



Roteadores CISCO para ISPs

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Agosto de 2018

Tendências no Mundo Digital



Mais Dados

8GB

De tráfego Internet por mês de PCs e tablets em 2021*

Mais Dispositivos

6.1B

Usuários de smartphones no mundo em 2020***

Mais Apps

20-50%

Aumento de banda nas empresas por ano até 2018**

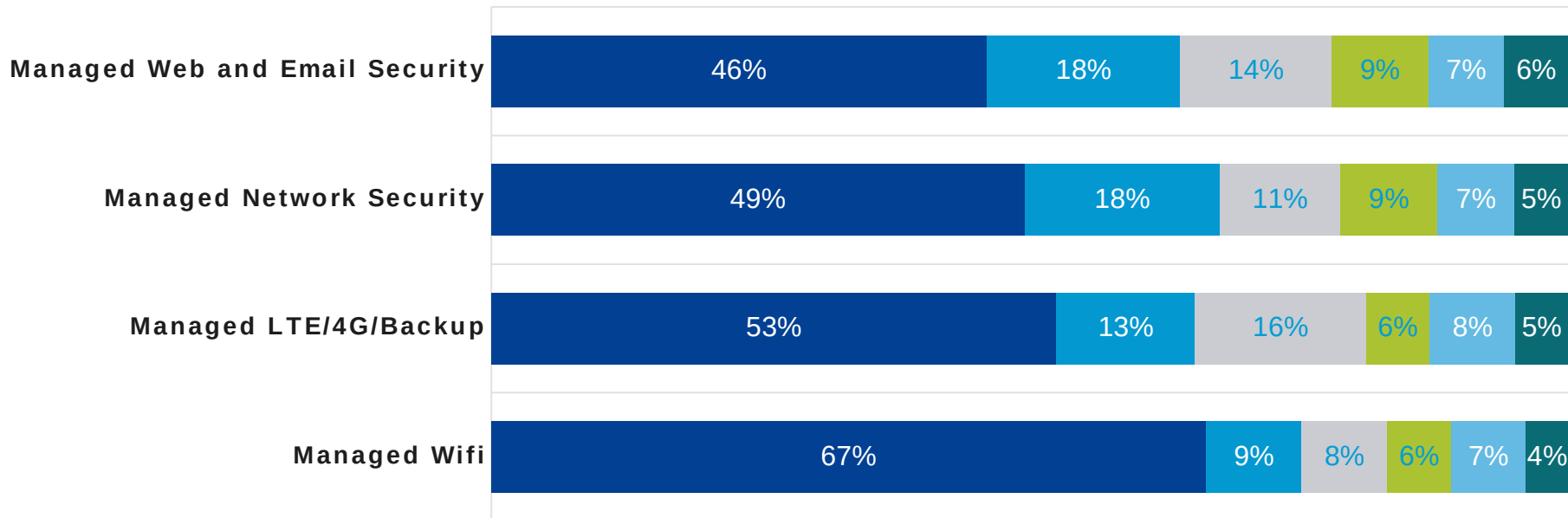
* Cisco Visual Networking Index

**US The Census Bureau of the Department of Commerce, 2015

*** Ericsson mobility report - <http://www.ericsson.com/ericsson-mobility-report>

Forte Preferência de Contratar do Provedor

■ Network Service Provider ■ Direct from Vendor ■ Value Added Reseller
■ Local Consultant ■ Don't want Managed ■ Don't Know



SMBs querem comprar Serviços Gerenciados do provedor de rede.
Menos de 10% não quer uma solução gerenciada.

Capturando Essa Oportunidade...

Aumento da Margem

Com mais oferta de SVA



Eficiência Operacional

Aproveitando a automação da nuvem



Simplicidade/ Melhor Experiência

Reduzindo o custo de aquisição, operação



Lealdade

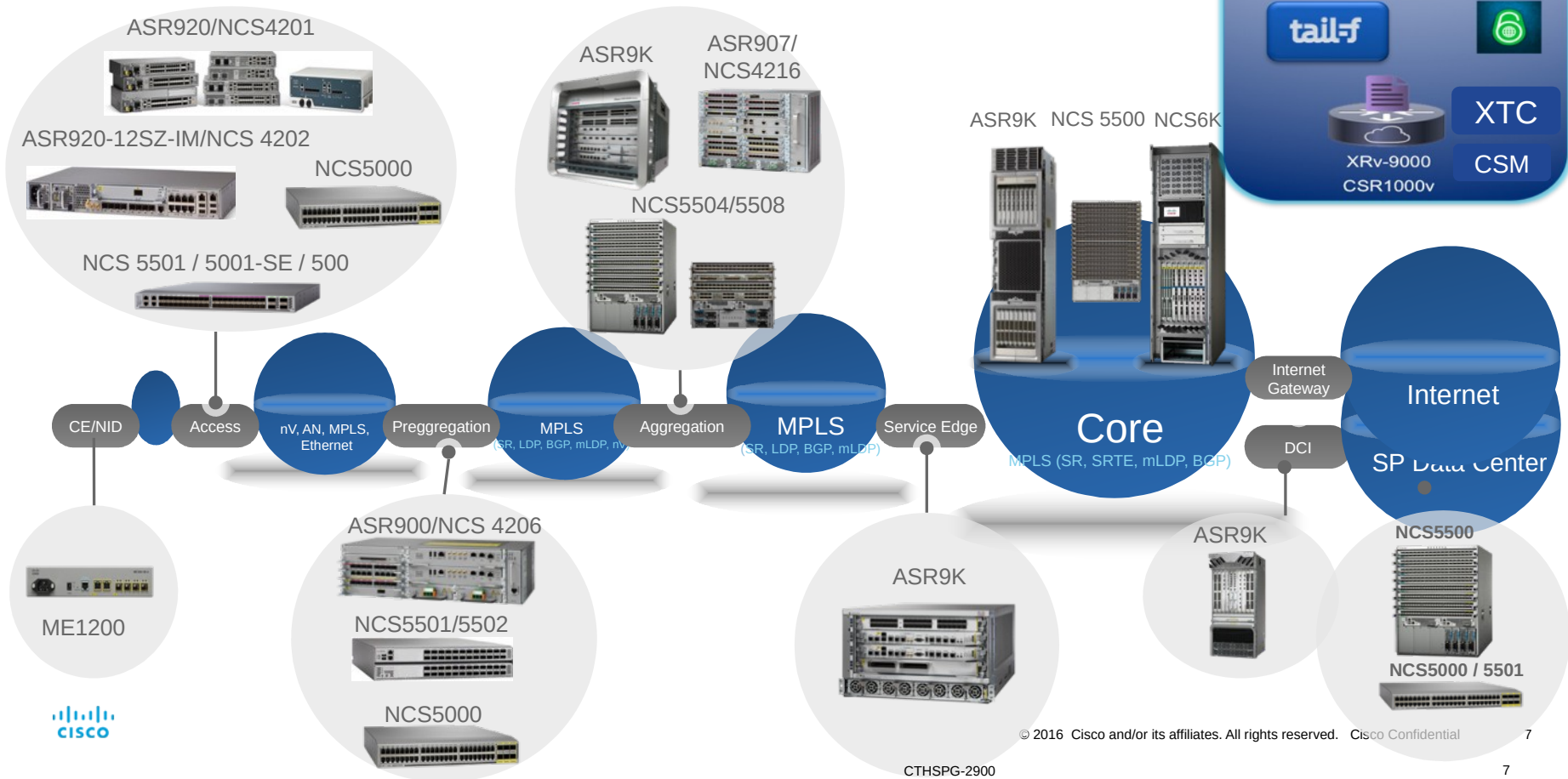
Redução da perda de clientes



- Mais de 50% dos SMBs comprariam SVAs do provedor de rede
- 75% dos clientes mudariam de provedor caso este não oferecesse serviço gerenciado baseado em nuvem

Large Telecom Service Provider Access Portfolio

Service Provider Access Portfolio



Trends: New Opportunities

The world has gone mobile

Changing Customer Expectations With AI, VR

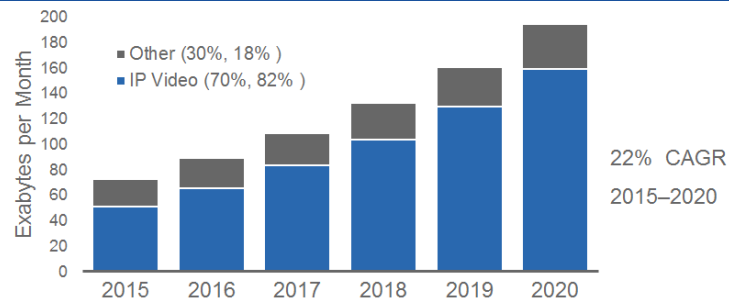


8X Mobile Traffic Growth
From 2015-2020



Ubiquitous Access
to Apps & Services

Traffic growth in Access, driven by video



Rise of cloud computing

Soon to Change SP Architectures/ Service Delivery



Changing Enterprise Business Models
Efficiency & Capacity

Digitization leading to IoE

Emergence of the Internet of Everything



People



Process



Data



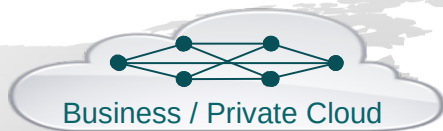
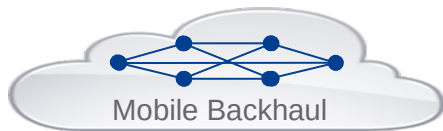
Things

Market Trend: Network Infrastructure Convergence

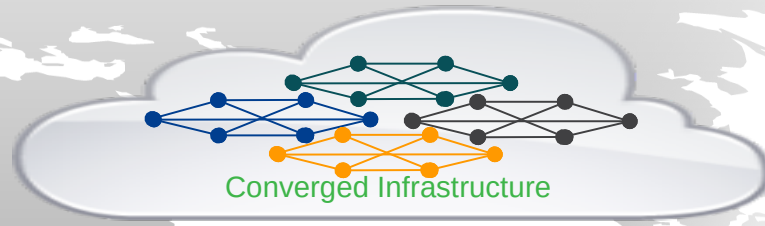
Single Any-Service Network for Lower CAPEX & OPEX

Decoupled Service from Infrastructure

- One efficiently utilized network
- One operational model
- All services on a single network



Multiple under-utilized networks
No integration between services
Different operational skill sets

