Optimux-1551
STM-1/OC-3 Terminal Multiplexer
Version 2.2
Installation and Operation Manual

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For further information contact RAD at the address below or contact your local distributor.
Limited Warranty

RAD warrants to DISTRIBUTOR that the hardware in the Optimux-1551 to be delivered hereunder shall be free of defects in material and workmanship under normal use and service for a period of twelve (12) months following the date of shipment to DISTRIBUTOR.

If, during the warranty period, any component part of the equipment becomes defective by reason of material or workmanship, and DISTRIBUTOR immediately notifies RAD of such defect, RAD shall have the option to choose the appropriate corrective action: a) supply a replacement part, or b) request return of equipment to its plant for repair, or c) perform necessary repair at the equipment’s location. In the event that RAD requests the return of equipment, each party shall pay one-way shipping costs.

RAD shall be released from all obligations under its warranty in the event that the equipment has been subjected to misuse, neglect, accident or improper installation, or if repairs or modifications were made by persons other than RAD's own authorized service personnel, unless such repairs by others were made with the written consent of RAD.

The above warranty is in lieu of all other warranties, expressed or implied. There are no warranties which extend beyond the face hereof, including, but not limited to, warranties of merchantability and fitness for a particular purpose, and in no event shall RAD be liable for consequential damages.

RAD shall not be liable to any person for any special or indirect damages, including, but not limited to, lost profits from any cause whatsoever arising from or in any way connected with the manufacture, sale, handling, repair, maintenance or use of the Optimux-1551, and in no event shall RAD's liability exceed the purchase price of the Optimux-1551.

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This Agreement shall be construed and governed in accordance with the laws of the State of Israel.

Product Disposal

To facilitate the reuse, recycling and other forms of recovery of waste equipment in protecting the environment, the owner of this RAD product is required to refrain from disposing of this product as unsorted municipal waste at the end of its life cycle. Upon termination of the unit’s use, customers should provide for its collection for reuse, recycling or other form of environmentally conscientious disposal.
General Safety Instructions

The following instructions serve as a general guide for the safe installation and operation of telecommunications products. Additional instructions, if applicable, are included inside the manual.

Safety Symbols

Warning

This symbol may appear on the equipment or in the text. It indicates potential safety hazards regarding product operation or maintenance to operator or service personnel.

Danger of electric shock! Avoid any contact with the marked surface while the product is energized or connected to outdoor telecommunication lines.

Protective ground: the marked lug or terminal should be connected to the building protective ground bus.

Some products may be equipped with a laser diode. In such cases, a label with the laser class and other warnings as applicable will be attached near the optical transmitter. The laser warning symbol may be also attached.

Please observe the following precautions:

• Before turning on the equipment, make sure that the fiber optic cable is intact and is connected to the transmitter.
• Do not attempt to adjust the laser drive current.
• Do not use broken or unterminated fiber-optic cables/connectors or look straight at the laser beam.
• The use of optical devices with the equipment will increase eye hazard.
• Use of controls, adjustments or performing procedures other than those specified herein, may result in hazardous radiation exposure.

ATTENTION: The laser beam may be invisible!

In some cases, the users may insert their own SFP laser transceivers into the product. Users are alerted that RAD cannot be held responsible for any damage that may result if non-compliant transceivers are used. In particular, users are warned to use only agency approved products that comply with the local laser safety regulations for Class 1 laser products.

Always observe standard safety precautions during installation, operation and maintenance of this product. Only qualified and authorized service personnel should carry out adjustment, maintenance or repairs to this product. No installation, adjustment, maintenance or repairs should be performed by either the operator or the user.
Handling Energized Products

General Safety Practices

Do not touch or tamper with the power supply when the power cord is connected. Line voltages may be present inside certain products even when the power switch (if installed) is in the OFF position or a fuse is blown. For DC-powered products, although the voltages levels are usually not hazardous, energy hazards may still exist.

Before working on equipment connected to power lines or telecommunication lines, remove jewelry or any other metallic object that may come into contact with energized parts.

Unless otherwise specified, all products are intended to be grounded during normal use. Grounding is provided by connecting the mains plug to a wall socket with a protective ground terminal. If a ground lug is provided on the product, it should be connected to the protective ground at all times, by a wire with a diameter of 18 AWG or wider. Rack-mounted equipment should be mounted only in grounded racks and cabinets.

Always make the ground connection first and disconnect it last. Do not connect telecommunication cables to ungrounded equipment. Make sure that all other cables are disconnected before disconnecting the ground.

Some products may have panels secured by thumbscrews with a slotted head. These panels may cover hazardous circuits or parts, such as power supplies. These thumbscrews should therefore always be tightened securely with a screwdriver after both initial installation and subsequent access to the panels.

Connecting AC Mains

Make sure that the electrical installation complies with local codes.

Always connect the AC plug to a wall socket with a protective ground.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A. The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A.

Always connect the power cord first to the equipment and then to the wall socket. If a power switch is provided in the equipment, set it to the OFF position. If the power cord cannot be readily disconnected in case of emergency, make sure that a readily accessible circuit breaker or emergency switch is installed in the building installation.

In cases when the power distribution system is IT type, the switch must disconnect both poles simultaneously.

Connecting DC Power

Unless otherwise specified in the manual, the DC input to the equipment is floating in reference to the ground. Any single pole can be externally grounded.

Due to the high current capability of DC power systems, care should be taken when connecting the DC supply to avoid short-circuits and fire hazards.

DC units should be installed in a restricted access area, i.e. an area where access is authorized only to qualified service and maintenance personnel.

Make sure that the DC power supply is electrically isolated from any AC source and that the installation complies with the local codes.
The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A. The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A.

