



# Roteadores CISCO para ISPs

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# 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\*\*

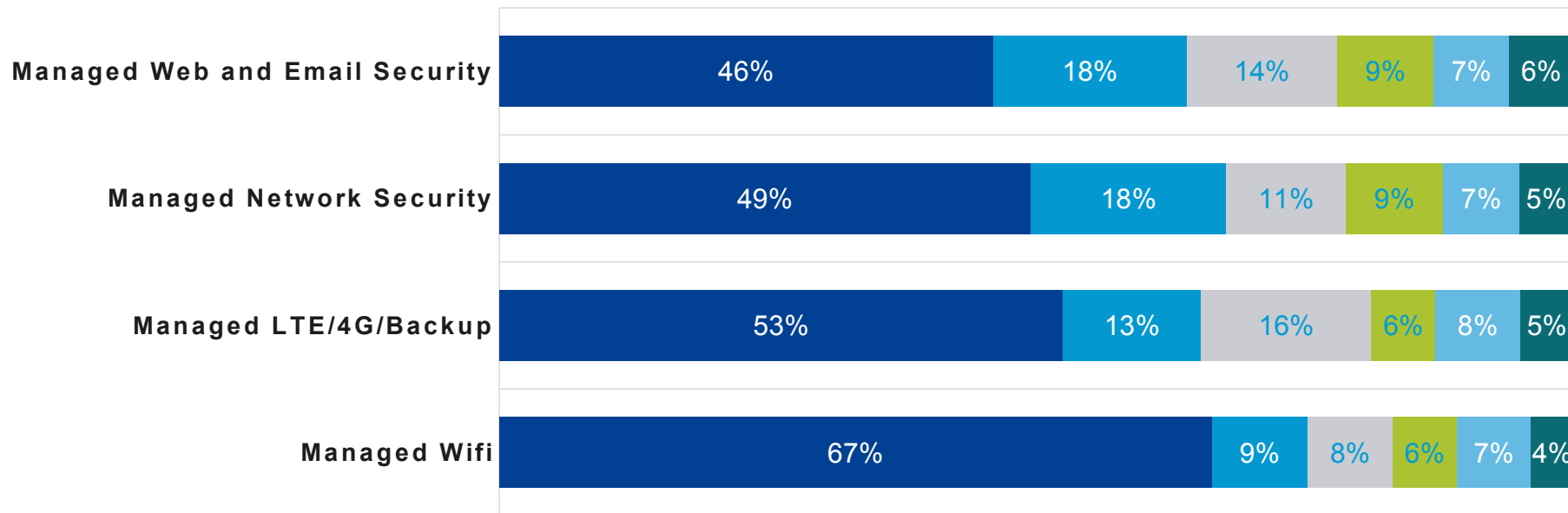
\* Cisco Visual Networking Index

\*\*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

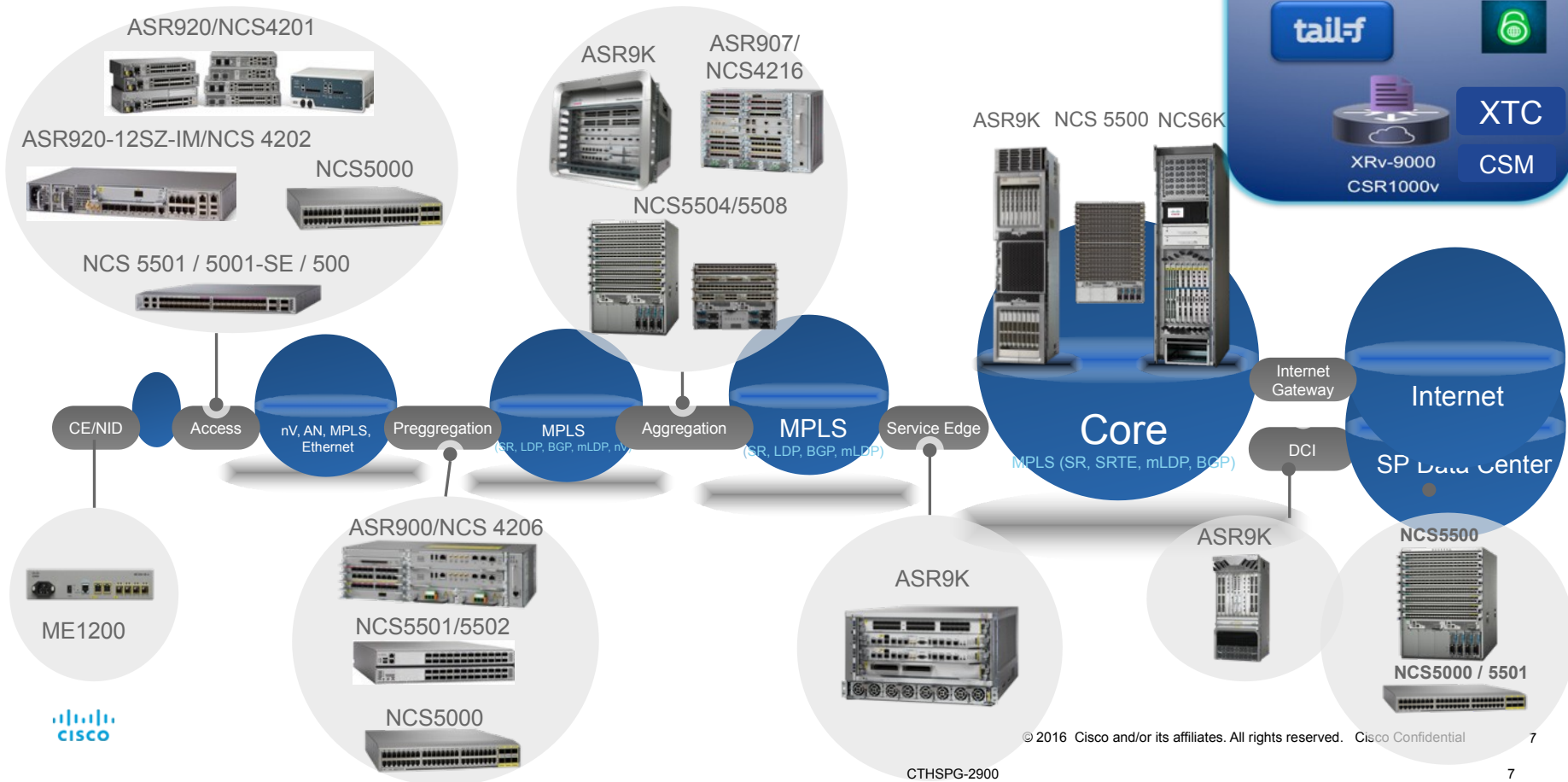
*Redução da perda de clientes*



- 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

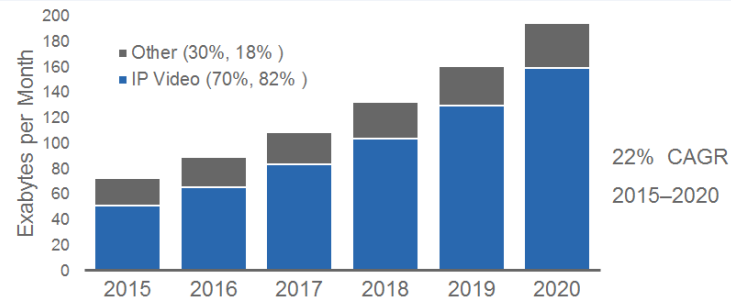


**8X Mobile Traffic Growth**  
From 2015-2020



**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

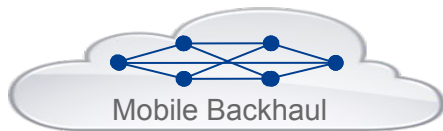


# Market Trend: Network Infrastructure Convergence

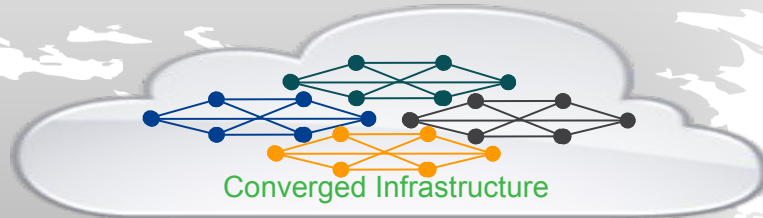
## Single Any-Service Network for Lower CAPEX & OPEX