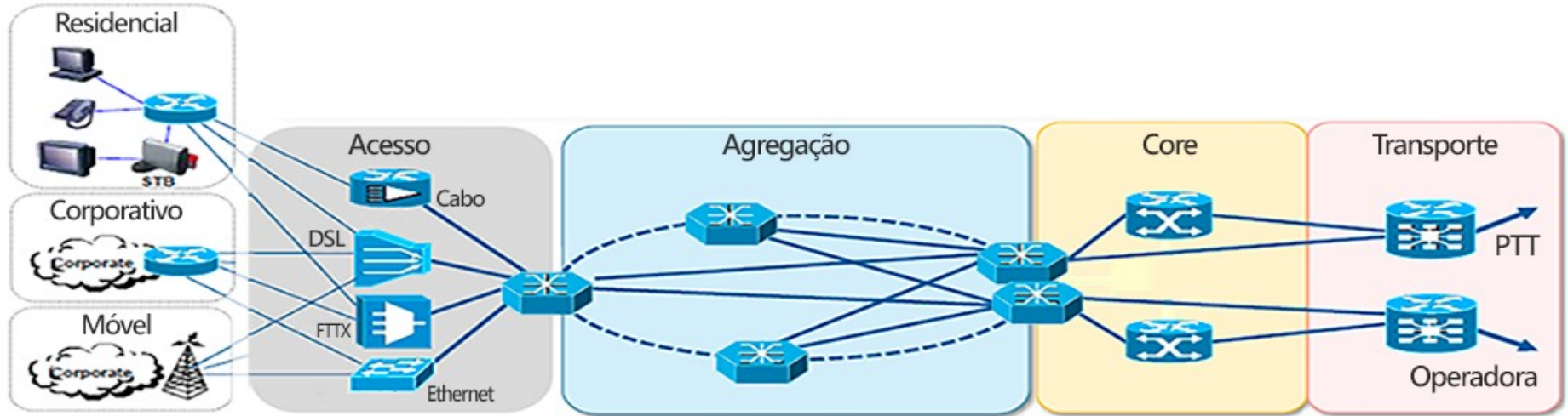


Convergence Benefits

- Up to 75% CAPEX savings
- OPEX efficiency – one skill set
- Revenue opportunities – one access, multiple services

Referencia Regional Service Provider Access Portfolio

Topologia de Referencia



CPE
WiFi
SD WAN
Security
IPv6

FTTH, PON
GPON, STP,
REP, 802.1Q
Etc,

OSPF, MPLS,
VPLS, L3VPN

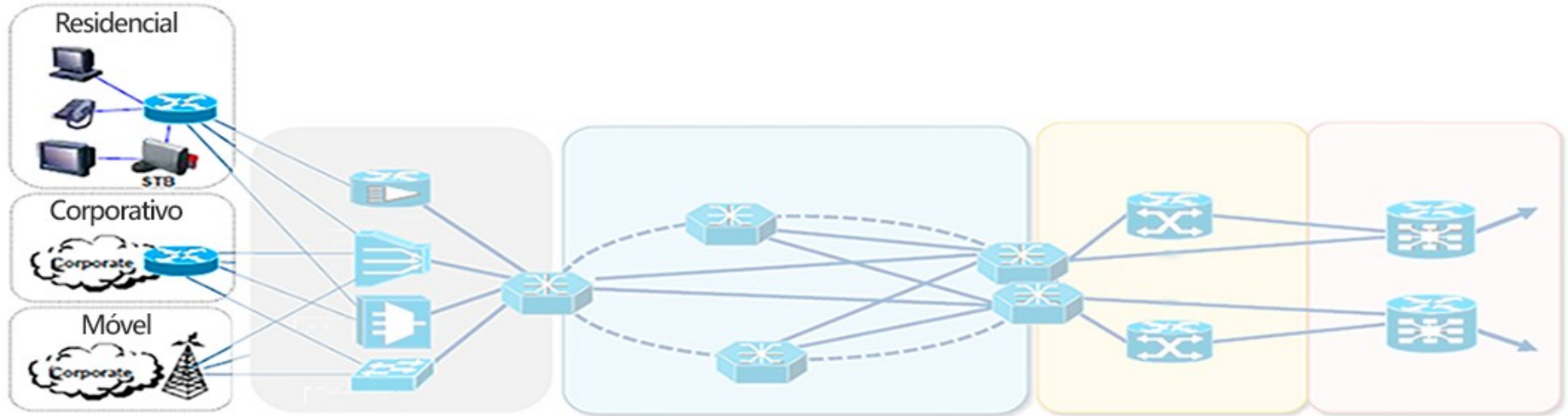
Segment Routing
BGP-eVPN

BGP, BNG
(PPPoE/IPoE/BRAS)
CGNAT,

NAT64

BGP
BGP Full
IPv4/IPv6

CPE



ISR 1000



Meraki



RV



Cisco Enterprise Routing Portfolio

Cloud



CSR 1000V

- 10 Mbps to 10 Gbps
- DNA Virtualization
- Extend enterprise routing, security and management to cloud

vEdge Cloud

- 10 Mbps to 100 Mbps
- Extend overlay to public cloud

Branch

ISR 800



- Up to 100 Mbps
- Fixed and fanless
- Enterprise-class branch routing with security

ISR 1000



- Up to 250 Mbps
- Fixed and fanless
- Integrated wired and wireless access

ISR 4000



- Up to 2 Gbps
- Modular
- Integrated container applications
- Compute with UCS

vEdge 1000



- Up to 1 Gbps
- Fixed

WAN Edge

ASR 1000



- 2.5-200Gbps
- High-performance service with hardware assist
- Hardware and software redundancy

vEdge 2000



- 10 Gbps
- Modular

SOHO



RV Series

vEdge 100



- 100 Mbps
- 4G LTE & Wireless

Virtual

ISRv



- 50 Mbps to 2.5 Gbps
- Virtual enterprise-class networking
- Run on x86 compute platform
- ENFV orchestration & management

Cisco ENCS



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

Cisco 1000 Series Integrated Services Routers

Foundation for the digital branch

WAN and Application Assurance

IWAN App over APIC-EM and DNA-C
Application Visibility and Link Optimization
VPN and Security

Advanced Mobility

LTE Advanced
Mobility Express

Pay-as-You-Grow Investment Protection

High Performance

High WAN-WAN and LAN-WAN
performance High Performance VPN and
Security

Proactive Security

Secure connectivity
Branch threat defense
Visibility and analytics

Physical

Cisco 1100
Integrated
Services Router



Connectivity

| | | | |
|----------|------|----------------------|--------------------|
| Ethernet | xDSL | LTE Advanced d | 801.11ac Wave 2 |
|----------|------|----------------------|--------------------|

Manageability

APIC-EM

WebUI

Prime

DNA Center

Cisco 1000 Series Integrated Services Routers

Value and Benefits



Speed and Performance

Multi-core hardware architecture

Open and programmable operating system IOS® XE

Trustworthy Systems



Connectivity

Ethernet, DSL, LTE Advanced,

Gigabit Ethernet LAN

802.11ac wave2 with Mobility Express



Ease of Use

Centralized management and orchestration with Cisco DNA Center

Zero touch deployment and provisioning



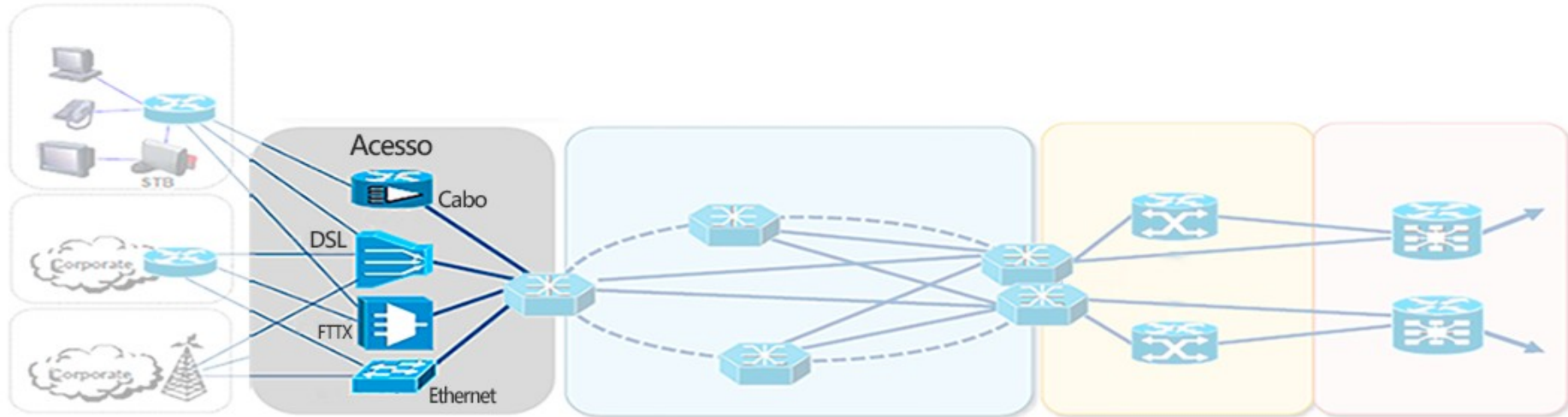
Comprehensive Security

Advanced threat defense with encryption at high-performance

Umbrella Branch provides secure WAN and enterprise-class security.

Encrypted Traffic Analytics using machine learning for anomaly detection

Acesso



ASR920



NCS 540



ASR 903



ASR 907

Cisco ASR 920 Portfolio



| | ASR-920-4SZ-A/ASR-920-4SZ-D | ASR-920-12CZ-A/ASR-920-12CZ-D | ASR-920-10SZ-PD | ASR-920-24TZ-M | ASR-920-24SZ-M | ASR-920-24SZ-IM | ASR-920-12SZ-IM |
|------------------|-----------------------------|-------------------------------|-----------------|----------------|----------------|----------------------------|-----------------|
| Size | 1RU | 1RU | 2-4RU | 1RU | 1RU | 1.5RU | 1RU |
| IM Slots | - | - | - | - | - | 1 | 1 |
| Air Flow | Front to Back | Front to Back | - | Front to Back | Front to Back | Front to Back/Side to Back | Front to Back |
| 1G ports | 2/6 | 12/14 | 10 | 24 | 24 | 24 | 12/16 |
| 10G ports | 4 | 2 | 2 | 4 | 4 | 4 | 4 |

ASR 920 Series



Secured Cell Site Router

12xGE + 4x10GE

Full line rate

One modular slot

-40C to 65C, < 300mm depth

IPSec, GPS, PoE support

Redundant and modular PS: AC and DC

High Density Model

Up to 24xGE + 4x10GE

Full line rate

Fixed or one modular slot

-40C to 65C, < 300mm depth

SyncE/1588/BITS

Redundant and modular PS: AC and DC

Low Density Models

Up to 12xGE and 2x10GE

Full line rate

-40C to 65C, < 300mm depth

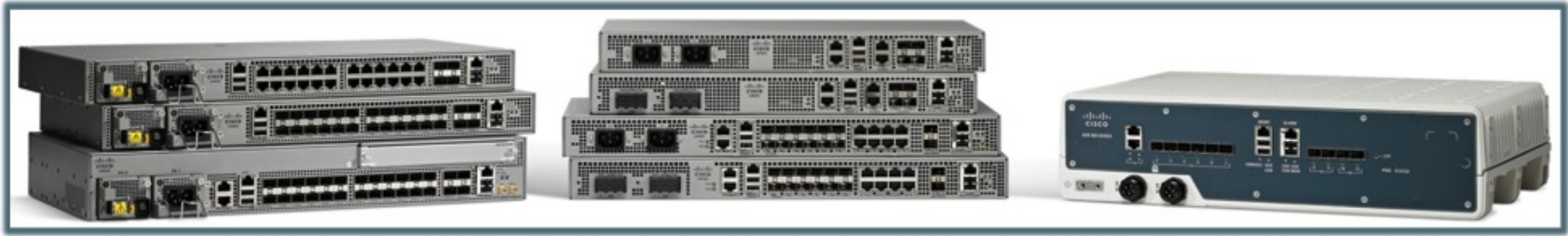
Passively cooled model available

SyncE/1588/BITS

Fixed redundant PS: AC and DC

Premium fixed access routers for Carrier Ethernet, Mobile Backhaul, or Fiber to the Home Deployment. Single ASIC and OS across portfolio

