The FLASHWAVE® 4100 Multiservice Provisioning Platform (MSPP) family offers field-proven optical access and transport combined with a powerful, flexible mix of provisioning technologies.

The platform assures smooth migration of Ethernet services onto an embedded SONET infrastructure by converging packet mapping capabilities over SONET. The FLASHWAVE 4100 Large/Small Shelf supports a wide variety of MEF-9 and MEF-14-certified E-Line and E-LAN services, providing:

- Flexible 1 Mbps bandwidth provisioning granularity
- Efficient statistical multiplexing for oversubscription
- Ethernet aggregation
- Class-of-service differentiation
- SONET reliability
- 0:2 and LCAS offers 2x throughput

**Bridging the Transition to Packet Services**

The FLASHWAVE 4100 MSPP bridges the transition to packet services, compliments existing investment and minimizes capital and operational outlay. Scalability ranges include DS1 to OC-48.

**The Right Solution**

The FLASHWAVE 4100 MSPP offers a wide range of customers an optimal combination of price, footprint and industry-leading service provisioning capabilities.
The FLASHWAVE 4100 MSPP is available in three form factors. These temperature-hardened platforms offer-carrier class availability for DS1, DS3/EC1, DS3 Transmux, 10/100/1000 Ethernet, OC-3 and OC-12 service delivery over OC-3/12/48 UPSR, 1+1 or 0:2 facilities. The platforms are used in Central Office (CO), controlled environmental vault, remote terminal and at customer locations in racks, cabinets and wall-mount configurations.

FLASHWAVE 4100 Extension Shelf

The FLASHWAVE 4100 Extension Shelf is a compact, modular solution using a 2RU chassis for high concentrations of DS1, DS3 or layer 1 Ethernet services over OC-3/12/48 or when footprint is at a premium. This platform can operate as a standalone UPSR network element or terminal SONET shelf. Its high density and small footprint improves slot cost-to-value capacity when configured in conjunction with another FLASHWAVE 4000 series MSPP or FLASHWAVE 7000 series Wavelength Division Multiplexing (WDM) element. The FLASHWAVE 4100 Extension Shelf enables legacy TDM services when deployed with a Packet Optical Networking Platform, such as the FLASHWAVE 9500 shelf.

FLASHWAVE 4100 Large Shelf

The FLASHWAVE 4100 Large Shelf offers layer 2 Ethernet support for E-Line and E-LAN connectivity and differentiated classes of service.

FLASHWAVE 4100 Small Shelf

The FLASHWAVE 4100 Small Shelf, with its integrated secure enclosure, offers half the number of service interface slots as the Large Shelf. It is designed for CPE locations that require all-front access, AC operation and integral battery backup.

Network Life Cycle Services

Fujitsu offers a broad selection of professional services for 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. Your Fujitsu sales representative can guide you in selecting the right service options for your business.

Popular planning and deployment services for the FLASHWAVE 4100 MSPP include:

▶ **Custom Cabinet Solutions** – Turnkey inside wall-mount and outside plant solutions, including standard and custom configurations for wireline, wireless, FTTx, cable and MSO customers

▶ **Furnish Material** – Identification and ordering of material needed to install network equipment such as electrical and fiber cable solutions, minor materials and third-party ancillary equipment

▶ **Turn-Up and Test** – From on-site configuration and simple turn-up to rigorous, long-term testing

▶ **Service Support Packages for Ongoing Maintenance** – Complete professional maintenance solutions with the right combination of flexibility and comprehensive assurance

▶ **Network Operations Center (NOC)** – A full range of vendor-independent network fault and performance monitoring features, offering guaranteed, round-the-clock system protection
The FLASHWAVE 4100 MSPP is flexible enough for CO or rugged Outside Plant (OSP) applications. Its high capacity and non-blocking STS and VT switch fabrics enable optical hub operation for converged wireline and wireless access networks. As a compact Digital Cross-connect system (DCS), it provides grooming in remote COs and cell sites.

