Statement

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1 Overview

Quidway S8500 series products, self-developed by Huawei-3Com, are new generation high-end Ethernet switches that support Resilient Packet Ring (RPR) interfaces. RPR is a new MAC layer protocol designed for transmitting large-capacity data services in MANs, and it provides a high-efficiency, high-reliability MAN networking solution through an inter-contrary, dual-ring network topology. The S8500 can provide users with 2-port 10G RPR network interface modules (VP2). The S8505/S8508/S8512 offers 5/8/12 RPR slots and supports up to 24 10G RPR interfaces. An RPR LPU can be inserted in any slot of the S8500.

2 Product Introduction

The S8500 RPR board complies with IEEE 802.17 standard and provides 10G RPR interfaces at present. The 10G RPR interfaces are compatible with XFP in both 10GE LAN mode and 10G POS WAN mode. The following figure shows the currently available 2-port 10G RPR LPU.

![2-port 10G RPR LPU view](image)

The following figure illustrates a typical RPR networking application:
RPR sites are connected to form an RPR ring. Downlink or uplink devices access and forward traffic through other boards in the RPR site to get traffic on or off the ring. In the RPR networking solution of the whole network, 10G RPR is used at the core layer, 2.5G RPR is used at the aggregation layer and GE RPR is used at the access layer.

3 Characteristics

The RPR (Resilient Packet Ring) technology integrates IP intelligentization, Ethernet economization, and high bandwidth efficiency, reliability of the fiber ring network, providing broadband IP MAN carriers with a good networking solution. One of the most attractive characteristics of RPR, dissimilar to the traditional MAC, is carrier-class reliability. This reliability helps RPR process data-oriented service transmission demands and enable an integrated solution to multi-service transmission. In addition, while providing SDH-similar network reliability, RPR effectively cutbacks the transmission expenditure.

In a word, RPR is a direct combination of IP technology and optical network technology. It originates from the customer demand for IP service development and adapts to the latest technology trend, thus bringing a set of low cost, high quality solution
for the construction of IP MANs.

The S8500 RPR LPU has the following characteristics:

3.1 Powerful Service turnover Capability

The service switching performance is required in the protocol for 10ms fault detection and 50ms service turnover. By optimizing the protocol, the S8500 RPR LPU can implement service turnover in less than 20ms in ideal cases, which fully satisfies the carrier-class requirements and presents the powerful edge of RPR.

3.2 Complete QoS Capability

The S8500 RPR LPU has powerful QoS processing capability for the traffic getting on/off the ring. It supports the ACL, traffic limitation, traffic shaping, queue scheduling, and inherits almost all the QoS features of the Ethernet interface. In addition, the LPU supports 802.1P, MPLS, mapping from IP priority to RPR priority, class-A/B/C services for delay and jitter at a certain level, and bandwidth reservation for high-priority services. With the fairness algorithm, RPR guarantees fair access of traffic to all nodes and efficient usage of loop bandwidth in the aspects of avoiding loop congestion and providing alert mechanism.

3.3 Abundant Ring Selection Mechanisms

The S500 RPR LPU supports various ring selection modes, and the shortest path mode is supported by default. Users can configure static ring selection as required, and static ring selection has a higher priority than dynamic ring selection. VLAN ring selection is also supported for the L2 tunnel mode.

In addition, the LPU supports ring selection with load sharing of the local access traffic, guaranteeing relative traffic balancing on two sub-rings.

3.4 L2 Bridging + L2 Tunnel

The S8500 RPR LPU supports MAC address learning of other nodes on the ring and guarantees unicast transmission of data streams, which greatly improves the protocol and
L2 forwarding efficiency. The sites with the same VLAN configured on the ring guarantee the L2 bridging by learning MAC addresses mutually. This case is quite suitable for multipoint interconnecting applications. In addition, the S8500 RPR LPU supports L2 tunnel applications. With VLAN-based tunnel division, two sites transparently transmit Ethernet packets mutually without learning MAC addresses in a VLAN. This case is suitable for dual-point interconnecting applications on the ring.

3.5 Ethernet-Compatible Protection Mechanism

The S8500 RPR LPU supports STP and can perform STP calculation together with common Ethernet interfaces, which well solves the problem of L2 loop in the cross ring and ring+chain networking modes and offers a higher-reliability networking solution.

The RPR ring can well support VRRP networking and provide mutual backup between nodes on the RPR ring, thus further improving the networking reliability.

