigned      YES NVRAM  administratively down down
GigabitEthernet0/0/7   unassigned      YES NVRAM  administratively down down

ASR1001-HX(config)#int GigabitEthernet0/0/4
ASR1001-HX(config-if)#no shut
ASR1001-HX(config-if)#end


ASR1001-HX#sh license

Feature: interface_1g                         Period left: 8  weeks 3  days
Index: 36        Feature: interface_1g                        Version: 1.0
        License Type: EvalRightToUse
        License State: Active, In Use
            Evaluation total period: 8  weeks 4  days
            Evaluation period left: 8  weeks 3  days
            Period used: 16 minutes 30 seconds
            Transition date: Apr 19 2016 15:30:08
        Lock type: Non Node locked
        Vendor info: <UDI><PID>NOTLOCKED</PID><SN>NOTLOCKED</SN></UDI><T>RTU</T>
        License Addition: Additive
        License Generation version: 0x8200000
        License Count: 1/0  (In-use/Violation)
        License Priority: Low
        Store Index: 17
        Store Name: Built-In License Storage
```

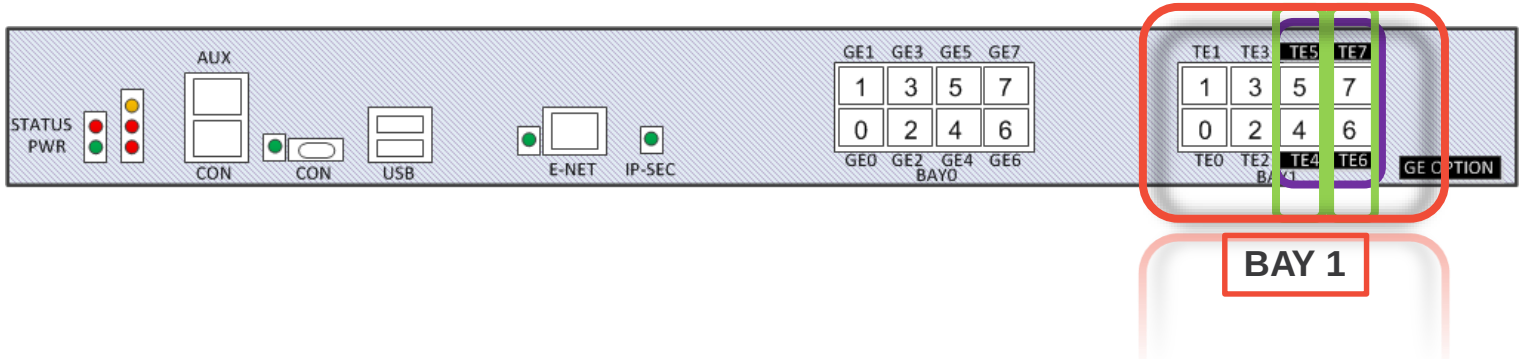
In-use count is 1

“no shut” on GigabitEthernet0/0/5 and show license detail interface_1g

```
ASR1001-HX#sh ip in br
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0/4   unassigned      YES NVRAM  administratively down down
GigabitEthernet0/0/5   unassigned      YES NVRAM  administratively down down
GigabitEthernet0/0/6   unassigned      YES NVRAM  administratively down down
GigabitEthernet0/0/7   unassigned      YES NVRAM  administratively down down

ASR1001-HX(config)#int GigabitEthernet0/0/5
ASR1001-HX(config-if)#no shut
ASR1001-HX(config-if)#end


ASR1001-HX#sh license

Feature: interface_1g                         Period left: 8  weeks 3  days
Index: 36        Feature: interface_1g                        Version: 1.0
        License Type: EvalRightToUse
        License State: Active, In Use
            Evaluation total period: 8  weeks 4  days
            Evaluation period left: 8  weeks 3  days
            Period used: 16 minutes 30 seconds
            Transition date: Apr 19 2016 15:30:08
        Lock type: Non Node locked
        Vendor info: <UDI><PID>NOTLOCKED</PID><SN>NOTLOCKED</SN></UDI><T>RTU</T>
        License Addition: Additive
        License Generation version: 0x8200000
        License Count: 1/0  (In-use/Violation)
        License Priority: Low
        Store Index: 17
        Store Name: Built-In License Storage
```

In-use count is 1

BAY 1 : Licensing



- Default case: If no SFP or SFP+ are present in the pair of ports, It consumes a 10Gige license on enabling the port(s). This is applicable to both port pairs 4-5 & 6-7
- 10Gige SFP+ First plugged-in: It consumes by default 10Gige License.
- 1Gige SFP First plugged-in: It consumes by default 1 Gige License.
- 10Gige SFP+ followed by 10Gige SFP+ plugged-in: It consumes 10Gige license

Contd…

Default case: If no SFP or SFP+ are present in the pair of ports, It consumes a 10Gige license on enabling the port(s).

```
ASR1001-HX#sh ip in br
Interface              IP-Address      OK? Method Status                Protocol
~
Te0/1/4                20.0.13.1       YES NVRAM  down                  down
Te0/1/5                20.0.14.1       YES NVRAM  down                  down
Te0/1/6                20.0.15.1       YES NVRAM  down                  down
Te0/1/7                20.0.16.1       YES NVRAM  down                  down


ASR1001-HX#sh license
~
Index 33 Feature: interface_10g
        Period left: 4  days 13 hours
        Period Used: 7  weeks 6  days
        License Type: EvalRightToUse
        License State: Active, In Use
        License Count: 2/0  (In-use/Violation)
        License Priority: Low
Index 34 Feature: interface_1g
        Period left: 4  days 7  hours
        Period Used: 7  weeks 6  days
        License Type: EvalRightToUse
        License State: Active, In Use
        License Count: 2/0  (In-use/Violation)
        License Priority: Low
```

In-use count is 2

10Gige SFP+ First plugged-in: It consumes by default 10Gige License

```
ASR1001-HX#sh ip in br
Interface              IP-Address      OK? Method Status                Protocol
~
Te0/1/4                20.0.13.1       YES NVRAM  administratively down down
Te0/1/5                20.0.14.1       YES NVRAM  administratively down down
Te0/1/6                20.0.15.1       YES NVRAM  administratively down down
Te0/1/7                20.0.16.1       YES NVRAM  up                    up


ASR1001-HX#sh license
~
Index 33 Feature: interface_10g
        Period left: 4  days 14 hours
        Period Used: 7  weeks 6  days
        License Type: EvalRightToUse
        License State: Active, In Use
        License Count: 1/0  (In-use/Violation)
        License Priority: Low
Index 34 Feature: interface_1g
        Period left: 4  days 8  hours
        Period Used: 7  weeks 6  days
        License Type: EvalRightToUse
        License State: Active, In Use
        License Count: 2/0  (In-use/Violation)
        License Priority: Low
```

In-use count is 1

1Gige SFP First plugged-in: It consumes by default 1 Gige License

