Product Overview

Designed for intelligent service demarcation at the edge of the network, the FSP 150CC-GE110 2.0 series enables cost-effective delivery of assured fiber-based Carrier Ethernet services for mobile backhaul and wholesale Ethernet applications. The series of ultra-compact first-mile demarcation devices provides a full range of multi-rate-capable Ethernet interfaces. The temperature-hardened design with no moving parts and optional network link protection ensures the highest service availability even in harsh environments.

Scalability for Large-Scale Deployment

As Carrier Ethernet networks scale, low-touch provisioning capabilities become essential to ensure cost-efficient service rollout and to significantly reduce the need for truck rolls. With the extensive set of standards-based auto-configuration functions and remote OAM capabilities built into the FSP 150CC-GE110 series, unskilled craft personnel can install and turn-up services fast and flexibly without onsite provisioning. Combined with the FSP 150EG-X, an edge gateway device purpose-built for service aggregation and handover in central office environments, the FSP 150CC-GE110 is ideal for large-scale mobile backhaul and wholesale offerings of intelligent Carrier Ethernet 2.0 services.

Syncjack™ Timing Excellence

Including comprehensive Syncjack™ technology for timing distribution, monitoring and timing service assurance, the FSP 150CC-GE110 series opens new revenue opportunities from the delivery of SLA-based synchronization services. Offering unique flexibility, the series optionally supports Synchronous Ethernet and IEEE 1588v2. Traditional T1/E1- or GPS-based synchronization can now be replaced with highly accurate synchronization and controlled delivery of timing information across packet backhaul networks.

End-to-End Etherjack™ Service Assurance

The FSP 150CC-GE110 series is designed for highest service availability. Our Etherjack™ demarcation technology enables service providers to provide an intelligent Carrier Ethernet 2.0 service demarcation point at customer premises and cell site locations. It is compliant with the latest OAM standards such as 802.3ah, 802.1ag, Y.1731 and Y.1564. The FSP 150CC-GE110 also features synthetic frame loss and delay measurement for multi-point service monitoring. SLA verification functions are implemented in hardware and can be performed on a per-service basis to ensure strong latency, jitter and packet delivery performance for mission-critical applications.

Features & Benefits

- Designed for intelligent service demarcation at the edge of your network
- Ideal for large-scale mobile backhaul and wholesale Carrier Ethernet service deployment
- Flexible and advanced creation of SLA-backed and MEF-certifiable Carrier Ethernet 2.0 services
- Low-latency forwarding and high measurement resolution for assuring real-time services
- Etherjack™ demarcation technology for support of stringent SLAs and integration with a wide range of back-office support tools
- Comprehensive Syncjack™ technology for timing distribution and delivery of SLA-based synchronization services
- Power over Ethernet (PoE) for power sourcing multiple remote devices
Technical Information

Access Capacity
- Two/Four 10/100/1000BaseT or 100/1000BaseX (SFP) ports
- Power over Ethernet (PoE) on all four access ports (IEEE 802.3at and 802.3af)

Network Interface
- Two 10/100/1000BaseT or 100/1000BaseX (SFP) ports
- One network port can be defined as an additional access port

Network Interface Redundancy
- IEEE 802.3ad Link Aggregation – active/standby mode with optional load balancing
- ITU-T G.8031 Network Path Protection Switching

Synchronization
- ITU-T G.8261/G.8262/G.8264 Synchronous Ethernet on all interfaces
- Sync Status Message support
- IEEE 1588v2 Precision Time Protocol for Time of Day
- BITS Sync Status Messaging
- 1 PPS in/out
- 10 MHz

VLAN Support
- 4096 VLANs (IEEE 802.1Q customer-tagged) and stacked VLANs (Q-in-Q service provider tagged)
- 2-tag management (push/pop/swap) for c-tag and s-tag
- IEEE 802.1ad Provider Bridging (c-tag, s-tag)
- Ethertype translation
- 16/32 Ethernet Virtual Circuits (EVC)
- 9612 Byte per frame MTU transparency

Traffic Management
- Acceptable client frame policy: tagged or untagged
- Service classification based on IEEE 802.1p, 802.1Q and IP-TOS/DSCP
- VLAN tag priority mapping (IEEE 802.1ad PCP encoding)
- MEF-compliant policing (CIR/CBS/EIR/EBS) with 3-color marking and 8 classes of service
- Port shaping on transmit for both client and network ports

Ethernet OAM
- IEEE 802.3ah EFM-OAM Link Management
- IEEE 802.1aq Connectivity Fault Management (CFM) with hardware assistance
- ITU-T Y.1731 Performance Monitoring
- ITU-T Y.1564 Service Activation Testing
- Terminal and facility loopbacks on port- and EVC-level for all interfaces
- Cable diagnostics with benchmarks (electrical interfaces only)
- Embedded RFC 2544 test generator and analyzer (ECPA)
- MEF-compliant Layer 2 Control Protocol Disposition and extensive filter options for Layer 2 packet types
- Link Loss Forwarding to signal local link and network path failures
- Dying gasp message for power failure alarming (EFM-OAM and SNMP trap option)

Low-Touch Provisioning
- DHCP/BOOTP auto-configuration
- IEEE 802.1x port authentication
- Text-based configuration files
- TFTP for configuration file copy

Performance Monitoring
- RFC 2819 RMON Etherstats on a per-port and per-service basis
- 15-minute and 1-day performance data bins
- IEEE 802.3ah/ITU-T G.8021 PHY level monitoring
- ITU-T Y.1731 single- and dual-ended Frame Loss Measurement
- Synthetic Frame Loss and Delay Measurement for multi-port service monitoring
- Multi-CoS monitoring on EVCSs scaling up to 64/128 simultaneous SQAM flows
- Threshold-setting and threshold-crossing alerts
- Physical parameter monitoring for SFP optics, including TCAs
- Temperature monitoring and thermal alarms

Management and Security

Local Management
- Serial connector (RS232) using CLI
- Local LAN port (RS485) using CLI, SNMP and Web GUI interfaces
- 3G/LTE USB interface

Remote Management
- Maintains in-band VLAN and MAC-based management tunnels
- Fully interoperable with FSP 150CM, FSP 150EG-X and other FSP 150CC products

Management Protocols
- IPv4 and IPv6 DCN protocol stacks, including dual-stack operation and 6-over-4 tunnels
- Telnet, SSH (v1/v2), HTTP/HTTPS, SNMP (v1/v2c/v3)

Secure Administration
- Configuration database backup and restore
- System software download via FTP, HTTPS, SFTP or SCP (dual flash banks)
- Remote authentication via RADIUS/TACACS
- SNMPv3 with authentication and encryption
- Access Control List (ACL)

