THE POSSIBILITIES ARE INFINITE

FLASHWAVE® 7500
METRO/REGIONAL ROADM PLATFORM
Metro and regional transport is entering a period of dramatic expansion, driven by deployment of advanced Ethernet, broadband and VOD services. Competing in this challenging environment demands transparent aggregation of high-bandwidth service applications over a single core infrastructure. The FLASHWAVE® 7500 ROADM brings the benefits of scalable ROADM technology to metro/regional networks around the world.

A Durable System Architecture

The FLASHWAVE 7500 ROADM is already widely deployed by major service providers in North America and is beginning deployment in Europe, Asia and the rest of the world. The platform aggregates voice, data, video, storage and wavelength services, driving cost-efficiency and reducing maintenance overhead.

Scalable, Flexible Metro/Regional Solution

The FLASHWAVE 7500 ROADM is the ideal core infrastructure solution for metro and regional long-haul networks. The system offers compelling advantages for Multiple System Operators (MSOs), the federal government, research and education entities and telecommunications service providers:

- **Seamless integration** of metropolitan DWDM networks with regional and long-distance infrastructure
- **2.5, 10 and 40 Gbps** service modules
- **Full-band tunable** narrowband network interfaces across all wavelengths
- **Small Form-factor Pluggable** (SFP) and 10-gigabit small form-factor (XFP) units
  - Reduce sparing costs
  - Simplify troubleshooting and repair
- **Self-leveling amplifiers** for ease of service activation and operational savings
- **Remotely reconfigurable** ROADM hub support for up to 12 degrees
- **Cost-optimized** 2D ROADM, Flexible OADM (FOADM) and Extension Shelf configurations
- **Direct optical interconnection** with FLASHWAVE 4500 MSPP-based networks
- **Ethernet, video and traditional SONET**, plus direct connection of narrowband optics from any ITU-compliant source
- **Unregulated networks** up to 1000 km and up to 24 OADM nodes

Field-Proven Technology

The platform has been proven via rigorous independent assessment. One example is testing by the U.S. Defense Information Systems Agency (DISA)-sanctioned Joint Interoperability Test Command (JITC) for use in the DISA Defense Information System Network (DISN). The FLASHWAVE 7500 platform has also been tested by the Department of Army Technology Integration Center (TIC) and recommended for use in the Installation Information Infrastructure Modernization Program (I3MP).
As a unified, scalable platform, the FLASHWAVE 7500 system offers four flexible configurations to support a wide range of applications:

▶ The FLASHWAVE 7500 FOADM (32-channel)
▶ The FLASHWAVE 7500 2D ROADM (40-channel)
▶ The FLASHWAVE 7500 WSS ROADM scalable in-service to a 12-degree hub configuration (40-channel)
▶ The FLASHWAVE 7500 Extension Shelf

The platform’s tunable Optical Line Cards (OLCs) and software are common to all FLASHWAVE 7500 configurations. This offers opportunities for cost-efficiency in engineering, training, installation and sparing. Chassis options include a 23-inch North American carrier-centric version, a 19-inch data center version and a 500 mm ETSI version.

**FLASHWAVE 7500 FOADM**

A full-function, compact, economical platform for mid-size applications, the FLASHWAVE 7500 FOADM is ideal for space-constrained metro central offices (COs). A single shelf supports up to six line cards, plus common operation and transmission cards in a FOADM or point-to-point configuration. Subsequent addition of modular optical switch units enables ROADM capabilities. OLC capacity is easily added without interrupting network operation.

**FLASHWAVE 7500 2D ROADM**

An economical choice for locations needing just two degrees of network connectivity, the FLASHWAVE 7500 2D ROADM can be deployed in a single-ring topology. The system provides full add/drop, pass-through and optical drop and continue capabilities in protected or unprotected point-to-point, linear and ring topologies. By combining ROADM and multiplexer functionality into a dedicated card, the platform makes slots available for optical line interfaces and revenue-generating service interfaces.

**FLASHWAVE 7500 WSS ROADM**

The FLASHWAVE 7500 WSS ROADM provides a powerful and cost-effective deployment solution for metro, regional and long-haul networks. The system dramatically reduces both capital outlay and operational expenses by fully automating zero-impact nodal upgrade capability. Configurations range from simple ROADM to multidegree hub with fast service delivery and transparent interoperability between rings and mesh networks.