### 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



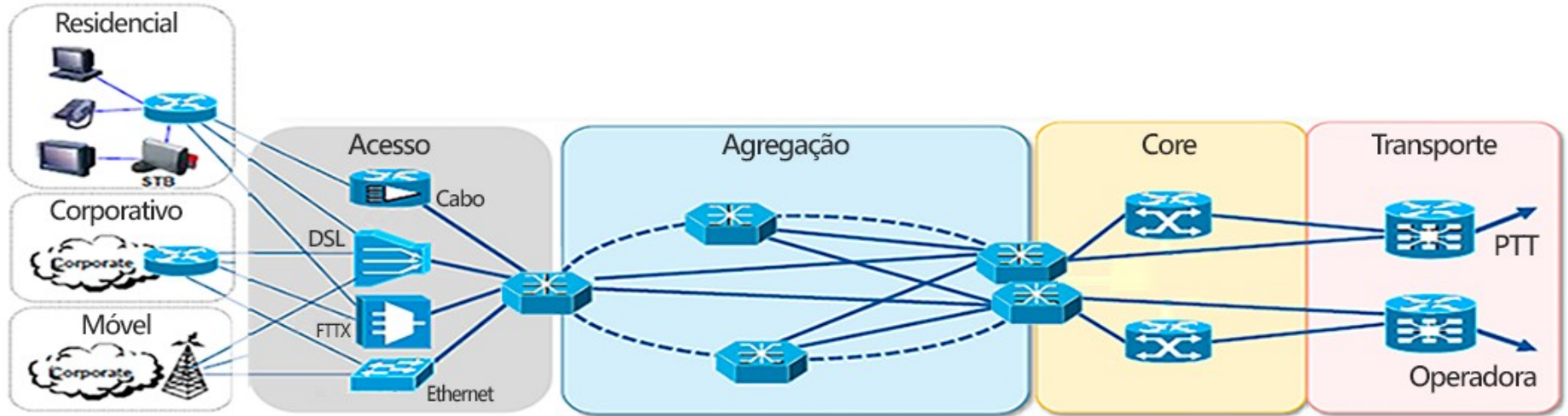
### Convergence Benefits

- 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,

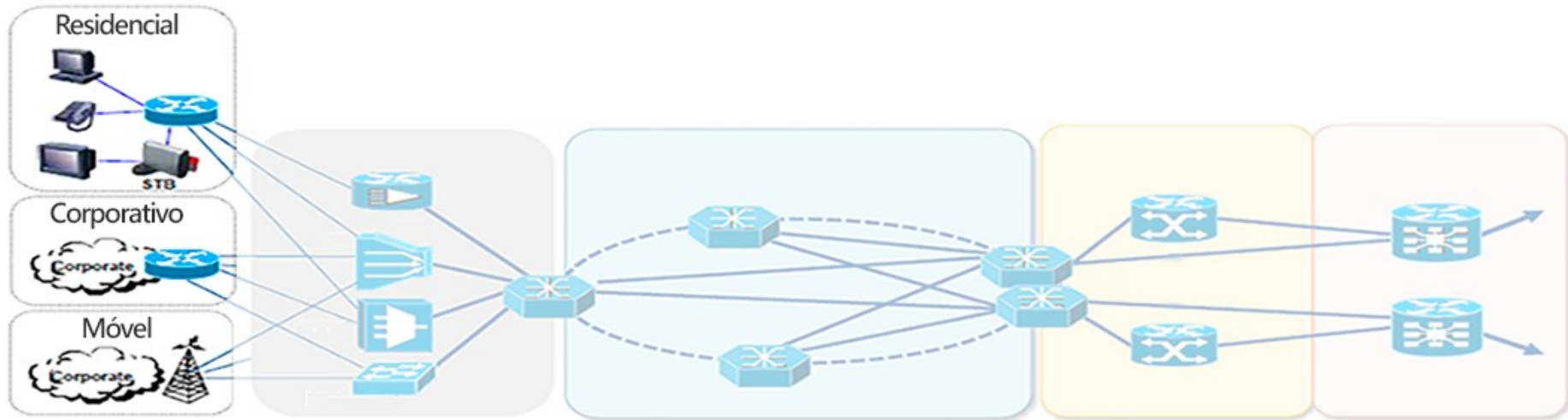
OSPF, MPLS,  
VPLS, L3VPN

Segment Routing  
BGP-eVPN  
DWDM

BGP, BNG  
(PPPoE/IPoE/BRAS)  
CGNAT,  
NAT64

BGP  
BGP Full  
IPv4/IPv6  
DDoS

# CPE



ISR 1000



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 E

### ASR 1000



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

## SOHO

### vEdge 100



- 100 Mbps
- 4G LTE & Wireless

### vEdge 1000



- Up to 1 Gbps
- Fixed

### vEdge 2000



- 10 Gbps
- Modular

### RV Series



## 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 3<sup>rd</sup> 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

### High Performance

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

### Proactive Security

Secure connectivity  
Branch threat defense  
Visibility and analytics

Investment Protection

### Physical

Cisco 1100  
Integrated  
Services Router



### Connectivity

Ethernet

xDSL

LTE  
Advanced

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



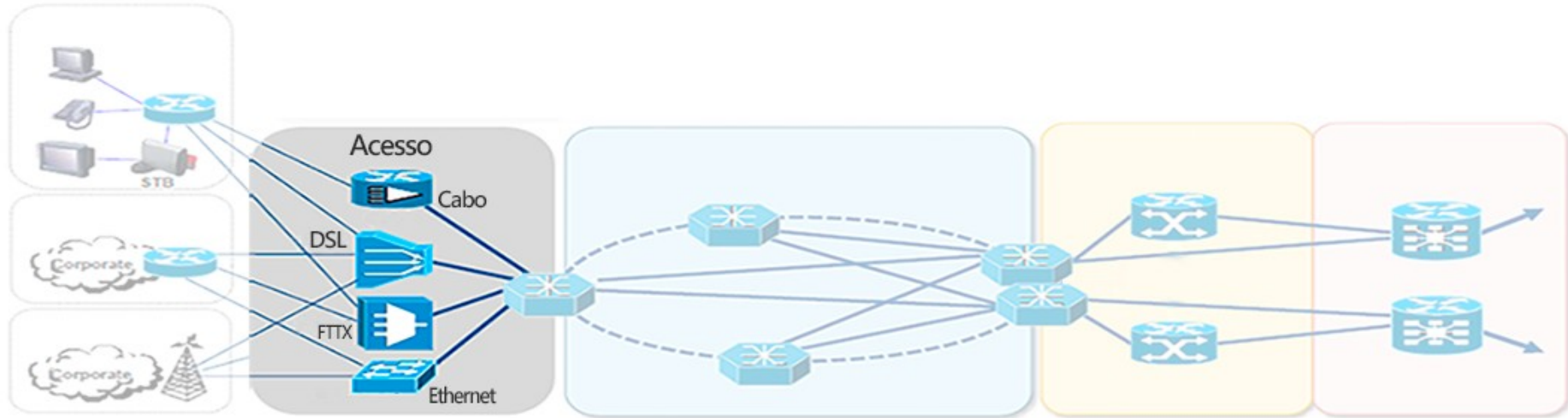
### Comprehensive Security

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 |
|------------------|-----------------------------|-------------------------------|-----------------|----------------|----------------|----------------------------|-----------------|
| <b>Size</b>      | 1RU                         | 1RU                           | 2-4RU           | 1RU            | 1RU            | 1.5RU                      | 1RU             |
| <b>IM Slots</b>  | -                           | -                             | -               | -              | -              | 1                          | 1               |
| <b>Air Flow</b>  | Front to Back               | Front to Back                 | -               | Front to Back  | Front to Back  | Front to Back/Side to Back | Front to Back   |
| <b>1G ports</b>  | 2/6                         | 12/14                         | 10              | 24             | 24             | 24                         | 12/16           |
| <b>10G ports</b> | 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

