T1 Protection (Fail-Over) Switch

Product Brochure & Data Sheet

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Product Overview

Valiant’s 4 Port T1 Protection (Fail-Over) Switch allows the user to connect up to four T1 lines from the telephone company to "active", as well as to "standby" T1 terminal(s), such as data server(s), routers etc. at the customer.

In the event of the failure of the data server(s) / equipment connected to the "A / active" ports, the T1 Protection (Fail-Over) Switch shall automatically switch and connect the T1 line(s) from the telephone company to the routers / data server(s) / equipment connected to "B / standby" ports. This ensures minimum downtime - that would have otherwise occurred due to equipment failure.

Features and Benefits

- Allows the users to connect up to 4 T1 lines from the Telephone Company to 4 active and 4 standby T1 terminals
- User configurable. May be used for a single T1 link and scaled up to 4 T1 links though user configuration
- Independent, user configurable switching parameters for each T1 link
- Built-in real-time clock / real-time logging maintains a history of all events
- Remotely accessible over a TCP-IP networks. Allows the user to access and carry out maintenance, or and T1 switch the links remotely, if required.
- RS232 and USB Serial Management and Monitoring.
- SNMP Management and Monitoring.
- Allows the users to create and maintain active/standby/duplicate customer premises data networks/data servers, without requiring to bear the recurring $$ expense of leasing additional expensive T1s lines from the telephone company
- Automatically switches the T1 link(s) from the Telephone Company between the "active" and "standby" T1 equipment at the customer premises, according to the customer-defined criterion
- Improves security. Allows the user to co-locate the "backup" / "standby" equipment in a different room/building and prevent data loss
- User programmable switching criterion independent for each T1 link
- Increases the reliability of the customer data/IT networks without the recurring additional cost of leasing additional T1 lines from the telephone company. The equipment may be used to create secondary/backup systems at the customer premises to provide virtually uninterrupted service.

User programmable criterion for switching between Active and Standby T1 Links at the customers premises:

<table>
<thead>
<tr>
<th>Loss of T1 Signal (LOS)</th>
<th>The Loss of Signal condition in a T1 may occur due to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a) The failure of the T1 Port of the customer premises equipment.</td>
</tr>
<tr>
<td></td>
<td>b) Or due to loss of power to the customer premises equipment.</td>
</tr>
<tr>
<td></td>
<td>c) Or due to the disconnection of the T1 cable between the protection Switch and the T1 Port of the customer premises Equipment.</td>
</tr>
<tr>
<td></td>
<td>The cause of LOF is 2 out of 5 Ft bits are in error for D4 Framing and 2 out of 5 frame bits are in error for ESF framing.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Loss Of Frame (LOF)</th>
<th>This Alarm is also known as Blue Alarm. This Alarm indicates unframed all ones being detected in the incoming signal on the receiver of T1 Protection Switch.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Alarm Indication Signal (AIS)</th>
<th>This Alarm is also known as Yellow Alarm. This Alarm indicates in D4 Framed bit 2 of each DSO for 255 consecutive channels has been detected as a zero.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Remote Alarm (RA)</th>
<th>When ESF Framed: Alternating eight ones/eight zeros have been detected in the ESF Datalink. A Yellow Alarm is typically transmitted to indicate a failure on the receive side of the Failed end.</th>
</tr>
</thead>
</table>

| CRC ERROR | This parameter is the number of CRC-6 errors (Cyclic Redundancy check errors) that occurred during the test period. CRC-6 errors are only counted while the Telco T1 framing is selected as ESF (External Superframe). The CRC-6 can be monitored either on In-Service or Out-of-Service T1 spans. Since the expected value of the CRC pattern can be anticipated, the received data can be compared to the expected results. Whenever the expected value does not equal the actual value a CRC error event is counted. |

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Application Diagram

Telco T1 link connected to Equipment-A

Equipment-A fails - Telco T1 automatically switches to Equipment-B

Equipment-A recovers - Telco T1 automatically switches to Equipment-A
Shelf Description

The T1 Protection (Fail-Over) Switch is fitted in a 19-inch 1U shelf that provides access to all external interfaces.

The T1 interfaces, power input and access and Management Ports (RS232) USB ports and 10BaseT Ethernet interfaces) are accessible from the front panel. The external alarm extension are accessible at the rear panel.

Front view of the shelf

T1 Protection (Fail-Over) Switch LED Indications

The LEDs indicate the following:

L1 - Equipment Port A “In Use” for at least one of the four (enabled) Links
L2 - Equipment Port B “In Use” for at least one of the four (enabled) Links
L3 - Not used
L4 - Not used
L5 - Green ON indicates 3.3V DC is present
     OFF indicates 3.3V DC is absent
L6 - Green ON indicates system is accessible through USB and 10/100BaseT USB ports
     OFF indicates USB is not connected, system is accessible through RS232 and 10/100BaseT USB ports
L7 - Green ON indicates system is accessible through Serial RS232 port.
     OFF indicates system is not accessible through Serial RS232 port.
L8 - Bi-Color Green indicates self test is pass Red indicates self test ERROR.

