Intelligent Optical Core Router

Overview

Optical networks The Nokia optical network portfolio leverages highly vertically integrated coherent optical engines to build an advanced-connectivity foun.

Key Takeaways

Intelligent optical core routers integrate coherent optics, multi-layer control, and IPoDWDM to optimize network performance, scalability, and operational efficiency.

Overview

Modern intelligent optical core routers combine high-performance IP routing with integrated coherent optical capabilities, enabling direct mapping of IP traffic onto DWDM wavelengths. This approach, often referred to as coherent routing, eliminates the need for standalone transponders and multiple Optical–Electrical–Optical (OEO) conversions, reducing latency, power consumption, and operational complexity while supporting high-bandwidth applications such as data center interconnects, metro aggregation, and long-haul transport.

Key Features

Coherent Pluggable Optics: Routers use pluggable 400G coherent optics (e.g., 400ZR and 400ZR+) that can be deployed directly in router ports, supporting distances from 40 km up to several hundred kilometers without additional transponders. Future generations are expected to scale to 800G speeds. IPoDWDM Integration: IP over DWDM (IPoDWDM) allows high-speed IP interfaces to generate DWDM wavelengths natively, collapsing multiple transport layers into a simplified architecture and enabling dynamic bandwidth scaling.

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Multi-

Layer Intelligence: Intelligent routers monitor both packet-layer metrics (latency, congestion) and optical-layer parameters (signal quality, reach constraints), allowing dynamic traffic engineering and adaptive network optimization. Energy and Space Efficiency: By embedding coherent optics directly in routers, these systems reduce the number of intermediate devices, lower power and cooling requirements, and improve sustainability for large-scale networks. Automation and Telemetry: Modern intelligent optical routers support network automation frameworks and streaming telemetry, enabling faster service activation, improved visibility, and efficient fault isolation.

Applications

Data Center Interconnect (DCI): Point-to-point or multi-span connections using 400G coherent optics for high-capacity, low-latency links between data centers. Metro and Regional Networks: Aggregation of hub-and-spoke traffic with flexible optical pass-throughs and ROADM integration.

Long-

Haul Transport: High-performance coherent optics extend optical reach to thousands of kilometers, supporting backbone networks and intercontinental links.

Benefits

Simplified network design and reduced operational complexity. Lower total cost of ownership through fewer devices and reduced energy consumption. Enhanced scalability and flexibility for AI-driven, cloud, and 5G network demands.

End-to-end visibility and control across IP and optical layers, enabling intelligent traffic management and improved service reliability. Intelligent optical core routers represent a converged IP-optical architecture that is essential for modern high-capacity networks, providing both performance and operational intelligence to meet the demands of data-intensive applications.

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Article Content

Optical networks

The Nokia optical network portfolio leverages highly vertically integrated coherent optical engines to build an advanced-connectivity foundation for the AI supercycle. This portfolio includes open modular

Enterprise Routers | Huawei Enterprise

NetEngine 8000E Series Routers Next-generation, full-service, intelligent routers designed to serve as enterprise WAN core, large enterprise network access nodes, DCI nodes, and campus or large-scal

Ciena products

Explore five practical use cases for enabling data center and AI-driven deployments with coherent routing.

7750 Service Router

It offers a comprehensive range of system and line card options with high-density interfaces and flexible optical breakouts, allowing for optimized, enhanced network designs.

Cisco Routed Optical Networking

Reduce your CapEx up to 60% by simplifying your network transport with Cisco industry-leading, coherent pluggable optics that deliver DWDM functionality

Coherent routing

Explore five practical use cases for enabling data center and AI-driven deployments with coherent routing.

AutoRouter — Intelligent Patchbay | Optocore | Fiber

Optocore AutoRouter is compatible with Optocore, ProGrid and DiGiCo fiber loops, creating a redundant “star” out of the ring topology. It works with other well

Expert''s Choice: 10 The Best Router For Optical Fibre

Are you in search of the perfect router for your optical fiber internet connection? Look no further! In this guide, we''ll explore the top options available on the

Intelligent OptiX Network | OptiX | All-Optical

Huawei''s intelligent OptiX network strategy aims to build intelligent, simplified, ultra-broadband, and ubiquitous next generation all-optical networks.

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Machine learning for intelligent optical networks: A comprehensive ...

These tasks mainly include traffic prediction, which helps the network to act in a proactive way, and resource allocation, which responsible for assigning multi-dimensional resources in optical

Core router

A core router is a router designed to operate in the Internet backbone, or core, or in core networks of internet service providers. To fulfill this role, a router must be able to support multiple

Future All-optical Network Architecture and Key Technologies

Evolving towards the 2030 optical communications network system and architecture is a key issue facing the optical communications industry and requires viable technical options for building future

IP over optical networks: architectural aspects

The Internet transport infrastructure is moving toward a model of high-speed routers interconnected by intelligent optical core networks. A consensus is emerging in the industry on utilizing an IP-centric

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Enabling IP-optical integration in core and metro networks

In recent years, coherent DSP technology has progressed to a point where it can be integrated on small pluggable form factors that can be equipped in optical line systems and

IP-MPLS and Optical | MCA Network Infrastructure Solutions

We deliver Nokia''s cutting-edge IP and Optical Networking solutions, featuring a comprehensive portfolio of high-performance routers, MPLS technologies, and fiber transport systems designed to support

Pioneering the IP and Optical Transformation

Full core router-to-router IP routing architecture is characterized by a single networking/switching layer in the IP domain and simple point-to-point optical infrastructure without the cost and complexity of

Optical Switching Data Center Networks: Understanding Techniques

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To overcome the bandwidth limitation and multi-tier architecture of electrically switched networks, optical switching techniques have been proposed and investigated to replace the current electrical switches.

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