4 Features

- Supports hot-swappable SR/LR/ER/ZR optical modules with various transmission distances
- Works at any service slot
- Supports hot swap
- Depends on IEEE 802.17 (RPR), guaranteeing interoperability with other vendors
- Supports IEEE 802.1d (STP)
- Supports IEEE 802.1w (RSTP)
- Supports IEEE 802.1s (MSTP)
- Supports IEEE 802.1p (COS priority)
- Supports IEEE 802.1Q (VLAN)
- Supports IEEE 802.3ae (10Gbase)
- Supports SONET/SDH industry standards, guaranteeing interoperability with other vendors
- Supports broadcast storm suppression
- Supports standards and extended ACL rules
- Supports Diff-Serv/QoS, including traffic policing CAR, traffic shaping, priority tag reset, packet redirection, queue scheduling mechanism, congestion avoidance mechanism, traffic mirroring, port mirroring and traffic statistics
- Supports eight priority queues/ports
- Supports the longest matching and packet-by-packet forwarding
- Supports line-speed forwarding of L2/L3 packets
- Supports 256K route forwarding table
- Supports equal cost routes
- Supports multicast forwarding
- Supports MPLS forwarding

5 Specifications

5.1 Dimensions

346.40 mm (L) × 399.15 mm (W) × 40.1 mm (H)

5.2 2-Port 10G RPR LPU

5.2.1 Introduction

The VP2 board offers two 10GE /10G POS XFP optical interfaces, compatible with LAN and WAN modes. The S8512 adopts 12 VP2 boards and provides up to 240G RPR optical interfaces. By configuring various optical modules, it can satisfy different requirements for the transmission distance, and provide users with flexible and diversified interface types for complex networking requirements. The VP2 conforms to standards such as IEEE 802.17 and IEEE 802.3ae.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
</table>

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### 5.2.2 Basic Features

- **Port:** Two 10GE/10G POS optical interfaces
- **Packet processing capability:** 10 Gbps line speed forwarding
- **Optical interface:** Supports hot-swappable XFP optical modules complying with 10GBASE-R/W and OC-192c/STM-64
- **Slot requirements:** The LPU can work at any LPU slot of the S8500 series frame and prevent from misinsertion

### 5.2.3 Specifications

<table>
<thead>
<tr>
<th>Properties</th>
<th>VP2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum power</td>
<td>117 w</td>
</tr>
<tr>
<td>Number of interfaces</td>
<td>Two 10GE/10G POS optical interfaces</td>
</tr>
<tr>
<td>Type of connector</td>
<td>XFP/LC</td>
</tr>
<tr>
<td>Interface rate</td>
<td>10 Gbps</td>
</tr>
</tbody>
</table>

### 5.2.4 Interface Modules

#### Table 2: XFP optical interface

<table>
<thead>
<tr>
<th>XFP module name</th>
<th>Central wavelength</th>
<th>Type of user interface connector offered by XFP module</th>
<th>Interface optical fiber specifications</th>
<th>Maximum transmission distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>10GBase-SR/SW-XFP</td>
<td>850 nm</td>
<td>LC</td>
<td>50/125 µm multi-mode optical fiber</td>
<td>26 m for 62.5 um MMF w/ 160 MHz*km optical fiber</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>82 m for 50 um MMF w/ 500 MHz*km optical fiber</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>300 m for 50 um MMF w/ 2000 MHz*km optical fiber</td>
</tr>
</tbody>
</table>
### Table

<table>
<thead>
<tr>
<th>XFP module name</th>
<th>Central wavelength</th>
<th>Type of user interface connector offered by XFP module</th>
<th>Interface optical fiber specifications</th>
<th>Maximum transmission distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>10GBase-LR/LW-XFP</td>
<td>1310 nm</td>
<td></td>
<td>9/125 μm single-mode optical fiber</td>
<td>10 km</td>
</tr>
<tr>
<td>10GBase-ER/EW-XFP</td>
<td>1550 nm</td>
<td></td>
<td>9/125 μm single-mode optical fiber</td>
<td>40 km</td>
</tr>
</tbody>
</table>

#### 5.2.5 Ports and Indicators

![Figure 3 2-port 10G RPR LPU panel](image)

Each port provides two indicators, LINK and ACT, indicating the current working status of the board.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Color</th>
<th>State</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINK</td>
<td>Green</td>
<td>Off</td>
<td>The line is not connected.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>The line is connected.</td>
</tr>
<tr>
<td>ACT</td>
<td>Orange</td>
<td>Off</td>
<td>No data is received/sent.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flashing</td>
<td>Some data is received/sent.</td>
</tr>
</tbody>
</table>

#### 5.3 Environments

- Operating temperature: 0–45℃
- Storing temperature: -40 to 70℃
- Relative humidity: 10–90% (Non-condensing)
- Fungus resistance level: 0
- Operating altitude: -60 to 3000 m
5.4 Security Standards

- EN 60950-1 (LVD Directive)
- UL 60950-1, Edition 1, April 1, 2003
- IEC 60950-1

5.5 EMC Standards

- CISPR 22: 2003-04-10 Edition 4 Class A
- CFR Title 47, FCC part 15, Subpart B, Class A
- ICES-003, Issue 4, 2004 Class A
- AS/NZS 3548 Class A
- VCCI V-4 (2002) Class A