Cisco ASR 920 Foundational Pillars



- **Sharing Single OS, Single ASIC:** Optimize network operations and manageability
- **Breadth of product portfolio:** Multiple product variants - Indoor and Outdoor
- **Compact:** Small form-factor and temperature hardened platforms
- **Advanced Carrier Ethernet & MBH DNA:** Single converged platform running on same OS and ASIC addressing needs of both CE and MBH
- **Enables Network Convergence** of Business & Residential Services for both Fixed & Mobile Networks

ASR 900 Chassis



ASR 902 (2RU)

Single Route Switch Processor

4 interface module slots

480G backplane capacity

I-Temp -40C to 65C, < 300mm depth

Redundant and modular PS AC and DC



ASR 903 (3RU)

Dual Route Switch Processor

6 interface module slots

480G backplane capacity

I-Temp -40C to 65C, < 300mm depth

Redundant and modular PS AC and DC

50 msec ISSU support



ASR 907 (7RU)

Dual Route Switch Processor

16 interface module slots

2T backplane capacity

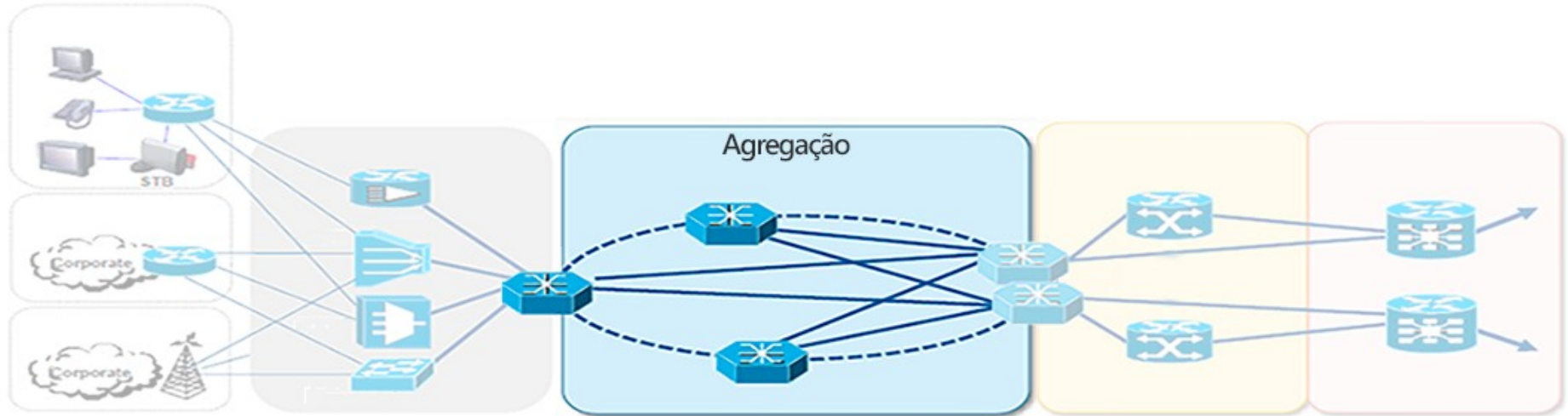
I-Temp -40C to 65C, < 300mm depth

Redundant and modular PS AC and DC

50 msec ISSU support

Compact , Redundant, and High Capacity Small Aggregation Platforms with Flexible Interface Support

Agregação



ASR920



NCS 540



NCS5000 /
NCS5500

IOS XR Family



Virtual RR/PE/DC
Forwarder

Cisco IOS-XRv 9000



Cisco NCS 5500 & NCS 5000



Cisco ASR 9000, CRS & NCS 6000

OPTIMIZED Cisco vXR Software



Elastic



Cost Optimized



Ultra-high Density



Carrier Grade



Programmability
and Automation

NCS 5500 Product Family

100G-optimized, Scalable IOS XR Routers



NCS 5501

800 Gbps – 1 RU



NCS 5502

4.8 Tbps – 2 RU



NCS 5504

14.4 Tbps – 7 RU



NCS 5508

28.8 Tbps – 13 RU



NCS 5516

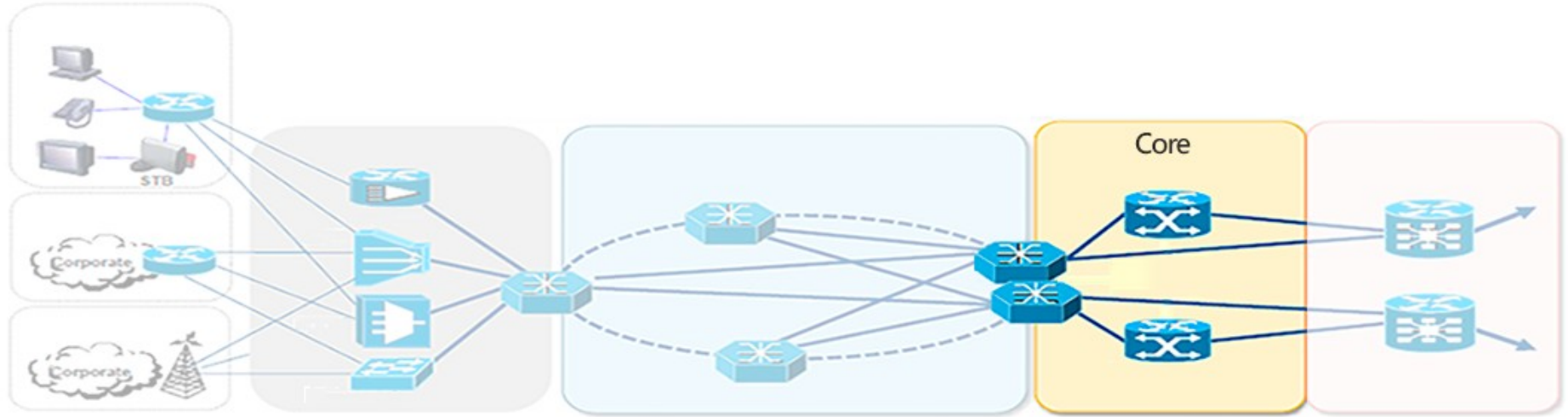
57.6 Tbps – 21 RU

Platforms Comparison

Scale Chart

| | NCS 5501 | NCS 5501-SE | NCS 5502/-SE | NCS 5508 | NCS 5516 | NCS 55A1-36H | NCS 5001 | NCS 5002 | NCS 5011 |
|---------------|-------------|----------------|-------------------------|-------------|-------------|-----------------|----------------------|-------------|-------------|
| 10G | 48+6x4 | 40+4x4 | 48x4 | 8x36x4 | 16x36x4 | 36x4 | 40+4x4 | 80+4x4 | 32x4 |
| 40G | 6 | 4 | 48 | 8x36 | 16x36 | 36 | 4 | 4 | 32 |
| 100G | 6 | 4 | 48 | 8x36 | 16x36 | 36 | 4 | 4 | 32 |
| BW Gbps | 800 | 800 | 4,800 | 28,800 | 57,600 | 3,6000 | 800 | 960 | 3,200 |
| Total Mpps | 720 | 600 | 5,760* | 34,560 | 69,120 | 3,340 | 1,440 | 1,440 | ? |
| Power w | 240 | 320 | 1,850* | 6,940 | 14,750 | 1,300 | 200 | 300 | 228 |
| Pfx scale | 1.1M+ | 2.75M | Up to 2.75M IPv4 | | | Up to 8M | 128k IPv4 + 16k MPLS | | |
| Buffer | | | 4GB per Forwarding ASIC | | | | 16MB | | |
| Queues | | | 96k | | | | 2,960 | | 1,280 |

CORE



ASR1001/
ASR1002



ASR1001 HX
ASR1002 HX



ASR9001 /
ASR9901

The Cisco ASR 1000 Series Router Family



Compact,
Powerful Router



Business-Critical
Resiliency



Instant-On
Service Delivery

Fixed Chassis

IOS-XE

Modular Chassis

ASR1001-X



2.5 to 20
Gbps

ASR1001-HY



44 to 60
Gbps

ASR1002-X



5 to 36
Gbps

ASR1002-HY



44 to
100
Gbps

ASR1004



10 to 40
Gbps

ASR1006



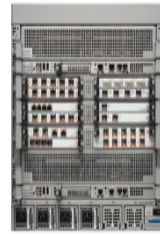
10 to
100
Gbps

ASR1006-X



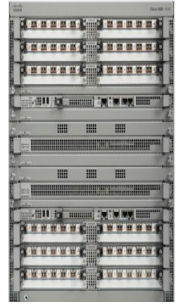
40 to
100
Gbps

ASR1009-X



40 to
200
Gbps

ASR1013



40 to
200
Gbps

ASR 1000 Series Momentum

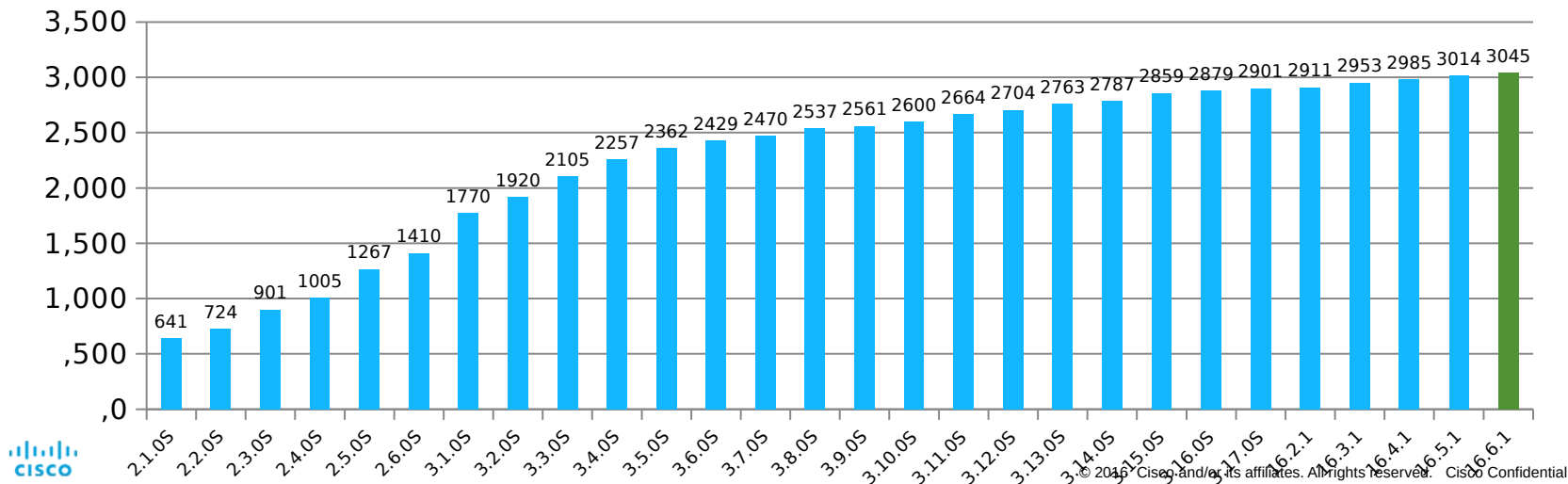
Customer Adoption

- 44,500+ customers (SP + ENT)
- 300,000+ chassis sold

Feature Velocity & Adoption

- 28 major releases since FCS in May 2008
- Over 3,000 features to support many solutions
 - SD-WAN, SD-Access, DNA, VPN, DCI, Segment Routing, Programmability, etc.

