Cisco 8000 Routers

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Sr. Product Manager, SPBU
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The Future of the Internet

New Normals
For the way we Work, Live, Play, and Learn

New Participants
Many remain unconnected and emerging IoT

New Potentials
The foundation of economies, governments, and societies
Market Dynamics

Explosive Internet Growth
2018 Cisco VNI

- More Users (% of population)
  - 2017: 45%
  - 2022: 60%

- More Devices per User
  - 2017: 2.4
  - 2022: 3.6

- More M2M Connections (billions)
  - 2017: 6.1
  - 2022: 14.6

- More Broadband Speed (Mbps)
  - 2017: 39
  - 2022: 75

**Economic Challenges for SPs**

- **0.5%** Flat Revenue Growth (2017 – 2022 CAGR: 0.5%)
- **11x** $1 of CapEx in 2020 has to do 11X the work it did in 2012
- **5x** Today, operators spend $5 of OpEx for each $1 of CapEx

**SPs Want More for Less**

- Reduce Costs (CapEx, OpEx) and Latency. Increase Capacity.
- Create New Revenue. Improve Experiences and Time to Service
- Increase Trust and Security

**HOWEVER, BUDGETS REMAIN FLAT**
Redefining the Economics of the Internet

Innovation across multiple dimensions can shift the paradigm.

New Possible Network Architectures
- Converged
- Cloud Enhanced
- Fabric Based

Delivering Unprecedented
- Cost & Power Efficiency
- Prioritized Operations
- Augmented Intelligence
Cisco Silicon ONE
Flexible Forwarding ASIC

One Unified Silicon Architecture
• Comprehensive routing with switching efficiency
• Multiple segments: web and service provider
• Multiple functions: system-on-a-chip, line card, and fabric
• Multiple form-factors: fixed or modular

Delivers Performance Without Compromise
• First routing silicon to break 10 Tbps barrier
• 2x bandwidth, 3x packets-per-second over current industry routing silicon
• 2x more power efficient
• Global route scale, deep buffering, P4 programmable
Cisco 8000 Routers
Cisco 8000 Routers
Service Provider scale and flexibility with Cisco Silicon ONE ASIC

Industry’s only platform optimized for 100G & 400G without compromising for High Availability

Cisco 8202
Cisco 8201
Cisco 8808
Cisco 8812
Cisco 8818

10.8 Tbps
115 Tbps
172 Tbps
260 Tbps
2 Pbps
## Cisco 8000 Routers

### Portfolio

<table>
<thead>
<tr>
<th>Model</th>
<th>FCS</th>
<th>Rack Units</th>
<th>Slots</th>
<th>Ports &amp; Line Cards</th>
<th>Total Throughput</th>
<th>Typical Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>8201</td>
<td>Q3 CY2019</td>
<td>1RU</td>
<td>Fixed</td>
<td>24x400GE + 12x100GE</td>
<td>10.8 Tbps</td>
<td>415W</td>
</tr>
<tr>
<td>8202</td>
<td>Q2 CY2020</td>
<td>2RU</td>
<td>Fixed</td>
<td>12x400GE + 60x100GE</td>
<td>10.8 Tbps</td>
<td>750W</td>
</tr>
<tr>
<td>8808</td>
<td>Q4 CY2019</td>
<td>16RU</td>
<td>8</td>
<td></td>
<td>115 Tbps</td>
<td>13KW</td>
</tr>
<tr>
<td>8812</td>
<td>Q3 CY2019</td>
<td>21RU</td>
<td>12</td>
<td></td>
<td>172 Tbps</td>
<td>20KW</td>
</tr>
<tr>
<td>8818</td>
<td>Q2 CY2020</td>
<td>33RU</td>
<td>18</td>
<td></td>
<td>260 Tbps</td>
<td>TBD</td>
</tr>
</tbody>
</table>
Cisco 8000 Routers
Securing critical infrastructure

Trust begins in hardware
Anti-counterfeit and trust anchor infrastructure

Verifying trust: Network OS
Image signing and secure boot infrastructure

Maintaining trust at runtime
Run-time defense, encrypted transport, DDoS protection

Visualize and report on trust
Integrity measurement and verification infrastructure.

8+ years of CSDL devotion
30+ years of leadership

Protect your brand | Unlock new revenue | Reduce cost
Software **IOS XR**
Cisco IOS XR 7
Redefining software for better operations

Simple
- Optimized to reduce memory, downloads, and boot times
- Streamlined protocols with SR/EVPN
- Secure zero-touch rollout

Modern
- Open APIs
- Customizable software images
- Cloud-enhanced

Trustworthy
- Assess hardware and software authenticity at boot and runtime
- Immutable record of all software and hardware changes
- Real-time visibility of trust posture
Cisco IOS XR 7
Cloud enhanced

Cisco Crosswork Data Gateway
(inside SP Network)
Network Services Orchestrator
Situation Manager
Optimization Engine
Health Insights
and more...