Before connecting the DC supply wires, ensure that power is removed from the DC circuit. Locate the circuit breaker of the panel board that services the equipment and switch it to the OFF position. When connecting the DC supply wires, first connect the ground wire to the corresponding terminal, then the positive pole and last the negative pole. Switch the circuit breaker back to the ON position.

A readily accessible disconnect device that is suitably rated and approved should be incorporated in the building installation.

If the DC power supply is floating, the switch must disconnect both poles simultaneously.

### Connecting Data and Telecommunications Cables

Data and telecommunication interfaces are classified according to their safety status.

The following table lists the status of several standard interfaces. If the status of a given port differs from the standard one, a notice will be given in the manual.

<table>
<thead>
<tr>
<th>Ports</th>
<th>Safety Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>V.11, V.28, V.35, V.36, RS-530, X.21, 10 BaseT, 100 BaseT, Unbalanced E1, E2, E3, STM, DS-2, DS-3, S-Interface ISDN, Analog voice E&amp;M</td>
<td>SELV Safety Extra Low Voltage: Ports which do not present a safety hazard. Usually up to 30 VAC or 60 VDC.</td>
</tr>
<tr>
<td>xDSL (without feeding voltage), Balanced E1, T1, Sub E1/T1</td>
<td>TNV-1 Telecommunication Network Voltage-1: Ports whose normal operating voltage is within the limits of SELV, on which overvoltages from telecommunications networks are possible.</td>
</tr>
<tr>
<td>FXS (Foreign Exchange Subscriber)</td>
<td>TNV-2 Telecommunication Network Voltage-2: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are not possible. These ports are not permitted to be directly connected to external telephone and data lines.</td>
</tr>
<tr>
<td>FXO (Foreign Exchange Office), xDSL (with feeding voltage), U-Interface ISDN</td>
<td>TNV-3 Telecommunication Network Voltage-3: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are possible.</td>
</tr>
</tbody>
</table>

*Always connect a given port to a port of the same safety status. If in doubt, seek the assistance of a qualified safety engineer.*

Always make sure that the equipment is grounded before connecting telecommunication cables. Do not disconnect the ground connection before disconnecting all telecommunications cables.

Some SELV and non-SELV circuits use the same connectors. Use caution when connecting cables. Extra caution should be exercised during thunderstorms.
When using shielded or coaxial cables, verify that there is a good ground connection at both ends. The grounding and bonding of the ground connections should comply with the local codes.

The telecommunication wiring in the building may be damaged or present a fire hazard in case of contact between exposed external wires and the AC power lines. In order to reduce the risk, there are restrictions on the diameter of wires in the telecom cables, between the equipment and the mating connectors.

**Caution**

To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cords.

**Attention**

Pour réduire les risques s'incendie, utiliser seulement des conducteurs de télécommunications 26 AWG ou de section supérieure.

Some ports are suitable for connection to intra-building or non-exposed wiring or cabling only. In such cases, a notice will be given in the installation instructions.

Do not attempt to tamper with any carrier-provided equipment or connection hardware.

**Electromagnetic Compatibility (EMC)**

The equipment is designed and approved to comply with the electromagnetic regulations of major regulatory bodies. The following instructions may enhance the performance of the equipment and will provide better protection against excessive emission and better immunity against disturbances.

A good ground connection is essential. When installing the equipment in a rack, make sure to remove all traces of paint from the mounting points. Use suitable lock-washers and torque. If an external grounding lug is provided, connect it to the ground bus using braided wire as short as possible.

The equipment is designed to comply with EMC requirements when connecting it with unshielded twisted pair (UTP) cables. However, the use of shielded wires is always recommended, especially for high-rate data. In some cases, when unshielded wires are used, ferrite cores should be installed on certain cables. In such cases, special instructions are provided in the manual.

Disconnect all wires which are not in permanent use, such as cables used for one-time configuration.

The compliance of the equipment with the regulations for conducted emission on the data lines is dependent on the cable quality. The emission is tested for UTP with 80 dB longitudinal conversion loss (LCL).

Unless otherwise specified or described in the manual, TNV-1 and TNV-3 ports provide secondary protection against surges on the data lines. Primary protectors should be provided in the building installation.

The equipment is designed to provide adequate protection against electro-static discharge (ESD). However, it is good working practice to use caution when connecting cables terminated with plastic connectors (without a grounded metal hood, such as flat cables) to sensitive data lines. Before connecting such cables, discharge yourself by touching ground or wear an ESD preventive wrist strap.
FCC-15 User Information

This equipment has been tested and found to comply with the limits of the Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the Installation and Operation manual, may cause harmful interference to the radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canadian Emission Requirements

This Class A digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulation.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Warning per EN 55022 (CISPR-22)

<table>
<thead>
<tr>
<th>Warning</th>
<th>Avertissement</th>
<th>Achtung</th>
</tr>
</thead>
<tbody>
<tr>
<td>This is a class A product. In a domestic environment, this product may cause radio interference, in which case the user will be required to take adequate measures.</td>
<td>Cet appareil est un appareil de Classe A. Dans un environnement résidentiel, cet appareil peut provoquer des brouillages radioélectriques. Dans ces cas, il peut être demandé à l'utilisateur de prendre les mesures appropriées.</td>
<td>Das vorliegende Gerät fällt unter die Funkstörgrenzwertklasse A. In Wohngebieten können beim Betrieb dieses Gerätes Rundfunkstörungen auftreten, für deren Behebung der Benutzer verantwortlich ist.</td>
</tr>
</tbody>
</table>
Mise au rebut du produit

Afin de faciliter la réutilisation, le recyclage ainsi que d'autres formes de récupération d’équipement mis au rebut dans le cadre de la protection de l’environnement, il est demandé au propriétaire de ce produit RAD de ne pas mettre ce dernier au rebut en tant que déchet municipal non trié, une fois que le produit est arrivé en fin de cycle de vie. Le client devrait proposer des solutions de réutilisation, de recyclage ou toute autre forme de mise au rebut de cette unité dans un esprit de protection de l’environnement, lorsqu’il aura fini de l’utiliser.

