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Cisco 8000 Series Routers: Redefining the Future of the Internet

Overview

The continued growth in latency-sensitive traffic and the move to cloud services fuels increased bandwidth in every section of the network: edge, aggregation, and core. Network providers must consider multiple strategies to minimize costs while maintaining high levels of service. The networking industry is clamoring for routing performance breakthroughs to support growth into the terabit network level to balance out the complexity and cost of continued horizontal scaling. Cisco is rising to meet the challenge by holistically evaluating silicon, optics, software, and systems to launch a router that anchors networks for a decade or more.

Service providers using the Cisco® 8000 Series routers with embedded Silicon One Application-Specific Integrated Circuits (ASICs) can alter their network cost structure and focus on new network topologies. Conventional communication network designs require tedious and expensive planning to operate and maintain. However, modern networks need on-demand scalability and must use telemetry data with automation to manage network capacity flow. The Cisco 8000 Series routers allow service providers to scale up or out because they support larger per-box performance measurements. This makes it possible to reduce the number of devices needed in the system. By using Cisco Crosswork™ suite of automation tools, service providers can build more accurate route exhaustion rate forecasts for improved budgeting and network cost control.

Address the most congested areas of your network with petabit-scale, cloud-enhanced routers designed to benefit from real-time analytics and telemetry to reduce operational complexity and overall Total Cost to Operate (TCO).

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Benefits
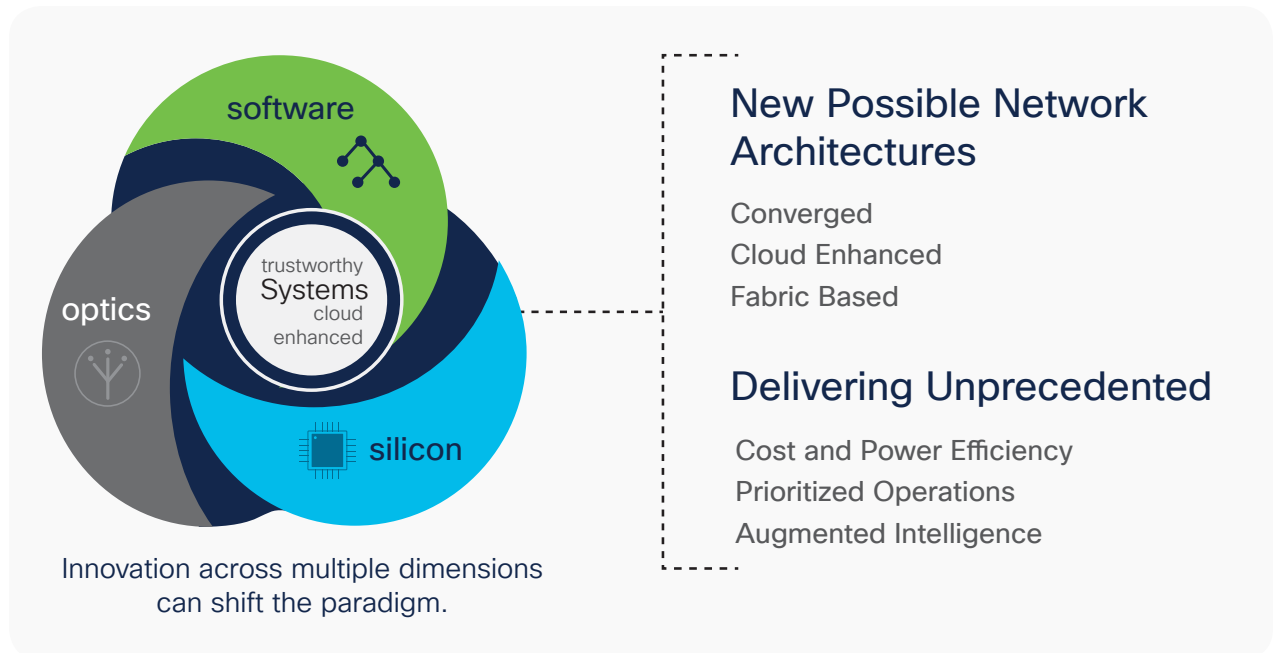
Simplify architecture and network design