```
ASR1001-HX#sh ip in br
Interface              IP-Address      OK? Method Status                Protocol
~
Te0/1/4                20.0.13.1       YES NVRAM  administratively down down
Te0/1/5                20.0.14.1       YES NVRAM  administratively down down
Te0/1/6                20.0.15.1       YES NVRAM  administratively down down
Te0/1/7                20.0.16.1       YES NVRAM  up                    up


ASR1001-HX#sh license
~
Index 33 Feature: interface_10g
        Period left: 4  days 14 hours
        Period Used: 7  weeks 6  days
        License Type: EvalRightToUse
        License State: Active, Not in Use, EULA accepted
        License Count: 0/0  (In-use/Violation)
        License Priority: Low
Index 34 Feature: interface_1g
        Period left: 4  days 9  hours
        Period Used: 7  weeks 6  days
        License Type: EvalRightToUse
        License State: Active, In Use
        License Count: 3/0  (In-use/Violation)
        License Priority: Low
```

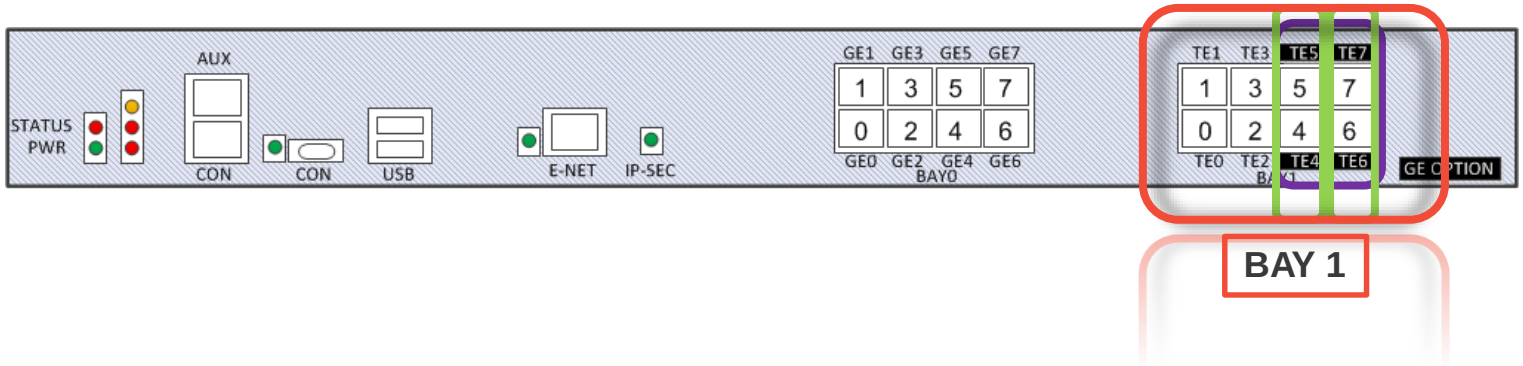
In use count 3, 2 for Bay-0 & one for Bay-1

10Gige SFP+ followed by 10Gige SFP+ plugged-in: It consumes 10Gige license

```
ASR1001-HX#sh ip in br
Interface              IP-Address      OK? Method Status                Protocol
~
Te0/1/4                20.0.13.1       YES NVRAM  administratively down down
Te0/1/5                20.0.14.1       YES NVRAM  administratively down down
Te0/1/6                20.0.15.1       YES NVRAM  up                    up
Te0/1/7                20.0.16.1       YES NVRAM  up                    up


ASR1001-HX#sh license
~
Index 33 Feature: interface_10g
        Period left: 4  days 14 hours
        Period Used: 7  weeks 6  days
        License Type: EvalRightToUse
        License State: Active, In Use
        License Count: 1/0  (In-use/Violation)
        License Priority: Low
Index 34 Feature: interface_1g
        Period left: 4  days 8  hours
        Period Used: 7  weeks 6  days
        License Type: EvalRightToUse
        License State: Active, In Use
        License Count: 2/0  (In-use/Violation)
        License Priority: Low
```

In use count 1 , as port 6 & 7 are one pair

BAY 1 : Licensing



1Gige SFP followed by 1Gige SFP plugged-in: It consumes 1Gige license

10Gige SFP+ followed by 1Gige SFP plugged-in: It consumes 10Gige license.

1Gige SFP followed by 10Gige SFP+ plugged-in: Converted to10Gige license

Thumb rule: *Highest of port speed license* will only be applicable during *dissimilar speed of SFPs* are plugged in the pair of ports.

1Gige SFP after 1Gige SFP plugged-in: It consumes 1Gige license

```
ASR1001-HX#sh ip in br
Interface              IP-Address      OK? Method Status                Protocol
~
Te0/1/4                20.0.13.1       YES NVRAM  administratively down down
Te0/1/5                20.0.14.1       YES NVRAM  administratively down down
Te0/1/6                20.0.15.1       YES NVRAM  up                    up
Te0/1/7                20.0.16.1       YES NVRAM  up                    up


ASR1001-HX#sh license
~
Index 33 Feature: interface_10g
        Period left: 4  days 14 hours
        Period Used: 7  weeks 6  days
        License Type: EvalRightToUse
        License State: Active, Not in Use, EULA accepted
        License Count: 0/0  (In-use/Violation)
        License Priority: Low
Index 34  Feature: interface_1g
        Period left: 4  days 8  hours
        Period Used: 7  weeks 6  days
        License Type: EvalRightToUse
        License State: Active, In Use
        License Count: 3/0  (In-use/Violation)
        License Priority: Low
```

In use count 3 , as port 6 & 7 are one pair and other 2 pairs gig0/0/4-7 are up in Bay-0

10Gig SFP+ followed by 1Gig SFP plugged-in: It consumes 10G license

```
ASR1001-HX#sh ip in br
Interface              IP-Address      OK? Method Status                Protocol
~
Te0/1/4                20.0.13.1       YES NVRAM  administratively down down
Te0/1/5                20.0.14.1       YES NVRAM  administratively down down
Te0/1/6                20.0.15.1       YES NVRAM  up                    up
Te0/1/7                20.0.16.1       YES NVRAM  up                    up