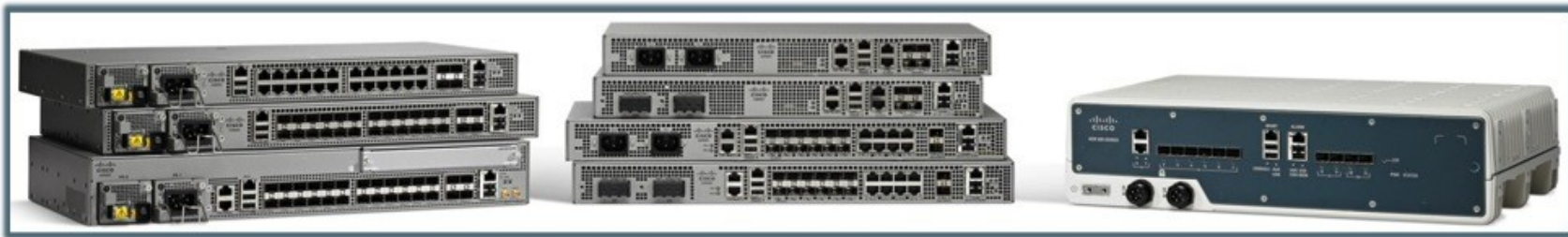
Passively cooled model available

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

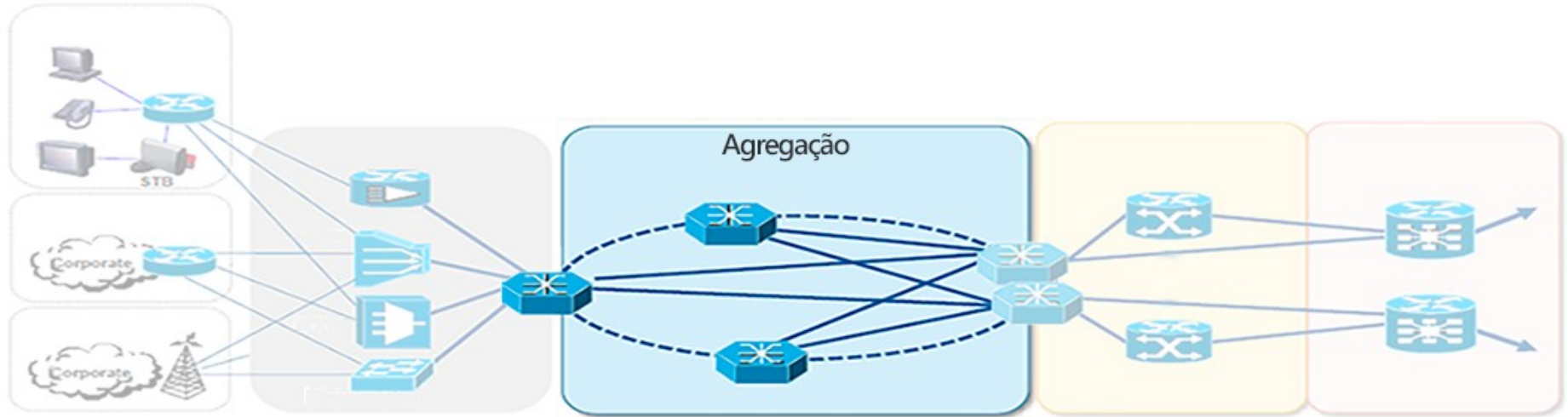
I-Temp -40C to 65C, < 300mm depth

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



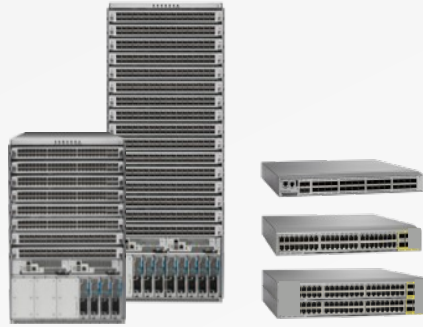
NCS5000 /  
NCS5500

# 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



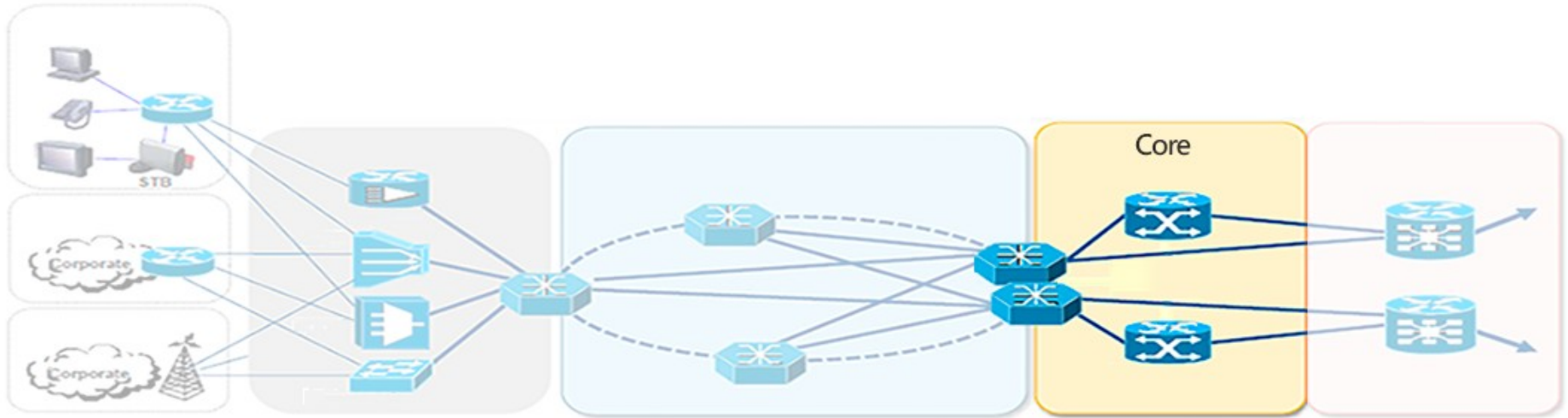
# Platforms Comparison

## Scale Chart

|               | NCS<br>5501             | NCS<br>5501-SE | NCS<br>5502/-SE  | NCS<br>5508 | NCS<br>5516 | NCS<br>55A1-36H | NCS<br>5001          | NCS<br>5002 | NCS<br>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<br>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<br>scale  | 1.1M+                   | 2.75M          | Up to 2.75M IPv4 |             |             | Up to<br>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



2.5 to 20  
Gbps

44 to 60  
Gbps

5 to 36  
Gbps

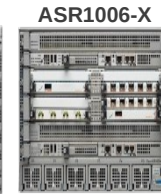
44 to 100  
Gbps



10 to 40  
Gbps



10 to 100  
Gbps



40 to 100  
Gbps



40 to 200  
Gbps



40 to 200  
Gbps

# ASR 1000 Series Momentum

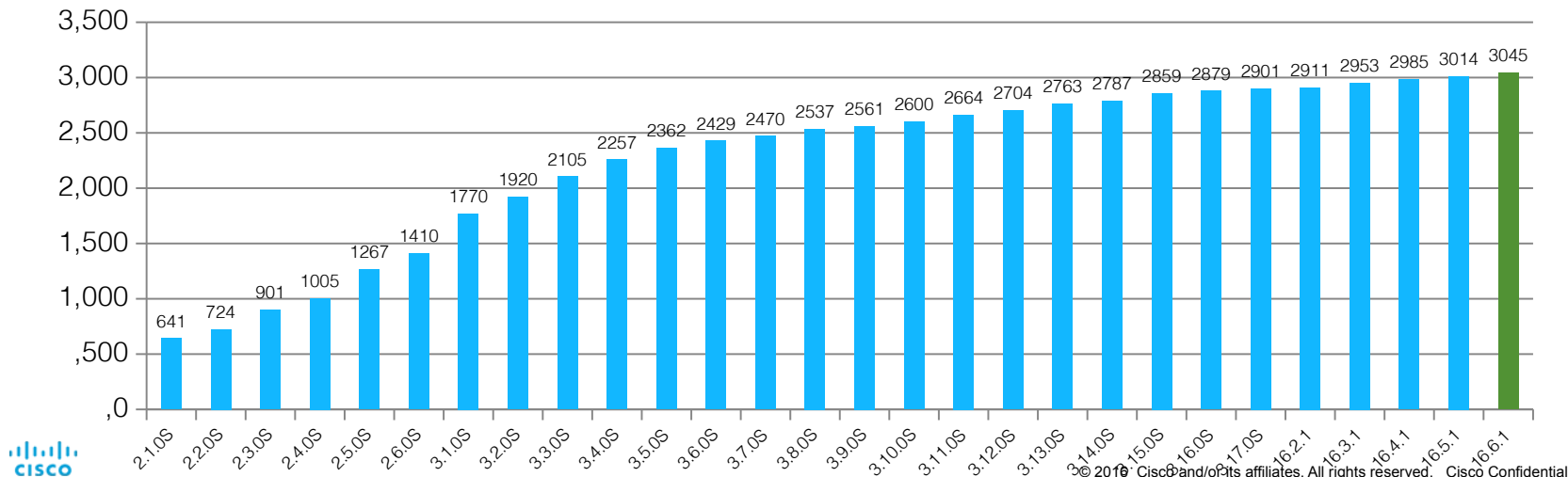
## Customer Adoption

- 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.