**FLASHWAVE 7500 Extension Shelf**

The FLASHWAVE 7500 Extension Shelf is an OLC-only configuration that delivers high-capacity optical services to customer premises where OADM infrastructure is not needed. The system reduces operational expenses by consolidating the complete DWDM infrastructure, from the customer to the network core, onto a unified platform.
ExtremE FlexibiLity

The flexible FLASHWAVE 7500 ROADM platform enables a broad spectrum of new, high-bandwidth applications such as broadband Internet transport, high-density video distribution, advanced IP and Ethernet services. The ability to base such a wide range of configurations on a single platform extends cost-effective ROADM benefits closer to the network edge than ever before.

The platform’s optical foundation is based on an advanced Wavelength Selective Switch (WSS). This technology offers the most flexible wavelength routing and topology available today. Advanced control-plane intelligence and sophisticated optical self-tuning allow scalable end-to-end service activation and multidegree hub configurations on a single interoperable platform.

Multiple DWDM Options

The Flexponder unit in the FLASHWAVE 7500 ROADM provides flexible, low-maintenance interfaces and multiplexing/demultiplexing for up to eight client signals. This capability extends across the platform’s 19-inch small, 2D ROADM, Core WSS and Extension Shelf configurations. The unit multiplexes up to eight Gigabit Ethernet, OC-3, OC-12 and OC-48 signals into a single 10.7 Gbps optical signal with digital wrapper. ITU-T-compliant narrowband optics allow the signal to be mapped to any of 40 channels. The platform’s traffic management features include non-blocking time-slot assignment (STS-1/STS-3c/STS-12c/STS-48c), ADM on a wavelength, VCAT and hairpinning.

Features that Drive Application Breadth

The FLASHWAVE 7500 platform offers several features that extend the scope of possible applications:

▶ Advanced traffic management features
▶ Tunable ITU-T compliant narrowband optics
▶ Inline amplification of DWDM signals
▶ Automatic topology and link discovery
▶ Automatic span-loss adjustment
▶ Cost-effective light path protection
▶ In-service upgrade capability to full-featured ROADM
▶ MLSE functionality for mitigation of high PMD-fiber impediments
Core Transport Infrastructure

As a high-capacity optical transport platform, the FLASHWAVE 7500 ROADM is ideal for transparently aggregating large, high-bandwidth service applications over a single optical core. For metro and regional long haul networks, the system enables seamless migration of existing voice, data and video infrastructure into a single DWDM infrastructure.

Video Distribution

Perfectly suited for streaming video-on-demand and broadcast applications, the FLASHWAVE 7500 platform lets service providers distribute multiple video streams throughout the optical DWDM infrastructure.

Private Network Applications

As the backbone infrastructure for large private network applications, the FLASHWAVE 7500 system ensures that financial institutions, educational consortiums and federal government installations can accommodate data traffic growth without costly network upgrades.

High-Capacity Access

The wide range of compatible FLASHWAVE 7500 configurations can seamlessly grow from low-traffic access points to fully-configured high-capacity systems, easily scaling up as data traffic increases.

The Ideal High-Capacity Optical Transport Vehicle
Fujitsu offers a broad selection of professional services to assist at every stage in a network’s evolution and operation. From planning through deployment and ongoing maintenance to future enhancements, Fujitsu Network Life Cycle Services are available whenever needed. Our comprehensive range of services includes network and system design, training, customized deployment, craft interface software, migration planning and more. Your Fujitsu sales representative can guide you in selecting the right service options for your business.

Popular planning and deployment services for the FLASHWAVE 7500 platform include:

▶ **Fiber characterization** – Fujitsu offers comprehensive analysis of installed fiber to improve current network performance, prepare for new growth and identify potential issues.
▶ **Onsite mentoring** – Our experts provide full training and knowledge transfers.
▶ **Design services for DWDM networks** – Our professional design staff works with you to prepare a complete, custom roadmap for success.

**Service Support Packages for Ongoing Maintenance**

If you’re looking for a complete professional maintenance solution, Fujitsu service support packages have the right combination of flexibility and comprehensive assurance. Choose the level and types of service you need to supplement your own resources. Our service support packages help keep your network running smoothly, provide critical care and protect the longevity of your investment.