Cisco Crosswork Cloud

Cisco Crosswork Network Insights
Visibility and intelligence to assess network routing health.

Cisco Crosswork Trust Insights
High-fidelity measurement, auditing, verification, and enforcement of network hardware and software trustworthiness.

Cisco Crosswork Qualification Environment
Automated and cloud-based environment to accelerate new software deployment.

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Cisco 8000 Series Roadmap
Cisco 8000 Routers
Hardware roadmap

Limited FCS:
Sep CY2019
General FCS: Mar CY2020
- Cisco 8812
- 48x100GE Linecard

Q2 CY2020
HW: April CY2020
- Cisco 8202

On the radar
Line Card: 36x400G with MACsec
- EC: Q4 2019
- FCS: Q4 2020

Limited FCS:
Dec CY2019
General FCS: Mar CY2020
- Cisco 8201
- Cisco 8808
- 36x400GE Linecard

2H CY2020
- Cisco 8818

Fixed: 32x400G 1RU
- EC: Q4 2019
- FCS: Q3 2020
Cisco 8000 Routers
IOS XR 7.0.X software features

### IOS XR

**7.0.11**
Cloud Aggregation

- L3 Routing (BGP & IGP)
- BGP PIC (core)
- 100G MACSec SW
- IPinIP decap
- Multicast (SSM, ASM)
- Platform security
- Netconf/YANG
- ZTP & iPXIE

- ECMP
- QoS
- ACLs
- Netflow
- ERSPAN
- ECN
- PFC
- UDF

**7.0.12**
Cloud Aggregation & Core LSR

- Segment Routing (LSR)
- FAT PW Label (LSR)
- RSVP-TE (Midpoint)
- Dark bandwidth
- Entropy Label (LSR)
- 32 Class map
- RSVP-TE (Headend)
- sFlow

- MPLS
- BGP-LU
- 6PE
- mLDP
- P2MP (LSR)
- MoFRR
- BGP FS
- SR-TE

October CY19

February CY20

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# Cisco 8000 Routers

## IOS XR software releases

<table>
<thead>
<tr>
<th>Version</th>
<th>Description</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>IOS XR DEV</td>
<td>Cloud Aggregation &amp; Core LSR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOS XR 7.0.Y</td>
<td>Cloud Aggregation, Core LSR</td>
<td>7.0.11 FCS</td>
<td>7.0.12 FCS</td>
</tr>
<tr>
<td>IOS XR 7.2.Y (All customers)</td>
<td>Core LSR - L3 VPN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOS XR 7.2.YY MSDC customers (Microsoft, Google, Facebook)</td>
<td>Cloud Aggregation &amp; Peering - L2 Features, BVI, GRE, SR-TE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOS XR 7.3.Y</td>
<td>Flex Algo Ti-LFA, SR-PM, SR-TE, SynchE, PTP, L2VPN, CFM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Cisco 8000 Routers

## Optics roadmap

<table>
<thead>
<tr>
<th>Release</th>
<th>400G Options</th>
<th>100G Options</th>
<th>40G Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>7.0.11</strong></td>
<td>• <a href="#">QDD-400G-CU1M</a> • <a href="#">QDD-400G-CU2M</a> • <a href="#">QDD-400G-FR4-S</a> • <a href="#">QDD-400G-LR8-S</a></td>
<td>• <a href="#">QSFP-100G-SM-SR</a> • <a href="#">QSFP-100G-LR4-S</a> • <a href="#">QSFP-100G-CWDM4-S</a> • <a href="#">QSFP-100G-SR4-S (BO)</a></td>
<td>• <a href="#">QSFP-40G-SR-BD</a> • <a href="#">QSFP-40G-SR4 (4x10G BO)</a> • <a href="#">QSFP-4x10G-LR-S (4x10G BO)</a></td>
</tr>
<tr>
<td><strong>7.0.12</strong></td>
<td>• <a href="#">QDD-400G-DR4-S</a> • <a href="#">QDD-400G-LR4-S</a> • <a href="#">QDD-400G-ZR/ZR+</a> • <a href="#">QSFP-4SFP10G-CU3M</a></td>
<td>• <a href="#">QSFP-100G-PSM4-S (BO)</a> • <a href="#">QSFP-100G-AOC (multiple distances)</a> • <a href="#">QSFP-100G-AOC2M</a></td>
<td>• <a href="#">QSFP-40G-LR4-S</a></td>
</tr>
<tr>
<td>7.2.1/2.11</td>
<td>• <a href="#">QDD-400G-CU2.5M</a> • <a href="#">QDD-400G-CU3M</a> • <a href="#">QDD-400G-AOC1M</a> • <a href="#">QDD-400G-AOC2M</a></td>
<td>• <a href="#">QSFP-100G-FR-S</a> • <a href="#">QSFP-100G-ER4L-S</a></td>
<td>• <a href="#">QDD-400G-SR8</a> • <a href="#">QDD-400G-2x400G FR</a></td>
</tr>
<tr>
<td>7.3.1 &amp; Beyond</td>
<td>• <a href="#">QDD-400G-LR4</a> • <a href="#">QDD-400G-AOC (multiple distances)</a> • <a href="#">QDD-400G-ZR/ZR+</a></td>
<td>• <a href="#">QSFP-40G-LR4-S</a></td>
<td>• <a href="#">QDD-400G-SR8</a> • <a href="#">QDD-400G-2x400G FR</a></td>
</tr>
</tbody>
</table>