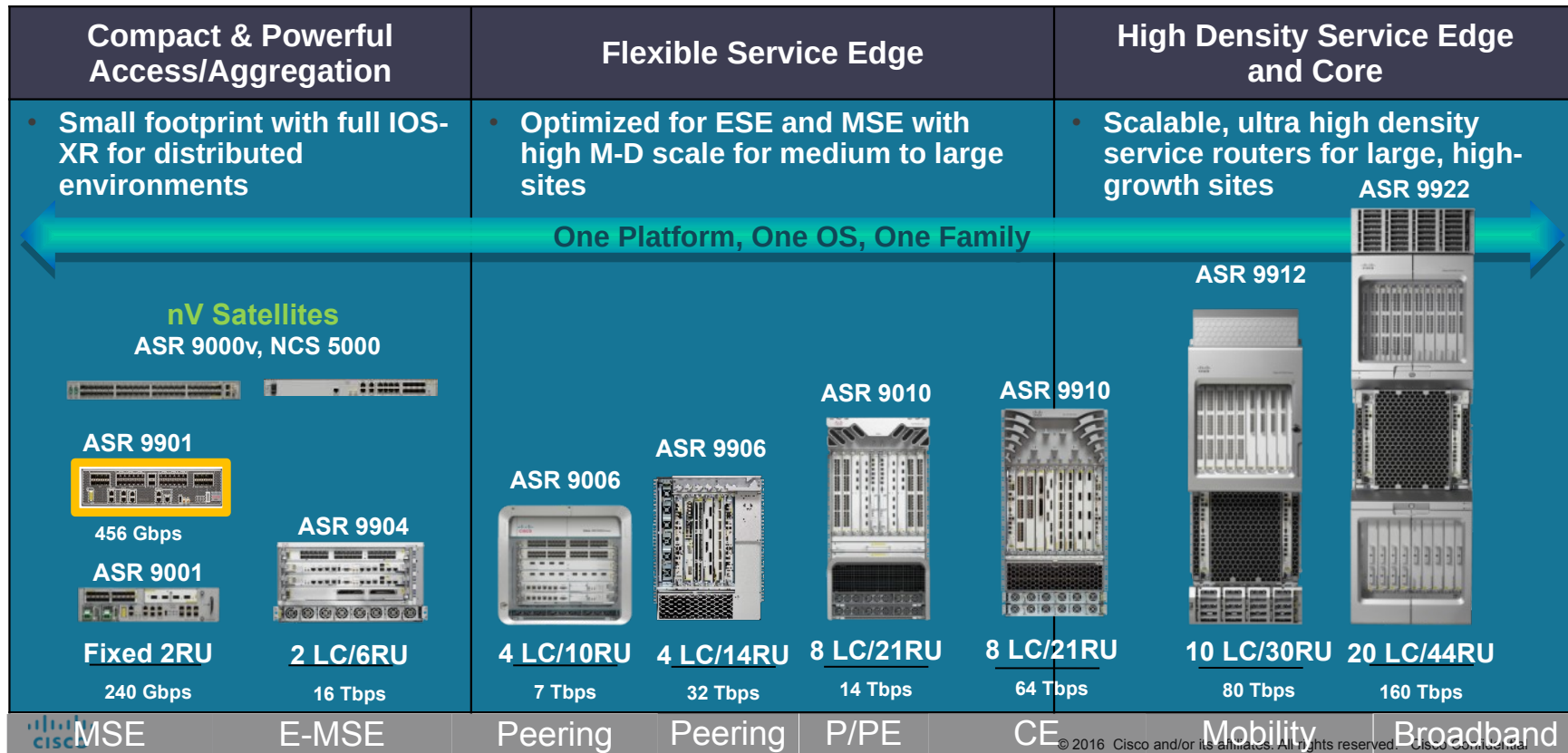
# of Features



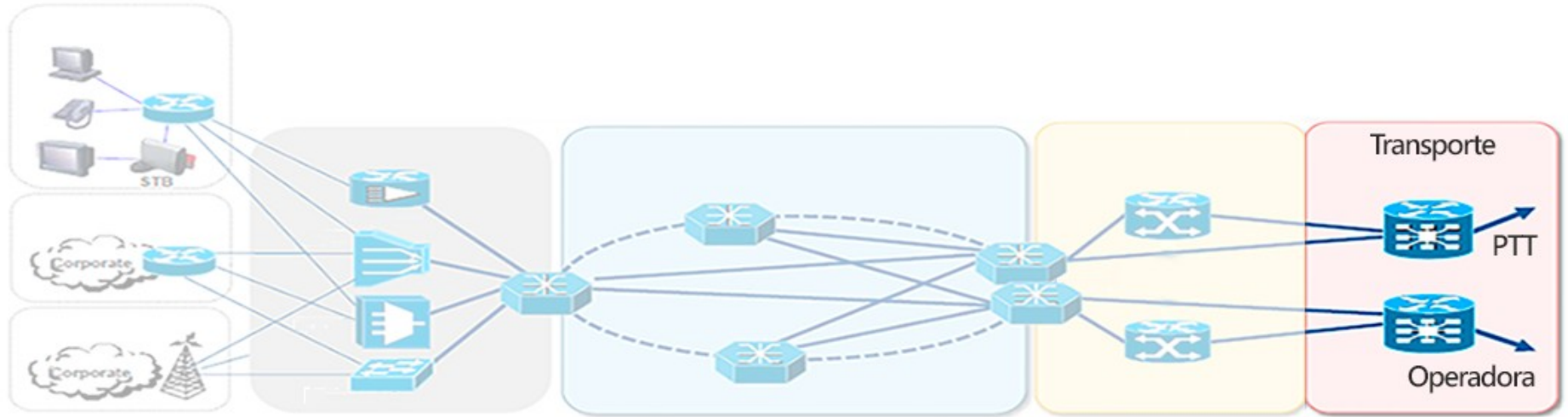
# Performance

|                 | 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<br>8/16GB                   | 0.5 M/1 M/3.5 M<br>4/8/16 GB | 1 M/3.5 M<br>8/16 GB                   | 0.5 M/1 M/3.5 M<br>4/8/16 GB           | 1 M/4 M<br>8 GB/16 GB  |          |             |
| Crypto (IMIX)   | 5 Gbps                                | 4 Gbps                       | 16 Gbps                                | 25 Gbps                                | 13 Gbps  | 16 Gbps  | 59 Gbps     |
| MACsec          | Point to Multipoint,<br>128 bits only | N/A                          | Point to Multipoint,<br>up to 256 bits | Point to Multipoint,<br>up to 256 bits | Point to Multipoint for GE and TenGE EPAs,<br>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