IP Routing
- DHCP, RIPv2 and static routes, ARP cache access control

System Logging
- Alarm log, audit log and security log

Regulatory and Standards Compliance
- MEF CE 2.0 certified
- IEEE 802.1Q (VLAN), 802.1p (Priority), 802.1ag (CFM), 802.3ah (EFM), 802.1x
- ITU-T Y.1731, G.8010/Y.1306, G.8011.1+2, G.8012, G.8031 (APS)
- MEF-6.1, 9, 10, 11, 14, 20, 21, 22, 23.1, 25, 26.1, 30, 33, 35
- IETF RFC 2544 (Frame Tests), RFC 2863 (IF-MIB), RFC 2865 (RADIUS), RFC 2819 (RMON)
- MEF-compliant ITU-T Y.1564 Service Activation Testing
- ANSI C84.1-1989
- ETSI 300 132-2, BTRN2511, ETS 300-019, ETS 300-019-2-[1,2,3], ETS 300-753
- NEBS Level 3 certified
- Telcordia GR-499, GR-63-CORE, SR-332
- Safety IEC/UL EN 60950, 21 CFR1040.10, EN 60825, EN 50371, EN 300-386, EN 50160, IEC 60320/C14
- EMI EN 300-386, GR-1089-CORE, ETS 300-132, FCC Part 15, Class A, Industry Canada

Environmental
- Dimensions: 1U compact chassis, 220mm x 44mm x 212mm / 8.7" x 1.75" x 8.4", 439mm x 44mm x 212mm / 17.3" x 1.75" x 8.4" (W x H x D)
- ETSI-compliant
- Operating temperature: -40 to +65°C (hardened environment)
- Storage temperature: -40 to +70°C (GR-63-CORE)
- Humidity: 5 to 95%, B1 (non-condensing)
- Integrated PSU 1-Redundant Modular PSU 1-5: 110/240VAC, -48 to -72VDC or +24 to +30VDC with over-voltage and over-current protection
- Maximum power consumption: 20 Watts / 200 Watts
- Dry alarm contacts

For more information please contact an ADVA Optical Networking consultant or visit us at www.advaoptical.com

Data Sheet, version 03/2014
Product Overview

The ADVA FSP 150CC family of Ethernet access products provides devices for Carrier Ethernet 2.0 service demarcation, extension and aggregation to support delivery of intelligent Ethernet services both in-region and out-of-region. These include the extension of Carrier Ethernet 2.0 services over available fiber, PDH and SONET/SDH facilities. The FSP 150CC family allows service providers to ubiquitously deliver differentiated Ethernet services in business, mobile backhaul and open access applications.

End-to-End Etherjack™ Service Assurance
The FSP 150CC is designed for highest service availability. ADVA Optical Networking’s Etherjack™ demarcation technology enables service providers to provide an intelligent Carrier Ethernet 2.0 service demarcation point, compliant with the latest OAM standards such as 802.3ah, 802.1ag, Y.1731, and Y.1564. Services can be remotely monitored and managed with a minimal number of truck rolls. The sophisticated and MEF 2.0-certified UNI function of the FSP 150CC includes support for a large number of EVCs and hierarchical QoS management. SLA verification can be performed on a per-service basis to ensure strong latency, jitter and packet delivery performance for mission-critical applications.

Syncjack™ Timing Excellence
The comprehensive Syncjack™ technology for timing distribution, monitoring and timing service assurance opens new revenue opportunities from the delivery of SLA-based synchronization services. Offering unique flexibility, the FSP 150CC simultaneously supports Synchronous Ethernet and IEEE 1588v2 with multiple timing domains across packet backhaul networks. Traditional T1/E1- or GPS-based synchronization can now be replaced with highly accurate synchronization and controlled timing over packet.

Scalability for Wholesale Deployment
As Carrier Ethernet networks scale, low-touch provisioning capabilities become essential to ensure cost-efficient service rollout and to significantly reduce the need for truck rolls. With the extensive set of standards-based auto-configuration functions and remote OAM capabilities built into the FSP 150CC, unskilled craft personnel can install and turn-up services without onsite provisioning. Combined with the FSP 150EG-X, an edge gateway device purpose-built for service aggregation and handover in central office environments, the FSP 150CC family is ideal for large-scale mobile backhaul and wholesale offerings.

Features & Benefits

- Enables MEF-certifiable E-Line, E-LAN, E-tree and E-Access Carrier Ethernet 2.0 services for business, mobile backhaul and open-access applications
- Comprehensive UNI for advanced service definition and service intelligence, fundamental to integrated service delivery
- Etherjack™ demarcation technology for support of stringent SLAs and integration with a wide range of back-office support tools
- Comprehensive Syncjack™ technology for timing distribution and delivery of SLA-based synchronization services
- Low-touch provisioning capability via in-band management ensures that unskilled craft personnel can install and turn-up services without any onsite provisioning
## Ethernet over TDM

<table>
<thead>
<tr>
<th>Applications</th>
<th>Service I/F</th>
<th>Network I/F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligent Ethernet service extension over up to eight T1/E1s for services up to 12 or 16Mbit/s</td>
<td>2 ports 10/100/1000BaseT or 100/1000BaseX and 2 ports 10/100BaseT</td>
<td>8 x T1/E1 bonding using VCAT/LCAS</td>
</tr>
<tr>
<td>Intelligent Ethernet service extension over one or two T3/E3s for services up to 90 or 68Mbit/s</td>
<td>2 ports 10/100/1000BaseT or 100/1000BaseX and 2 ports 10/100 BaseT</td>
<td>2 x T3/E3 bonding using VCAT/LCAS</td>
</tr>
</tbody>
</table>

## Native Ethernet

<table>
<thead>
<tr>
<th>Applications</th>
<th>Service I/F</th>
<th>Network I/F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligent Ethernet service demarcation and extension over fiber for services up to 1Gbit/s</td>
<td>4 ports 10/100BaseT and 1 port 10/100/1000BaseT or 100/1000BaseX</td>
<td>Protected 100/1000 BaseT or 100/1000BaseX</td>
</tr>
<tr>
<td>Cost-effective delivery of intelligent Ethernet services and synchronization over fiber</td>
<td>4 ports 10/100/1000BaseT or 100/1000BaseX and Power over Ethernet</td>
<td>Protected 100/1000BaseT or 100/1000BaseX</td>
</tr>
<tr>
<td>Delivery of intelligent wholesale Ethernet services and synchronization over fiber</td>
<td>1 port 10/100/1000BaseT or 100/1000BaseX</td>
<td>Protected 100/1000BaseT or 100/1000BaseX</td>
</tr>
<tr>
<td>Delivery of intelligent Ethernet services and highly accurate synchronization over fiber</td>
<td>6 ports 10/100/1000BaseT or 100/1000BaseX</td>
<td>Protected 100/1000BaseX</td>
</tr>
<tr>
<td>Demarcation and aggregation of intelligent high capacity Ethernet services</td>
<td>Up to 2 ports 10GBaseX and 16 ports 1000BaseX</td>
<td>Protected 10GBaseX</td>
</tr>
</tbody>
</table>

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Data Sheet, version 03/2014
Product Overview

The FSP 150CC-825 provides Carrier Ethernet service extension over fiber for service providers looking to deploy intelligent and differentiated services. The device can work with ADVA Optical Networking’s aggregation platform, with industry-standard data switches and routers and in book-ended applications. With five Ethernet service ports and advanced service definition capabilities, the FSP 150CC-825 is capable of supporting multiple customers and multiple services over a shared network connection. Network interface protection and redundant power supplies ensure highest service availability.