(*) All 400G optics/cables are at proto stage, actual release has dependency on vendors achieving their FCS dates.
The Cisco difference

Breadth of portfolio
1G to 100G and now 400G

Unmatched SW and HW Platform
IOS XR 7, Trusted SW & HW

Technical expertise & Industry thought leadership
Switch, Router, Optics, Silicon photonics and leadership with SR, EVPN etc. technologies.

End-to-End Architecture
Fabric Architectures, FTTH, 5G, Cable rPHY, TDM2IP

World class service
Renown Cisco TAC experience

Innovative Business Model
Subscription based SIA, RTU Licenses
Cisco 8000 Positioning and Value Propositions
Cisco 8000 Routers

Positioning

Key Features
- Up to ~260Tbps
- 400GbE Optimized with support for Terabit ports
- Fixed and Modular systems

Target Use Cases
- Core LSR
- Cloud Aggregation

Value Propositions
- Unprecedented scale & performance
- Trusted SW & HW platform
- Programmability accelerates feature velocity to unlock customer-led innovation
- Fabric redundancy without compromise
- New silicon architecture ensures Cisco standard platform longevity
Cisco NCS 5500 Routers
Positioning

Key Features
- Up to ~154Tbps
- 100G Optimized with seamless upgradeability to 400G
- Native 1GbE to 400GbE
- IPoDWDM (1G to 200G)

Target Use Cases
- SP Aggregation (Cable, Mobile, Wireline)
- SP Peering
- Core LSR
- Cloud Aggregation
- SP Data Center

Value Propositions
- Broader uses cases
- Investment protection for existing installed base
- A wide range of HW options for both Fixed and Modular chassis
- Optimized TCO for mixed port configurations
## Cisco 8000 Routers

### Positioning Analysis for Core LSR and Cloud Aggregation

<table>
<thead>
<tr>
<th>Remarks</th>
<th>Cisco 8000 Series</th>
<th>NCS 5500 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing Customer - Brownfield</strong></td>
<td></td>
<td>![Checkmark]</td>
</tr>
<tr>
<td>• Customer already certified and qualified the NCS5500</td>
<td></td>
<td>![Checkmark]</td>
</tr>
<tr>
<td>• Customer looking to transition from the CRS/NCS6K/ASR9K or require 14.4T per slot capacity or 400GE fixed</td>
<td>![Checkmark]</td>
<td></td>
</tr>
<tr>
<td><strong>Existing or New Customer - Greenfield</strong></td>
<td>![Checkmark]</td>
<td>![Checkmark]</td>
</tr>
<tr>
<td>• Evaluate opportunity with BU PLM: use case, density, features, platform longevity</td>
<td>![Checkmark]</td>
<td>![Checkmark]</td>
</tr>
<tr>
<td><strong>Competing against 14.4T/slot high density products from Arista or Juniper</strong></td>
<td></td>
<td>![Checkmark]</td>
</tr>
</tbody>
</table>
Competitive
## Service Provider Routing