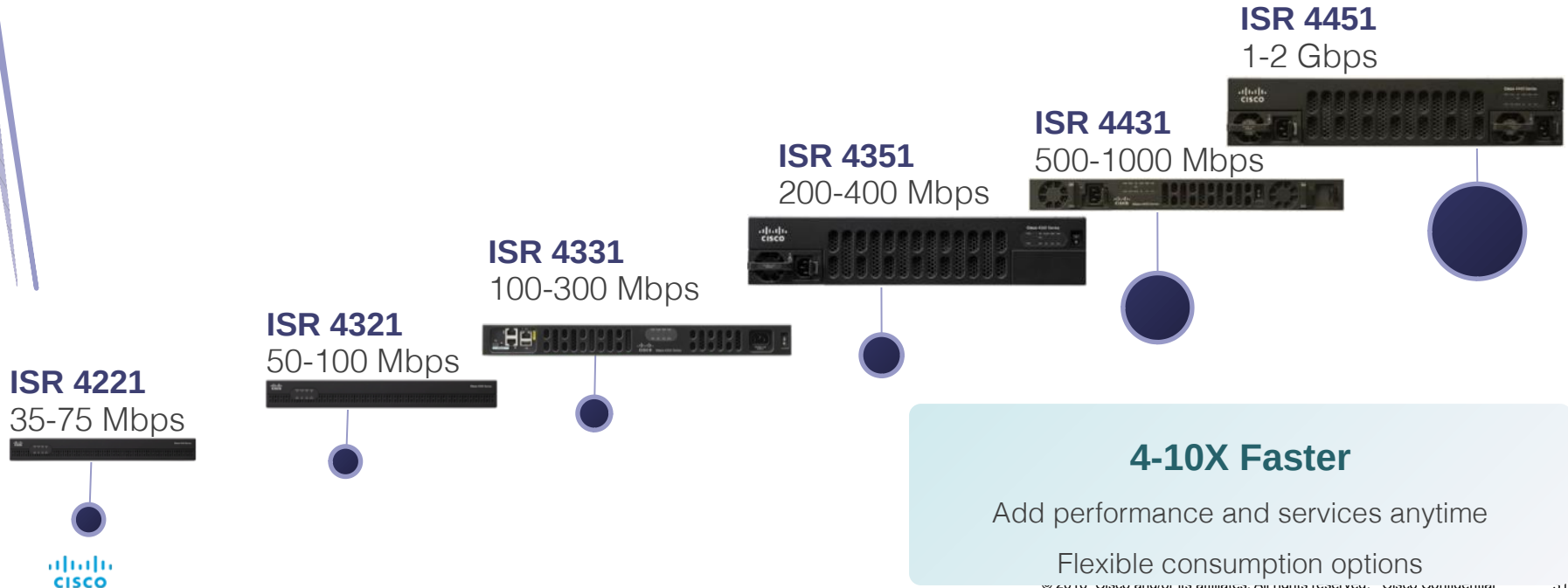


ASR-1k



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

Investment Protection Without Oversubscription

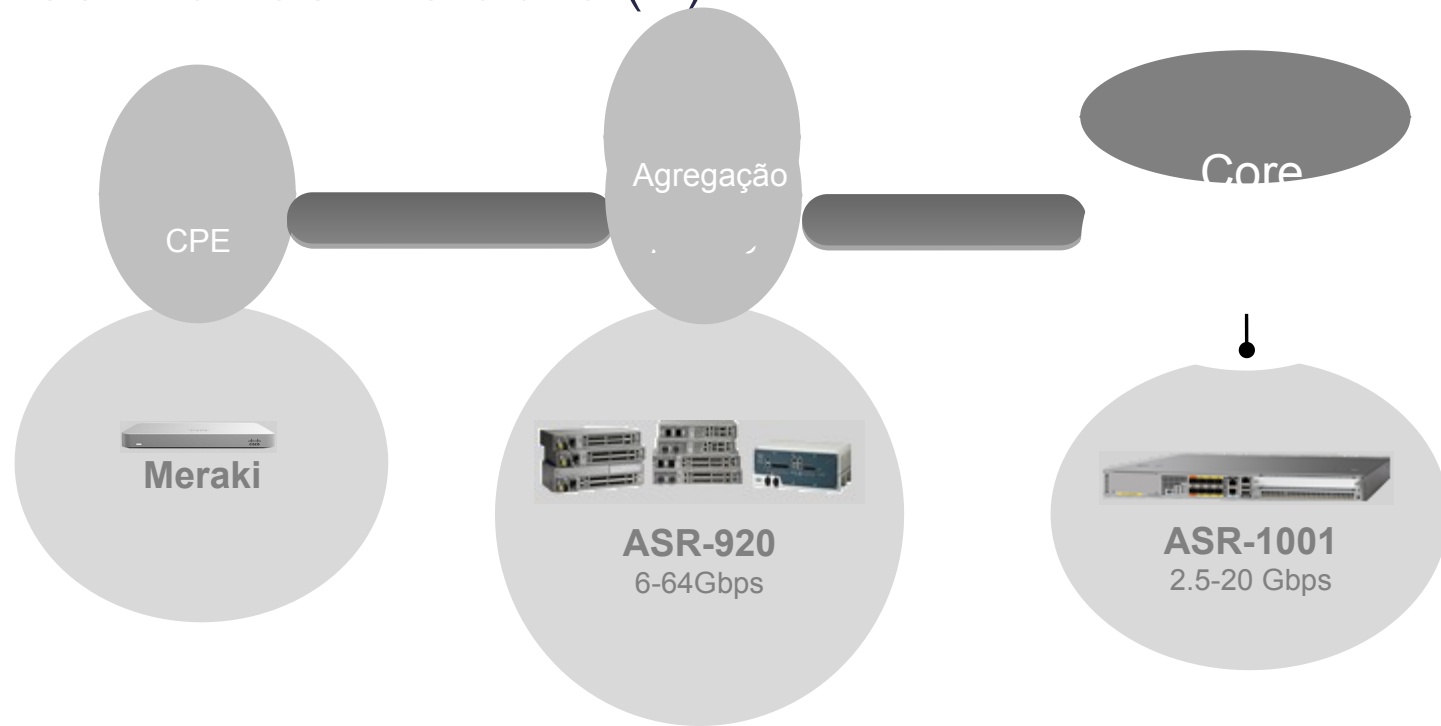


# ISR4K Specifications Summary

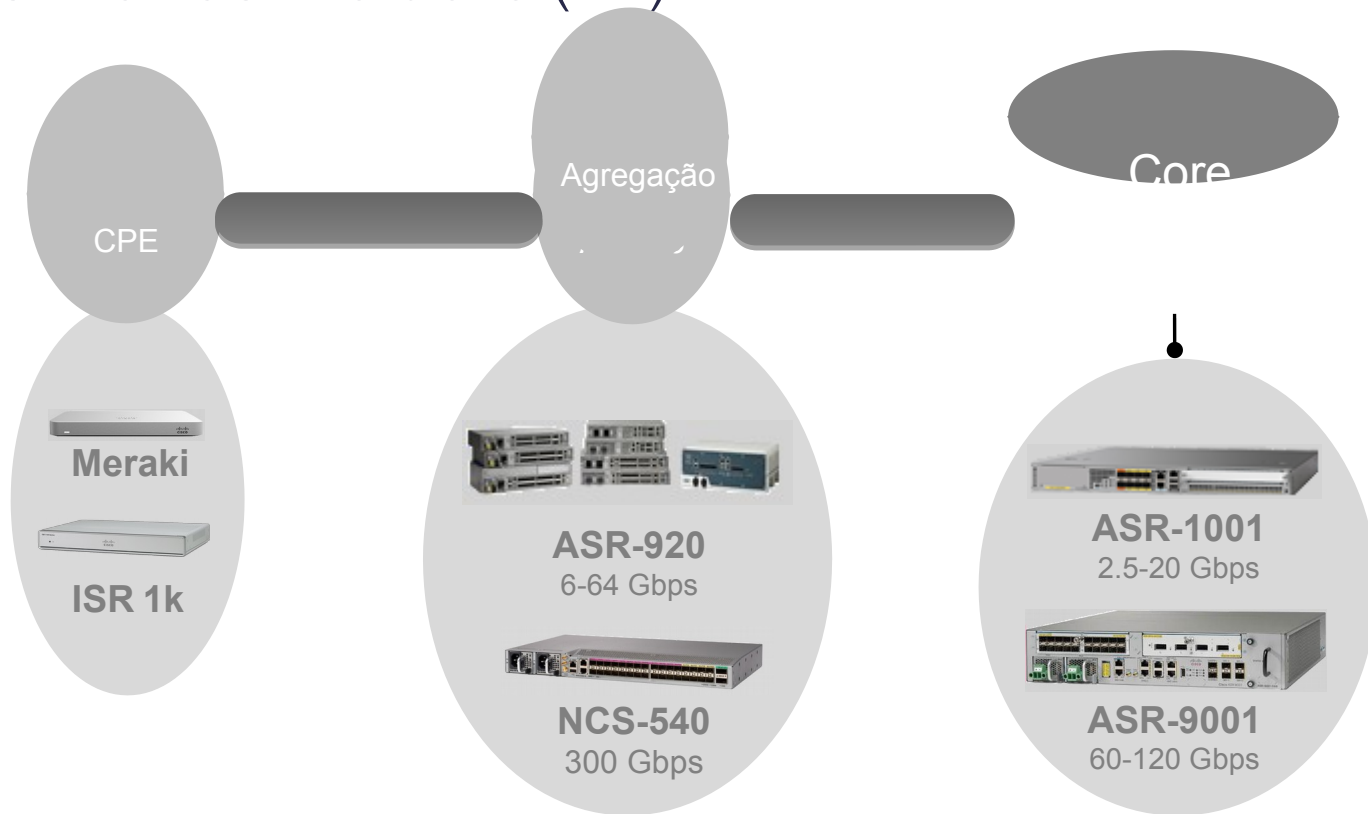
| Platform        |                 | Height | GE / RJ45 / SFP | NIM | SM-X / DW | Default / Max Memory | Default / Max Flash Memory | RPS |