**Multiple Service provisioning Technologies**

The FLASHWAVE 4100 MSPP converges GFP, LO- and HO-VCAT, LCAS, VLAN and RPR on a single platform. It ensures superior flexibility for provisioning data services:

- SONET resiliency
- Resilient Packet Ring (RPR) efficiency on the FLASHWAVE 4100 Large/Small Shelf
- Advanced carrier Ethernet
- 802.1q VLAN tagging

**Drive Down OPEX, Preserve Investment**

The FLASHWAVE 4100 Extension Shelf DS1 service card with integrated NIU condenses trouble ticket resolution time and expedites installation. Its extensive loopback capabilities, NPRM, 30-day PM binning, CI alarm recognition and integrated multi-pattern Bit Error-Rate Testing (BERT) provide a powerful tool set to expedite installation, mitigate service issues and reduce truck rolls. As a result, operational expenses shrink.
Network SONET/TDM to Packet Transition

The FLASHWAVE 4100 product family provides extensive Ethernet capabilities (10/100Base-T and 100 and 1000Base-X). It offers an excellent solution for operators transitioning to a more packet-centric network while still providing important revenue-bearing legacy OC-n/TDM services.

Business CPE

A wide array of DS-1/3, OC-3/12 and Ethernet service interfaces ensures cost-effective, efficient solutions for business access applications. Modular shelf options, combined with multiple options for racks and secure indoor and outside plant cabinets, provides the flexibility needed for the business services market. Support for CWDM, and OC-48 DWDM network optics, as well as standard 1310 nm versions, ensures efficient operation even when the fiber plant is highly constrained.

Mobile Backhaul

The compact 2RU FLASHWAVE 4100 Extension Shelf is perfectly suited for mobile backhaul applications. For these applications, the platform offers legacy DS1s with integrated NIU, Ethernet services and Transmux. OC-3/12 subtending rings are available for optical hubbing at a cell hub site. The platform can operate over standard –48 V DC or +24 V DC power common to many cell sites.

Business Park Services

The FLASHWAVE 4100 product family is fully temperature-hardened and offers multiple industry-certified outside plant cabinet options. This makes it the best solution for providing TDM, SONET and Optical Ethernet services for business parks.

Optical Hubbing

For core aggregation sites, the FLASHWAVE 4100 Extension Shelf supports optical hubbing of multiple OC-3/12 rings. This enables traffic aggregation and grooming across multiple networks in a DCS-type application. Integrated Transmux units allow M13 multiplexing and DS1 to DS3 traffic grooming.
Architectures
- Terminal (1+1)
- Linear ADM (1+1) (Large and Small Shelf only)
- Unidirectional Path Switched Ring (UPSR)
- 0:2 Both line cards working and unprotected

Line Interfaces
- OC-3, OC-12 and OC-48 line interfaces are available in standard** or SFP-based versions
- Standard SC, LC connectors**
- 1310 or 1550 nm wideband
- SFP LC connectors
- CWDM SFP optics
- OC-48 DWDM SFP optics

Service Interfaces
- DS1 36*- or 64-pin AMP® connectors
- DS3 and EC1 BNC connectors
- DS3 Transmux BNC connectors
- OC-3 and OC-12 service interfaces are available in SFP-based versions
- 1310 or 1550 nm wideband
- CWDM SFP optics
- 10/100Base-T RJ-45 connectors
- 100Base-X (SFP) LC connectors
- 1000Base-X (SFP) LC connectors

Protection Options
<table>
<thead>
<tr>
<th>Service Interface</th>
<th>Ports/Card</th>
<th>Unprotected Ports/Shelf</th>
<th>Protected Ports/Shelf</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1</td>
<td>14</td>
<td>84</td>
<td>84</td>
</tr>
<tr>
<td>DS3/EC1</td>
<td>3</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>DS3 Transmux</td>
<td>3</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>OC-3</td>
<td>4</td>
<td>48</td>
<td>24</td>
</tr>
<tr>
<td>OC-12</td>
<td>1</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>10/100Base-T</td>
<td>4</td>
<td>48</td>
<td>-</td>
</tr>
<tr>
<td>100Base-X</td>
<td>4</td>
<td>24</td>
<td>-</td>
</tr>
<tr>
<td>1000Base-X</td>
<td>2</td>
<td>12</td>
<td>-</td>
</tr>
</tbody>
</table>