Instructions générales de sécurité

Les instructions suivantes servent de guide général d'installation et d'opération sécurisées des produits de télécommunications. Des instructions supplémentaires sont éventuellement indiquées dans le manuel.

Symboles de sécurité

<table>
<thead>
<tr>
<th>Symbole</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>!</td>
<td>Avertissement</td>
</tr>
<tr>
<td>Danger de choc électrique ! Evitez tout contact avec la surface marquée tant que le produit est sous tension ou connecté à des lignes externes de télécommunications.</td>
<td></td>
</tr>
<tr>
<td>Mise à la terre de protection : la cosse ou la borne marquée devrait être connectée à la prise de terre de protection du bâtiment.</td>
<td></td>
</tr>
</tbody>
</table>
Avertissement

Certains produits peuvent être équipés d'une diode laser. Dans de tels cas, une étiquette indiquant la classe laser ainsi que d'autres avertissements, le cas échéant, sera jointe près du transmetteur optique. Le symbole d'avertissement laser peut aussi être joint.

Veuillez observer les précautions suivantes :

- Avant la mise en marche de l'équipement, assurez-vous que le câble de fibre optique est intact et qu'il est connecté au transmetteur.
- Ne tentez pas d'ajuster le courant de la commande laser.
- N'utilisez pas des câbles ou connecteurs de fibre optique cassés ou sans terminaison et n'observez pas directement un rayon laser.
- L'usage de périphériques optiques avec l'équipement augmentera le risque pour les yeux.
- L'usage de contrôles, ajustages ou procédures autres que celles spécifiées ici pourrait résulter en une dangereuse exposition aux radiations.

ATTENTION : Le rayon laser peut être invisible !

Les utilisateurs pourront, dans certains cas, insérer leurs propres émetteurs-récepteurs Laser SFP dans le produit. Les utilisateurs sont avertis que RAD ne pourra pas être tenue responsable de tout dommage pouvant résulter de l'utilisation d'émetteurs-récepteurs non conformes. Plus particulièrement, les utilisateurs sont avertis de n'utiliser que des produits approuvés par l'agence et conformes à la réglementation locale de sécurité laser pour les produits laser de classe 1.

Respectez toujours les précautions standards de sécurité durant l'installation, l'opération et la maintenance de ce produit. Seul le personnel de service qualifié et autorisé devrait effectuer l'ajustage, la maintenance ou les réparations de ce produit. Aucune opération d'installation, d'ajustage, de maintenance ou de réparation ne devrait être effectuée par l'opérateur ou l'utilisateur.

Manipuler des produits sous tension

Règles générales de sécurité

Ne pas toucher ou altérer l'alimentation en courant lorsque le câble d'alimentation est branché. Des tensions de lignes peuvent être présentes dans certains produits, même lorsque le commutateur (s'il est installé) est en position OFF ou si le fusible est rompu. Pour les produits alimentés par CC, les niveaux de tension ne sont généralement pas dangereux mais des risques de court-circuit peuvent toujours exister.

Avant de travailler sur un équipement connecté aux lignes de tension ou de télécommunications, retirez vos bijoux ou tout autre objet métallique pouvant venir en contact avec les pièces sous tension.

Sauf s'il en est autrement indiqué, tous les produits sont destinés à être mis à la terre durant l'usage normal. La mise à la terre est fournie par la connexion de la fiche principale à une prise murale équipée d'une borne protectrice de mise à la terre. Si une cosse de mise à la terre est fournie avec le produit, elle devrait être connectée à tout moment à une mise à la terre de protection par un conducteur de diamètre 18 AWG ou plus. L'équipement monté en châssis ne devrait être monté que sur des châssis et dans des armoires mises à la terre.

Branchez toujours la mise à la terre en premier et débranchez-la en dernier. Ne branchez pas des câbles de télécommunications à un équipement qui n'est pas mis à la terre. Assurez-vous que tous les autres câbles sont débranchés avant de déconnecter la mise à la terre.
Connexion au courant du secteur

Assurez-vous que l’installation électrique est conforme à la réglementation locale.

Branchez toujours la fiche de secteur à une prise murale équipée d’une borne protectrice de mise à la terre.

La capacité maximale permissible en courant du circuit de distribution de la connexion alimentant le produit est de 16A. Le coupe-circuit dans l’installation du bâtiment devrait avoir une capacité élevée de rupture et devrait fonctionner sur courant de court-circuit dépassant 35A.

Branchez toujours le câble d’alimentation en premier à l’équipement puis à la prise murale. Si un commutateur est fourni avec l’équipement, fixez-le en position OFF. Si le câble d’alimentation ne peut pas être facilement débranché en cas d’urgence, assurez-vous qu’un coupe-circuit ou un disjoncteur d’urgence facilement accessible est installé dans l’installation du bâtiment.

Le disjoncteur devrait déconnecter simultanément les deux pôles si le système de distribution de courant est de type IT.

Connexion d’alimentation CC

Sauf s’il en est autrement spécifié dans le manuel, l’entrée CC de l’équipement est flottante par rapport à la mise à la terre. Tout pôle doit être mis à la terre en externe.

A cause de la capacité de courant des systèmes à alimentation CC, des précautions devraient être prises lors de la connexion de l’alimentation CC pour éviter des courts-circuits et des risques d’incendie.

Les unités CC devraient être installées dans une zone à accès restreint, une zone où l’accès n’est autorisé qu’au personnel qualifié de service et de maintenance.

Assurez-vous que l’alimentation CC est isolée de toute source de courant CA (secteur) et que l’installation est conforme à la réglementation locale.