ASR1001-HX#sh license
~
Index 33 Feature: interface_10g
        Period left: 4  days 14 hours
        Period Used: 7  weeks 6  days
        License Type: EvalRightToUse
        License State: Active, In Use
        License Count: 1/0  (In-use/Violation)
        License Priority: Low
Index 34 Feature: interface_1g
        Period left: 4  days 8  hours
        Period Used: 7  weeks 6  days
        License Type: EvalRightToUse
        License State: Active, In Use
        License Count: 2/0  (In-use/Violation)
        License Priority: Low
```

In use count 1

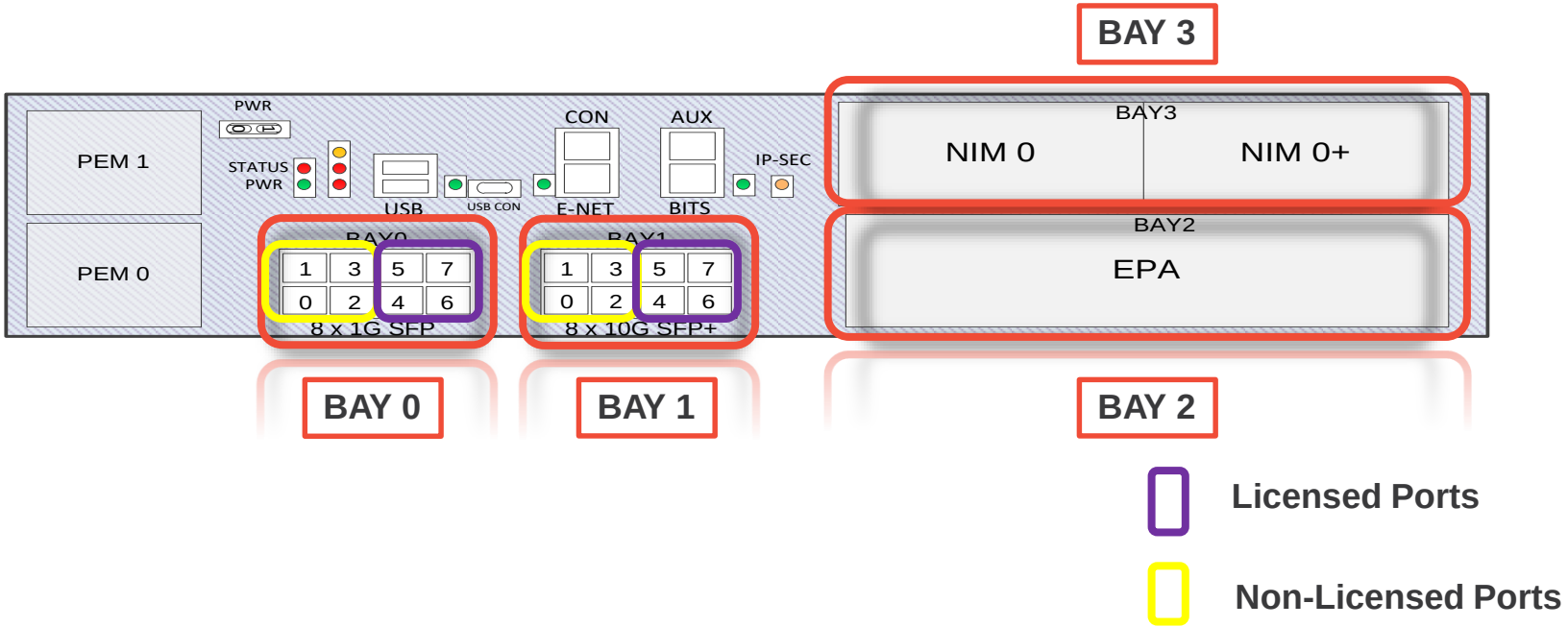
1G SFP followed by 10Gige SFP+ plugged-in: Converted to 10G license

```
ASR1001-HX#sh ip in br
Interface              IP-Address      OK? Method Status                Protocol
~
Te0/1/4                20.0.13.1       YES NVRAM  administratively down down
Te0/1/5                20.0.14.1       YES NVRAM  administratively down down
Te0/1/6                20.0.15.1       YES NVRAM  up                    up
Te0/1/7                20.0.16.1       YES NVRAM  up                    up


ASR1001-HX#sh license
~
Index 33 Feature: interface_10g
        Period left: 4  days 13 hours
        Period Used: 7  weeks 6  days
        License Type: EvalRightToUse
        License State: Active, In Use
         License Count: 1/0  (In-use/Violation)
        License Priority: Low
Index 34 Feature: interface_1g
        Period left: 4  days 8  hours
        Period Used: 7  weeks 6  days
        License Type: EvalRightToUse
        License State: Active, In Use
        License Count: 2/0  (In-use/Violation)
        License Priority: Low
```

Count set to 1 after conversion

Reduced from 3 to 2

ASR 1002-HX Front Panel Schema



Crypto Throughput License

Trust based Crypto Throughput License.

ASR1001-HX(config)#platform hardware crypto-throughput level ?

8-16g crypto throughput upgrade, bits per second
8g crypto throughput level, bits per second

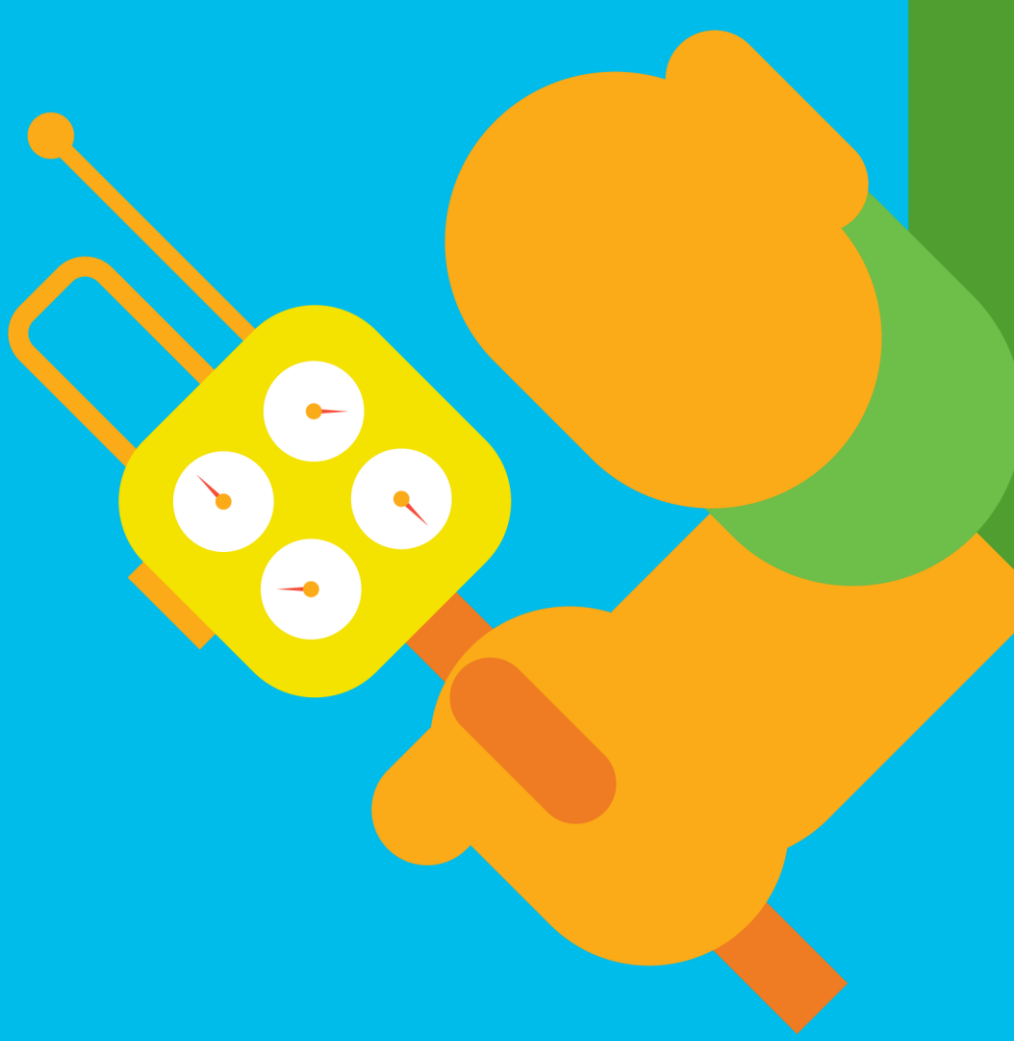
ASR1002-HX(config)#platform hardware crypto-throughput level ?

16-25g crypto throughput upgrade, bits per second
8-16g crypto throughput upgrade, bits per second
8-25g crypto throughput upgrade, bits per second
8g crypto throughput level, bits per second

```
ASR1001-HX(config)#platform hardware crypto-throughput level 8-16g
% Crypto Bandwidth set to 16G bps.