### Competitive comparisons

<table>
<thead>
<tr>
<th>Category</th>
<th>Arista</th>
<th>Nokia</th>
<th>Huawei</th>
<th>Juniper</th>
<th>Cisco</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portfolio Breadth</td>
<td><img src="image1" alt="Circle" /></td>
<td><img src="image2" alt="Circle" /></td>
<td><img src="image3" alt="Circle" /></td>
<td><img src="image4" alt="Circle" /></td>
<td><img src="image5" alt="Circle" /></td>
</tr>
<tr>
<td>End-to-end Architecture</td>
<td><img src="image1" alt="Circle" /></td>
<td><img src="image2" alt="Circle" /></td>
<td><img src="image3" alt="Circle" /></td>
<td><img src="image4" alt="Circle" /></td>
<td><img src="image5" alt="Circle" /></td>
</tr>
<tr>
<td>Innovation &amp; Thought Leadership</td>
<td><img src="image1" alt="Circle" /></td>
<td><img src="image2" alt="Circle" /></td>
<td><img src="image3" alt="Circle" /></td>
<td><img src="image4" alt="Circle" /></td>
<td><img src="image5" alt="Circle" /></td>
</tr>
<tr>
<td>SW Feature Richness</td>
<td><img src="image1" alt="Circle" /></td>
<td><img src="image2" alt="Circle" /></td>
<td><img src="image3" alt="Circle" /></td>
<td><img src="image4" alt="Circle" /></td>
<td><img src="image5" alt="Circle" /></td>
</tr>
<tr>
<td>SP Incumbency</td>
<td><img src="image1" alt="Circle" /></td>
<td><img src="image2" alt="Circle" /></td>
<td><img src="image3" alt="Circle" /></td>
<td><img src="image4" alt="Circle" /></td>
<td><img src="image5" alt="Circle" /></td>
</tr>
<tr>
<td>Network Automation &amp; Telemetry</td>
<td><img src="image1" alt="Circle" /></td>
<td><img src="image2" alt="Circle" /></td>
<td><img src="image3" alt="Circle" /></td>
<td><img src="image4" alt="Circle" /></td>
<td><img src="image5" alt="Circle" /></td>
</tr>
</tbody>
</table>
Cisco 8000 Software Licensing
Cisco 8000 Software Licensing
Flexible consumption model (FCM)

What is FCM?
- New IOS XR capability
- Software licenses used to add capacity as needed
- Simplified license tracking

How does FCM work?
- Deploy router with minimum software fill-rate
- Easily add capacity as demand increases
- Global network visibility

Why use FCM?
- Reduced upfront capital and network-wide pooling
- Software innovation
- Investment protection
- Includes automation tools

Why is FCM better?
- On-going software innovation keeps IOS XR software cutting edge
- Only Cisco has network-wide pooling, license portability, more visibility

Cisco 8000 requires both Right-to-Use (RTU) perpetual and Software-Innovation-Access (SIA) subscription-based licenses.
Flexible Consumption Model

1. Hardware Infrastructure

2. Two simple suites: Essentials and Advanced
   - Automation attach for scalable network software

3. SIA Feature upgrade PIDs provide access to innovation and investment protection. 3 years of mandatory SIA required

- A la Carte (Scale Enhanced)
- Advanced Software (L3VPN - MPLS IPv4/IPv6, MACSec, TE, L3 Tunnel, SL-APIs)
- Essentials Software (Most of the transport oriented feature set with Automation, NSO)
- Right to Use (RTU)
- Software Innovation Access (SIA)
Cisco 8000 Software Licensing

Right To Use (RTU) rules*

**Essentials RTU**
(required for 50% of the bandwidth at initial purchase)

**Advanced RTU**
(required for 50% of the bandwidth at initial purchase)

**Scale Enhanced**
(>2M FIB, required for every port activated in the box/ LC)

The RTU license for Cisco 8000 is port based; 100G RTU can ONLY be used for a 100GE port. Similarly, 400G RTU can ONLY be used for 400GE port:

- 1x400G port can NOT be used for 4x100G RTU
- 1x400G RTU can be used to break out a 400G port into 4x100G
- 4x100G RTU can NOT be used for 400G port

* Some rules are different than other platforms
CX Offering for Cisco 8000
Customer Experience Lifecycle for Cisco 8000
Delivering expert guidance at every stage of your technology journey

- Advise
  - Knowledge Transfer (Base & Advanced)
    Provide training on the architecture, implementation, and deployment aspects to Cisco 8000 platform
  - Validation for Cisco 8000 (SVS)
    Certify and validate your software and solutions.

- Implement
  - Design & Deployment
    Plan, test and deploy software and solutions.
  - Cisco 8000 Migration
    Plan and migrate, with support every step of the way.

- Optimize
  - Optimization & Solution Support
    Maximize your investment, audit your network, resolve issues preemptively and access extensive training resources.

- Architectural Services Approach
- Architecture Assessment
- Architectural Refresh
- Refresh, Manage, and Scale

Automation, Security and Analytics Everywhere

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CX Offers for Cisco 8000 Routers

**Advise and Implement**
- SP Route and Switch Advise and Implement Service (Cisco 8000 release)
- Network Migration Service Update (Cisco 8000 release with Automation)
- Solution Validation Service Update (with Cisco 8000 capability)
- Continuous Automation and Validation Testing (with Cisco 8000 capability)
- Knowledge Transfer Quickstart (Base) for Cisco 8000
- Knowledge Transfer Quickstart (Adv) for Cisco 8000

**Optimize**
- Cisco Business Critical Services for Cisco 8000

**Support Services:**
- SP Base
- SmartNet Total Care
- Partner Support Service
- SP Software Support
- Solution Support

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Q & A