Service Intelligence

The sophisticated and MEF-certified UNI function is designed for highest performance and provides the service intelligence necessary to offer a differentiated Carrier Ethernet service portfolio. Rate limitation, scheduling and shaping per EVC and CoS allows service providers to maintain QoS commitments and ensure fair bandwidth distribution even when network resources are over-subscribed or congested. The FSP 150CC-825 supports a large number of EVCs and hierarchical QoS management to support all E-Line, E-LAN and E-Tree applications. It enables service providers to deliver Ethernet services that can be remotely configured, monitored and managed.

End-to-End Etherjack™ Service Assurance

The FSP 150CC-825 is designed for highest service availability and scalability. ADVA Optical Networking’s patent-pending Etherjack™ demarcation technology enables service providers to provide an intelligent Carrier Ethernet service demarcation point, compliant with the latest OAM standards such as 802.3ah, 802.1ag, Y.1731 and RFC 2544. SLA verification can be performed on a per-service basis to ensure high latency, jitter and packet delivery performance for mission-critical applications. With its in-service and out-of-service loopback testing capability, service verification can be performed at turn-up and on-demand without service interruption.

Scalability for Wholesale Deployment

As Carrier Ethernet networks scale, low-touch provisioning capabilities become essential to ensure cost-efficient service rollout and to significantly reduce the need for truck rolls. With the extensive set of standards-based auto-configuration functions and remote OAM capabilities built into the FSP 150CC-825, unskilled craft personnel can install and turn-up services without onsite provisioning.

Features & Benefits

- Optimized for MEF-certifiable business Ethernet and Internet access services with advanced service intelligence for integrated service delivery
- MEF-certified UNI implementation with hierarchical traffic management for advanced service definition and low-latency forwarding
- Etherjack™ demarcation technology for support of stringent SLAs and integration with a wide range of back-office support tools
- Low-touch provisioning capability to ensure that unskilled craft personnel can install and turn-up services without any onsite provisioning
- Network interface protection and redundant power supplies match requirements for highest service availability
Access Capacity
- 4 ports 10/100BaseT ports plus 1 port 10/100/1000BaseT or 100/1000BaseX (SFP)

Network Interface
- 2 ports 100/1000BaseT or 100/1000BaseX (SFP)

Network Interface Redundancy
- LAG Active/Standby

VLAN Support
- 4096 VLANs (IEEE 802.1Q customer-tagged) and stacked VLANs (Q-in-Q service provider-tagged)
- 2-tag management (push/pop/swap) for c-tag and s-tag
- IEEE 802.1ad Provider Bridging (c-tag, s-tag)
- Ethertype translation

Traffic Management
- Acceptable client frame policy: tagged or untagged
- Service classification based on 802.1p, 802.1Q and IP-TOS/DSCP
- MEF-compliant policing (CIR/CBS/EIR/EBS) with 3-color marking and 8 classes of service
- Hierarchical queuing and shaping
- Port shaping on transmit for both client and network ports

Ethernet OAM
- IEEE 802.3ah EFM-OAM Link Management
- IEEE 802.1ag Connectivity Fault Management (CFM)
- ITU-T Y.1731 Performance Monitoring
- Terminal and facility loopbacks on port- and EVC-level for all interfaces
- Cable diagnostics with benchmarks (electrical interfaces only)
- Embedded RFC 2544 test generator and analyzer (ECPA)
- Multi-vendor SLA monitoring with UDP/ICMP echo and ICMP timestamp (ESA)
- MEF-compliant Layer 2 Control Protocol Disposition and extensive filter options for Layer 2 packet types
- Link Loss Forwarding to signal local link and network path failures
- Dying gasp message for power failure alarming

Performance Monitoring
- RFC 2819 RMON Etherstats on a per-port and per-service basis
- 15-minute and 1-day performance data bins
- IEEE 802.3ah/ITU-T Y.8021 PHY level monitoring
- ITU-T Y.1731 single- and dual-ended Frame Loss Measurement
- Multi-CoS monitoring on EVCs
- Threshold-setting and threshold-crossing alerts
- Physical parameter monitoring for SFP optics, including TCAs
- Temperature monitoring and thermal alarms

Low-Touch Provisioning
- DHCP/BOOTP auto-configuration
- 802.1x port authentication
- Text-based configuration files
- TFTP for configuration file copy

Management and Security

Local Management
- Serial connector (RJ45) using CLI
- Local LAN port (RJ45) using CLI, SNMP and Web GUI interfaces

Remote Management
- Maintains in-band VLAN and MAC-based management tunnels
- Full interoperability with FSP 150CM and FSP 150CC products

Management Protocols
- Telnet, SSH (v1/v2), HTTP/HTTPS, SNMP (v1/v2c/v3)

Secure Administration
- Configuration database backup and restore
- System software download via FTP, HTTPS, SFTP or SCP (dual flash banks)
- Remote authentication via RADIUS/TACACS
- SNMPv3 with authentication and encryption
- Access Control List (ACL)

IP Routing
- DHCP, RIPv2 and static routes, ARP cache access control

Regulatory and Standards Compliance
- IEEE 802.1Q (VLAN), 802.1p (Priority), 802.1ag (CFM), 802.3ah (EFM), 802.1x
- ITU-T Y.1731, G.8010/Y.1306, G.8011.1+2, G.8012, G.8031 (APS)
- MEF-6, MEF-9, MEF-10.1, MEF-14, MEF-21
- IETF RFC 2544 (Frame Tests), RFC 2863 (IF-MIB), RFC 2865 (RADIUS), RFC 2819 (RMON)
- ANSI C84.1-1989
- ETSI 300 132-2, BTNR2511, ETS 300-019, ETS 300-019-2-[1,2,3], ETS 300-753
- NEBS Level 3 certified
- Telcordia GR-499, GR-63-CORE, SR-332
- Safety IEC/UL/EN 60950, 21CFR1040.10, EN 60825, EN 50371, EN 300-386, EN 50160, IEC 60320/C14
- EMI EN 300-386, GR-1089-CORE, ETS 300-132, FCC Part 15, Class A, Industry Canada