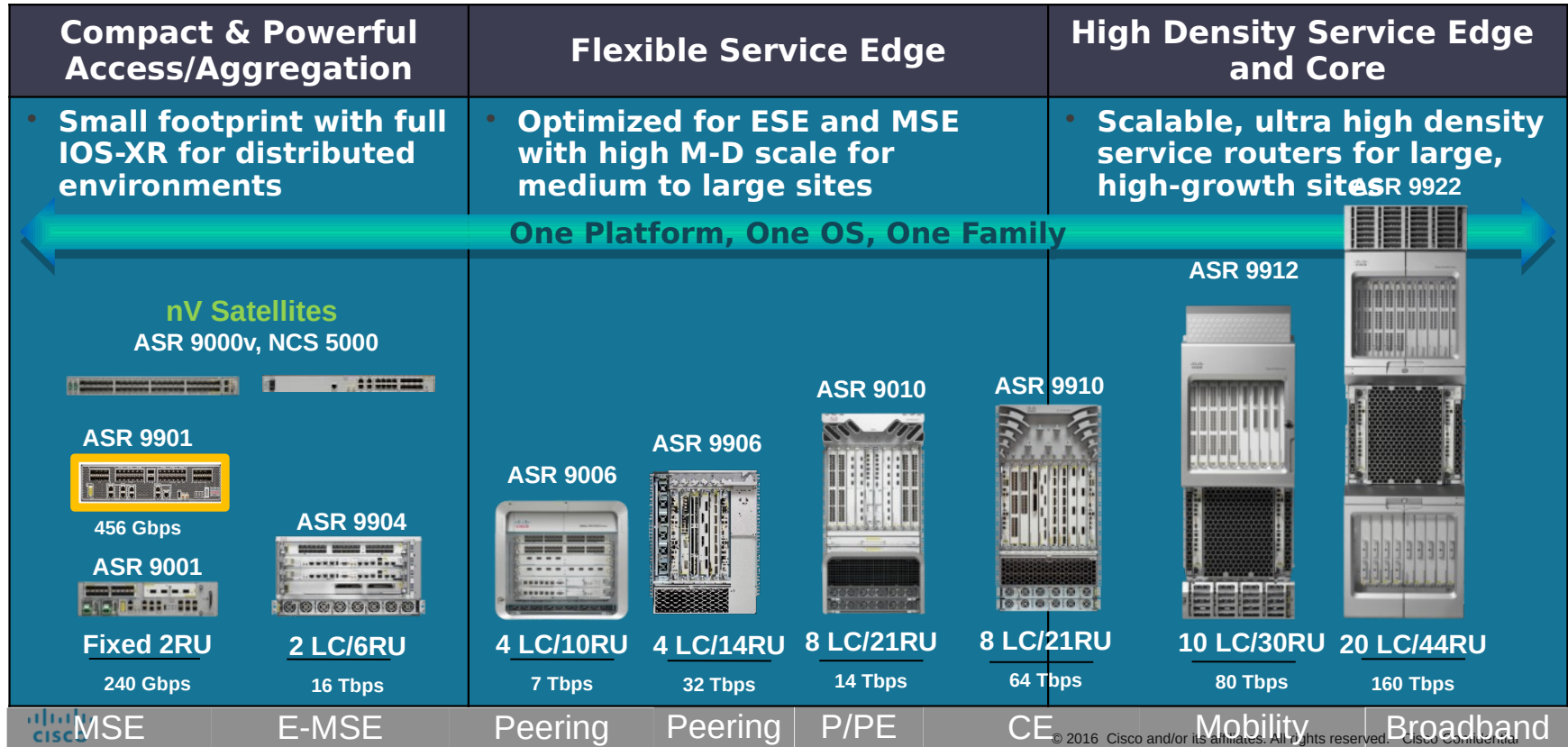
of Features



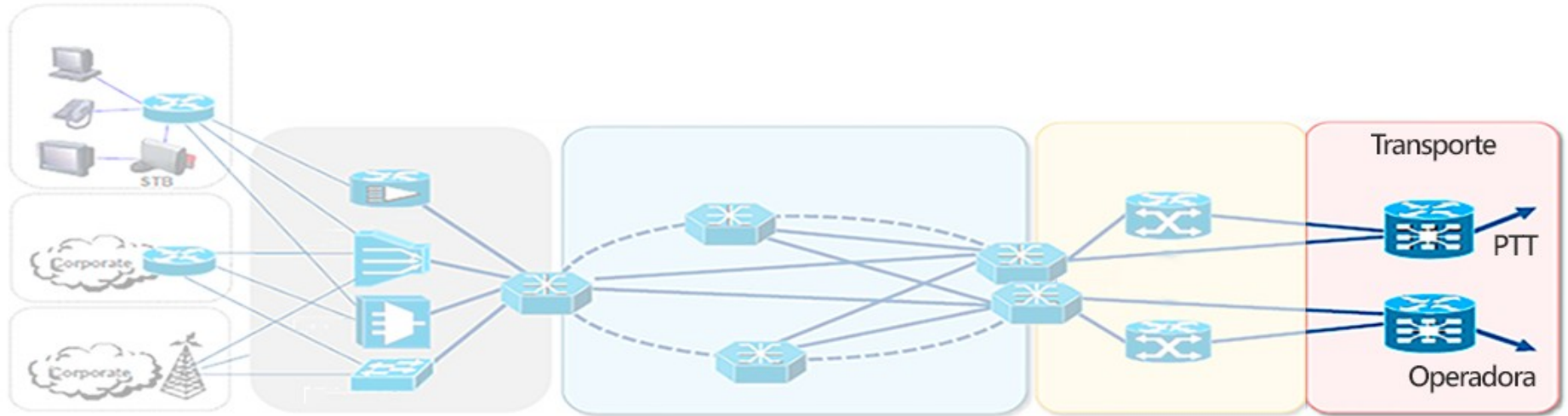
Performance

| | ASR 1001-X | ASR 1002-X | ASR 1001-HX | ASR 1002-HX | ESP40 | ESP100 | ESP200 |
|-----------------|---------------------------------------|------------------------------|--|--|--|----------|-------------|
| Throughput | 2.5 – 20 Gbps | 5 – 36 Gbps | 44 – 60Gbps | 44 – 100 Gbps | 40 Gbps | 100 Gbps | 200 Gbps |
| PPS Performance | 19 Mpps | 34 Mpps | 30 Mpps | 79 Mpps | 25 Mpps | 79 Mpps | 152 Mpps |
| IPv4 Routes | 1.0/3.5 M 8/16GB | 0.5 M/1 M/3.5 M 4/8/16 GB | 1 M/3.5 M 8/16 GB | 0.5 M/1 M/3.5 M 4/8/16 GB | 1 M/4 M 8 GB/16 GB | | |
| Crypto (IMIX) | 5 Gbps | 4 Gbps | 16 Gbps | 25 Gbps | 13 Gbps | 16 Gbps | 59 Gbps |
| MACsec | Point to Multipoint, 128 bits only | N/A | Point to Multipoint, up to 256 bits | Point to Multipoint, up to 256 bits | Point to Multipoint for GE and TenGE EPAs, up to 256 bits | | |
| ZBFW Sessions | 2M | | | 6M | 2M | 6M | |
| NAT Sessions | 2M | | | 4M | 2M | 4M | |
| AVC (course) | 5 Gbps | 18 Gbps | 30 Gbps | 52 Gbps | 23 Gbps | 76 Gbps | |
| CUBE enterprise | 12K | 14K | 16K | | | | |
| Broadband subs | 8K | 29K | | 58 K | 64 k | 58k | TBD |
| QoS (queues) | 16K | 116K | | 232 K | 128 K | 232 K | 464 K |
| Suite-B | Yes | | | | No | Yes | |
| Clocking | SyncE | SyncE, GPS, BITS | SyncE, GPS | SyncE, GPS | SyncE With ELC or SyncE SPA, BITS | | |
| TCAM | 10 Mbit | 40 Mbit | | 80 Mbit | 40 Mbit | 80 Mbit | 2 x 80 Mbit |
| | | | | | | | |