- Use one or two routers to provide the same scale as four to six units of the previous generation
- Simplify your network operations with real-time analytics and insights delivered from Cisco Crosswork Cloud

Reduce costs

- Reduce data center footprints by consolidating routers to lower your network costs with breakthrough density and unprecedented scale and efficiency
- Deploy terabits per second of routing capacity with service provider-class functionality and high availability, while reducing per-bandwidth power consumption
- New standardized coherent optics that scale with your bandwidth to lower Operating Expense (OpEx)

Mitigate risks

- Measure, audit, verify, and enforce the trustworthiness of your critical infrastructure to enhance network security
- Every software image you download from Cisco is cryptographically signed using private keys. This advanced signing technology establishes software integrity, enforcement, and measurement

software

optics

trustworthy
Systems
cloud
enhanced

silicon

New Possible Network Architectures

Converged

Cloud Enhanced

Fabric Based

Delivering Unprecedented

Cost and Power Efficiency

Prioritized Operations

Augmented Intelligence

Innovation across multiple dimensions can shift the paradigm.

The need to expand quickly and manage costs along the way

According to the Cisco Annual Internet Report 2018-2023, more than 70% of the global population will have mobile connectivity by 2023, with 5G-enabled mobile devices making up 10% of the total mobile connections. Providers must satisfy this growing demand for networked devices that want access to latency-sensitive streaming content or cloud-hosted services from anywhere—not just a fixed office space.

To keep up with this dynamic and mobile consumption, your network needs to scale with demand, not days, weeks, or months after the demand spike. You need a design that uses a flexible infrastructure with the ability to deploy terabits per second of routing capacity that easily scales, providing near real-time capacity growth. With the software Flexible Consumption Model (FCM) and the ability to pool licenses across qualified network devices, your engineers can add capacity on demand where needed without a significant capital impact. Improve your Return On Investment (ROI) by using the network more completely and efficiently when it has the ability to dynamically respond to demand spikes and congestion events rather than have static capacity built in areas that may not need it.

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 increase
- 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 Cisco IOS® XR software cutting edge
- Only Cisco has network-wide pooling, license portability, more visibility

Key capabilities

Improve the technology to keep up

To help service providers minimize infrastructure-related Capital Expenditures (CapEx), the 8000 Series routers offer the ability to scale network capacity for a decade or more without investing in a new routing platform.

- Line card ports are capable of 100G or 400G connections and support capacities from 10 Tbps up to 260 Tbps in fixed and modular systems, respectively.
- With a flexible consumption licensing model, adding or removing capacity becomes a programming function rather than a major project with a significant impact in cost and time.
- The Cisco Silicon One chip is the first true routing silicon chip to break the 10-Tbps barrier.
- The chip offers a full complement of routing features in a single, 1-Rack Unit (RU) device.

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If the cost and timeframe for scaling can be controlled, the next point of concern for service providers would be network topology designs that consist of smaller, high- performance nodes woven into the network fabric architecture. This distributed architecture offers inherent scalability, resiliency, and operational simplicity. It takes advantage of modularity and standardized elements that can be orchestrated with automation into an easily managed system. By using a fabric design with standardized elements, service providers can quickly bring units online for additional capacity or take them offline for maintenance with minimal impact to the network. The system takes advantage of telemetry data to compile network health reports that give engineers actionable intelligence at a single glance. Engineers can then use orchestration tools and automation to deploy uniform and systematic updates as needed, ensuring ubiquity in configuration designs throughout the network and reducing potential human errors in designs.

Maintain control with automation

To build the highly scalable, distributed infrastructure described above, service providers need to integrate automation tools into their network and improve their operational structures to support traffic growth. When a 10G route is down, the network should have enough capacity on alternate routes to keep traffic flowing with minimal delays. However, when a 100G or 400G route drops, the network could be at a catastrophic standstill without the proper safeguards in place to quickly manage the capacity transition to alternate routes. With automation in the network that detects congestion or other network events before they happen, the network can be designed to automatically take action to reroute traffic or alter the traffic flow based on Service Level Agreement (SLA) parameters and ensure that client expectations are satisfied.