Mechanical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rack mounting</td>
<td>Standard 19-Inch. DIN Rack</td>
</tr>
<tr>
<td>Height</td>
<td>44.00 mm.</td>
</tr>
<tr>
<td>Depth</td>
<td>260.00 mm.</td>
</tr>
<tr>
<td>Width</td>
<td>477.00 mm.</td>
</tr>
<tr>
<td>Weight</td>
<td>4.00 kg.</td>
</tr>
</tbody>
</table>
## Technical Specifications

### Network Interface

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of Interfaces</strong></td>
<td>4 Telco T1 Links (common link/Telco T1s)</td>
</tr>
<tr>
<td></td>
<td>4 Active T1 Links (for Equipment-A)</td>
</tr>
<tr>
<td></td>
<td>4 Standby T1 Links (for Equipment-B)</td>
</tr>
<tr>
<td><strong>Line Rate</strong></td>
<td>T1 - 1.544 Mbps</td>
</tr>
<tr>
<td><strong>Line Code</strong></td>
<td>B8ZS, AMI (User Selectable)</td>
</tr>
<tr>
<td><strong>Frame Structure</strong></td>
<td>SF, ESF (User Selectable)</td>
</tr>
<tr>
<td><strong>Bit Rate</strong></td>
<td>1544 Kbps ± 50 ppm</td>
</tr>
<tr>
<td><strong>Jitter Tolerance</strong></td>
<td>As per ITU-T G.823</td>
</tr>
<tr>
<td><strong>Output Jitter</strong></td>
<td>&lt; 0.05 UI (in the frequency range of 20 Hz to 100 Khz)</td>
</tr>
<tr>
<td><strong>Nominal Line Impedance</strong></td>
<td>100 Ohms Balanced RJ-45</td>
</tr>
<tr>
<td><strong>Nominal Pulse Width</strong></td>
<td>244 ns</td>
</tr>
<tr>
<td><strong>Pulse Mask</strong></td>
<td>As per ITU (CCITT) Rec. G.703</td>
</tr>
<tr>
<td><strong>Loss and recovery of frame alignment</strong></td>
<td>As per clause 3 of ITU (CCITT) G.732</td>
</tr>
<tr>
<td><strong>Loss and recovery of multiframe alignment</strong></td>
<td>As per clause 5.2 of ITU (CCITT) G.732</td>
</tr>
</tbody>
</table>

### AC Power Supply Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output voltage of AC Adapter</strong></td>
<td>100 V to 240 V AC</td>
</tr>
<tr>
<td><strong>Range of input AC voltage</strong></td>
<td>100 V to 240 V AC, 50Hz / 60Hz</td>
</tr>
<tr>
<td><strong>System Input voltage</strong></td>
<td>7.5 V DC to 9.0 V DC, DC input polarity protection.</td>
</tr>
<tr>
<td><strong>Maximum full load output current</strong></td>
<td>2.5 A at 7.5 V DC/9.0 V DC</td>
</tr>
<tr>
<td><strong>Input voltage reversal protection</strong></td>
<td>Provided in the Card</td>
</tr>
<tr>
<td><strong>Efficiency at full load</strong></td>
<td>&gt;86%</td>
</tr>
</tbody>
</table>

### DC Power Supply Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input DC voltage - Dual Input</strong></td>
<td>-48V DC (nominal)</td>
</tr>
<tr>
<td><strong>Range of input voltage</strong></td>
<td>-18V to -72V DC</td>
</tr>
<tr>
<td><strong>System voltage</strong></td>
<td>3.3 V</td>
</tr>
<tr>
<td><strong>Input voltage reversal protection</strong></td>
<td>Provided in the Card</td>
</tr>
<tr>
<td><strong>Short circuit protection</strong></td>
<td>Provided</td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>≤ 10W</td>
</tr>
</tbody>
</table>

### Temperature

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating</strong></td>
<td>0°C to 50°C</td>
</tr>
<tr>
<td><strong>Humidity</strong></td>
<td>5% to 95% Non-Condensing</td>
</tr>
</tbody>
</table>

### Management and control ports

- Serial Management Port - RS232 COM Port and USB Port
- 10/100 BaseT for remote management over a LAN
- 10/100 BaseT Telnet over a TCP-IP network
Technical Specifications

NMS (with Telnet) XPort Specifications

<table>
<thead>
<tr>
<th>Network Interface</th>
<th>RJ-45 Ethernet 10BaseT or 100BaseT-TX (auto sensing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatibility</td>
<td>Ethernet Version 2.0 IEEE802.3</td>
</tr>
<tr>
<td>Protocols Supported</td>
<td>ARP, UDP/IP, TCP/IP, Telnet, ICMP, SNMP, SSH</td>
</tr>
<tr>
<td>LEDs</td>
<td>10Base-T and 100Base-TX Activity, full/half duplex</td>
</tr>
<tr>
<td>Monitoring and Management</td>
<td>SNMP V2, Serial login, Telnet login</td>
</tr>
</tbody>
</table>

Command Language

- Command Line Interface (English text commands)

Compliance/Regulatory

- EMC FCC Part 15 Class 2
- Operation ETS 300 019 Class 3.2
- Storage ETS 300 019 Class 1.2
- Transportation ETS 300 019 Class 2.3

Ordering Information

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Part No.</th>
<th>Product Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VCL-T1-PRO-1421-DLX-2DC048</td>
<td>4 Port T1 Failover Protection Switch (4xT1 Inputs, 8xT1 Outputs) 19” Shelf 2U High Mount Version 1+1 DC power supply input (DC Powered Version)</td>
</tr>
<tr>
<td>2</td>
<td>VCL-T1-PRO-1421-DLX-1AC220</td>
<td>4 Port T1 Failover Protection Switch (4xT1 Inputs, 8xT1 Outputs) 19” Shelf 1U High Mount Version 1x 100-240V DC power supply input (adapter option) (AC Mains Powered Version)</td>
</tr>
<tr>
<td>3</td>
<td>VCL-T1-PRO-1421-DLX-2AC220</td>
<td>4 Port T1 Failover Protection Switch (4xT1 Inputs, 8xT1 Outputs) 19” Shelf 1U High Mount Version 2x 100-240V AC power supply input (adapter option) (AC Mains Powered Version)</td>
</tr>
</tbody>
</table>

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