ASR1001-HX#sh license

~
~
Index 31 Feature: 1HXIPS8G
        Period left: 2  weeks 4  days
        Period Used: 5  weeks 6  days
        License Type: EvalRightToUse
        License State: Active, In Use
        License Count: Non-Counted
        License Priority: Low
Index 32 Feature: 1HX8G16G
        Period left: 2  weeks 4  days
        Period Used: 5  weeks 6  days
        License Type: EvalRightToUse
        License State: Active, In Use
        License Count: Non-Counted
        License Priority: Low
```

EULA need to be accepted for the first time as it is RTU License

Network Clocking



Support for Network Clocking

Netsync feature as per ITU-T G.781

- Bay 0 1GE ports
- Bay 1 10GE/1GE ports

Synchronous Ethernet (SyncE)

- Bay 0 1GE ports
- Bay 1 10GE/1GE ports

Support for Network Clocking on ASR1002-HX

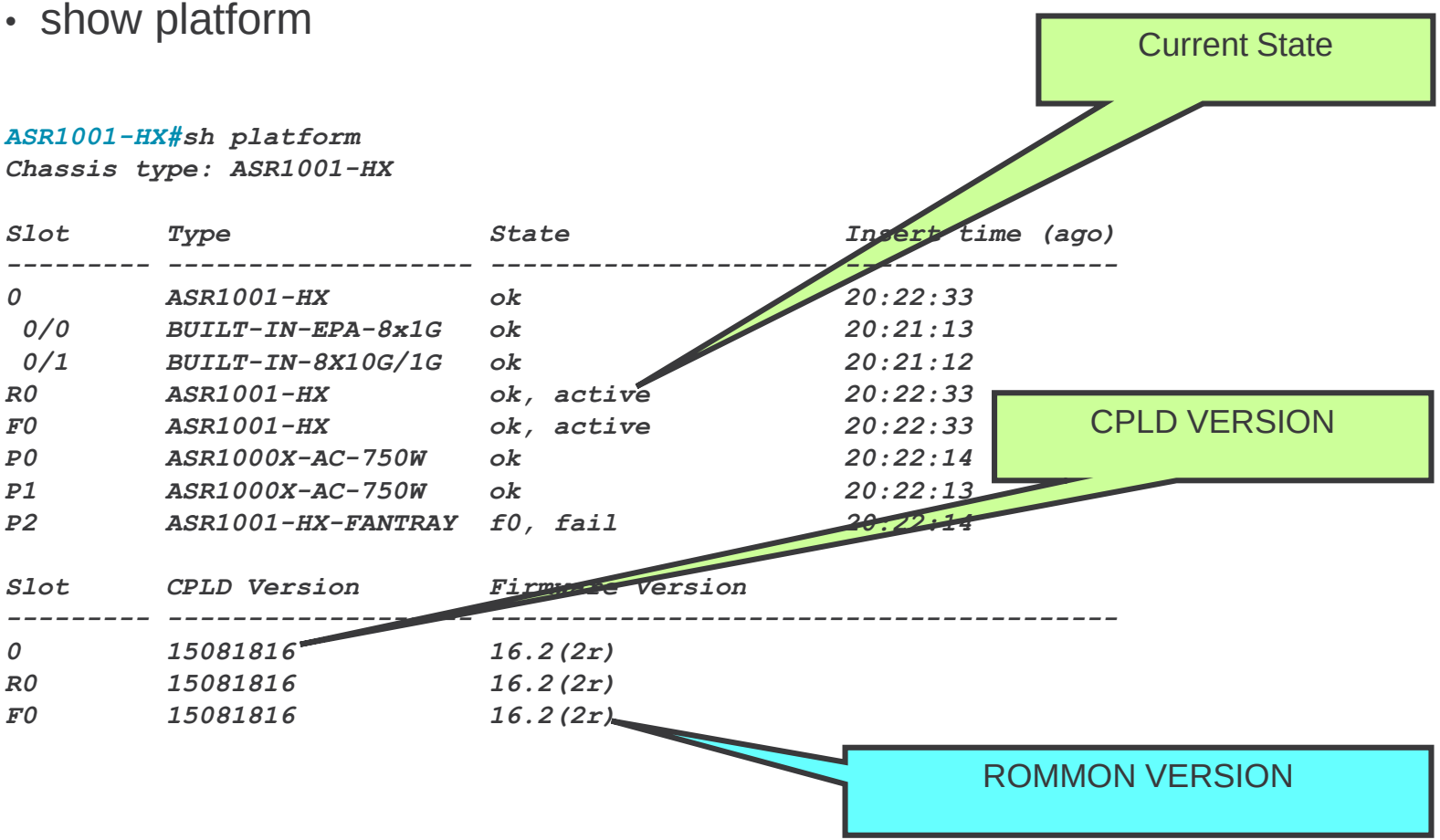
- BITs RX and TX timing port supported using E1/T1 interface protocol (through RJ-48 port)
- Also Network clocking is supported on NIM Bay 3 :

  4 x T1/E1 or 8 x T1/E1 NIM

Basic Troubleshooting

- show platform

```
ASR1001-HX#sh platform
Chassis type: ASR1001-HX

Slot      Type                State                 Insert time (ago)
--------- ------------------- --------------------- -----------------
0         ASR1001-HX          ok                    20:22:33
 0/0      BUILT-IN-EPA-8x1G   ok                    20:21:13
 0/1      BUILT-IN-8X10G/1G   ok                    20:21:12
R0        ASR1001-HX          ok, active            20:22:33
F0        ASR1001-HX          ok, active            20:22:33
P0        ASR1000X-AC-750W    ok                    20:22:14
P1        ASR1000X-AC-750W    ok                    20:22:13
P2        ASR1001-HX-FANTRAY  f0, fail              20:22:14

Slot      CPLD Version        Firmware Version
--------- ------------------- ---------------------------------------
0         15081816            16.2(2r)
R0        15081816            16.2(2r)
F0        15081816            16.2(2r)
```



show hw-module subslot 0/0 fpd