|-----------------|-----------------|--------|-----------------|-----|-----------|----------------------|----------------------------|-----|
| <b>ISR 4451</b> |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

# Exemplos de Topologia

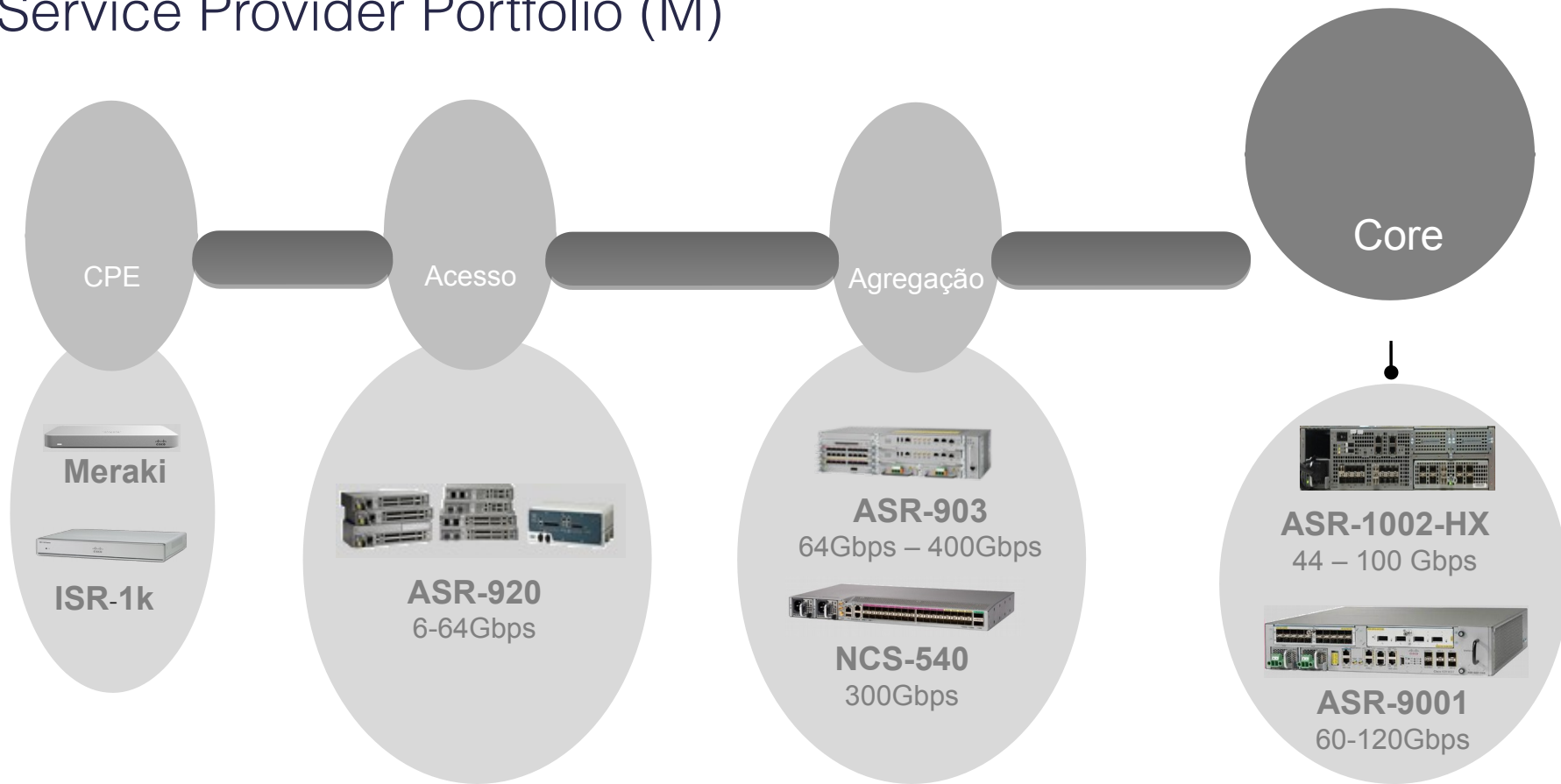
# Service Provider Portfolio (P)



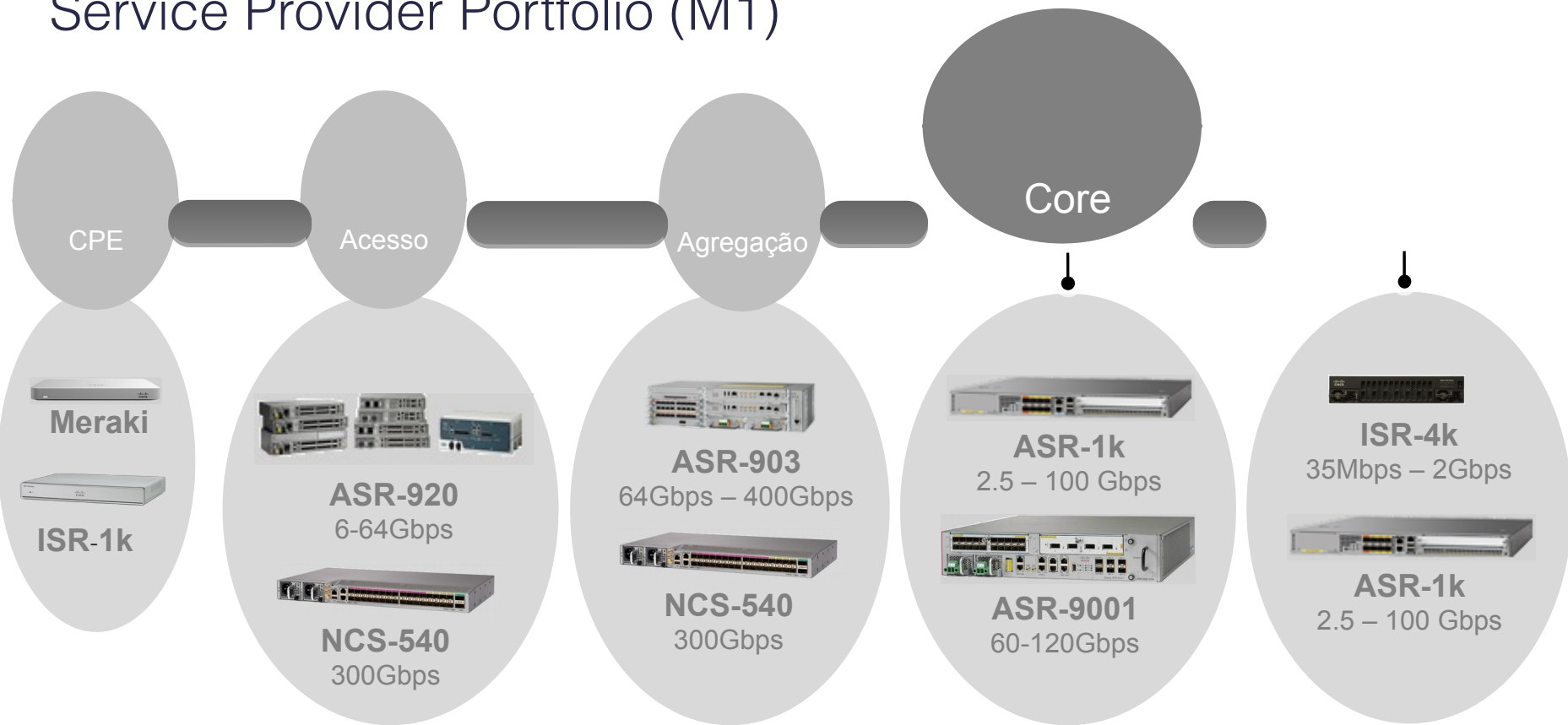
# Service Provider Portfolio (P1)