La capacité maximale permissible en courant du circuit de distribution de la connexion alimentant le produit est de 16A. Le coupe-circuit dans l’installation du bâtiment devrait avoir une capacité élevée de rupture et devrait fonctionner sur courant de court-circuit dépassant 35A.

Avant la connexion des câbles d’alimentation en courant CC, assurez-vous que le circuit CC n’est pas sous tension. Localisez le coupe-circuit dans le tableau desservant l’équipement et fixez-le en position OFF. Lors de la connexion de câbles d’alimentation CC, connectez d’abord le conducteur de mise à la terre à la borne correspondante, puis le pôle positif et en dernier, le pôle négatif. Remettez le coupe-circuit en position ON.

Un disjoncteur facilement accessible, adapté et approuvé devrait être intégré à l’installation du bâtiment.

Le disjoncteur devrait déconnecter simultanément les deux pôles si l’alimentation en courant CC est flottante.
Declaration of Conformity

Manufacturer's Name: RAD Data Communications Ltd.
Manufacturer's Address: 24 Raoul Wallenberg St., Tel Aviv 69719, Israel

Declares that the product:
Product Name: Optimux-1551

Conforms to the following standard(s) or other normative document(s):

**EMC:**

**Safety:**
- EN 60950: 2000 Safety of information technology equipment.

Supplementary Information:
The product herewith complies with the requirements of the EMC Directive 89/336/EEC, the Low Voltage Directive 73/23/EEC and the R&TTE Directive 1999/5/EC for wired equipment. The product was tested in a typical configuration.

Tel Aviv, 22 August 2004

Haim Karshen
VP Quality

European Contact: RAD Data Communications GmbH, Otto-Hahn-Str. 28-30, 85521 Ottobrunn-Riemerling, Germany
Quick Start Guide

Installation of Optimux-1551 should be carried out only by an experienced technician. If you are familiar with Optimux-1551, use this guide to prepare the unit for operation.

1. Installing Optimux-1551

Connecting the Interfaces

1. Connect the OC-3/STS-3 (/STM-1) equipment to the back panel fiber optic or BNC connectors.
2. Connect the E1/DS1 channels to the back panel Telco connectors. Refer to Appendix A.
3. Connect a control terminal via a cross-cable (supplied with the product) to the back panel Control port; or, connect a Telnet host, a PC running a Web browsing application, or a RADview/SNMP management station to the back panel Ethernet port. (In a direct Ethernet connection, use a cross-cable.)

Optimux-1551 supports multiple simultaneous management sessions as follows:

- One session via terminal application connected directly to the unit’s Control port
- Up to two sessions via Telnet and/or web browser connected to the unit’s Ethernet port
- Multiple sessions (maximum quantity depends on network resources) via SNMP application (for example, RADview) connected to the unit’s Ethernet port.

Connecting the Power

Connect the power cable to the power connector on the Optimux-1551 power supply.

The unit has no power switch. Operation starts when the power is applied to the power supply connector(s).

Caution: Do not connect or disconnect the power cable from the device while the cable is connected to the power main!
2. Configuring Optimux-1551

Configure Optimux-1551 to the desired operation mode via an ASCII terminal connected to the back panel Control port. Alternatively, you can manage Optimux-1551 over Telnet, a PC running a Web browsing application or RADview application via the MNG port.

Starting a Terminal Session

➢ To connect the terminal:
1. Connect a terminal cross adaptor with a flat cable (supplied with the product) to the Control connector of Optimux-1551.
2. Turn the control terminal on.
3. Reset Optimux-1551 by turning it off and back on.
4. Once the ON LED starts flashing, press <Enter> several times.
5. Optimux-1551 automatically adjusts itself to the current terminal baud rate and responds with a string of dots.
6. Press <.> (period) several times, until Optimux-1551 displays the user name and password entry form.
7. Enter your user name and password and proceed with the management session.

Configuring the IP Management Parameters

➢ To configure the IP management parameters:

From the Management menu (Main > Configuration > System Configuration > Management), select the following host IP parameters:
- Host IP address
- Subnet mask
- Default gateway IP address
- Community names
- Network managers.
Configuring the Timing

➢ To configure the master clock:
  • From the Master Clock menu (Main > Configuration > System Configuration > Master Clock), configure the Optimux-1551 master clock:

<table>
<thead>
<tr>
<th>Notes</th>
<th>In a point-to-point application, if the near end unit is set to internal clock, the far end unit should be set to loopback clock. Refer to Chapter 6, Configuring Typical Applications.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>▪ Internal</td>
</tr>
<tr>
<td></td>
<td>▪ Loopback</td>
</tr>
<tr>
<td></td>
<td>▪ External Reference E1 (if optional station clock card is installed)</td>
</tr>
<tr>
<td></td>
<td>▪ External Reference T1 (if optional station clock card is installed)</td>
</tr>
<tr>
<td></td>
<td>▪ External Tributary (if optional station clock card is installed).</td>
</tr>
</tbody>
</table>

Caution
There is no alarm indication for incorrect clock configuration.

Configuring the Primary and Management Ethernet Ports

➢ To configure the Ethernet ports:
  From the Primary/Management Port menu (Main > Configuration > System Configuration > Control Port > Ethernet Configuration), configure the following parameters:
  • Autonegotiation
  • Ethernet mode, if autonegotiation is disabled
  • LAN speed, if autonegotiation is disabled.