```
ASR1002-HX#sh hw-module subslot 0/0 fpd

==== ====================== ====== ============================================
                            H/W    Field Programmable    Current    Min. Required
Slot Card Type              Ver.   Device: "ID-Name"     Version       Version
==== ====================== ====== ================== =========== ==============
 0/0 BUILT-IN-EPA-8x1G      1.0    42-EPA_BUILTIN_1G       1.22         1.13
==== ====================== ====== ============================================
```

-Check if the recommended version is installed

-Repeat step for subslot 0/1 for Built-In-EPA-8x10G

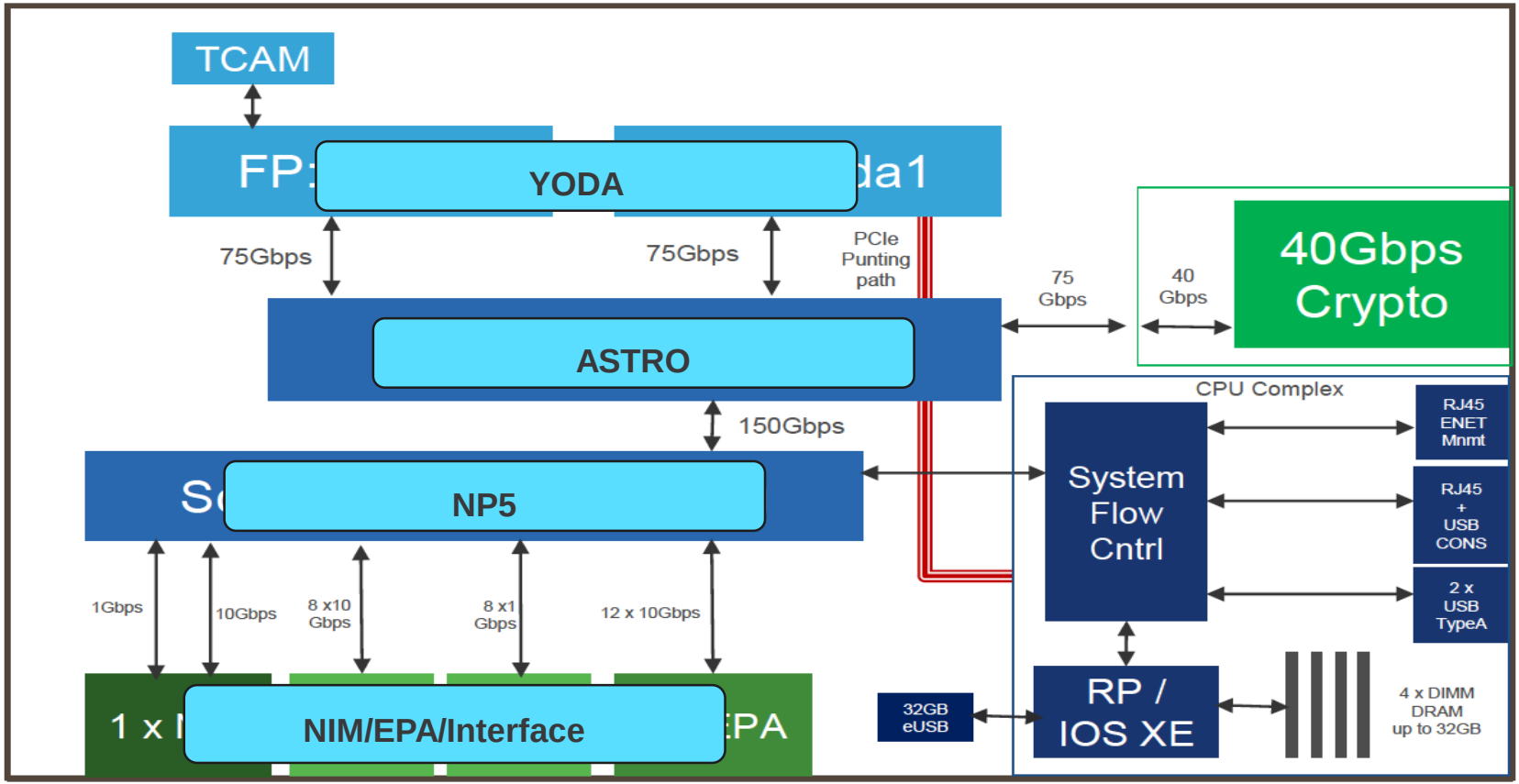