Cisco ASR9000/ASR9900 Portfolio



Transporte



NCS5500-SE



ISR-4k



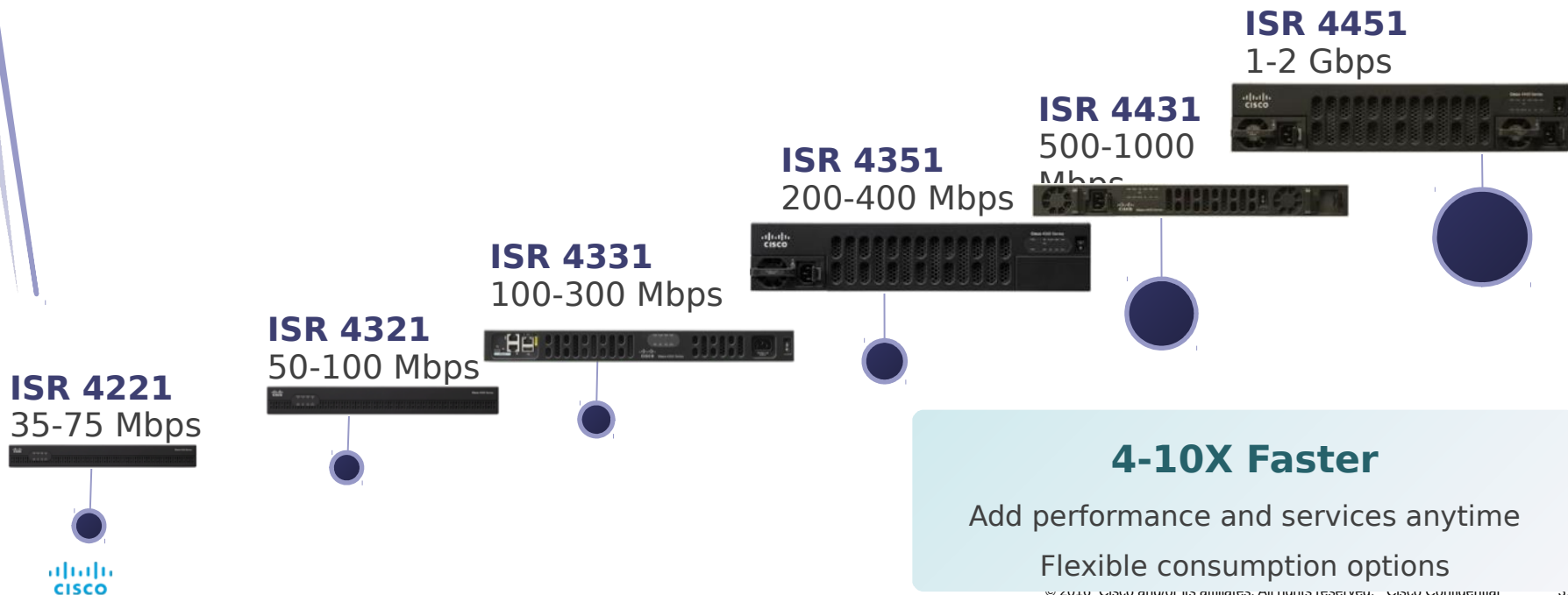
ASR9000 /
ASR9900



ASR-1k

Pay-As-You-Grow with Cisco ISR 4000 Series

Investment Protection Without Oversubscription

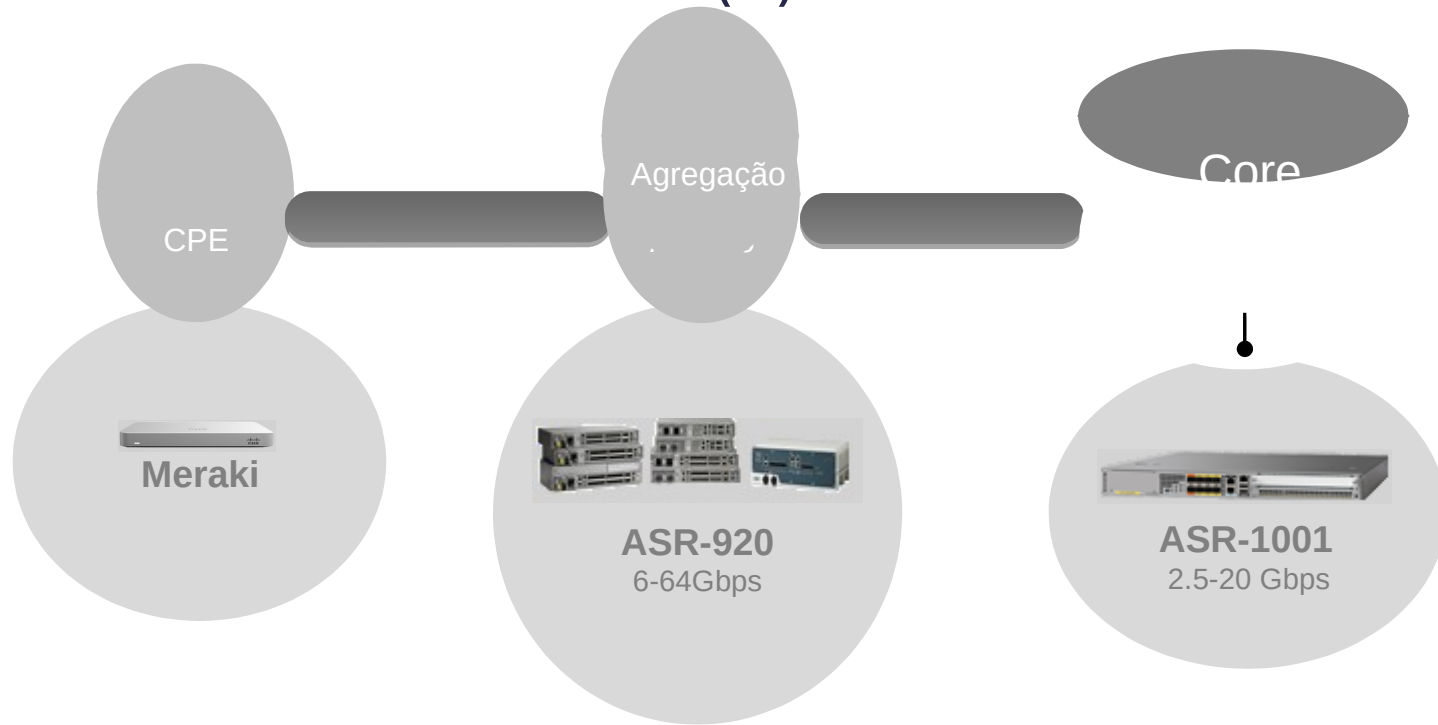


ISR4K Specifications Summary

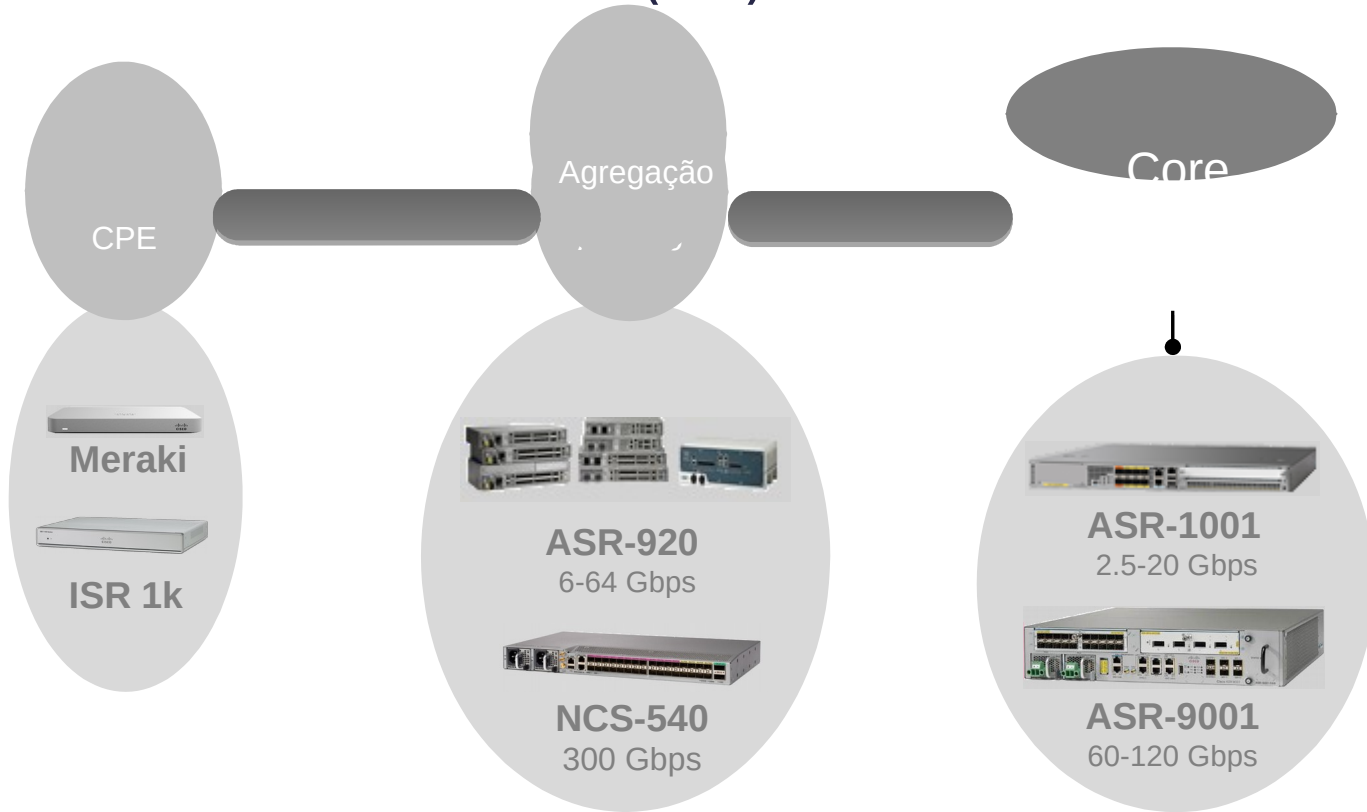
| Platform | | Height | GE / RJ45 / SFP | NIM | SM-X / DW | Default / Max Memory | Default / Max Flash Memory | RPS |
|-----------------|-----------------|--------|-----------------|-----|-----------|----------------------|----------------------------|-----|
| ISR 4451 | 1 – 2 Gbps | 2RU | 4/4/4 | 3 | 2 / 1 | 4GB / 16GB | 8GB / 32GB | Yes |
| ISR 4431 | 500 – 1000 Mbps | 1RU | 4/4/4 | 3 | 0 | 4GB / 16GB | 8GB / 32GB | Yes |
| ISR 4351 | 200 – 400 Mbps | 2RU | 3/3/3 | 3 | 2 / 1 | 4GB / 16GB | 4GB / 16GB | No |
| ISR 4331 | 100 – 300 Mbps | 1RU | 3/2/2 | 2 | 1 / 0 | 4GB / 16GB | 4GB / 16GB | No |
| ISR 4321 | 50 – 100 Mbps | 1RU | 2/2/1 | 2 | 0 | 4GB / 8GB | 4GB / 8GB | No |