Configuring the OC-3/STS-3 (STM-1) Port

➢ To configure the OC-3/STS-3 (STM-1) port:
  From the Uplink Configuration menu (Main > Configuration > Physical Ports Configuration > Uplink Configuration), configure the following parameters:
  • EED threshold
  • SD threshold
  • J1 Tx path trace enable
  • J1 Rx path trace enable
  • J1 path trace.
Configuring the E1/DS1 Channels

- To configure the E1/DS1 Channels:

  From the LIU Configuration menu (Main > Configuration > Physical Ports Configuration > Channel Configuration > LIU Configuration):

  1. Select E1 or DS1 as the Channel Line Type.

  Note  
  If the OP-63E1 card is installed, DS1 is not an option.

  2. If E1 is the channel type, select the Interface Type.

  3. Select Line Coding.

  4. If DS1 is the channel type, select Line Length.
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Chapter 1

Introduction

This chapter provides a general introduction to Optimux-1551, including:

- An overview of Optimux-1551, its versions and options
- A brief physical description of Optimux-1551
- A functional description of Optimux-1551
- Technical specifications.

1.1 Overview

Optimux-1551 is an STS-3/OC-3/STM-1 synchronous digital multiplexer intended mainly for use in point-to-point applications, providing access to SONET (Synchronous Optical Network)/SDH (Synchronous Digital Hierarchy) transmission cores at the STS-3/OC-3/STM-1 level (155.52 Mbps).

Optimux-1551 provides a flexible, efficient and cost-effective method for transporting PDH (Plesiochronous Digital Hierarchy) signals at E1 rates (2.048 Mbps) or DS1 rates (1.544 Mbps) via a SONET or SDH uplink.

Optimux-1551's uplink aggregate can be equipped with electrical intra-office interfaces or with short-haul or long-haul optical interfaces. The long-haul optical interface supports a range of up to 80 km (50 miles), thereby enabling remote access to regional and national SONET/SDH transmission networks.

Optional backup cards can be installed to provide no-single-point-of-failure redundancy for the STS-3/OC 3/STM-1 uplink, power supply, and control and access primary cards. When a backup card is replaced, there is no interruption in system operation (hot swap). When a primary card is replaced, the switching time from the primary card to the backup card is less then 50 ms.
Product Options

Uplink Interface Options

Optimux-1551 is available with an electrical coaxial uplink interface or a variety of fiber optic uplink options (see Table 1-7). The unit can be ordered with a second (redundant) uplink.

Power Supply Options

To avoid injury, always disconnect an AC or DC power supply's cable before removing the power supply.

Optimux-1551 is available with one of the following types of power supply:

- 100 to 240 VAC
- 48 VDC nominal.

The unit can be ordered with a second (redundant) power supply.

Channel Module Options

The channels interfaces can be:

- 120Ω balanced or 75Ω unbalanced E1, or
- 100Ω balanced DS1.

The physical E1/DS1 connections are made through 64-pin Telco connectors.

Notes

- In this manual, the access and control card is referred to by its designation on the front panel: OP-6384, OP-2128, or OP-4256.
- For 75Ω unbalanced E1, use a Telco-Telco cable (P/N: CBL-TELCO-TELCO/2M) and a BNC patch panel (P/N: OP-A/ADAPTOR/21BNC), which supports 21 unbalanced E1 ports.

The unit can be ordered with a second (redundant) OP-6384, OP-2128, or OP-4256 card, which connects to the channels via an internal Y-connection on the backplane.

Note

Both cards must be the same type: two OP-6384s, two OP-2128s, or two OP-4256s. OP-63E1 only supports E1 (63 channels). OP-6384 supports E1 (63 channels) or DS1 (84 channels). OP-2128 supports E1 (21 channels) or DS1 (28 channels), and OP-4256 supports E1 (42 channels) or DS1 (56 channels).
Cabling accessories for the channel connector include:

- Telco-Telco cable, P/N: CBL-TELCO-TELCO/2M
- Telco-open cable, P/N: CBL-TELCO-OPEN/2M
- Telco-RJ45 cable, P/N: CBL-TELCO-RJ45/2M
- BNC patch panel, P/N: OP-A/ADAPTOR/21BNC (supports 21 unbalanced E1 ports)
- RJ-45 patch panel, P/N: OP-A/ADAPTOR/28RJ (supports 21 E1 or 28 DS1 balanced ports).

**Note**

*Cabling accessories are not supplied with the Optimux-1551 – they must be ordered separately.*

**Station Clock Option**

An optional station clock card can be installed on the OP-6384/OP-2128/OP-4256 card. When both the station clock and an external clock are used, the unit's transmit clock for transmission over the STS-3/OC-3/STM-1 uplink is locked to the station clock input source. The input source can be either one of the E1/DS1 tributaries or a dedicated external E1/DS1 input.

The station clock card supports STRATUM 3 for the SONET/SDH equipment.

**Applications**

**Point-to-Point Application**

In *Figure 1-1*, a company campus line or a line leased from the local operator is used to link two Optimux-1551 units situated at a distance ranging from several hundreds of meters to several tens of kilometers. A backup uplink is optionally used to ensure uninterrupted data flow between the two sites. The Optimux-1551 at each site is connected to E1/DS1 access equipment.

*Figure 1-1. Point-to-Point Link Application*
Operation over SONET/SDH Network

Optimux-1551’s uplink enables direct connections to SONET/SDH networks as illustrated in Figure 1-2.

![Figure 1-2. Point-to-Point application over SONET/SDH networks](image)

E1/DS1 Fan-Out for SONET/SDH Network

The uplink enables E1/DS1 fan-out connections to SONET/SDH networks as illustrated in Figure 1-3, where the unit can be connected to an add-drop multiplexer (ADM).

![Figure 1-3. E1/DS1 Fan-Out for SONET/SDH Networks](image)
Features

With the optical uplink, Optimux-1551 provides a simple, flexible and cost-effective solution for transporting multiple E1/DS1 signals at distances up to 80 km (50 miles).

