Main Features

Multi-service Provisioning

To meet various service interface requirements in metro networks, MSTP products provide access for various services to simplify the transport network. Based on a single platform, the new-generation MSTP products support a broad range of services:

- **SDH services**: STM-1(e/o), STM-4, STM-16, STM-64
- **PDH services**: E1/T1, E3/T3, E4
- **N*64K services**: V.35, Frame E1
- **Ethernet services**: Fast Ethernet, Gigabit Ethernet, and 10 Gigabit Ethernet
- **ATM/IMA services**: 2M, 34M, 155M, 622M ATM, IMA E1
- **Storage services**: Fiber Channel, FICON, ESCON, DVB-ASI
- **Built-in WDM**: 2.5G, 10G, and any service access rate from 34 Mbit/s to 2.7 Gbit/s.
New-generation MSTP products support distributed ASON features with high reliability, easy maintenance, and excellent interoperability with legacy networks:

01. High Reliability
- Restoration to any available resource including legacy and microwave SDH networks.
- Multi-failure resistance on any topology with SLA including 1+1 permanent protection.
- Design, simulation, and expansion.

02. Easy Maintenance
- Revertible to original route when failure is fixed
- Automatic synchronization to simplify planning of complicated topologies.
- Network planning tool (MDS) for fast network design, simulation, and expansion.
- Service level alarm report and performance monitor on control plane, and easy failure location and network health diagnosis.

03. Excellent Interoperability
- Seamless migration between legacy and ASON services.
- End to end service provisioning across legacy and ASON hybrid networks.
- Permanent 1+1 feature to SNCP of legacy networks with path correlation.
- ASON+VCAT+LCAS with guaranteed Ethernet bandwidth and bandwidth utilization ratio.
Compatible with Legacy, Adaptable to Future

- New-generation MSTP products use a universal switch and native circuit service processing boards to provide native circuit switching capability, thus offering optimum transport quality for TDM services.
- Each device has three different applications, to accommodate different service development stages. MSTP mode is used for dominant TDM services, hybrid mode is used mainly for coexistent TDM and IP services, and packet mode is used for dominant IP services. The three different application modes can be easily transformed by simply expanding the service cards.
• TDM and Packet modes are compatible for efficient network integration. The innovative bridge technology allows for seamless interoperability of TDM networks and packet networks (regarding service provisioning, DCN, clocks, and E2E management).

**Innovative Bridge Technology for Seamless Interworking**

**Long-haul Transmission Solution**

New-generation MSTP provides various types of LH transport solutions, such as FEC, REG, ROPA (Remote Optical Pump Amplifier), and Raman.

- FEC improves OSNR tolerance which enables long distance transmission.
- REG provides a cost-effective electrical regenerator solution for STM-16/STM-64 LH transmission.
- ROPA enables 70 dB single hop transmission.
- Raman enables 68 dB single hop transmission.
- ROPA+Raman enable 80 dB single hop transmission.
## Specifications

**OptiX OSN 550**

### System Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subrack dimensions</td>
<td>88 mm (H) x 442 mm (W) x 220 mm (D)</td>
</tr>
<tr>
<td>Switching capacity</td>
<td>Packet: 60 Gbit/s&lt;br&gt;TDM: 20 Gbit/s (high order), 5 Gbit/s (low order)</td>
</tr>
<tr>
<td>Service slots</td>
<td>6 service interface slots</td>
</tr>
<tr>
<td>Highly reliable design</td>
<td>1+1 hot backup for power supply modules&lt;br&gt;1+1 hot backup for system control boards&lt;br&gt;1+1 hot backup for cross-connect and synchronous timing boards</td>
</tr>
<tr>
<td>Supported interfaces</td>
<td>Packet transport interfaces: E1, FE/GE/10GE&lt;br&gt;MSTP interfaces: STM-16/4/1, E1/E3/T1/T3, FE/GE, EoPDH</td>
</tr>
<tr>
<td>Power Supply</td>
<td>–72 to –38.4 V DC; 110/220 V AC</td>
</tr>
<tr>
<td>Installation</td>
<td>• ETSI rack with 300 mm/600 mm depth&lt;br&gt;• 19-inch rack&lt;br&gt;• Wall-mount&lt;br&gt;• Desktop&lt;br&gt;• Outdoor cabinet</td>
</tr>
<tr>
<td>Weight</td>
<td>• Net (no board or fan): 2.78 kg&lt;br&gt;• Typical configuration: 5.8 kg</td>
</tr>
</tbody>
</table>
## System Features