Environmental
- Dimensions: 1U compact chassis, 439mm x 43mm x 269mm / 17.3” x 1.7” x 10.6” (W x H x D), ETSI-compliant
- Operating temperature: 0 to +50°C
- Storage temperature: -40 to +70°C (GR-63-CORE)
- Humidity: 5 to 95%, B1 (non-condensing)
- Modular AC-PSU: 90 to 264VAC (47 to 63Hz) with over-voltage and over-current protection
- Modular DC-PSU: -36 to -72VDC or +18 to +30VDC with over-voltage and over-current protection
- Maximum power consumption: 25 Watts
Product Overview

Optimized for mobile backhaul applications, the FSP 150CC-GE206 enables cost-effective delivery of Carrier Ethernet 2.0 services and highly accurate synchronization over fiber-based access networks. With six Ethernet service ports plus two expansion slots for personality modules, the FSP 150CC-GE206 is capable of supporting multiple customers or service configurations. The optional personality module slots support additional Ethernet ports or circuit emulation modules for T1/E1 services. Network interface protection, redundant power supplies and the temperature-hardened design ensure highest service availability.

Syncjack™ Timing Excellence

Its comprehensive Syncjack™ technology for timing distribution, monitoring and timing service assurance opens new revenue opportunities from the delivery of SLA-based synchronization services. Offering unique flexibility, the FSP 150CC-GE206 simultaneously supports Synchronous Ethernet, IEEE 1588v2 and has a built-in GPS receiver. Traditional T1/E1-based synchronization can now be replaced with highly accurate synchronization and controlled timing over packet. An internal Stratum-3 clock is capable of holdover to support remote site, head-end and feeder applications.

End-to-End Etherjack™ Service Assurance

The FSP 150CC-GE206 is designed for highest service availability. ADVA Optical Networking’s Etherjack™ demarcation technology enables service providers to provide an intelligent Carrier Ethernet 2.0 service demarcation point, compliant with the latest OAM standards such as 802.3ah, 802.1ag, Y.1731 and Y.1564. The FSP 150CC-GE206 also features synthetic frame loss and delay measurement for multi-point service monitoring. The sophisticated and MEF-certified UNI function includes support for a large number of EVCs and hierarchical QoS management. SLA verification can be performed on a per-service basis to ensure strong latency, jitter and packet delivery performance for mission-critical applications.

Real-Time Performance Data and Live Analysis

High-performance trading applications drive performance management functions that go well beyond traditional Ethernet service demarcation. They include the ability to monitor service performance in real-time and to analyze critical transactions at microsecond level. The FSP 150CC-GE2061 provides enhanced real-time streaming of performance data on micro-burst traffic conditions. In addition, data of interest can be filtered and mirrored to dedicated destinations for remote analysis in real-time.

Features & Benefits

- Optimized for intelligent mobile backhaul Carrier Ethernet 2.0 applications and seamless migration from 3G to 4G radio access
- MEF 2.0-certified UNI/NNI implementation with hierarchical traffic management for advanced service definition and low-latency forwarding
- Comprehensive Syncjack™ technology for timing distribution and delivery of SLA-based synchronization services
- Etherjack™ demarcation technology for support of stringent SLA monitoring, including real-time streaming of performance data
- Traffic mirroring with truncation and highly accurate timestamp options for sub-microsecond analysis of critical data transactions
Technical Information

Access Capacity
- 6 ports 10/100/1000BaseX (SFP) or 3 ports 10/100/1000BaseT, plus 3 ports 100/1000BaseX (SFP)
- Optional 16 or 32 T1/E1 circuit emulation ports
- Optional 4 or 8 GbE port expansion module

Network Interface
- 2 ports 100/1000BaseX (SFP)

Network Interface Redundancy
- IEEE 802.3ad Link Aggregation – active/standby mode with optional load balancing
- ITU-T G.8031 Network Path Protection Switching
- ITU-T G.8032 Ethernet Ring Protection Switching

Synchronization
- ITU-T G.8261/G.8262/G.8264 Synchronous Ethernet on all interfaces
- Sync Status Message support
- IEEE 1588v2 Precision Time Protocol
- BITS-in and BITS-out
- BITS Sync Status Messaging
- External time-of-day input and 10MHz input/output (1PPS, ToD)
- Internal Stratum-3 clock with holdover
- Built-in GPS receiver

T1/E1 Circuit Emulation
- Channelized (CESoPSN): CES, DB-CES, FR, HDLC, IPoFR/C-HDLC/PPP
- Un-channelized (SATOP): CES, HDLC, IPoFR/C-HDLC/PPP (V.35 or RS-530)

VLAN Support
- 4096 VLANs (IEEE 802.1Q customer-tagged) and stacked VLANs (Q-in-Q service provider-tagged)
- 2-tag management (push/popswap) for c-tag and s-tag
- IEEE 802.1ad Provider Bridging (c-tag, s-tag)
- Ethertype translation

Traffic Management
- Acceptable client frame policy: tagged or untagged
- Service classification based on 802.1p, 802.1Q and IP-TOS/DSCP
- MEF-compliant policing (CIR/CBS/EIR/EBS) with 3-color marking and 8 classes of service
- Hierarchical queuing and shaping
- Port shaping on transmit for both client and network ports

Ethernet OAM
- IEEE 802.3ah EFM-OAM Link Management
- IEEE 802.1ag Connectivity Fault Management (CFM) with hardware assistance
- ITU-T Y.1731 Performance Monitoring
- Y.1564 Service Activation Testing
- Terminal and facility loopbacks on port- and EVC-level for all interfaces
- Cable diagnostics with benchmarks (electrical interfaces only)
- Embedded RFC 2544 test generator and analyzer (ECPA)
- MEF-compliant Layer 2 Control Protocol Disposition and extensive filter options for Layer 2 packet types
- Link Loss Forwarding to signal local link and network path failures
- Dying gasp message for power failure alarming (EFM-OAM and SNMP trap option)

Performance Monitoring
- RFC 2819 RMON Etherstats on a per-port and per-service basis
- 15-minute and 1-day performance data bins
- IEEE 802.3ah/ITU-T G.8021 PHY level monitoring
- ITU-T Y.1731 single- and dual-ended Frame Loss Measurement
- Synthetic Frame Loss and Delay Measurement for multi-point service monitoring
- Multi-CoS monitoring on EVCs scaling up to 512 simultaneous flows
- Threshold-setting and threshold-crossing alerts