**Network Operations Center**

With a full range of vendor-independent network fault and performance monitoring features, the Fujitsu Network Operations Center (NOC) offers guaranteed, round-the-clock system protection. Our reliable NOC facility is available as a primary or supplemental operations resource. This service not only helps you control costs and maintain high levels of customer satisfaction, it also provides trustworthy and reliable after-hours and emergency coverage.
FEATURES AND SPECIFICATIONS

**Architectures**
- Optical ring
- Optical mesh
- Linear add/drop
- Point-to-point

**Network Capacity**
- Up to 40 wavelengths
- Up to 1200 km reach for up to 24 spans without 3R regeneration
- Span loss up to 41 dB (0.19 dB/km) with RAMAN amplification
- Span length (for all service types up to 40 Gbps)
  - 20 km without optical amplifiers
  - 215 km with RAMAN amplification
- WSS-based optical switch fabric
- 2D ROADM
- FOADM
- 12-degree optical hubbing
- Self-tuning/self-leveling/auto pre-channel power balancing
- Intelligent control plane GMPLS
- Inline amplifier

**Interfaces**
- 10, 40 Gbps transponder, muxponder, regeneration
- 10G high-speed Flexponder (MSPP-on-a card)
- Network interface optics
  - Full C-band tunable narrowband optics
- Client interface optics
  - Small form-factor SONET/SDH (SR, IR and LR)
  - Small form-factor GigE (SX, LX)
  - Small form-factor CWDM (SR, LR)
- Forward Error Correction (FEC)
  - Reed Solomon (239, 255) RS-FEC
  - Ultra FEC (U-FEC), Enhanced FEC (E-FEC)

**Operations**
- TL1 over TCP/IP
- TL1 over OSI
- SNMP
- GMPLS control plane
- Software and firmware download
- Remote memory backup/restore
- OSC with 10 Mbps user channel
- Remote OAM&P
- Remote equipment inventory
- NETSMART® 500 Element Management System (EMS)
- NETSMART 1500 Network Management System (NMS)
- NETSMART 2000 network design and planning tool

**Service Modules**

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<tr>
<th>Feature</th>
<th>Options</th>
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<tbody>
<tr>
<td>Fast Ethernet</td>
<td>Multirate 2.5 Gbps transponder (1 port 100 Mbps–2.5 Gbps)</td>
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<tr>
<td>ESCON</td>
<td>OC-3/OC-3c/OC-3 UNI/STM-1</td>
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<td>D1/SDI Video</td>
<td>OC-12/OC-12c/OC-12 UNI/STM-4</td>
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<td>Fibre Channel/FICON</td>
<td>Gigabit Ethernet</td>
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<td>HDTV</td>
<td>Multirate 2.5 Gbps transponder (1 port 100 Mbps–2.5 Gbps)</td>
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<tr>
<td>DV6000</td>
<td>10 Gbps Flexponder (8 ports)</td>
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<tr>
<td>FDDI</td>
<td>Multirate 2.5 Gbps transponder (1 port 100 Mbps–2.5 Gbps)</td>
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<td>10 Gigabit Ethernet (LAN PHY)</td>
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<td>10 Gigabit Ethernet (WAN PHY)</td>
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<td>OC-192/STM-64</td>
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<td>OTU2</td>
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<td>OC-768/STM-256</td>
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**Monitoring and Alarms**
- Optical performance monitoring
- Wavelength management
- Lightpath circuit tracking
- Topology discovery and display
- SONET PM
- Gigabit Ethernet PM

**Power Consumption/Heat Dissipation**
- Optical/HUB shelf: <360W (1228 BTU/hr)
- 2D-ROADM shelf: <680W (2318 BYU/hr)
- Tributary shelf: <930W (3170 BTU/hr)

**Operating Environment**
- Temperature: 0 to 50 °C (32 to 122 °F)
- Humidity: 5 to 95% (non-condensing)
- NEBS Level 3 compliant

**Physical Characteristics**
- Dimensions (H x W x D)
  - 23" Shelf: 22.7 x 21.3 x 11.5" (573 x 541 x 296 mm)
  - 19" Shelf: 22.7 x 18.5 x 11.5" (577 x 470 x 292 mm)
  - ETSI shelf: 30.2 x 19.7 x 11.1" (775 x 500 x 280 mm)
- Weight
  - Fully-loaded shelf: <160 lb (73 kg)
- Power input: –48 V DC
- Integrated redundant power supply