Exemplos de Topologia

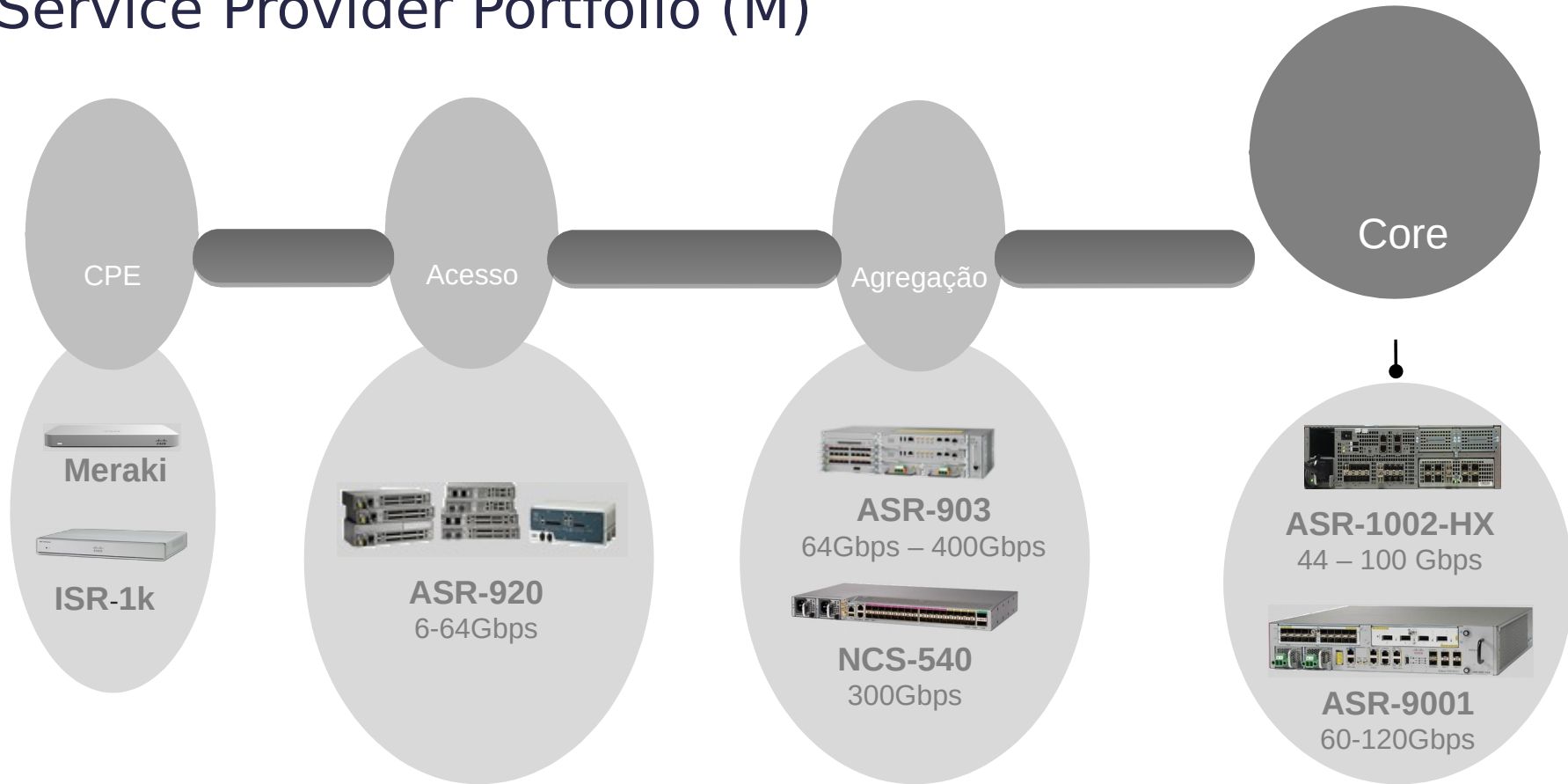
Service Provider Portfolio (P)



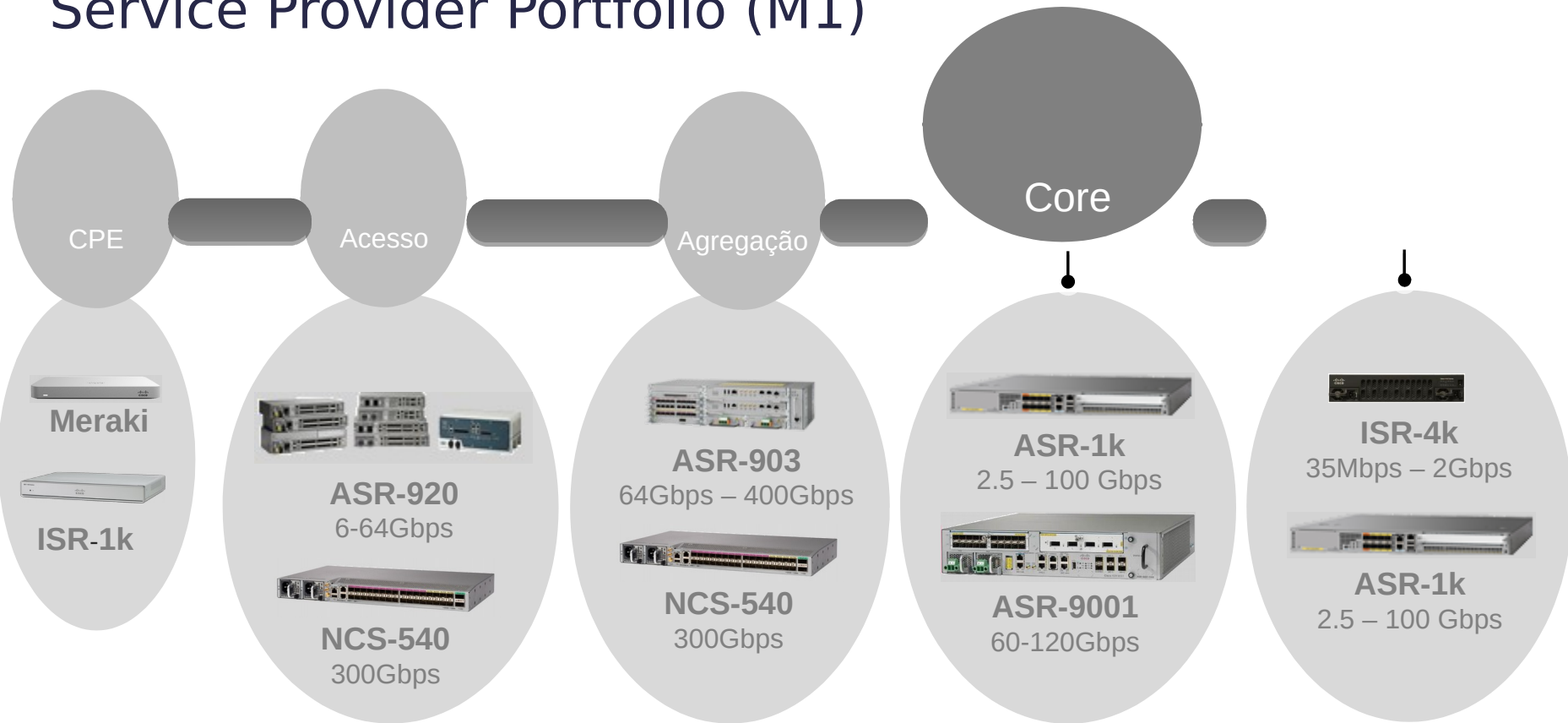
Service Provider Portfolio (P1)



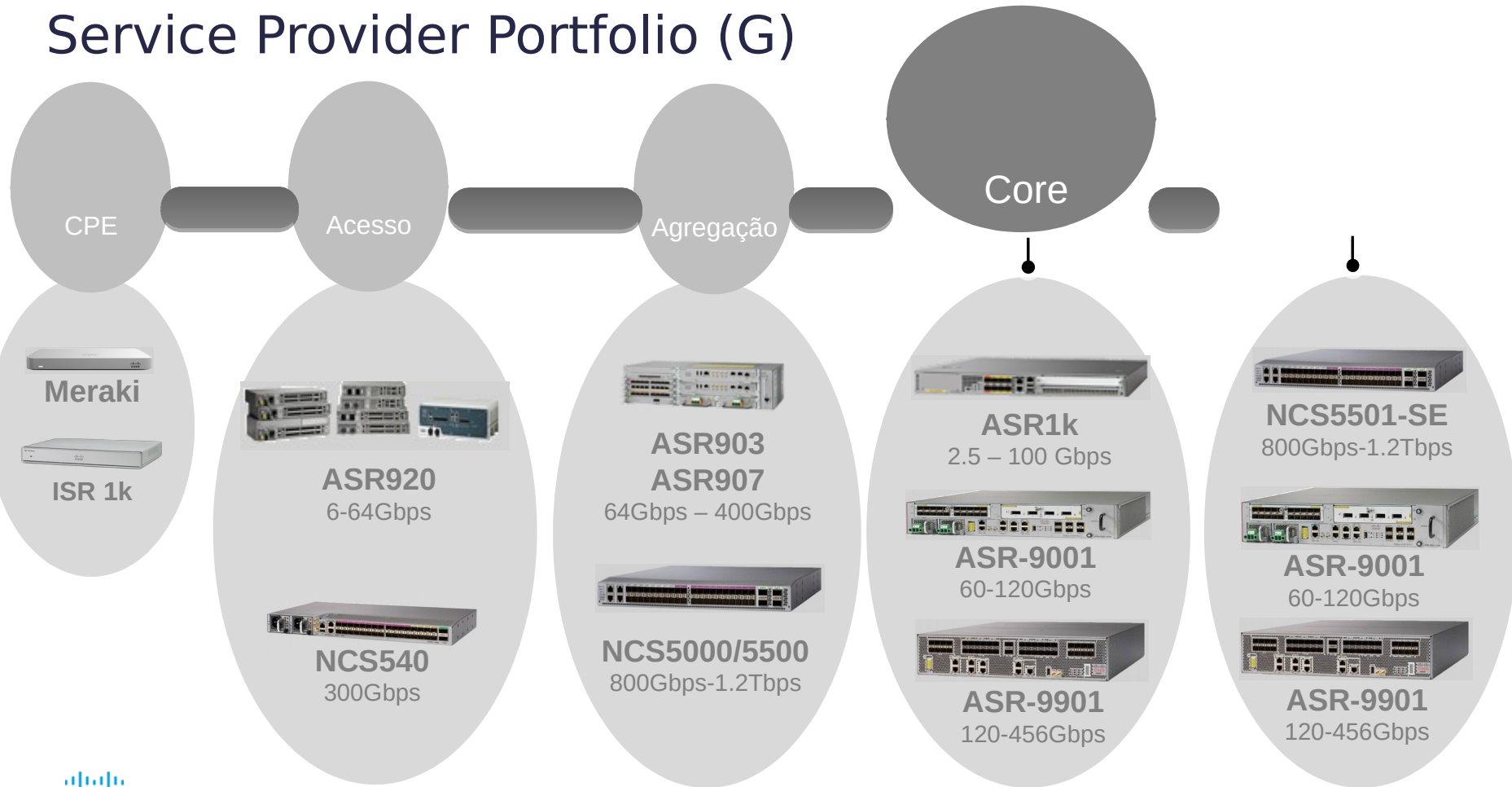
Service Provider Portfolio (M)



Service Provider Portfolio (M1)