Troubleshooting System State – Fault Isolation

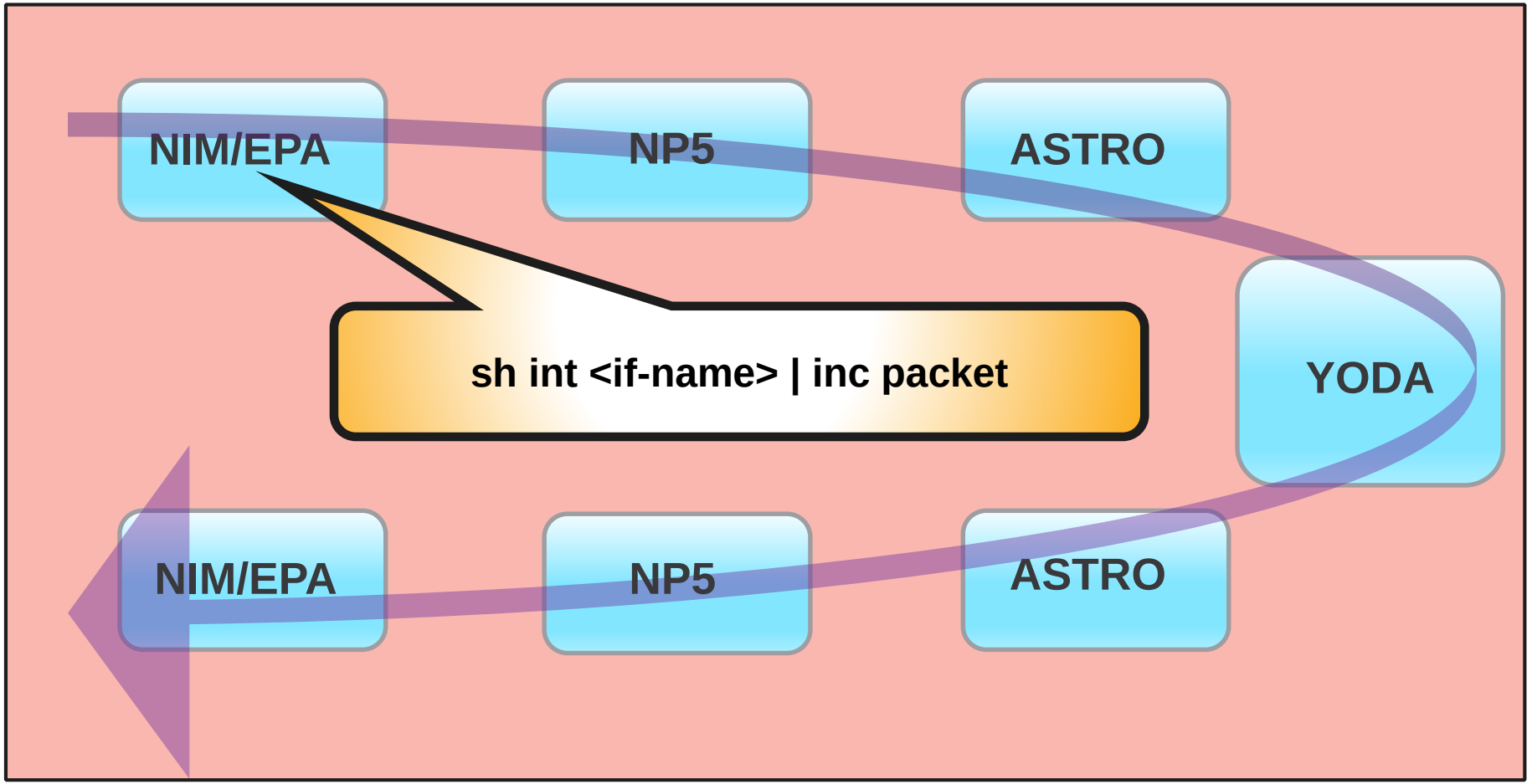
- Check the console logs – there is almost always a message that will tell you why the system did not come up
- Tracelogs are stored in /bootflash/tracelogs/
- Crash core files are stored in the shell at /bootflash/core and additional crash info may reside in bootflash
  - Retrieving the core file by utilizing any copy utility such as FTP or TFTP
  - The easiest and fastest would be to use an USB Stick
- Check LED status – Major, Minor, are cleared by correcting the issue indicated in “show facility-alarm status”

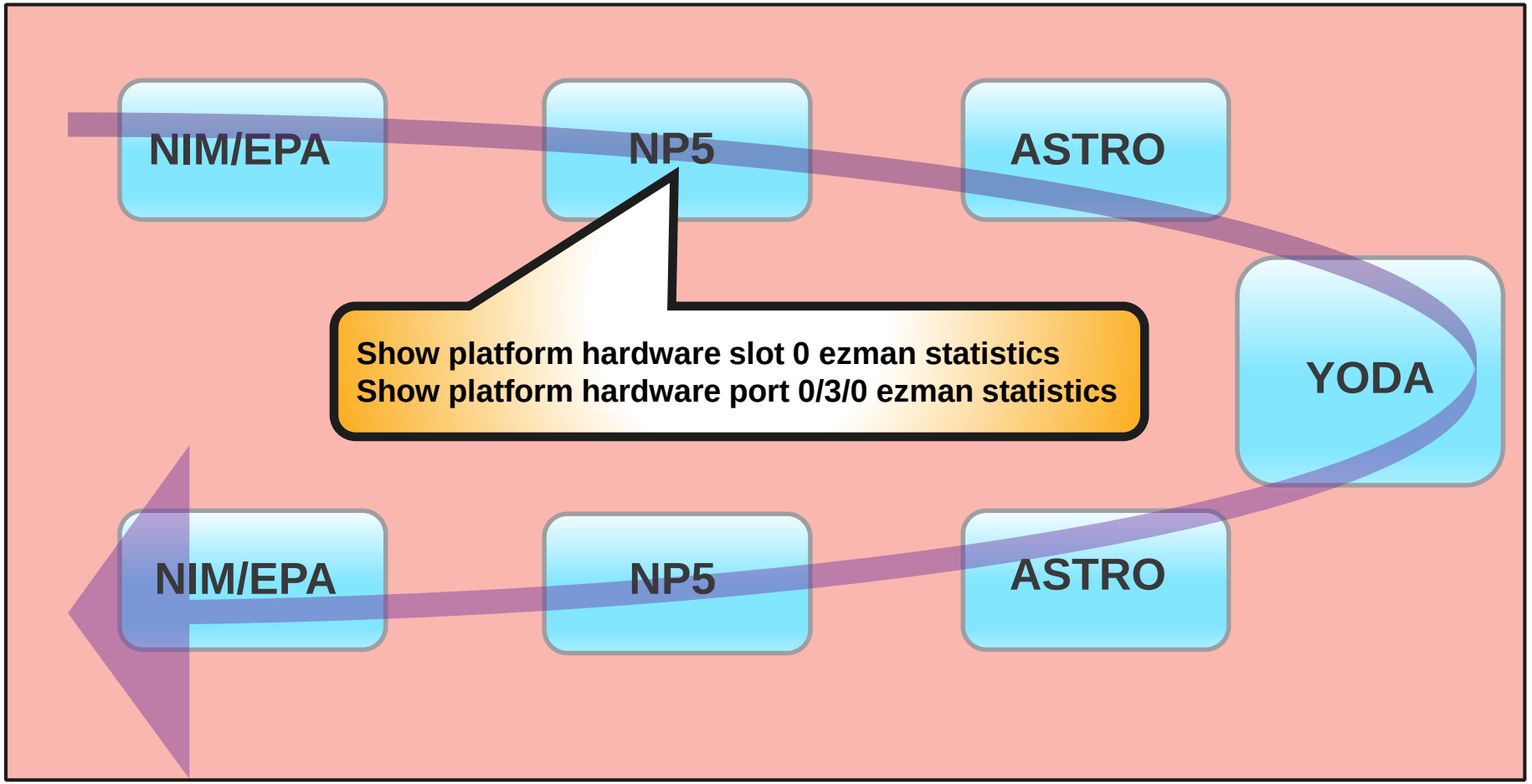
  Use ‘show platform’ to check the current status