Optimux-1551 multiplexes 21/42/63 E1 or 28/56/84 DS1 channels over a single STS-3/OC-3/STM-1 data stream. This provides a highly cost-effective, simple solution for transporting multiple E1/DS1 channels for a broad range of applications.

Optimux-1551 supports fiber optic (multimode, single-mode, WDM, and SF3) and coax uplinks.

Optimux-1551 supports 1+1 unidirectional SONET/SDH automatic protection, as well as 1+1 protection on E1/DS1 tributaries and power supply modules, eliminating any single point of failure.

Critical modules can be automatically switched to optional backup modules when required. An optional second power supply provides automatic power redundancy and fail-safe operation. An optional second uplink provides user-configurable redundancy on uplink failure. An optional second OP-6384/OP-2128/OP-4256 card provides user-configurable redundancy for other primary hardware functions. All of these redundant cards can also be replaced without shutting down the unit and without interrupting data flow.

The power supply (and optional backup power supply) can be ordered with either 100 to 240 VAC or 48 VDC nominal intake.

The timing source for transmission to the STS-3/OC-3/STM-1 can be the Optimux-1551 internal clock, loopback of the received clock, or an external clock (requires an optional station clock card installed on the OP-6384/OP-2128/OP-4256 card).

Note

If a station clock card is installed on the main OP-6384/OP-2128/OP-4256 card and there is a backup OP-6384/OP-2128/OP-4256 card, then to maintain redundancy a station clock card must also be installed on the backup OP-6384/OP-2128/OP-4256 card.

To facilitate system diagnostics, Optimux-1551 features LED status indicators, AIS alarm generation, alarm dry contact interface with cut-off button, in-service monitoring of E1/DS1 lines and statistics collection and diagnostic loops on channels and uplinks.

Optimux-1551 setup, control, and diagnostics can be managed via a serial port (from an ASCII terminal), via an Ethernet/Fast-Ethernet port (from a RADview or other SNMP, Telnet, or Web browser station), or from a remote unit via inband DCC bytes (RADview/SNMP, Telnet, or Web). The serial port can also be configured for dial-out alarms.

Optimux-1551 is packaged in a compact 2U high unit for mounting in either an ANSI or ETSI 19" rack.

Optimux-1551 is designed to meet the requirements of NEBS level 3.

### 1.2 Physical Description

Optimux-1551 is a compact 88 mm/3.4 inch (2U) high unit, which can operate as a standalone unit or can be installed in a 483mm/19 inch ANSI or ETSI rack using the brackets provided with the unit. *Figure 1-4* is a 3D view of the unit.

*Figure 1-4. Optimux-1551 Front Panel – 3D View*

The front panel includes the power connectors, the fan tray, and the LED indicators for power, system, alarm, uplink, and channel status. For details on the front panel LEDs, see *Chapter 3*.

The back panel contains the connectors for uplinks, channels, serial and Ethernet management, monitoring, optional external clock, and alarm dry contact. It also contains another set of LED indicators for the uplink, system, and power status, as well as an alarm cut-off button. For details on the back panel, see *Chapter 3*.

*Figure 1-5. Optimux-1551 Back Panel – 3D View*
1.3 Functional Description

General Description

Figure 1-6. General
The cards in the Optimux-1551 are listed in Table 1-1.

Table 1-1. Primary Cards

<table>
<thead>
<tr>
<th>Card</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(OP-6384/OP-2128/OP-4256)</td>
<td>The main board of the unit, it contains the major circuits. A second card can be installed for redundancy. The cards are hot-swap replaceable.</td>
</tr>
<tr>
<td>Power Supply</td>
<td>100 to 240 VAC, or 48 VDC. A second power supply can be installed for redundancy. The power supplies are hot-swap replaceable.</td>
</tr>
<tr>
<td>Backplane</td>
<td>Communications and physical connections for the primary cards.</td>
</tr>
<tr>
<td>Tributary</td>
<td>The tributary card provides physical interfaces to the E1/DS1 lines, including line transformers, for up to 63 E1 (2.048 Mbps) or for 84 DS1 (1.544 Mbps) lines. The tributary card provides six 64-pin telco connectors.</td>
</tr>
<tr>
<td>Management</td>
<td>Permanent, non-replaceable card that provides the physical connection hardware for an (optional) external clock input, an Ethernet connection, a serial (terminal) connection, an E1/DS1 channel monitoring (sniffing) output, a alarm dry contact output, and an alarm cut-off pushbutton.</td>
</tr>
<tr>
<td>Uplink</td>
<td>Coax or fiber optic STS-3/OC-3/STM-1 (155.52 Mbps) uplink. A number of optical interface cards are available for multimode, single-mode, and various wavelengths. A second card can be installed for redundancy. The cards are hot-swap replaceable.</td>
</tr>
<tr>
<td>Fan Tray</td>
<td>The fan tray has four fans. The fan tray also has a Status LED that indicates the internal fans’ status. The fan tray is hot-swap replaceable</td>
</tr>
</tbody>
</table>

**OP-6384/OP-2128/OP-4256 Card**

The OP-6384/OP-2128/OP-4256 card includes mappers, E1/DS1 channel interfaces, SONET/SDH STS-3/OC-3/STM-1 overhead terminator, dry contacts for major and minor alarms, serial communications interface, Ethernet interface, redundancy logic for itself and for the uplink card, CPU interface, and clock interface. The card is the mounting base for the optional station clock card.
### OP-6384/OP-2128/OP-4256 Card Redundancy

**Note**

*If two cards are installed, both must be of the same type (both cards should either be OP-6384, OP-2128, or OP-4256) and used with the same type and number of channels:*

- OP-63E1: 63 E1
- OP-84T1: 63 E1 or 84 DS1
- OP-2128: 21 E1 or 28 DS1
- OP-4256: 42 E1 or 56 DS1.