<table>
<thead>
<tr>
<th>Typical Configuration</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>52W</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operation Environment</th>
<th>Temperature</th>
<th>Relative Humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Long term: 0°C to 45°C</td>
<td>10% to 90%</td>
</tr>
<tr>
<td></td>
<td>Short term: -5°C to 55°C</td>
<td>5% to 95%</td>
</tr>
</tbody>
</table>

## Packet Transport Features

### Service features
- E-Line and E-LAN
- QinQ
- MPLS-TP based VPWS and VPLS
- 802.1d, 1q, 1ad bridge
- TDM PWE3: CESoPSN and SAToP, compression of idle timeslots
- ATM/IMA PWE3
- ETH PWE3
- IGMP SNOOPING V2
- Blacklist
- Broadcast packet suppression
- ACL

### QoS features
- DiffServ mode based on traffic classification
- Simple traffic classification, complex traffic classification, per hop behavior (PHB), and ACL
- Committed access rate (CAR)
- PQ scheduling priority, weighted round robin (WRR), and PQ+WRR queuing
- Tail drop
- Eight priority queues
- Shaping based on port scheduling priority
# Packet Transport Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hardware-based OAM</strong></td>
<td>Supports both LSP OAM and PW OAM: • CV (Connectivity Verification) • FFD (Fast Failure Detection) • FDI (Forward Defect Indicator) • BDI (Backward Defect Indicator) • CES PW VCCV • Ping • Traceroute</td>
</tr>
<tr>
<td><strong>Ethernet OAM</strong></td>
<td>• ETH-CC (continuity check), ETH-loopback, ETH-link trace • Remote loopback, remote fault detection</td>
</tr>
<tr>
<td><strong>Carrier-class protection</strong></td>
<td>• 1:1 protection for label switched path (LSP) and pseudo-wire (PW), guaranteeing 50 ms switching time • Multi-section pseudo-wire (MS-PW) • Link aggregation group (LAG) protection • LPT • STP/RSTP • IMA Protection</td>
</tr>
<tr>
<td><strong>Clock synchronization</strong></td>
<td>• Two external clock inputs/outputs (2 MHz or 2 Mbit/s) • Two external time signals (1 pps+TOD) • Adaptive clock recovery (ACR) • Synchronous Ethernet • IEEE 1588v2</td>
</tr>
</tbody>
</table>
### MSTP Features

| Interface        | • Electrical interfaces: E1/T1, E3/T3, 10/100BASE-TX  
                  | • Optical interfaces: GE, STM-1/4/16  
|------------------|------------------------------------------------------------------------------------------------------------------|
| Carrier-class protection | • SDH Network Protection  
                         | 2-fiber MS-SP Ring; 1+1, 1:n (n<=14) Linear MSP; SNCP; Fiber shared virtual path protection; DNI (ITU-T G.842)  
                         | • Ethernet Service Protection  
                         | RSTP, LAG  
| Clock synchronization | • Two external clock inputs/outputs (2 MHz or 2 Mbit/s)  
                         | • Two external time signals (1 pps+TOD)  
                         | • Line clock source  
                         | • Tributary clock source  

---

### System Features

| Subrack dimensions | 722 mm (H) x 497 mm (W) x 295 mm (D)  
|-------------------|-----------------------------------------------------------------------------------------|
| Switching capacity | Packet: 100 Gbit/s. TDM: 200 Gbit/s (high order), 20 Gbit/s (low order)  
| Service slots     | 15 slots for processing boards and 16 slots for interface boards  