```
ASR1002-X#sh facility-alarm status

System Totals  Critical: 20  Major: 0  Minor: 0

Source                    Time                    Severity      Description [Index]
------                    ------                  --------      -------------------
Power Supply Module 0     Feb 10 2016 01:04:24    CRITICAL      Power Supply Failure [0]
GigabitEthernet0/0/2      Feb 10 2016 01:04:39    CRITICAL      Physical Port Link Down [1]
xcvr container 0/0/4      Feb 10 2016 01:04:37    CRITICAL      Transceiver Missing - Link
Down [1]
xcvr container 0/0/5      Feb 10 2016 01:04:37    CRITICAL      Transceiver Missing - Link
Down [1]
TenGigabitEthernet0/1/0   Feb 10 2016 01:04:47    INFO          Physical Port
Administrative State Down [36]
xcvr container 0/1/1      Feb 10 2016 01:04:44    INFO          Transceiver Missing [0]
xcvr container 0/2/3      Feb 10 2016 01:04:44    CRITICAL      Transceiver Missing - Link
Down [1]
```

Data Path counters

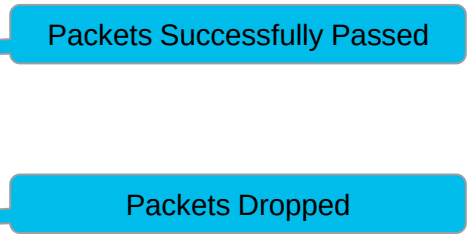


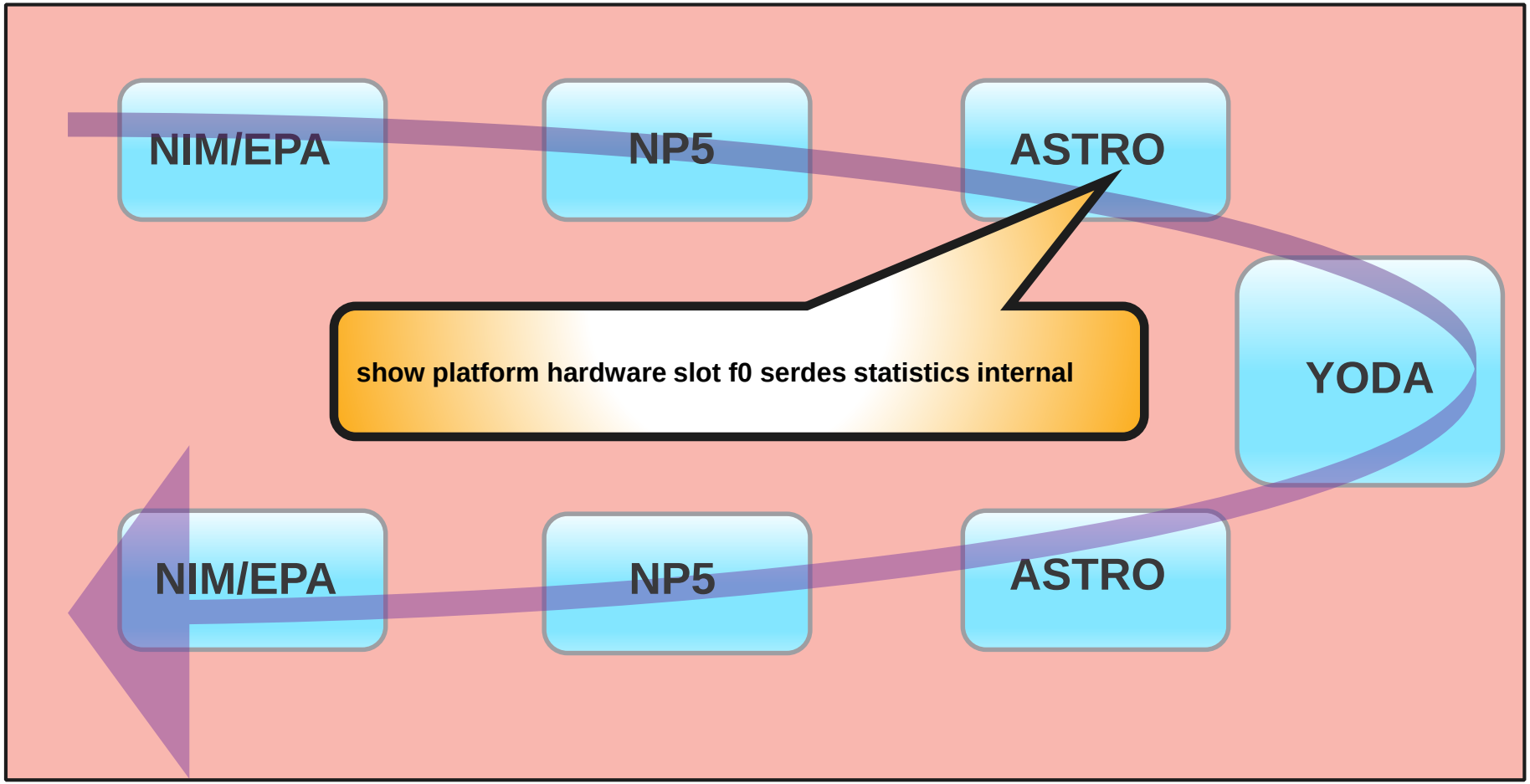




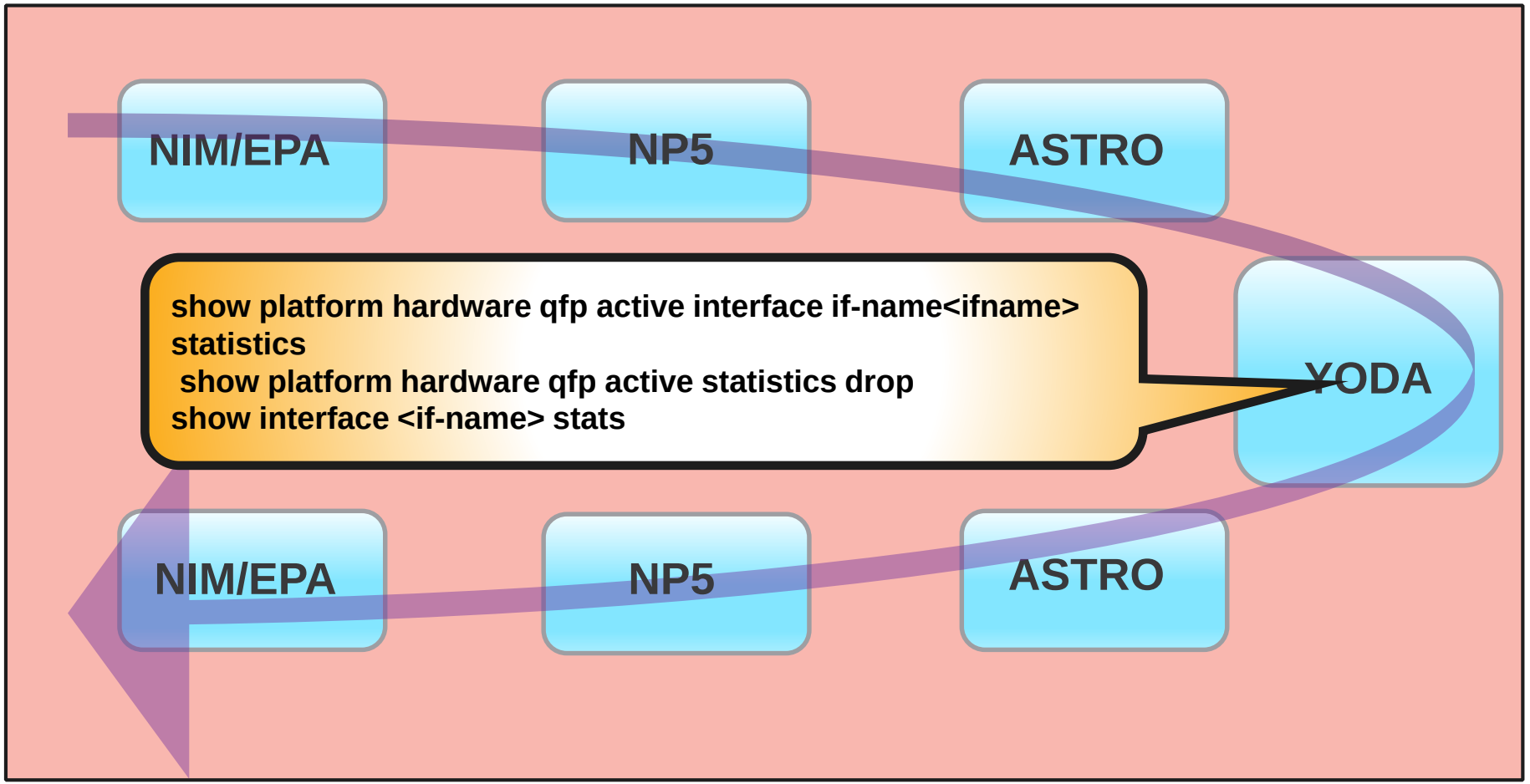
asr1002-HX#show platform hardware port 0/0/0 ezman statistics