Using automation to help manage a mass-scale architecture has inherent operational cost benefits:

- Automatic rerouting to multiple alternate paths during outage events offers improved network resiliency.
- Congestion management offers threshold controls to shift loads during peak usage times or maintenance and outage events.

- Use segment routing to build network slices for differentiated service levels to clients and facilitate new revenue streams.
- Network maintenance is simplified because nodes can be programmed in or out of service without disrupting traffic.
- Cloud-based test environments allow engineers to stress-test new infrastructure nodes or software and configuration designs before deployments.

The 8000 Series routers are cloud enhanced by the Crosswork Automation suite. These automation tools speed up innovation, improve customer experiences, and can streamline operations. Service providers can now plan, implement, operate, and optimize the network to gain mass awareness, augmented intelligence, and proactive control. Using automation allows service provider engineers to move from a reaction-based workflow to a planning-oriented workflow that lets them control service implementations and drive ubiquity into their network deployments. This change improves network stability and the customer experience and helps reduce OpEx. It also makes new revenue streams based on high-performance SLAs feasible.

Gain flexibility with modernized software

To keep up with today's more flexible networks, network infrastructure operating systems need to modernize as well. Cisco improved the operational structure of IOS XR in the newest release of the Cisco network operating system, IOS XR7 (XR7). We believe that a modern operating system should be simple, powerful, and trustworthy. As a modern operating system, XR7 is designed to help engineers by:
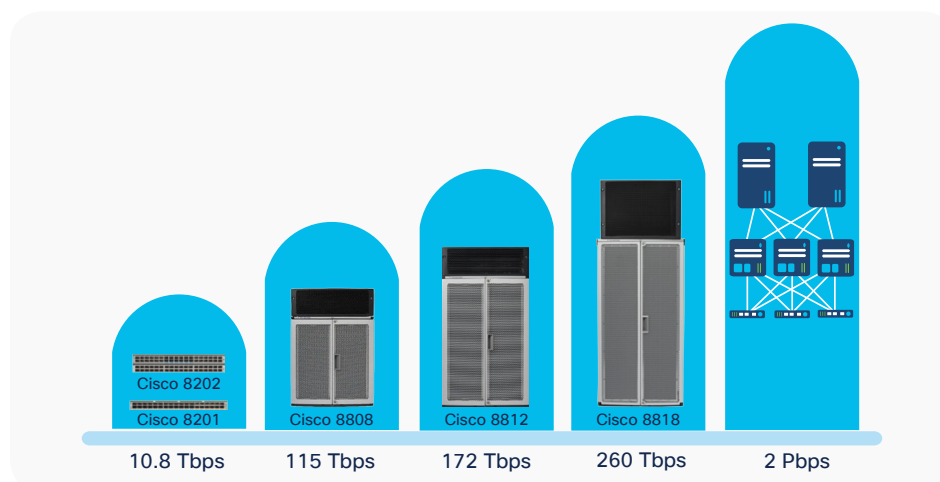
- Providing a single operating system paradigm across the network: edge, aggregation, and core
- Reducing OpEx with custom loads of XR7 based on the features you need
- Using a Linux design for easier provisioning and deployment
- Improving operational efficiencies with management API integration to provide near real-time, actionable telemetry data
- Allowing for automation to drive smoother implementations and remote configuration updates

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XR7 works across access, edge, aggregation, and core hardware environments. Having a single operating system reduces the management complexity for a team of engineers and improves the operational efficiency of the network. With IOS XR7, you can load and operate only the features you need for a specific use case, whether it's a full version load on a multipetabit core router or a scaled-back version that runs on a multigigabit access router.

With XR7, service providers build powerful automation into their network that takes advantage of the reporting tools and structure they already have in place. By integrating open APIs that access the software stack at all levels, XR7 provides the custom access that service providers need to efficiently build and operate a network. For example, with the service layer APIs integrated into XR7, service providers use the same controller agent and telemetry data collection tools that have been used in the past. By combining these service layer APIs with the Open Forwarding Abstraction (OFA) API, engineers can make near real-time changes to the network routes.