- Physical parameter monitoring for SFP optics, including TCAs
- Temperature monitoring and thermal alarms

Enhanced Diagnostics and Real-Time Performance Management
- Port-based traffic mirror with frame truncation and highly accurate timestamp options to facilitate sub-microsecond analysis
- Enhanced TWAMP-like service monitoring with 10 msec granularity and real-time streaming for instantaneous performance analysis

Low-Touch Provisioning
- DHCP/BOOTP auto-configuration
- IEEE 802.1x port authentication
- Text-based configuration files
- TFTP for configuration file copy

Management and Security

Local Management
- Serial connector (RJ45) using CLI
- Local LAN port (RJ45) using CLI, SNMP and Web GUI interfaces

Remote Management
- Maintains in-band VLAN and MAC-based management tunnels
- Full interoperable with FSP 150CM and FSP 150CC products

Management Protocols
- IPv4 and IPv6 DCN protocol stacks, including dual-stack operation and 6-over-4 tunnels
- Telnet, SSH (v1/v2), HTTP/HTTPS, SNMP (v1/v2c/v3)

Secure Administration
- Configuration database backup and restore
- System software download via FTP, HTTPS, SFTP or SCP (dual flash banks)
- Remote authentication via RADIUS/TACACS
- SNMPv3 with authentication and encryption
- Access Control List (ACL)

IP Routing
- DHCP, RIPv2 and static routes, ARP cache access control

System Logging
- Alarm log, audit log and security log

Regulatory and Standards Compliance
- MEF CE 2.0 certified
- IEEE 802.1Q (VLAN), 802.1p (Priority), 802.1ag (CFM), 802.3ah (EFM), 802.1x
- ITU-T G.8131.1, G.8101/Y.1306, G.8011.1+2, G.8012, G.8031 (APS)
- MEF-6.1, 9, 10, 11, 14, 20, 21, 22.1, 23.1, 25, 26.1, 30, 33, 35
- IETF RFC 2544 (Frame Tests), RFC 2863 (IF-MIB), RFC 2865 (RADIUS), RFC 2819 (ROMON)
- MEF-compliant ITU-T Y.1564 Service Activation Testing
- ANSI C84.1-1989
- ETSI 300 132-2, BTNR2511, ETS 300-019, ETS 300-019-2-[1,2,3], ETS 300-753
- NEBS Level 3 certified
- Telcordia GR-499, GR-63-CORE, SR-332
- Safety IEC/UL/EN 60950, 21CFR1040.10, EN 60825, EN 50371, EN 300-386, EN 50160, IEC 60322/C14
- EM EMI EN 300-386, GR-1089-CORE, ETS 300-132, FCC Part 15, Class A, Industry Canada

Environmental
- Dimensions: 1U compact chassis, 439mm x 433mm x 269mm / 17.3” x 17.5” x 10.6” (W x H x D), ETSI-compliant
- Maximum power consumption: 70 Watts
- Modular DC-PSU: -36 to -72VDC or +18 to +30VDC with over-voltage and over-current protection
- Built-in GPS receiver
- Internal Stratum-3 clock with holdover
- External time-of-day input and 10MHz input/output (1PPS, ToD)
- IEEE 1588v2 Precision Time Protocol
- BITS-in and BITS-out
- BITS Sync Status Messaging
- External time-of-day input and 10MHz input/output (1PPS, ToD)
- Internal Stratum-3 clock with holdover
- Built-in GPS receiver

FSP 150CC-GE206V

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Product Overview

The FSP 150CC-XG210 provides a high-capacity 10 Gigabit Carrier Ethernet aggregation solution enabling cost-effective delivery of Carrier Ethernet 2.0 services and highly accurate synchronization over fiber-based access networks. The non-blocking design supports traffic aggregation from up to 16 GbE ports and/or two 10GbE ports provided on hot-swappable access interface modules. Network interface protection, redundant power supplies and the temperature-hardened design ensure highest service availability.

Flexible Deployment Option

Designed for flexibility and scalability, the FSP 150CC-XG210 can be deployed in point-to-point, hub-and-spoke and resilient access ring topologies. It can be used to provide an intelligent Ethernet service demarcation point and can act as a scalable central aggregation solution for other FSP 150CC devices. With its multitude of carrier-class protection and resiliency options, the FSP 150CC-XG210 supports the delivery of differentiated and highly reliable Carrier Ethernet 2.0 services across all access network topologies. Both LAN PHY and WAN PHY modes support deployment in Ethernet and SONET/SDH networks.

Syncjack™ Timing Excellence

Its comprehensive Syncjack™ technology for timing distribution, monitoring, testing and timing service assurance opens new revenue opportunities from the delivery of SLA-based synchronization services. Offering unique flexibility, the FSP 150CC-XG210 simultaneously supports Synchronous Ethernet and IEEE 1588v2 across packet backhaul networks. With its comprehensive IEEE 1588v2 implementation, the FSP 150CC-XG210 can be configured to operate in Slave, Transparent Clock and Boundary Clock mode to enable highly accurate clock recovery.

End-to-End Etherjack™ Service Assurance

The FSP 150CC-XG210 is designed for highest service availability. ADVA Optical Networking’s Etherjack™ demarcation technology enables service providers to provide an intelligent Carrier Ethernet 2.0 service demarcation point, compliant with the latest OAM standards such as 802.3ah, 802.1ag, Y.1731 and Y.1564. The FSP 150CC-XG210 also features synthetic frame loss and delay measurement for multi-point service monitoring. The sophisticated and MEF 2.0-certified UNI function includes support for a large number of EVCs, as well as hierarchical QoS management. SLA verification can be performed on a per-service basis to ensure strong latency, jitter and packet delivery performance for mission-critical applications.

Features & Benefits

- Optimized for high-speed Carrier Ethernet 2.0 access and aggregation applications supporting up to 20Gbit/s of backhaul capacity
- Hot-swappable access interface modules for fast and flexible in-service adaptation to customer interface and service requirements
- MEF 2.0-certified UNI/NNI implementation with hierarchical traffic management scaling up to 1024 Ethernet Virtual Connections simultaneously
- Comprehensive Syncjack™ technology for timing distribution and delivery of SLA-based synchronization services
- Etherjack™ demarcation technology for support of stringent SLAs and integration with a wide range of back-office support tools
Technical Information

Access Capacity
- Two slots for access interface modules with hot swap support
- 1 x 10GE (XFP/SFP+) module
- 8 x 1GE (SFP) module

Network Interface
- Two ports 10GE (XFP)

Network Interface Redundancy
- IEEE 802.3ad Link Aggregation – active/standby mode with optional load balancing
- ITU-T G.8031 Network Path Protection Switching
- ITU-T G.8032 Ethernet Ring Protection Switching