Two OP-6384/OP-2128/OP-4256 cards can be ordered with Optimux-1551 to provide 1+1 hardware protection. Where two cards are installed and redundancy is configured as automatic, one of the cards is the active card and the second is the standby card. The active and standby status switches between the cards when a failure is detected on the active card.

Two modes of protection are supported:

- **Automatic**
  - Backup card becomes active card on failure condition in first card.
- **Off**
  - Automatic switching between cards is disabled but still may be performed manually. The active card is the card selected as the main card.

### Causes for Redundancy Switching

The following reasons can cause a redundancy switch (jump) from the active to the backup OP-6384/OP-2128/OP-4256 card. The reasons are listed in descending order of priority. In other words, if reason 1 occurs in card 1, operation switches to card 2, and then reason 2 occurs in card 2, operation will not switch back to card 1 (if reason 1 is still occurring).

#### Table 1-2. Causes for Redundancy Switching

<table>
<thead>
<tr>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Problem with framer</td>
</tr>
<tr>
<td>2. Problem with station clock when the unit is operating with an external clock</td>
</tr>
<tr>
<td>3. Problem with a mapper</td>
</tr>
<tr>
<td>4. Problem with a CPLD (hardware logic component)</td>
</tr>
<tr>
<td>5. The state of loss conditions on E1/DS1 channels depends on the configuration of tributary channel priorities and tributary fail limits (see Configuring the OP-6384/OP-2128/OP-4256 (Access and Control) Card Redundancy, and Configuring the Channels sections, Chapter 4). The status of the channels can be viewed in the System Status menu (Monitor &gt; System Monitoring &gt; System Status).</td>
</tr>
<tr>
<td>6. Problem with the flash memory.</td>
</tr>
</tbody>
</table>
Multiplexing and Mapping

There are three mappers on the OP-6384 Card, two on the OP-4256 card and one on the OP-2128 card. The mappers map the channel signals to the TUG3 level. The SONET/(SDH) STS-3/OC-3/STM-1 overhead terminators map the TUG-3 over VC-4 and STM-1. See Figure 1-7 to Figure 1-10 and Table 1-3 to Table 1-6.

![Figure 1-7. E1 over STM-1 Multiplexing](image)

**Table 1-3. E1 over STM-1 Mapping**

<table>
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<th>TU#</th>
<th>TUG3</th>
<th>TUG2</th>
<th>TU12</th>
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Figure 1-8. DS1 over STM-1 Multiplexing

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Figure 1-10. DS1 over OC-3 Multiplexing

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<td>17</td>
<td>1</td>
<td>3</td>
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<td>18</td>
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<td>46</td>
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<td>3</td>
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<td>3</td>
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<tr>
<td>19</td>
<td>1</td>
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<td>3</td>
<td>47</td>
<td>2</td>
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<td>3</td>
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<td>3</td>
<td>5</td>
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<tr>
<td>20</td>
<td>1</td>
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<td>3</td>
<td>48</td>
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<td>6</td>
<td>3</td>
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<td>3</td>
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<tr>
<td>21</td>
<td>1</td>
<td>7</td>
<td>3</td>
<td>49</td>
<td>2</td>
<td>7</td>
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<td>3</td>
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<td>22</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>50</td>
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<td>1</td>
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<td>78</td>
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<td>23</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>51</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>79</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>24</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>52</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>80</td>
<td>3</td>
<td>3</td>
<td>4</td>
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<tr>
<td>25</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>53</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>81</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>26</td>
<td>1</td>
<td>5</td>
<td>4</td>
<td>54</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>82</td>
<td>3</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>27</td>
<td>1</td>
<td>6</td>
<td>4</td>
<td>55</td>
<td>2</td>
<td>6</td>
<td>4</td>
<td>83</td>
<td>3</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>28</td>
<td>1</td>
<td>7</td>
<td>4</td>
<td>56</td>
<td>2</td>
<td>7</td>
<td>4</td>
<td>84</td>
<td>3</td>
<td>7</td>
<td>4</td>
</tr>
</tbody>
</table>

**Note**

HVC 1: Channels 1 – 28, HVC 2: Channels 29 – 56, HVC 3: Channels 57 – 84
Uplink Cards

Two types of STS-3/OC-3/STM-1 uplink interfaces are supported:

- Electrical – with BNC connectors
- Optical –
  - 850 nm for multimode fiber
  - 1310 and 1550 nm laser for extended range over single-mode fiber
  - 1310 and 1550 nm laser (WDM) for extended range over single fiber using different wavelengths for transmit and receive
  - 1310 nm laser (SF3) for extended range over single fiber using the same wavelength for transmit and receive.

Note

The uplink cards are hot-swappable.

Fiber Optic Interface Cards

Fiber optic interface cards are modular cards that convert incoming optical signals to electrical signals, and outgoing electrical signals to optical signals. Conversion is achieved by utilizing an infrared LED or laser transmitter. Fiber optic interface cards support ST, SC, SC/APC, and FC-PC connectors, single-mode and multimode fibers, and wavelengths of 850 nm, 1310 nm and 1550 nm. Table 1-7 details available fiber optic types and their performance.