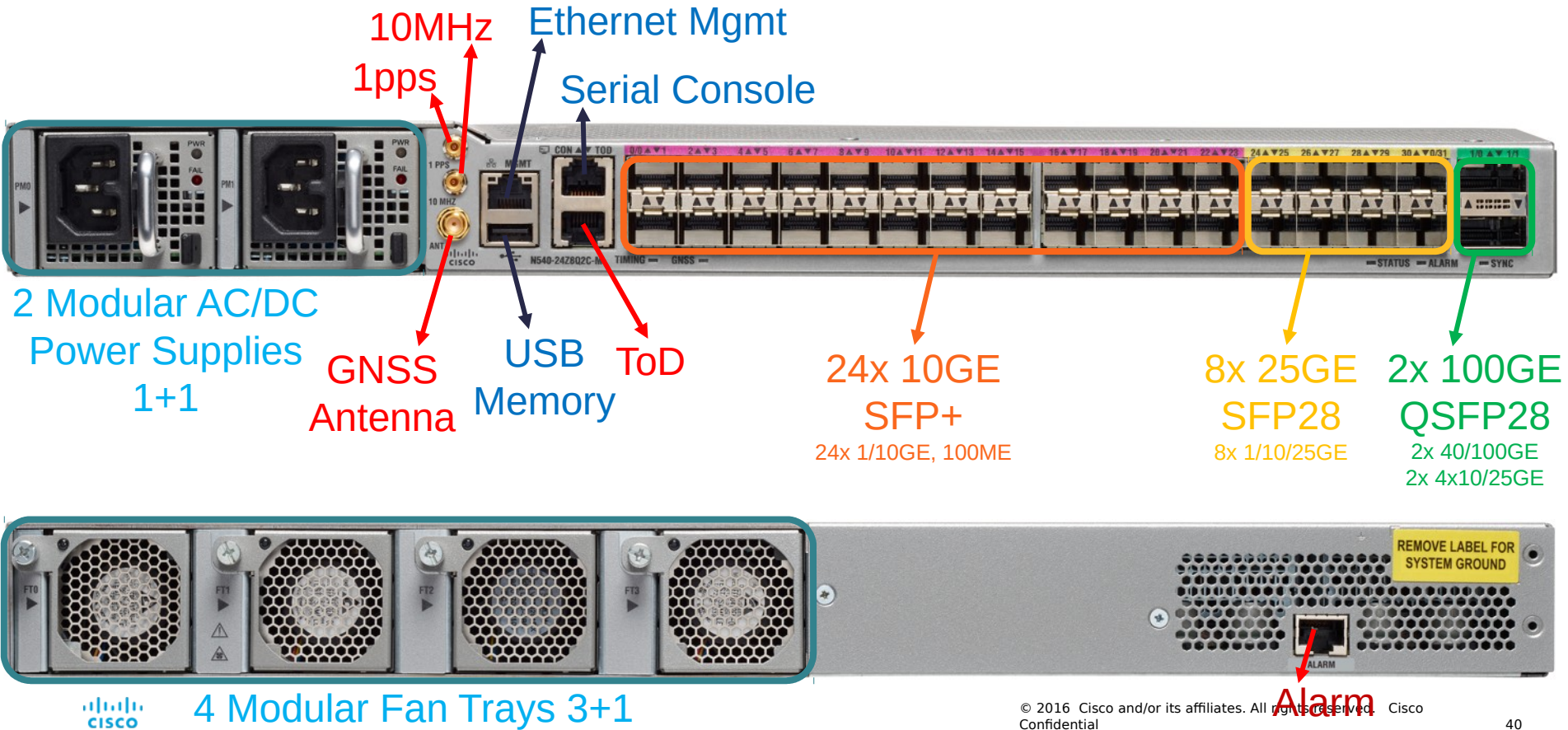


Service Provider Portfolio (G)



Novidade: NCS 540

NCS 540 Front & Back Details



N540-24Z8Q2C-SYS

ASIC/CPU/Mem

- 300 Gbps BCOM, Intel Broadwell 4C 1.8GHz CPU
- 32GB RAM, 128G SSD

Port Config

- 24x1/10G SFP+, 8x 25G SFP28, 2x100G QSFP28
- DWDM/ZR support on all SFP+ interfaces

PSU/Fan

- Modular & redundant PSUs and fans
- Front to back airflow

Temp Range

- iTemp 40C to +70C
- Conformal coated SKU for hot humid conditions

Optics

- 1/10G: SR/LR/ER/ZR/DWDM
- 25G: SR/LR, 40G: SR/LR/ER, 100G: SR/LR/ER4L

Timing

- 1PPS in/out, 10Mhz in/out, ToD, Internal GNSS
- SyncE, G.8265.1, G.8275.1/2, Class B BC

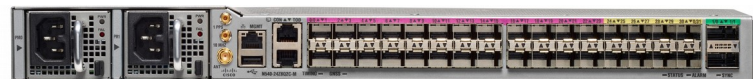
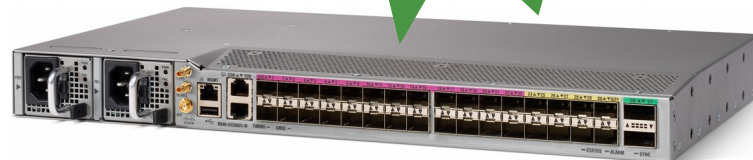
Service Scale

- 256 L3VPN, 2K PWs

Software

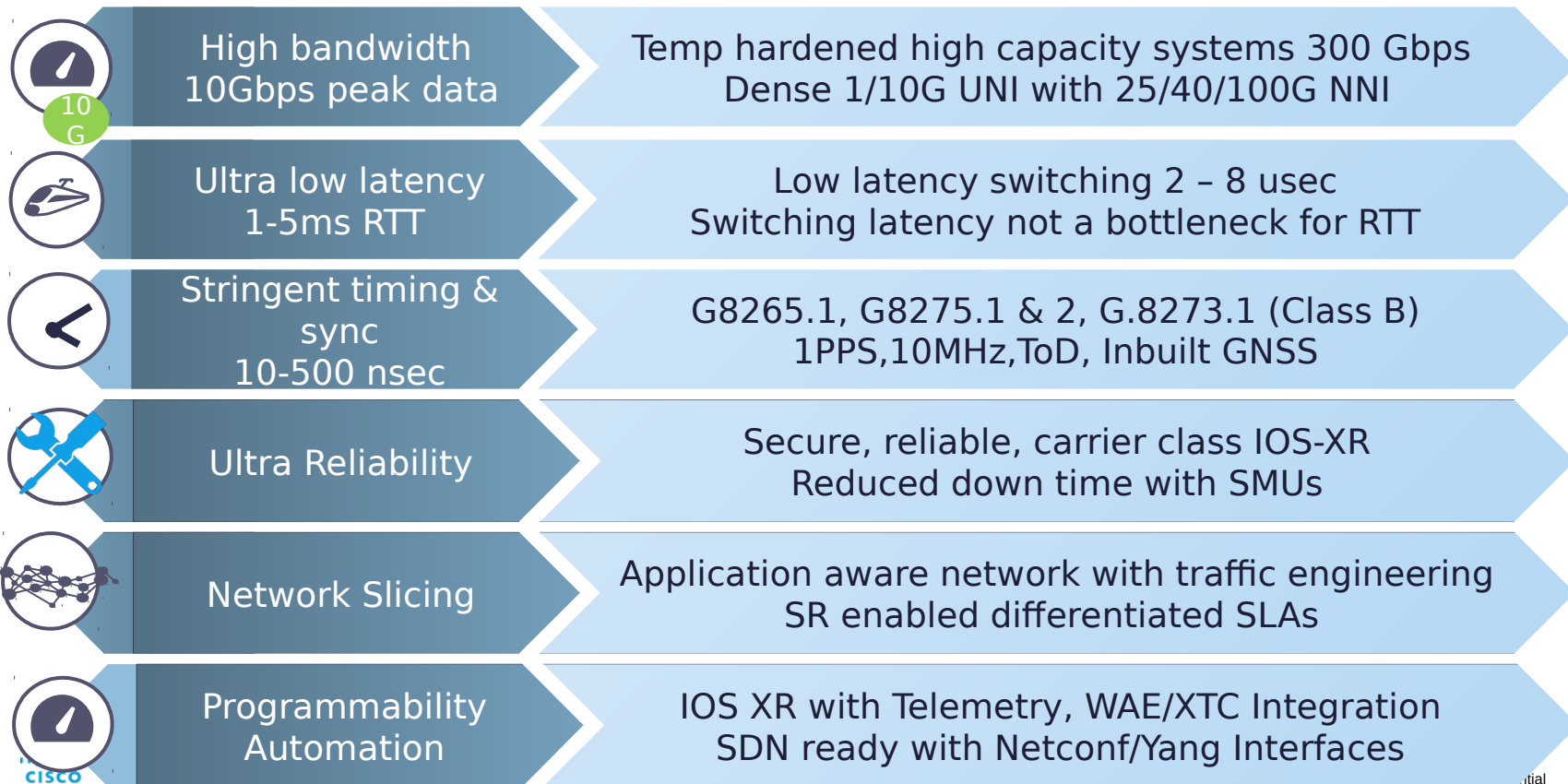
- FCS 64 bit IOS XR 6.3.2
- Full SW feature parity with NCS 5500

Shipping



| SFP+ | SFP28 | QSFP28 |
|-------------|------------|-------------|
| • 24 x GE | • 8 x GE | |
| • 24 x 10GE | • 8 x 10GE | • 8 x 10GE |
| | • 8 x 25GE | • 8 x 25GE |
| | | • 2 x 40GE |
| | | • 2 x 100GE |

NCS 540 5G Readiness



Novidade: ASR9901

ASR 9901 Highlights

FCS Mar'18
IOS XR 6.4.1



Form Factor & BW

- **2 RU** box with 2 Tomahawk NPU
(ASR 9001 is 2 RU with 2 Typhoons)
- Depth of ~23 inches, (9001 is 18")
- 456G Duplex BW

SW & Licensing

- **64 bit XR only**
- PAYG mode for **120G, 256G** and **456G**
- Full feature parity with Tomahawk feature-set

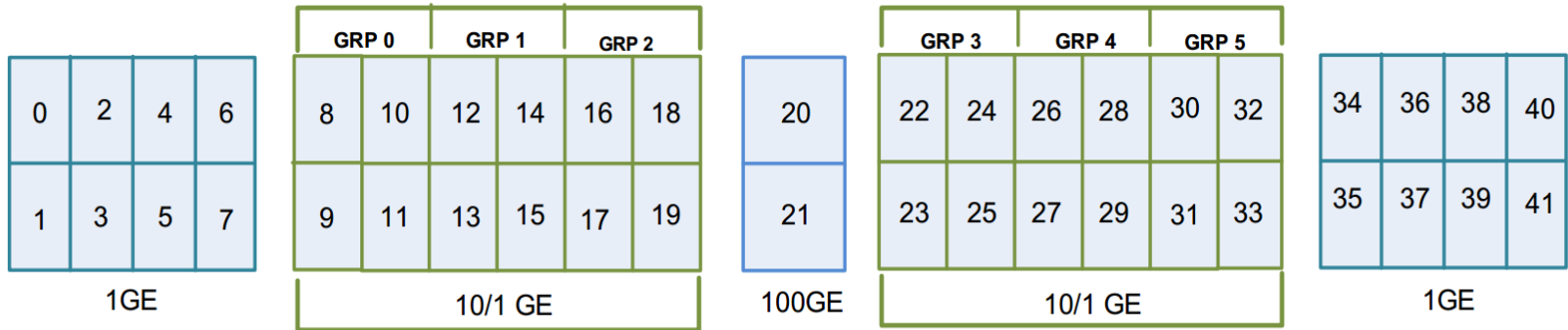
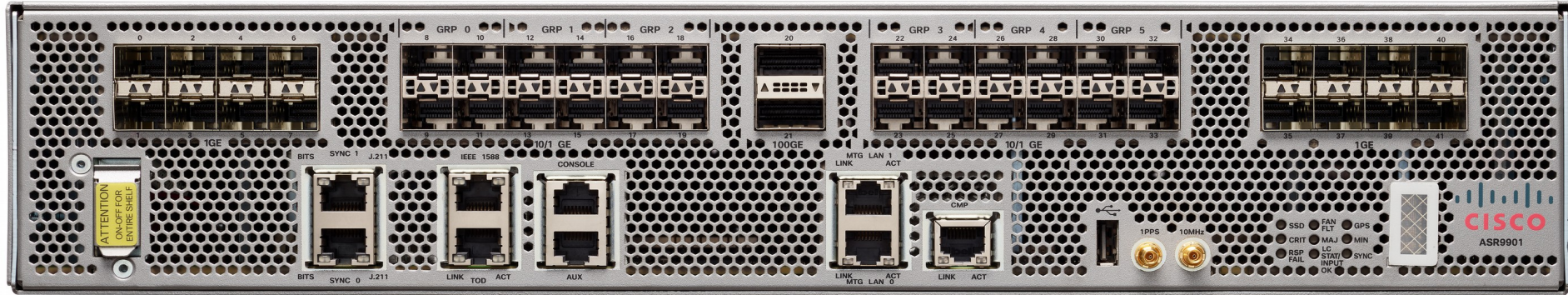
Ports / Port Density