Synchronization (optional)
- ITU-T G.8261/G.8262/G.8264 Synchronous Ethernet on all interfaces
- Sync Status Message support
- IEEE 1588v2 Precision Time Protocol (Transparent, Slave and Boundary Clock Mode)
- Multiple IEEE 1588v2 clock domains
- BITS-in and BITS-out
- BITS Sync Status Messaging
- Input/output selectable ports for Time of Day, 10MHz clock and Pulse-Per-Second signals (1PPS)
- Internal Stratum-3 clock with holdover

VLAN Support
- 4096 VLANs (IEEE 802.1Q customer-tagged) and stacked VLANs (Q-in-Q service provider tagged)
- 2-tag management (push/pop/swap) for c-tag and s-tag
- IEEE 802.1ad Provider Bridging (c-tag, s-tag)
- Ethertype translation
- 1024 Ethernet Virtual Circuits (EVC)
- 9612 Byte per frame MTU transparency

Traffic Management
- Acceptable client frame policy: tagged or untagged
- Service classification based on 802.1p, 802.1Q and IP-TOS/DSAP
- MEF-compliant policing (CIR/CBS/EIR/EBS) with 3-color marking and 8 classes of service
- Hierarchical queuing and shaping
- Rate shaping on transmit for both client and network ports

Ethernet OAM
- IEEE 802.3ah EFM-OAM Link Management
- IEEE 802.1ag Connectivity Fault Management (CFM) with hardware assistance
- ITU-T Y.1731 Performance Monitoring
- ITU-T Y.1564 Service Activation Testing
- Terminal and facility lookbacks on port- and EVC-level for all interfaces
- Embedded RFC 2544 test generator and analyzer (ECPA)
- MEF-compliant Layer 2 Control Protocol Disposition and extensive filter options for Layer 2 packet types
- Link Loss Forwarding to signal local link and network path failures
- Dying gas message for power failure alarming (EFM-OAM and SNMP trap option)
- Environmental alarm inputs (dry contacts)

Low-Touch Provisioning
- DHCP/BOOTP auto-configuration
- IEEE 802.1x port authentication
- Text-based configuration files
- TFTP for configuration file copy

Performance Monitoring
- RFC 2819 RMON Etherstats on a per-port and per-service basis
- 15-minute and 1-day performance data bins
- IEEE 802.3ah/ITU-T G.8021 PHY level monitoring
- ITU-T Y.1731 single- and dual-ended Frame Loss Measurement
- Synthetic Frame Loss and Delay Measurement for multi-point service monitoring
- Multi-CoS monitoring on EVCs scaling up to 4096 simultaneous flows
- Threshold-setting and threshold-crossing alerts
- Physical parameter monitoring for XFP/SFP+ optics, including TCAs
- Temperature monitoring and thermal alarms

Management and Security

Local Management
- Serial connector (RJ45) using CLI
- Local LAN port (RJ45) using CLI, SNMP and Web GUI interfaces

Remote Management
- Maintains in-band VLAN and MAC-based management tunnels
- Full interoperable with FSP 150CM and FSP 150CC products

Management Protocols
- IPv4 and IPv6 DCN protocol stacks, including dual-stack operation and 6-over-4 tunnels
- Telnet, SSH (v1/v2), HTTP/HTTPS, SNMP (v1/v2c/v3)

Secure Administration
- Configuration database backup and restore
- System software download via FTP, HTTP, SFTP or SCP (dual flash banks)
- Remote authentication via RADIUS/TACACS
- SNMPv3 with authentication and encryption
- Access Control List (ACL)

IP Routing
- DHCP, RIPv2 and static routes, ARP cache access control

System Logging
- Alarm log, audit log and security log

Regulatory and Standards Compliance
- MEF CE 2.0 certified
- IEEE 802.1Q (VLAN), 802.1p (Priority), 802.1ag (CFM), 802.3ah (EFM), 802.1x
- ITU-T Y.1731, G.8010/Y.1306, G.8011.1+2, G.8012, G.8031 (APS)
- MEF-6.1, 9, 10, 11, 14, 20, 21, 22.1, 23.1, 25, 26.1, 30, 33, 35
- IETF RFC 2544 (Frame Tests), RFC 2863 (IF-MIB), RFC 2865 (RADIUS), RFC 2819 (RMON)
- MEF-compliant ITU-T Y.1564 Service Activation Testing
- ANSI C84.1-1989
- ETSI 300 132-2, BTNR2511, ETS 300-019, ETS 300-019-2-[[1,2,3], ETS 300-753
- NEBS Level 3 certified
- Telcordia GR-499, GR-63-CORE, SR-332
- Safety IEC/UL/EN 60950, 21CFR1040.10, EN 60825, EN 50371, EN 300-386, EN 50160, IEC 60320/C14
- EMU EN 300-386, GR-1089-CORE, ETS 300-132, FCC Part 15, Class A, Industry Canada

Environmental
- Dimensions: 1U compact chassis, 439mm x 43mm x 269mm / 17.3” x 1.75” x 10.6” (W x H x D), ETSI-compliant
- Operating temperature: -40 to +65°C (hardened environment)
- Storage temperature: -40 to +70°C (GR-63-CORE)
- Humidity: 5 to 95%, B1 (non-condensing)
- Modular AC-PSU: 90 to 264VAC (47 to 63Hz) with over-voltage and over-current protection
- Modular DC-PSU: -17 to -48VDC or +18 to +30VDC with over-voltage and over-current protection
- Maximum power consumption: 100 Watts

For more information please contact an ADVA Optical Networking consultant or visit us at www.advaoptical.com

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Product Overview

The FSP 150EG-X is an edge gateway purpose-built to deliver cost-effective capacity, scalability and resiliency for Carrier Ethernet 2.0 service aggregation and handover in a central office or other high-density environments. The high-capacity, non-blocking edge gateway provides a central aggregation solution for FSP 150CC Carrier Ethernet demarcation devices. It acts as a timing gateway for synchronization services and includes the termination of circuit emulation services. The FSP 150EG-X enables service providers to scale their Carrier Ethernet 2.0 backhaul offering to address larger applications while providing a manageable, cost-effective platform that is optimized to deliver intelligent services. With 24 slots that accept a variety of module types, the FSP 150EG-X can address different access technologies, including fiber, PDH and SONET/SDH of various rates. The FSP 150EG-X enables a high degree of resiliency at the service and equipment level for mission-critical Carrier Ethernet 2.0 backhaul applications.