# Service Provider Portfolio (M)

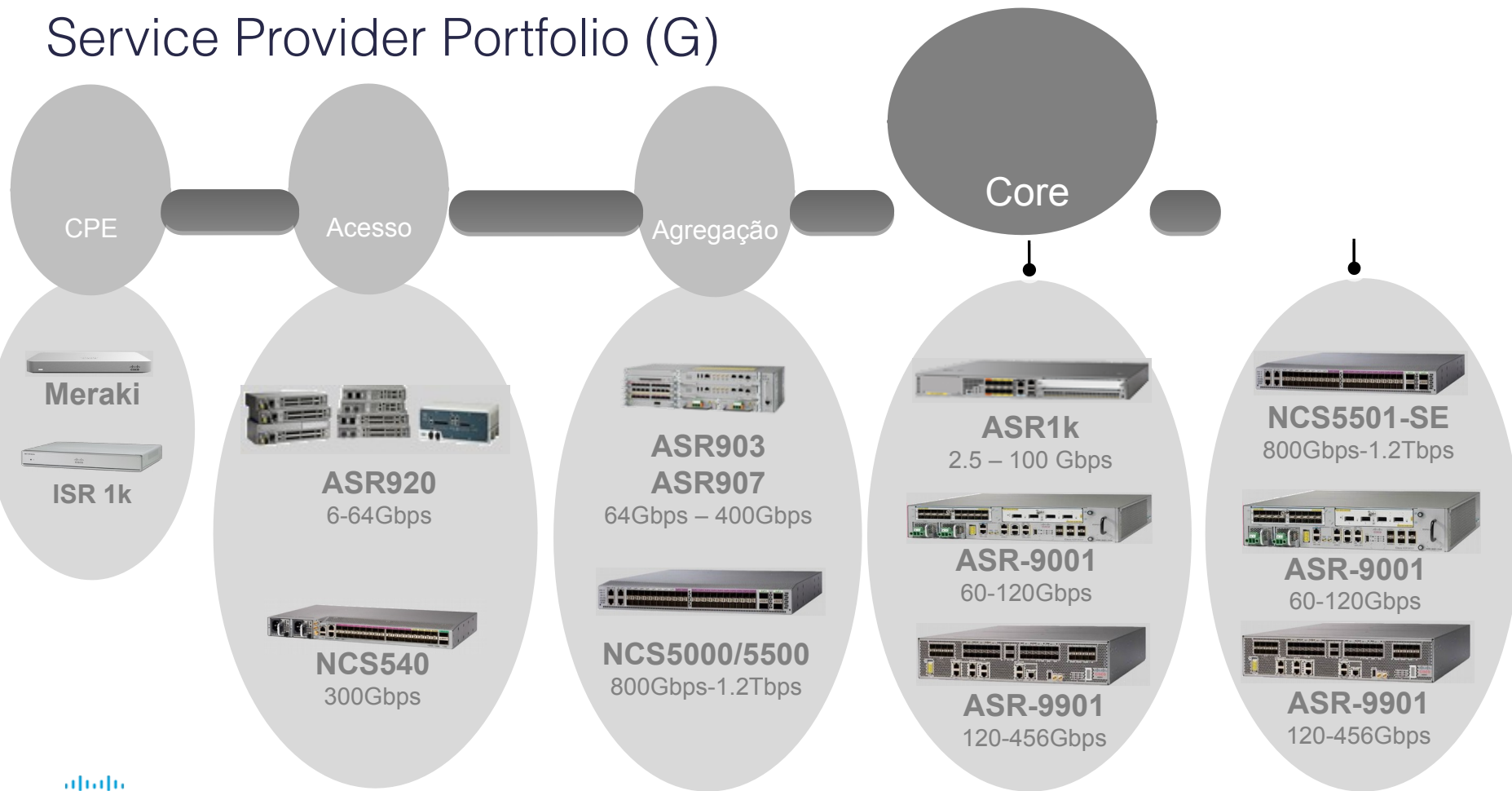


# Service Provider Portfolio (M1)



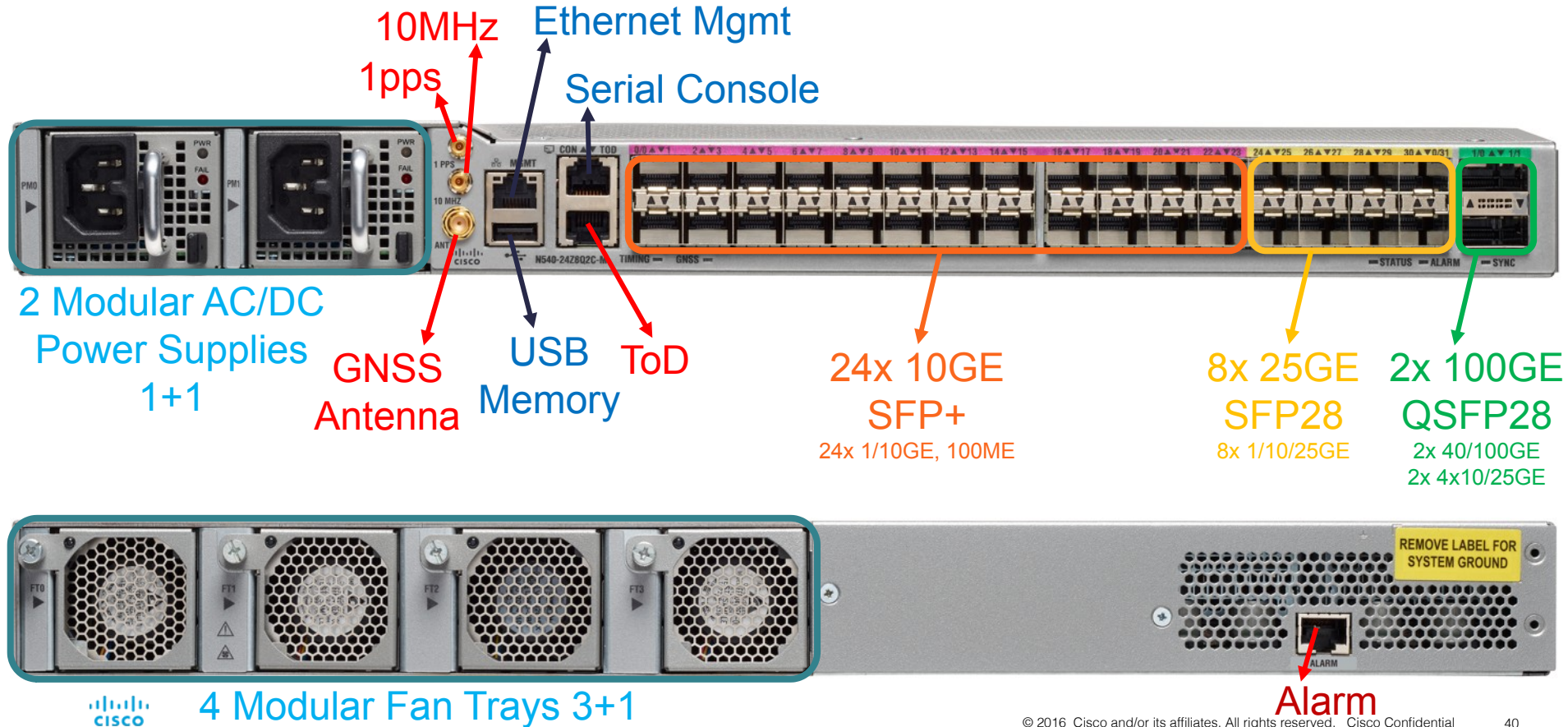


# Service Provider Portfolio (G)



# 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

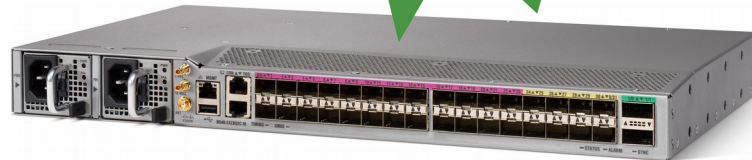
## Service Scale

- 256 L3VPN, 2K PWs

## Software

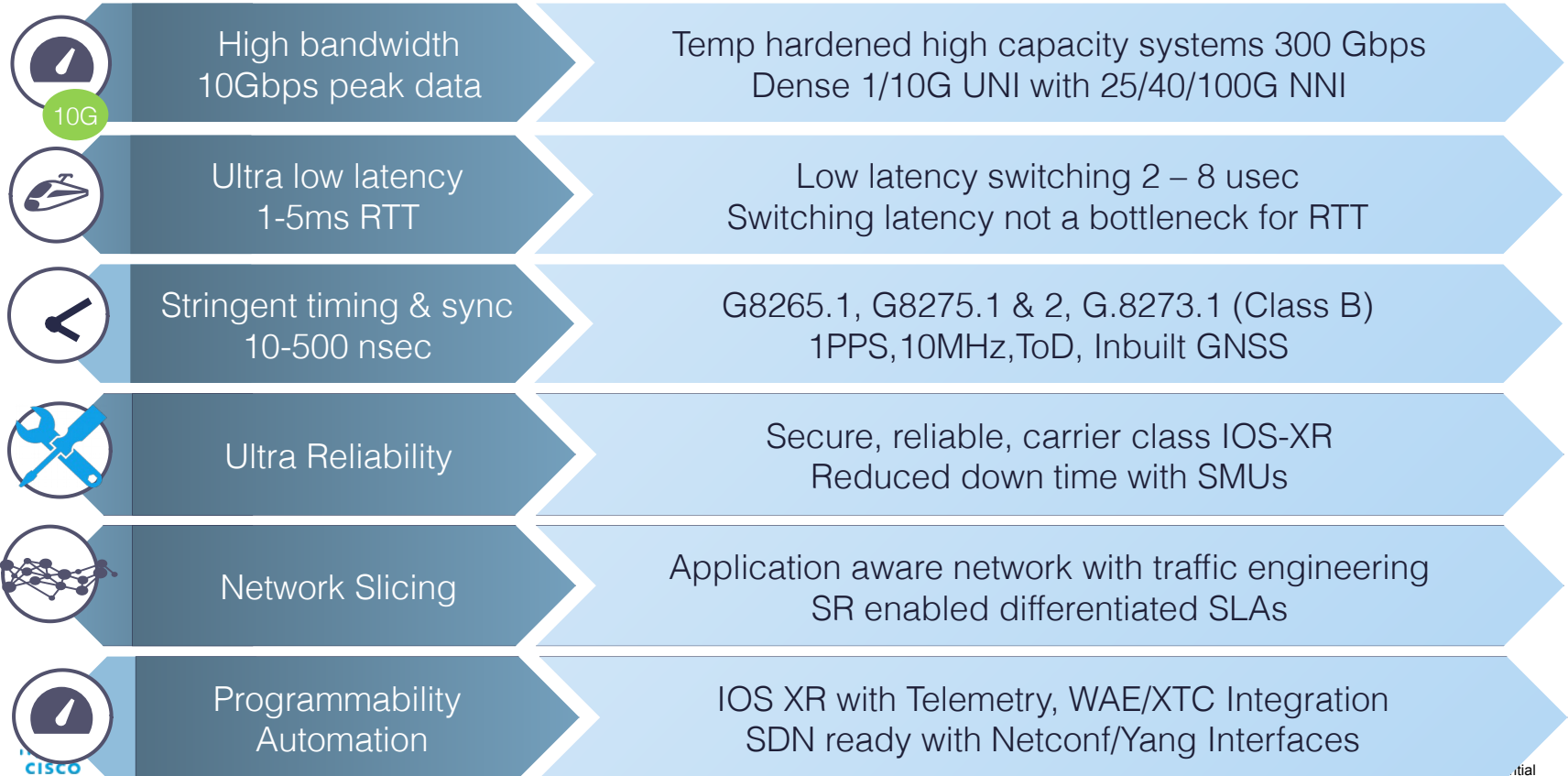
- FCS 64 bit IOS XR 6.3.2
- Full SW feature parity with NCS 5500

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 (9001 is 120G Duplex)*

## 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 port : LAN & MACSEC*

## SW & Licensing

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

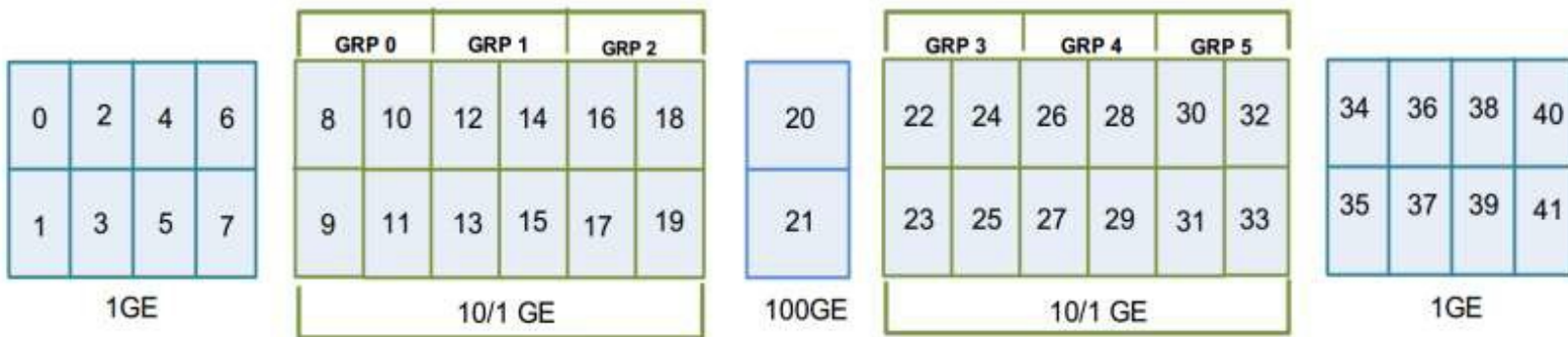
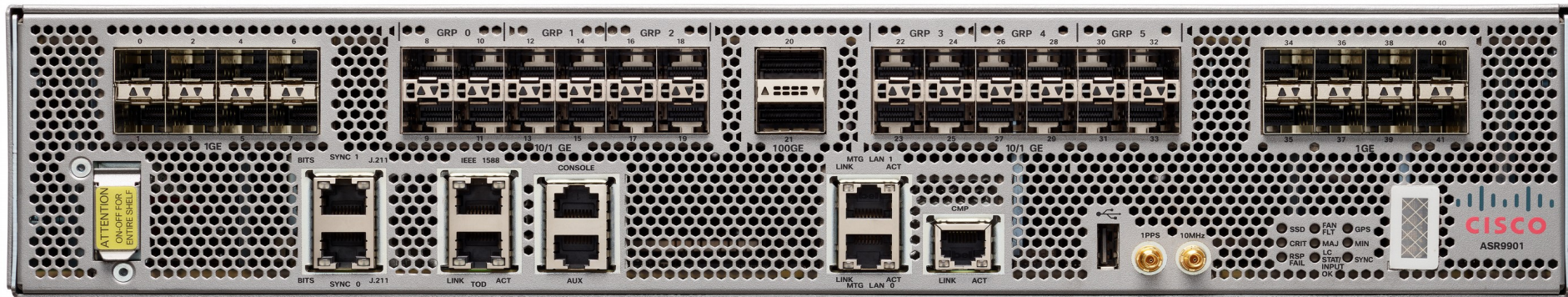
## Mechanicals & Commons