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OptiX OSN 3500
## System Features

| Highly reliable design       | 1+1 hot backup for power supply modules  
|                             | 1+1 hot backup for system control boards  
|                             | 1+1 hot backup for cross-connect and synchronous timing boards  
|                             | Redundancy protection for fan modules  

### Supported interfaces

| Packet transport interfaces | E1, STM-1, FE/GE/10GE  
| MSTP INTERFACES            | STM-64/16/4/1, E1/E3/E4/T1/T3, FE/GE/10GE, DDN, IMA/ATM, SAN  
| WDM INTERFACES             | • 40-channel DWDM interfaces, compliant with ITU-T G.694.1  
|                             | • 8-channel CWDM interfaces, compliant with ITU-T G.694.2  

### Power Supply

| –72 to –38.4V DC; 110/220V AC (External module)  

### Operation Environment

| Temperature | Relative Humidity  
| Long term:  | 0°C to 45°C  | 10% to 90%  
| Short term: | -5°C to 55°C | 5% to 95% |

## Packet Transport Features

### Service features

- E-Line and E-LAN
- QinQ
- MPLS-TP based VPWS and VPLS
- TDM PWE3: CESoPSN and SAToP, compression of idle timeslots
- ETH PWE3
- IGMP SNOOPING V2
- Blacklist
- Broadcast packet suppression
- ACL
### Packet Transport Features

<table>
<thead>
<tr>
<th>QoS features</th>
<th>MPLS OAM</th>
<th>Ethernet OAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>• H-QoS scheduling and traffic shaping</td>
<td>• Supports both LSP OAM and PW OAM:</td>
<td>• ETH-CC (continuity check), ETH-loopback, ETH-link trace</td>
</tr>
<tr>
<td>• DiffServ mode based on traffic classification</td>
<td>• CV (Connectivity Verification)</td>
<td>• Remote loopback, remote fault detection</td>
</tr>
<tr>
<td>• Simple traffic classification, complex traffic classification, per hop</td>
<td>• FFD (Fast Failure Detection)</td>
<td></td>
</tr>
<tr>
<td>behavior (PHB), and ACL</td>
<td>• FDI (Forward Defect Indicator)</td>
<td></td>
</tr>
<tr>
<td>• Committed access rate (CAR)</td>
<td>• BDI (Backward Defect Indicator)</td>
<td></td>
</tr>
<tr>
<td>• PQ scheduling priority, weighted fair queuing (WFQ), and PQ+WQF queuing</td>
<td>• CES PW VCCV</td>
<td></td>
</tr>
<tr>
<td>• Tail drop and weighted random early detection (WRED)</td>
<td>• Ping</td>
<td></td>
</tr>
<tr>
<td>• Eight priority queues</td>
<td>• Traceroute</td>
<td></td>
</tr>
<tr>
<td>• Shaping based on port scheduling priority</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Hardware-based OAM
- MPLS OAM
- Ethernet OAM
- RMON (RFC 2819)
- LM, DM
- MAC/PHY loopback
## Packet Transport Features

| Carrier-class protection | • 1+1 and 1:1 Linear MSP, guaranteeing 50 ms switching time  
• 1+1 and 1:1 protection for label switched path (LSP) and pseudo-wire (PW), guaranteeing 50 ms switching time  
• Multi-section pseudo-wire (MS-PW)  
• Link aggregation group (LAG) protection  
• Multi-chassis link aggregation group (MC-LAG) protection  
• Dual-homing protection  
• LPT  
• STP/RSTP/MSTP |
|------------------------|---------------------------------------------------|
| Clock synchronization   | • Two external clock inputs/outputs (2 MHz or 2 Mbit/s)  
• Two external time signals (1 pps+TOD)  
• Adaptive clock recovery (ACR)  
• Synchronous Ethernet  
• IEEE 1588v2 |