End-to-End Etherjack™ Service Assurance

The FSP 150EG-X seamlessly integrates into any Carrier Ethernet OAM landscape. ADVA Optical Networking’s Etherjack™ technology enables service providers to provide intelligent service assurance, compliant with the latest OAM standards such as 802.3ah, 802.1ag, Y.1731 and Y.1564. With its ultra-fast, hardware-based processing capabilities, the FSP 150EG-X performs SLA verification with maximum precision and robust scalability. The MEF 2.0-certified UNI/NNI function includes support for hierarchical QoS management.

Syncjack™ Timing Excellence

Its comprehensive Syncjack™ technology for timing distribution, monitoring and timing service assurance opens new revenue opportunities from the delivery of SLA-based synchronization services. Acting as a timing gateway, the FSP 150EG-X simultaneously supports Synchronous Ethernet and IEEE 1588v2 across packet backhaul networks. Traditional T1/E1- or GPS-based synchronization can be replaced by precise synchronization with nanosecond accuracy and controlled timing over packet.

Ethernet Service Management

The FSP 150EG-X provides a consistent design model, facilitating scalability and highest service availability in access and backhaul applications. With its integration into ADVA Optical Networking’s field-proven and service-aware FSP Service Manager, the FSP 150EG-X facilitates operational efficiency and high-velocity service rollout for mobile backhaul, wholesale access and business applications. It offers the simplicity to support thousands of Carrier Ethernet 2.0 services and enables service providers to keep pace with the constantly increasing demand for bandwidth and next-generation services.

Features & Benefits

- Optimized for ENNI demarcation, fulfilling service hand-off requirements in open access, mobile backhaul and business Carrier Ethernet 2.0 applications
- Etherjack™ technology for solid service OAM performance, supporting a large number of monitored services and flows
- Comprehensive Syncjack™ gateway technology for timing distribution and delivery of SLA-based synchronization services
- Consistent design model for end-to-end Ethernet service management in combination with FSP 150CC products
- High degree of resiliency at the service and equipment level for backhaul network solutions, enabling highest service availability
System Capacity
- 140G centralized, full duplex switch fabric
- 24 single-width/12 double-width data traffic slots
- Dedicated slots for switch fabric, shelf controller unit and timing module

Redundancy
- Redundant switch fabric, shelf controller and timing module
- Dual power supplies
- Three modular fan trays

Network Topology
- Linear point-to-point, hub-and-spoke, ring and mesh topologies

Traffic Modules
- 36 x 10/100BaseT (Mini RJ-21)
- 10 x 100/1000BaseX (SFP)
- 1 x 10GBaseX (XFP) LAN/WAN-PHY
- 4 x OC-3/STM-1 channelized or 1+1 OC-12/STM-4 channelized for EoSONET/SDH
- 4 x OC-3/STM-1 channelized or 1+1 OC-12/STM-4 channelized for E1/T1 PWE3/SAToP

Protection and Resiliency
- IEEE 802.3ad Link Aggregation – active/standby mode with optional load balancing
- ITU-T G.8031 Network Path Protection Switching
- ITU-T G.8032 Ethernet Ring Protection Switching
- 1+1 SONET/SDH Linear Protection Switching

VLAN Support
- 4096 VLANs per port
- 2000 VLAN-based EVCs system-wide
- IEEE 802.1Q customer-tagged and stacked VLANs (Q-in-Q)
- 2-tag management (push/pop/swap) for c-tag and s-tag
- IEEE 802.1ad Provider Bridging (c-tag, s-tag)
- Configurable TPID for Q-in-Q frames

Traffic Management
- Acceptable client frame policy: tagged or untagged
- Service classification based on 802.1p, 802.1Q and IP-TOS/DSCP
- MEF-compliant policing (CIR/CBS/EIR/EBS) with 3-color marking and 8 classes of service
- Hierarchical queuing and shaping

Ethernet OAM
- IEEE 802.3ah EFM-OAM Link Management
- IEEE 802.1ag Connectivity Fault Management (CFM)
- ITU-T Y.1731 Performance Monitoring
- ITU-T Y.1564 Service Activation Testing
- Terminal and facility loopbacks on port- and VLAN-level for all interfaces
- Cable diagnostics with benchmarks (electrical interfaces only)
- MEF-compliant Layer 2 Control Protocol Disposition
- Link Loss Forwarding for local link and network path failures

Performance Monitoring
- RFC 2819 RMON Etherstats on a per-port and per-service basis
- 5-minute, 15-minute and 1-day performance data bins
- ITU-T Y.1731 Frame Loss and Delay Measurement
- Synthetic Frame Loss and Delay Measurement
- Multi-CoS monitoring on EVCs
- Threshold-setting and threshold-crossing alerts
- Physical parameter monitoring for SFP optics, including TCAs

Synchronization
- ITU-T G.8261/G.8262/G.8264 SyncE on all interfaces
- Sync Status Message support
- IEEE 1588v2 PTP for Time-of-Day and frequency distribution
- Dual BITS-in and BITS-out with BITS Sync Status Messaging
- Time-of-day input/output (1PPS, T0D) and 10MHz input/output
- Hardware-based time-stamping with nanosecond accuracy
- NTP client-mode operation supporting multiple servers

Low-Touch Provisioning
- DHCP/BOOTP auto-configuration
- IEEE 802.1x port authentication
- Text-based configuration files and TFTP for configuration file copy

Management and Security
Local Management
- Serial connector (RS-232/RJ45) using CLI
- Two DCN LAN ports (RJ45) for DCN redundancy
- Local LAN port (RJ45) using CLI, SNMP and Web GUI interfaces

Remote Management
- Maintains VLAN and MAC-based management tunnels
- Interoperability with FSP 150CP via EFM OAM extensions

Protocols
- Telnet, SSH (v2), HTTP/HTTPS, SNMP (v1/v3)

Secure Administration
- Configuration database backup and restore
- System software download via FTP, HTTPS, SFTP or SCP
- Remote authentication via RADIUS
- SNMPv3 with authentication and encryption
- Access Control List (ACL)

IP Routing
- DHCP, RIPv2 and static routes, ARP cache access control

System Logging
- Alarm log, audit log and security log

Regulatory and Standards Compliance
- MEF CE 2.0 certified
- IEEE 802.1Q (VLAN), 802.1p (Priority), 802.1ag (CFM), 802.3ah (EFM), 802.1x
- ITU-Y.1731, Q.8011/Y.1306, Q.8011.1+2, Q.8012, Q.8031 (APS)
- MEF-6.1, 9, 10.2, 11, 14, 20, 21, 22.1, 23.1, 25, 26, 30, 33, 35
- IETF RFC 2544 (Frame Tests), RFC 2863 (IF-MIB), RFC 2865 (RADIUS), RFC 2819 (RMON)
- MEF-compliant ITU-T Y.1564 Service Activation Testing
- ANSI C84.1-1999
- ETSI 300 132-2, BTNR5211, ETS 300-019/-019-2-[1,2,3]/-753
- NEBS Level 3 certified
- Telcordia GR-499, GR-63-CORE, SR-332
- Safety IEC/UL/EN 60950, 21CFR1040.10, EN 60825, EN 50371, EN 300-386, EN 50160, IEC 60320/C14
- EMI EN 300-386, GR-1089-CORE, ETS 300-132, FCC Part 15, Class B, Industry Canada