```
RX Counters
  MAC Filter drop:0  Unknown Vlan Drop:0
  High Priority
   Pass Pkt:0              Bytes:0
   Drop Pkt:0              Bytes:0
  Low Priority
   Pass Pkt:0              Bytes:0
   Drop Pkt:0              Bytes:0
TX Counters
  High Priority
   Pass Pkt:0              Bytes:0
   Drop Pkt:0              Bytes:0
  Low Priority
   Pass Pkt:0              Bytes:0
   Drop Pkt:0              Bytes:0
```





```
asr1002-HX#show platform hardware slot f0 serdes statistics internal

Network-Processor-0 Link:
  Local TX in sync, Local RX in sync
  From Network-Processor     Packets:            0  Bytes:            0
  To Network-Processor       Packets:            0  Bytes:            0


Encryption-Processor-0 Link
  Local TX not in sync, Local RX not in sync
  From Encryption-Processor    Packets:            0  Bytes:            0
  To Encryption-Processor      Packets:            0  Bytes:            0
```



asr1002-HX# show platform hardware qfp active interface if-name<ifname> statistics

```
Platform Handle 7
-----------------------------------------------------------------
Receive Stats                           Packets        Octets
-----------------------------------------------------------------
  Ipv4                                      0             0
  Ipv6                                      0             0
  Tag                                       0             0
  McastIpv4                                 0             0
  McastIpv6                                 0             0
  FragIpv4                                  0             0
  FragIpv6                                  0             0
  ReassIpv4                                 0             0
  ReassIpv6                                 0             0
  Other                                     0             0
-----------------------------------------------------------------
Transmit Stats                          Packets        Octets
-----------------------------------------------------------------
  Ipv4                                      0             0
  Ipv6                                      0             0
  Tag                                       0             0
  McastIpv4                                 0             0
  McastIpv6                                 0             0
  FragmentsIpv4                             0             0
  FragmentsIpv6                             0             0
  FragmentedIpv4                            0             0
  FragmentedIpv6                            0             0
  Other                                     0             0
-----------------------------------------------------------------
Input Drop Stats                        Packets        Octets
-----------------------------------------------------------------
  Ingress Drop stats are not enabled on this interface
-----------------------------------------------------------------
Output Drop Stats                       Packets        Octets
-----------------------------------------------------------------
  The Egress Drop stats are not enabled on this interface
```

show platform hardware qfp active statistics drop

Global Drop Stats	Packets	Octets
BadUidbIdx	6	2364
InjectErr	8	3352

Key Takeaways

Key Takeaways

- **The Rise of a new era of Hybrid models**

  ASR1001-HX & ASR1002-HX

- **One Size Does Not Fit All**

  Pay as you grow with on-demand scale and performance
  Crypto/10GE/1GE Ports.

- Better Throughput, better Crypto throughput, Larger TCAM

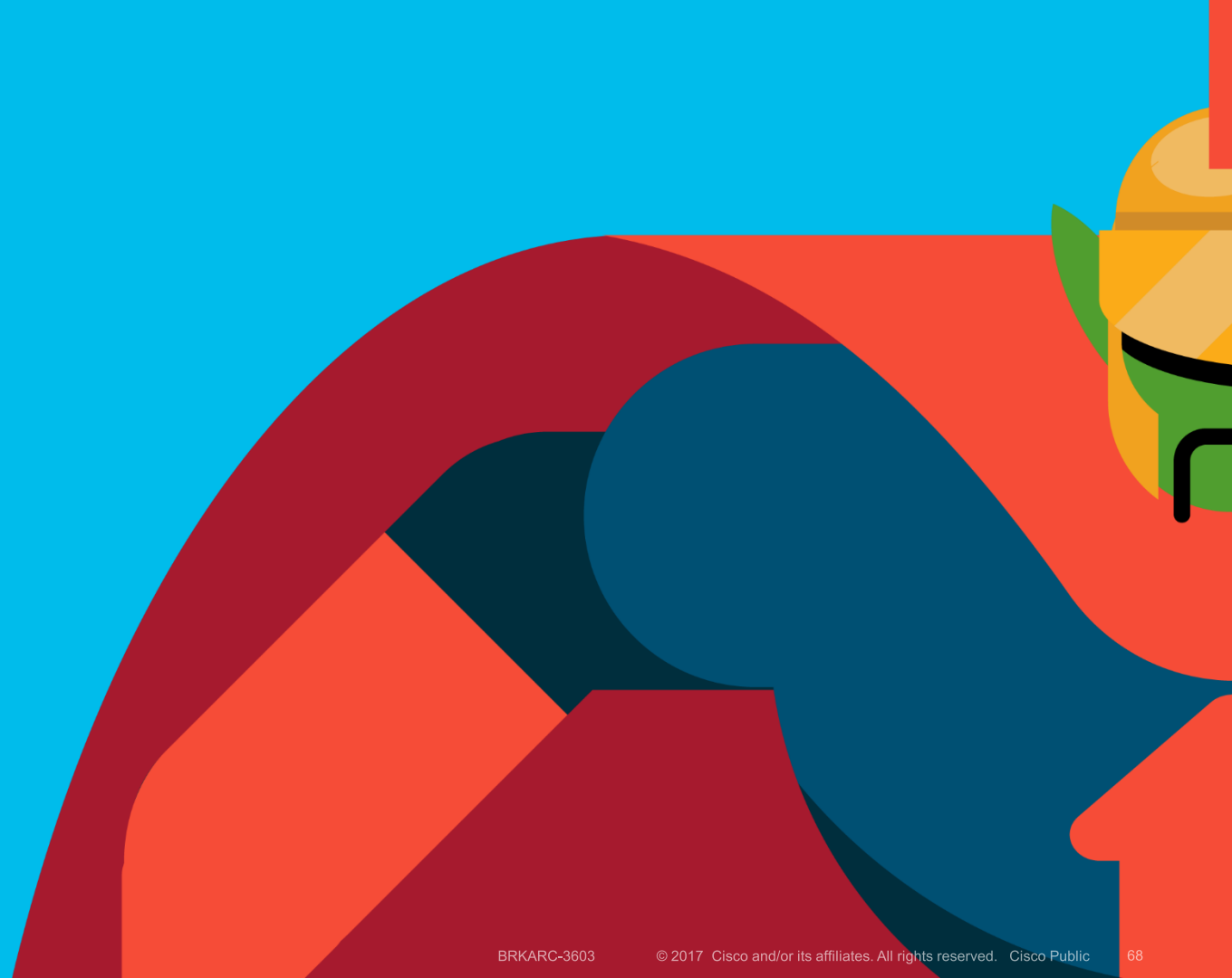
- Throughput & Port capabilities upgraded via Licenses.

- Support for Network Clocking.

  Netsync feature as per ITU G.781
  Synchronous Ethernet (SyncE)

- Better Debug-ability by additional components and tracing packets via commands.

Q & A



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