## MSTP Features

| Interface | • Electrical interfaces: DDN (V.35/V.24/X.21/RS-449/RS-530/RS-530A), E1/T1, E3/T3, E4, STM-1(E), 10/100BASE-TX, 1000BASE-T  
• Optical interfaces:  
  - Ethernet 100base-FX, 1000BASE-SX/LX/ZX, 10GBASE-LR/LW  
  - STM-1 S-1.1, L-1.1, L-1.2  
  - STM-4 S-4.1, L-4.1, L-4.2  
  - STM-16 I-16, S-16.1, L-16.1, L-16.2, V-16.2, U-16.2  
  - STM-64 I-64.2, S-64.2, L-64.2b, P1L1-2D2, V-64.2  
  - 40-channel DWDM interfaces (FEC off band), compliant with ITU-T G.694.1  
  - 8-channel CWDM interfaces, compliant with ITU-T G.694.2  
  - Others: FC/ESCON/DVB-ASI |
|------------|---------------------------------------------------|
## MSTP Features

| Carrier-class protection | - Mesh Protection and restoration (ASON)  
|                         |   - Distributed restorable rerouting protection  
|                         |   - Five dedicated protection scheme levels based on different SLA: Diamond, Gold, Silver, Copper and Iron  
|                         | - SDH Network Protection  
|                         |   2/4 fiber MS-SP Ring, 1+1 or 1:n (n<=14) linear MSP, SNCP/SNMP/  
|                         |   SNCTP, fiber shared virtual path protection, fiber shared MS-SP Ring (one optical interface can support 2 groups of MS-SP Rings), DNI (ITU-T G.842)  
|                         | - Service Protection  
|                         |   Ethernet: RPR, ERPS, RSTP, LAG/DLAG/PPS/BPS  
|                         |   ATM: VP-RING, PPS/BPS  
|                         | - Electrical Interface Protection  
|                         |   1:n tributary protection for E1/T1, E3/T3, E4, STM-1(e), and FE |
# Multi-Service Transport Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet Over SDH</td>
<td>• GFP/LAPS/VCAT/LCAS</td>
</tr>
<tr>
<td></td>
<td>• L2 switch, 64 aggregation directions for powerful Ethernet convergence</td>
</tr>
<tr>
<td></td>
<td>• Mapping granularity, VC-12-nv/VC-3-nv, and VC-4-nv</td>
</tr>
<tr>
<td></td>
<td>• Point-to-point LPT, point-to-multi-point LPT</td>
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<tr>
<td></td>
<td>• MPLS and stackable VLAN for L2 VPN</td>
</tr>
<tr>
<td></td>
<td>• 4/8-level CoS, CAR based on 64K granularity</td>
</tr>
<tr>
<td></td>
<td>• IEEE 802.3ah, 802.1ag</td>
</tr>
<tr>
<td>RPR</td>
<td>• Automatic topology discovery</td>
</tr>
<tr>
<td></td>
<td>• 3-level CoS, A (A0/A1) / B (B-CIR/B-EIR) / C</td>
</tr>
<tr>
<td></td>
<td>• Steering/Wrapping/Steering + Wrapping protection scheme guarantee</td>
</tr>
<tr>
<td></td>
<td>• 50ms switching</td>
</tr>
<tr>
<td></td>
<td>• Spatial reuse of bandwidth with fairness algorithm</td>
</tr>
<tr>
<td></td>
<td>• Integrated MPLS with RPR to provide VLL/VPLS service</td>
</tr>
<tr>
<td>ATM</td>
<td>• Support 2M, 34M, 155M, 622M ATM, and IMA E1</td>
</tr>
<tr>
<td></td>
<td>• Support up to 93 IMA group and 189 E1s</td>
</tr>
<tr>
<td>Others</td>
<td>• Support FC/ESCON/DVB-ASI</td>
</tr>
<tr>
<td></td>
<td>• Support DDN (Nx64K) and framed E1</td>
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