Environmental
- Dimensions: 10U Chassis, 443mm x 444mm x 277mm/17.4" x 17.5" x 10.9" (W x H x D), ETSI-compliant
- Operating temperature: +0 to +45°C
- Storage temperature: -40 to +70°C (GR-63-CORE)
- Humidity: 5 to 95%, 81 (non-condensing)
- Modular DC-PSU: -36 to -72VDC with over-voltage and over-current protection
- Modular AC-PSU: 90 to 264VAC with over-voltage and over-current protection
- Maximum power consumption: 950 Watts

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Product Overview

The FSP 3000 is a scalable WDM transport solution specifically designed for service providers and large enterprises looking for flexibility and cost-efficiency in transporting, multiplexing, switching and protecting high-speed data, storage and video applications. The FSP 3000 facilitates bandwidth scale and service flexibility in access, backhaul, metro and long-haul networks, while supporting the creation of new revenue opportunities for high-speed OTN, Ethernet, storage and managed wavelength services.

Efficient Transport

To minimize transport cost and optimize efficiency in all network areas, the modular architecture of the FSP 3000 comprises a family of hot-swappable modules to meet network application requirements and make convergence practical. In addition to its unique optical layer design supporting CWDM and DWDM, it offers our CoherentExpress technology optimized for 100G+ agile optical core networking. Up to 192 wavelengths per fiber pair and a wide range of high-density transponder options optimize the spectral efficiency in the transmission fiber, eliminate fiber exhaust and reduce power and space consumption.

Superior Network Flexibility

The FSP 3000 supports static and configurable photonic components, including tunable lasers and multi-degree ROADM technology for colorless, directionless and contentionless wavelength routing. To achieve superior flexibility, service multiplexing options include innovative OTN with add/drop and switching capability, Ethernet and SONET/SDH technology. Along with optical network encryption and ultra-low latency modules optimized for enterprise applications, the FSP 3000 provides the most cost-effective optical transport solution.

Network Automation

In combination with the FSP Network Manager and FSP Service Manager, the FSP 3000 greatly reduces operational costs through SDN-based system operation and service-centric provisioning. The embedded RAYcontrol™ GMPLS control plane enables automated on-demand delivery and management of any mix of services, therefore simplifying network operations and improving network resiliency. It enables service providers and enterprises to introduce new levels of efficiency in the operation of optical transport networks and to substantially increase customer satisfaction.

Features & Benefits

- Fixed or reconfigurable optical layer for long-haul, metro and access applications supporting DWDM and CWDM
- Colorless, directionless and contentionless multi-degree ROADM functionality with GMPLS-based control plane for real-time provisioning and service restoration
- Multi-service, sub-wavelength aggregation and switching supporting Ethernet, OTN, SONET/SDH, storage and video services up to 100Gbit/s
- Erbium and Raman amplification option for non-regenerated transmission over distances exceeding 2,000km and up to 50dB single-span loss
- High-density design for smallest footprint and lowest power consumption, resulting in operational cost savings
Technical Information

Wavelengths per Fiber Pair
- Up to 96 wavelengths for dynamic, meshed topologies
- Up to 192 wavelengths for static point-to-point topologies

Topology
- Point-to-point, point-to-multipoint, add/drop, ring and mesh

Optical Protection
- Several levels of line and path protection, Fast Wavelength Restoration (FWR)

Link Reach
- Non-regenerated distances exceeding 2,000km

Services
- Ethernet 100Mbit/s, 1, 10, 40 and 100Gbit/s (LAN and WAN)
- Fibre Channel/FICON 1, 2, 4, 8, 10 and 16Gbit/s
- InfiniBand HP NonStop™ ServerNet Cluster
- OC-3, -12, -48, -192 and -768
- STM-1, -4, -16, -64 and -256
- OTU-1, -2, -3 and -4
- Uncompressed video
- CPRI up to 10G
- Any rate interface ranging from 125Mbit/s to 2.7Gbit/s

Optics
- CWDM according to ITU-T G.694.2
- DWDM channel spacing 50/100GHz according to ITU-T G.694.1
- Extensive support for pluggable SFP/SFP+/XFP/CFP interfaces on both client and network ports
- Tunable interfaces on network ports
- Support for all types of client interface optics

Modules
- Core transponders (WCC)
- Access transponders (WCA)
- Enterprise transponders (WCE)
- Packet transport modules (xPCA)
- Core muxponders (xTCC)
- Access muxponders (xTCA)
- Enterprise muxponders (xTCE)
- ODU cross-connect (xWXC)
- Optical amplifier modules (EDFA, Raman)
- Dispersion compensation modules (DCM)
- Protection modules (PM)
- Filter modules (CLSM, xGSM, xCSM+/-)
- Optical supervisory channel modules (OSCM, OSFM)
- Reconfigurable Optical Add Drop Multiplexers (ROADM) with dynamic channel equalization
- Splitter modules (SM)
- Controller modules (NCU, SCU)
- Versatile switch and optical line monitoring modules (VSM, RSM, OLM)
- Optical time domain reflectometry module (OTDR)
- Encryption module for data and storage services (AES)

Management & Control Plane
- RAYcontrol™ GMPLS-based control plane for real-time optical channel provisioning, dynamic recovery and resource discovery
- OSPF-based DCN routing and constraint-based traffic routing
- SNMP and TL1 management protocol
- FSP Network Manager and FSP Service Manager
- Integration into OEM partner network management systems

Environmental
- Standard temperature (operating): +5°C to +40°C
- Extended temperature (operating): -33°C to +55°C
- Relative humidity (operating): 5% to 85% (non-condensing)
- Relative humidity (short-term): 5% to 90% (non-condensing)
- Outdoor enclosures for passive components

Regulatory
- NEBS Level 3, ETSI and VCCI
- CE, FCC, UL and cUL

Laser Safety Classification
- Hazard Level 1M Product: IEC 60825-1 and 60825-2
- Class 1 Laser Product: 21 CFR 1040.10 and 1040.11

Power
- Voltage: -36VDC to -72VDC or 120/230VAC
- Typical power consumption: 200W per shelf

Physical
- Mounting brackets for 19", ETSI and 23" ANSI/NEBS racks
- Back-to-back ETSI compliant

Shelf Options
- 1U (active and passive), 7U and 9U