Maximum Number of Service Interfaces

<table>
<thead>
<tr>
<th>Service Interface</th>
<th>Large Shelf (12 service interface slots)</th>
<th>Protection Options</th>
<th>Small Shelf (6 service interface slots)</th>
<th>Extension Shelf (12 service interface slots)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ports/Card</td>
<td>Unprotected Ports/Shelf</td>
<td>Protected Ports/Shelf</td>
<td>Ports/Card</td>
</tr>
<tr>
<td>DS1</td>
<td>28</td>
<td>168</td>
<td>168</td>
<td>DS1 with or without NIU</td>
</tr>
<tr>
<td>3-Port DS3</td>
<td>3</td>
<td>18</td>
<td>18</td>
<td>8-Port high-density DS3/EC1</td>
</tr>
<tr>
<td>3-Port DS3 Transmux</td>
<td>3</td>
<td>18</td>
<td>18</td>
<td>OC-3</td>
</tr>
<tr>
<td>OC-12</td>
<td>1</td>
<td>12</td>
<td>6</td>
<td>OC-12</td>
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<tr>
<td>10/100Base-T</td>
<td>8</td>
<td>48</td>
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<td>10/100Base-T</td>
</tr>
<tr>
<td>100Base-X</td>
<td>2</td>
<td>12</td>
<td>-</td>
<td>1000Base-X</td>
</tr>
</tbody>
</table>

* Mix of 36- and 64-pin AMP connectors on FLASHWAVE 4100 Small Shelf, all others are 64-pin AMP.
** Large and Small Shelf
FEATURES AND SPECIFICATIONS

Synchronization
- Internal Stratum 3, DS1 BITS* (primary or secondary) or line timing source
- Synchronization Status Messaging (SSM)
- Operations
- TL1 protocol over X.25**, OSI/Ethernet or IP/Ethernet
- TCP/IP*** and X.25**** gateway functionality
- SNMP Monitoring
- Software download and remote memory backup/restore
- NETSMART® 500 craft user interface and NETSMART 1500 EMS
- Interoperable with all Fujitsu transmission products
- Telcordia™ OSMINE certified
- NEBS Level 3 certified
- UL listed

Operating Environment
- Temperature
  - SONET TDM: –40 to +65 °C (–40 to +149 °F)
  - Ethernet Large/Small Shelf: 0 to 55 °C (32 to 131 °F)
  - Ethernet Extension Shelf: –40 to +65 °C (–40 to +149 °F)
- Humidity: 5 to 95% (non-condensing)
- Max Power Consumption (Heat Dissipation)
  - Large Shelf: 484 W (1652 BTU/hr)
  - Small Shelf: 292 W (997 BTU/hr)
  - Extension Shelf: 277 W (944 BTU/hr)

Physical Characteristics
- Large Shelf
  - Dimensions (H x W x D): 14 x 17.5 x 12” (35.6 x 44.5 x 30.5 cm)
  - Weight (fully-loaded): 75 lb (34 kg)
  - Power Input: –48 V DC
- Small Shelf
  - Dimensions (H x W x D): 11.5 x 18.75 x 10.75” (29.3 x 47.7 x 27.4 cm)
  - Weight (fully-loaded): 38 lb (17 kg)
  - Power Input: –48 V DC
- Extension Shelf
  - Dimensions (H x W x D): 3.5 x 17.5 x 13.5” (8.9 x 44.5 x 34.3 cm)
  - Weight (fully-loaded): 22.4 lb (10.2 kg)
  - Power Input: +24 V DC or –48 V DC

* Large shelf includes input and output, small shelf is output only, extension shelf is input only
** Large shelf, small shelf only
*** Large shelf and extension shelf only
**** Large shelf only