- *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*



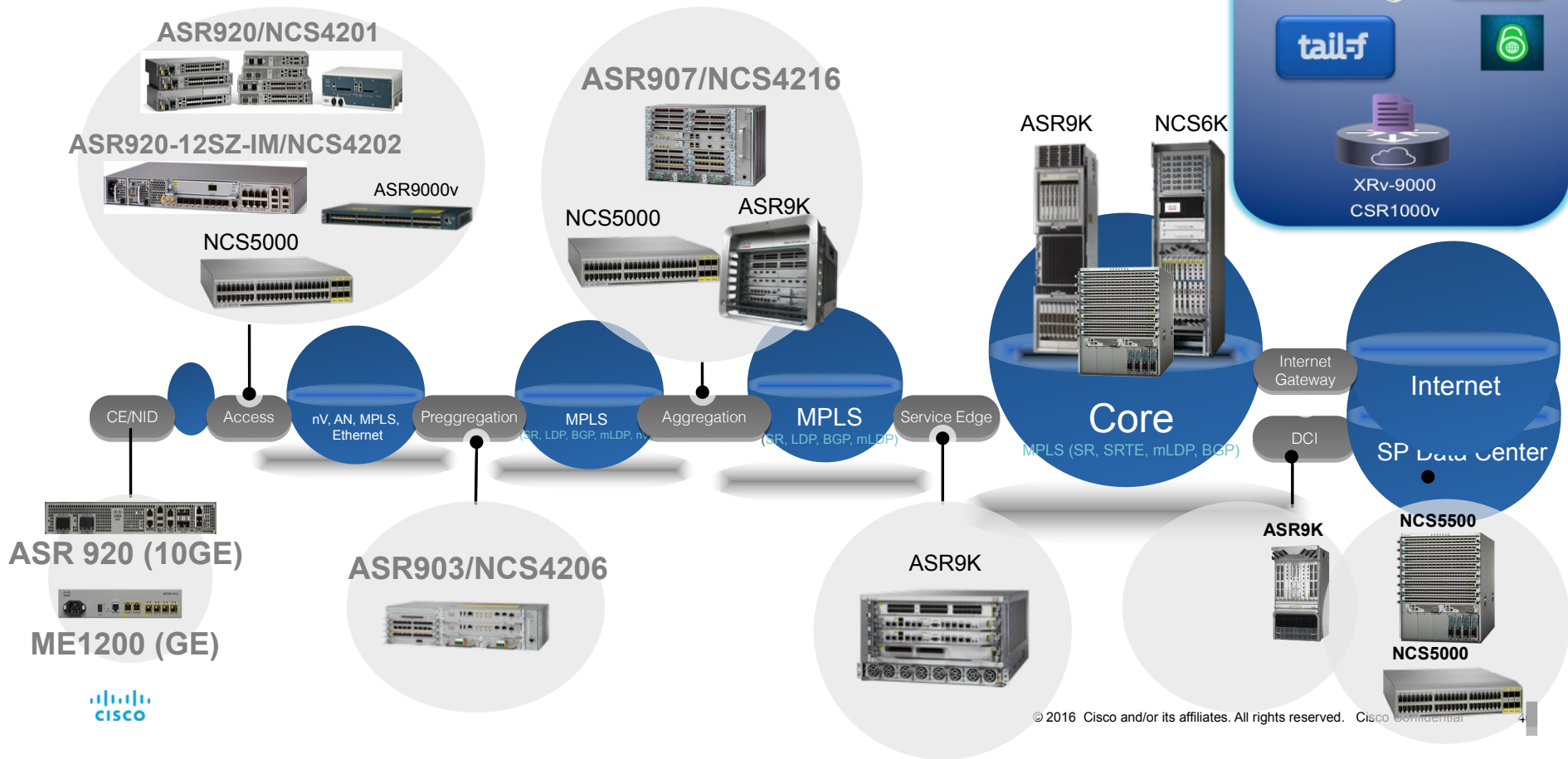


# ASR 9901 Port mapping

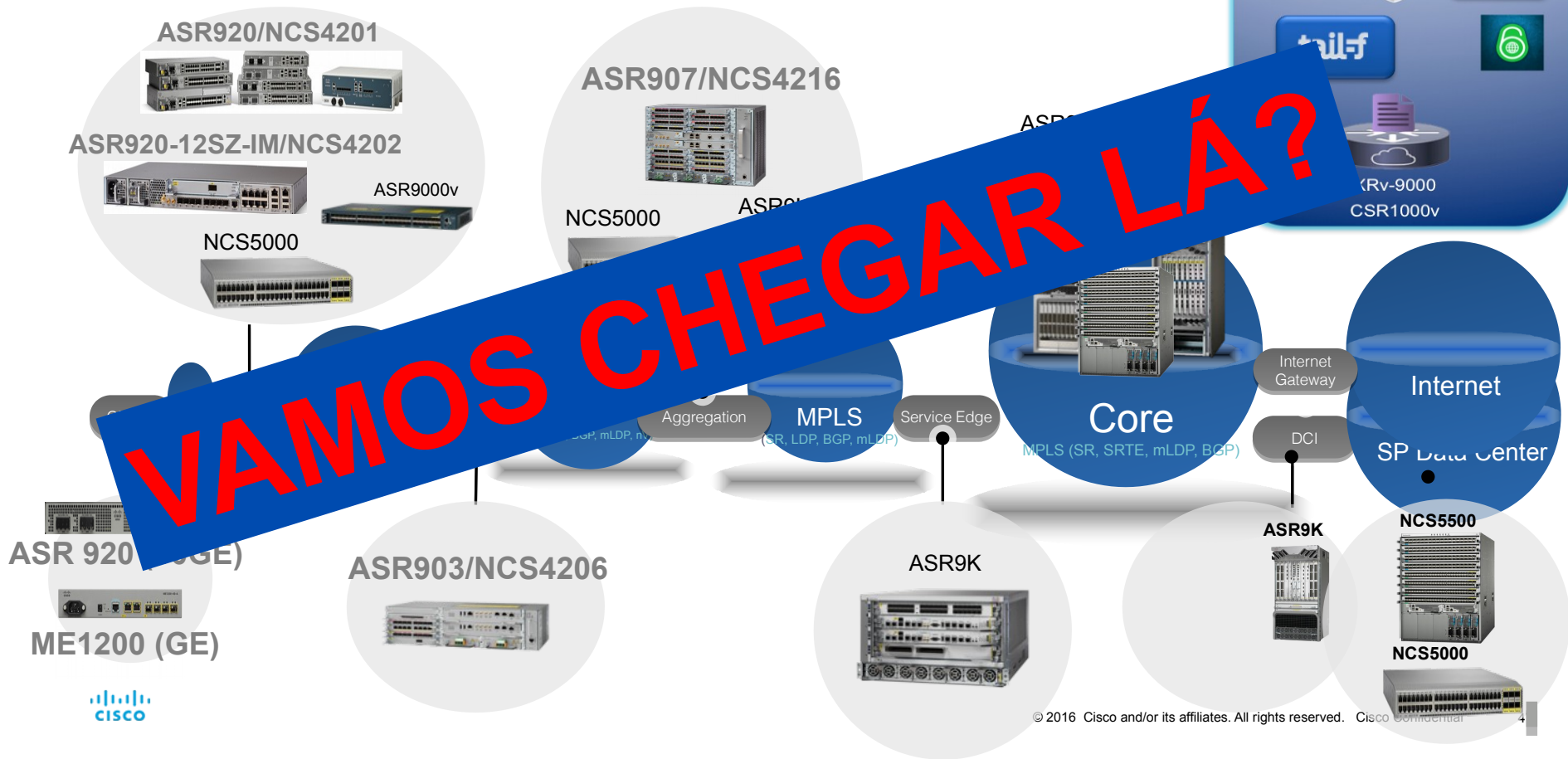




# Service Provider Access Portfolio



# Service Provider Access Portfolio



**OBRIGADO !!!**



**Adalberto Lins**  
**Adalberto@cisco.com**



# Resumo oferta CISCO para o seu Cliente .:|:~|:~.

•

✓ Internet (Rede Metro, BNG, BGP, DWDM etc)

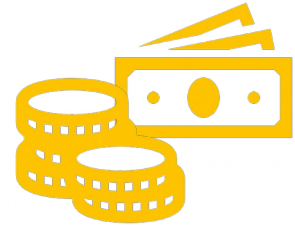


✓ LAN to LAN (MPLS, VPWS, SR)

• SD-WAN – Meraki e Viptela



• Datacenter (Backup)



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• Residencial: Umbrella (DNS, Ransomware, BotNet, Parental Control)



• Corporativa: Umbrella, Firewall UTM (Meraki/ASA), Anti-DDoS, EndPoint(AMP),



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• Simple IT Dashboard: Meraki (Segurança, Cameras, WiFi, Rede)



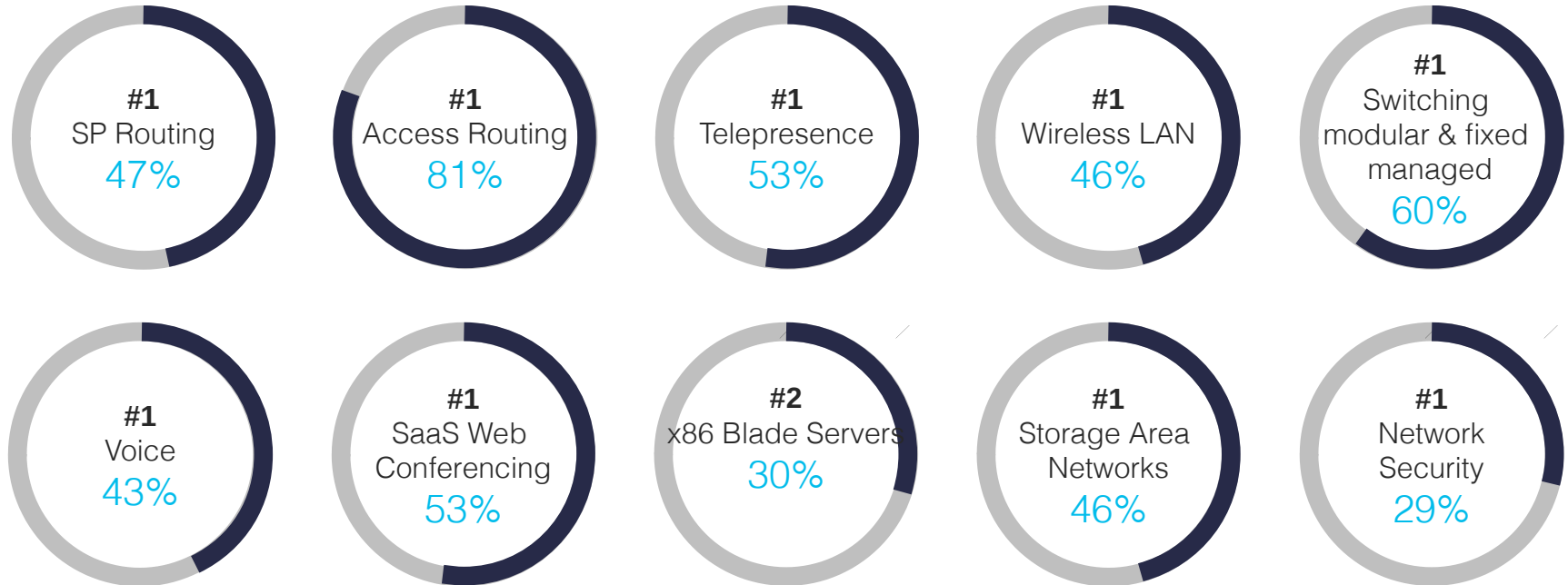
• Managed Service: Find-IT SMB



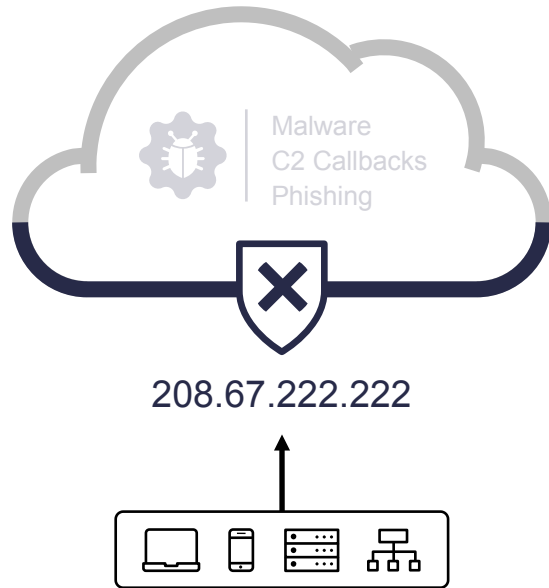
• Colaboration (Voz, Video, Conferencia, EaD)



# A Liderança de Mercado da Cisco nos Segmentos em que Atua



# 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