- Fixed ports available; **no MPAs**
- 42 ports on the faceplate :
16X1G, 24X1/10G,
2X100G(QSFP28)
- 1G ports : LAN & MACSEC
10G ports: LAN & MACSEC
100G ports: LAN & MACSEC

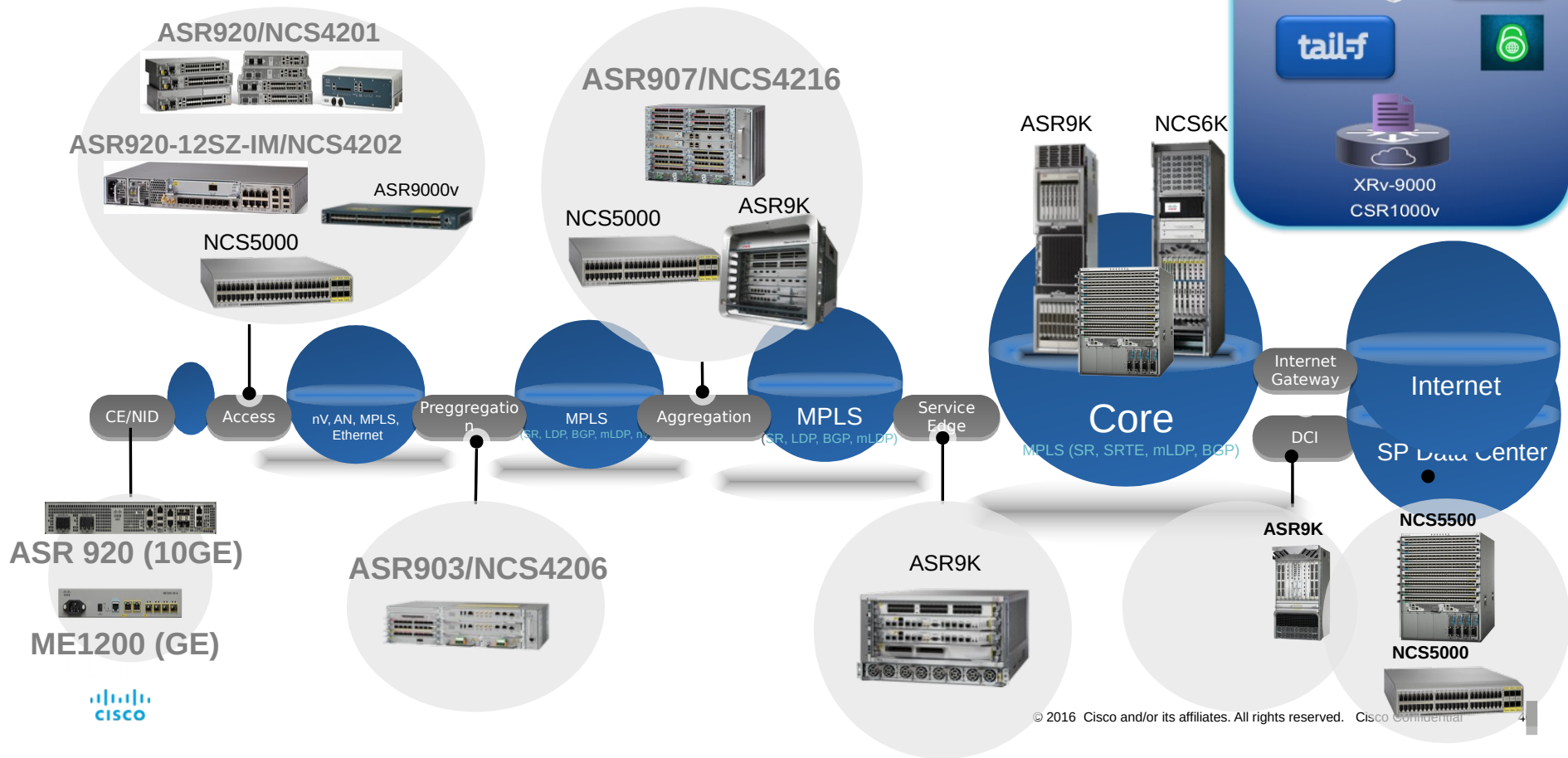
Mechanicals & Commons

- Redundant Power & Fan-trays
- Front to back Airflow
- NEBS, EMC Compliant
- All ports/power cabling on front plate; fan trays on backside
- Typical Power Consumed :
1200W

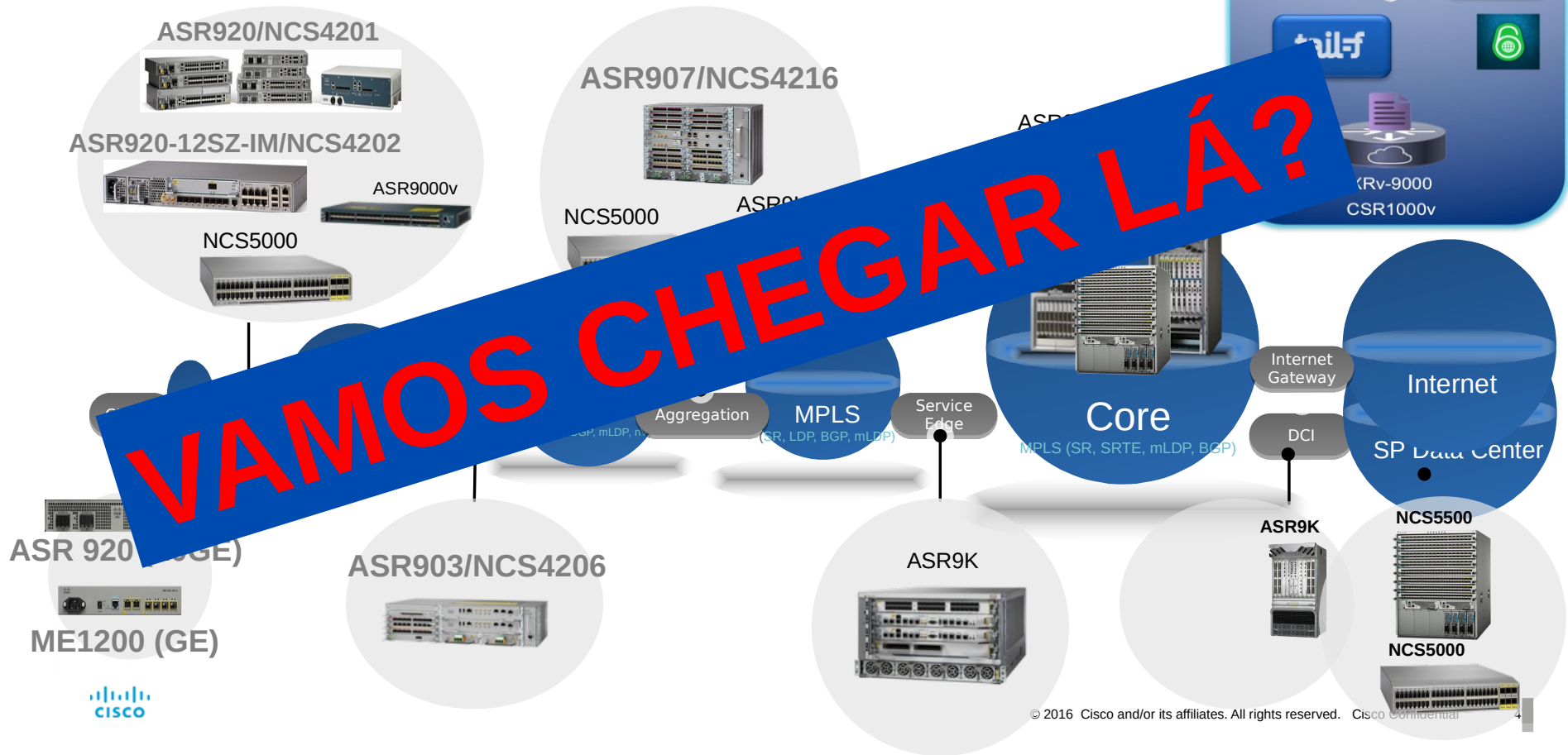
ASR 9901 Port mapping



Service Provider Access Portfolio



Service Provider Access Portfolio



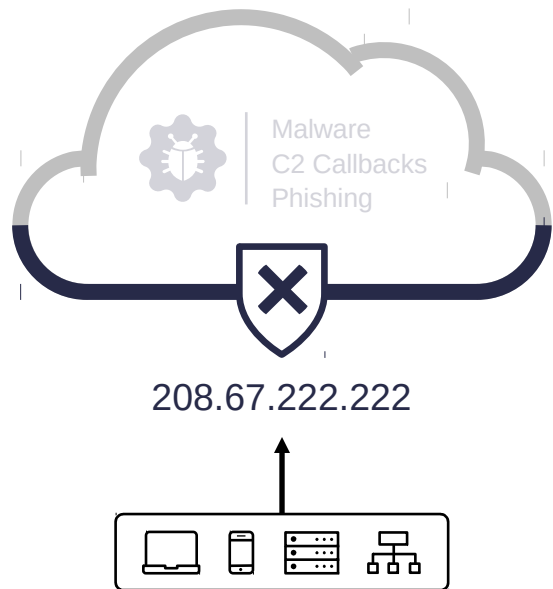
OBRIGADO !!!



Adalberto Lins
Adalberto@cisco.com



Cisco Umbrella



Built into the foundation of the internet

Intelligence to see attacks before launched

Visibility and protection everywhere

Enterprise-wide deployment in minutes

Integrations to amplify existing investments

Intelligence

Co-occurrence model

Identifies other domains looked up in

rapid succession of a given domain

Natural language processing model

Detect domain names that spoof terms and brands

2M+ live events per second

11B+ historical events

Spike rank model

Detect domains with sudden spikes in traffic

Predictive IP space monitoring

Analyzes how servers are hosted to detect future malicious domains

Dozens more models

Our efficacy



Easiest security product you'll ever deploy

- 1 Signup
- 2 Point your DNS
- 3 Done