Models and options

The Cisco 8000 routers are available in two fixed-form factors or in three modular-form factors that range in performance from 10.8 Tbps to 260 Tbps within single-unit deployments or upwards of two petabits when arranged in a fabric together.

Cisco 8202 / Cisco 8201	Cisco 8808	Cisco 8812	Cisco 8818	
10.8 Tbps	115 Tbps	172 Tbps	260 Tbps	2 Pbps

Cisco 8200 Series

The Cisco 8200 Series uses a single Cisco Silicon One ASIC in its Router-on-Chip (RoC) model, which delivers full routing functionality. The 8200 Series 1 RU and 2 RU routers provide 10.8 Tbps of network bandwidth with much lower power consumption than contemporary 10-Tbps systems. As a full-featured, carrier-class router, the 8200 Series provides tens of milliseconds of buffering, large forwarding tables, and flexible packet operations. It offers enhanced programmability suitable for deployments in power- and space-constrained facilities such as central office locations (COLOs), Content Delivery Networks (CDNs), Internet exchange points, or Point of Presence (PoP) sites.

Cisco 8800 Series

The Cisco 8800 Series delivers density and efficiency with the extensive scale, buffering, and feature capabilities common to all Cisco 8000 Series routers. It includes three chassis to meet a broad set of network and facility requirements:

Cisco 8808: 115.2 Tbps, 8 slots, 16 RU

Cisco 8812: 172.8 Tbps, 12 slots, 21 RU

Cisco 8818: 259.2 Tbps, 18 slots, 33 RU

Use cases

The 8000 Series routers would provide immediate benefits to providers looking to reimagine their core label switch routing, cloud-scale aggregation, or peering deployment designs. Build resiliency into peering and aggregation networks with a fabric-based architecture with the ability to digest multiple use case requirements and dynamically adjust path usage based upon network conditions. The ability to remove manual workflows for creating Label Switch Paths (LSPs) and replace them with routers that utilize network telemetry data and make near real-time changes creates the flexibility and control required to operate competitive networks for ultra-low latency services.

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Financing to help you achieve your objectives

Cisco Capital® can help you acquire the technology you need to achieve your objectives and stay competitive. We help you reduce CapEx, accelerate your growth, and optimize your investment dollars and ROI. Cisco Capital financing gives you flexibility in acquiring hardware, software, services, and complementary third-party equipment, with just one predictable payment. Cisco Capital is available in more than 100 countries. Click here to learn more about Cisco Capital.

For cloud service providers to keep up with the explosive growth in encrypted data center traffic, web providers need to build a network architecture that can scale up or out to help reduce the cost of aggregation and to secure ingress and egress traffic for data centers. Rather than increasing your data center footprint with multiple new network systems being installed, the Cisco 8000 Series can deliver the performance equivelant of several multichassis systems in a reduced footprint. Powered by a single ASIC design, the Cisco 8000 Series router provides unified forwarding architecture and a unified programming model for simplified and scalable deployments across any network deployment topology. This streamlined system can simplify network architectures because one rack unit can provide the performance of two previous units. This increased performance leads to reduced operational and capital equipment expenditures.

The Cisco advantage

Our networking services help you outline a strategy to achieve your desired business outcomes. We help you navigate evolving technology and digital transformations, prepare your business for emerging trends, and address risks and compliance. Using our expertise, tools, and methodologies, you can improve efficiency and build an agile network for the future.

At Cisco, we continuously work to innovate our communication network platforms so service providers can build personalized networks that meet the needs of their users. The innovations launched with the Cisco 8000 Series routers, Silicon One chip, and IOS XR7 represent our efforts to deliver the next generation of network infrastructure.

Learn more

To learn more about the Cisco 8000 Series routers, please visit the 8000 Series product page.

To learn more about the new release of Cisco IOS XR7, please visit the IOS XR7 page.

For more information on the Cisco automation tools available, please visit the Crosswork suite page.