Table 1-7. Optical Uplink Performance

<table>
<thead>
<tr>
<th>Wavelength [nm]</th>
<th>Fiber Type [μm]</th>
<th>Transmitter Type</th>
<th>Typical Output Power [dBm]</th>
<th>Receiver Sensitivity [dBm]</th>
<th>Connector Type</th>
<th>Typical Max. Range [km] [miles]</th>
</tr>
</thead>
<tbody>
<tr>
<td>850nm</td>
<td>62.5/125 Multimode</td>
<td>VCSEL</td>
<td>-18</td>
<td>-26</td>
<td>SC, ST, FC</td>
<td>2</td>
</tr>
<tr>
<td>1310nm</td>
<td>9/125 Single-mode</td>
<td>Laser</td>
<td>-12</td>
<td>-31</td>
<td>ST, SC, FC</td>
<td>20</td>
</tr>
<tr>
<td>1550nm</td>
<td>9/125 Single-mode</td>
<td>Laser</td>
<td>-12</td>
<td>-31</td>
<td>ST, FC, SC</td>
<td>20</td>
</tr>
<tr>
<td>1310nm/1550nm</td>
<td>9/125 Single-mode</td>
<td>Laser (SF1/SF2)</td>
<td>-12</td>
<td>-29</td>
<td>SC</td>
<td>20 km</td>
</tr>
<tr>
<td>1310nm</td>
<td>9/125 Single-mode</td>
<td>Laser (SF3)</td>
<td>-12</td>
<td>-27</td>
<td>SC/APC</td>
<td>20 km</td>
</tr>
</tbody>
</table>
**Electrical Interface Card**

The electrical interface card includes a line interface transceiver. The receiver recovers clock and data from the incoming signal, and also provides signal detect output. The receive and transmit data cables are connected to the card through a 75Ω coaxial BNC connector (unbalanced).

**Uplink Redundancy**

Up to two uplink cards can be ordered with Optimux-1551. The uplink A card is the default active uplink and the uplink B card is the default protection (backup) uplink. The uplink card redundancy is unidirectional 1+1 automatic protection in accordance with GR-253-CORE (for SONET) and ITU G.841 (for SDH). Together with the unit’s 1+1 protection on the E1/DS1 tributaries, this eliminates any single point of failure.

The status of the uplink cards changes if any of the following occurs to the current active uplink:

- Loss of signal
- Loss of frame
- EED B2
- MS-AIS
- SD (signal degradation) – the SD threshold can be user-configured.

The signal received from the active uplink (A or B) is passed to both the active OP-6384/OP-2128/OP-4256 card and the protection OP-6384/OP-2128/OP-4256 card.
Both uplinks must be the same interface type, i.e., both electrical or both optical.

With a backup uplink card installed, Optimux-1551 redundancy mechanisms can be implemented. The following user-selectable modes are available:

**Automatic Redundancy**
Upon detection of signal loss or malfunction in the active uplink (A), switches to the protection uplink (B). Automatically reinstates card (A) as active when card (A) recovers from the signal loss condition.

**Manual Redundancy**
Switches transmission to the protection uplink (B) upon active uplink (A) malfunction or signal loss, but unlike, automatic redundancy, does not reinstate uplink (A) as active when uplink (A) recovers from the signal loss condition.

**Off**
Uplink A is the active uplink and cannot switch to uplink B.
### Table 1-8. Automatic and Manual Uplink Redundancy

<table>
<thead>
<tr>
<th>Mode</th>
<th>Fault Condition on Uplink (A) Rx</th>
<th>Consequent Action</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic</td>
<td>Signal loss</td>
<td>Backup activated</td>
<td>If signal loss is recovered on uplink (A), uplink (A) is automatically reselected.</td>
</tr>
<tr>
<td>Automatic</td>
<td>Loss of frame, MS-AIS, EED, SD</td>
<td>Backup activated</td>
<td>There is no way to check if uplink (A) has recovered. Therefore, uplink (A) will be reactivated only if a fault condition is detected on the protection uplink (B).</td>
</tr>
<tr>
<td>Manual</td>
<td>Signal loss, loss of frame, MS-AIS, EED, SD</td>
<td>Backup activated</td>
<td>The main uplink (A) will not be reactivated as long as the mode is manual.</td>
</tr>
<tr>
<td>Off</td>
<td>(Not applicable)</td>
<td>Backup not activated</td>
<td>Uplink A is always the active uplink.</td>
</tr>
</tbody>
</table>

### Channels

Each E1/DS1 channel port performs the following functions:

- **Receive path**: recovers the data stream and the associated clock signal from the received line signal. The resulting channel data stream is transferred to the uplink.

- **Transmit path**: receives the channel data stream from the uplink and generates the line signal for transmission to the equipment connected to the interface.

### Power Supply

To avoid injury, always disconnect an AC or DC power supply’s cable before removing the power supply.

Optimux-1551 can be ordered with a 100 to 240 VAC or 48 nominal VDC power supply.

*Note*

*The power supply cards are hot-swappable.*

### Power Supply Redundancy

Up to two power supplies can be ordered with Optimux-1551. The power supplies share the load. In the event of a failure in one of the power supplies, the other power supply automatically continues to support the entire load.
If two power supplies are used, they do not have to be the same type. The power supply configuration can be:

- One or two AC
- One or two DC
- One AC and one DC.

**Note**

When installing both an AC power supply and a DC power supply, adhere to the following guidelines:

- Jumper J1 on the DC power supply must be removed
- The DC power supply must be installed in power supply slot B and the AC power supply in power supply slot A.

Each power supply has its own inlet connector.

If two power supply cards are installed, during normal operation power for the Optimux-1551 is taken from both supplies.

If one power supply fails, all the power consumption is automatically taken from the second power supply. If the failed power supply returns to normal operation, power is again taken from both supplies.
Management

Optimux-1551 is managed either by an ASCII terminal connection, using menu dialogs with numbered options selected by the operator, or via a more advanced interface, such as RADview, Telnet, or a web browser.

Terminal management menus and procedures are described in Chapter 4, Supervisory Port Software Configuration.

Physical connections for control can be made through the Control (RS-232) port using a DB-9 connector (cross cable required) for terminal connection or through the MNG-ETH (Ethernet/Fast Ethernet) port using an RJ-45 interface for Ethernet connection. The Control port can also be configured to support call out using a standard dialup modem.

Monitoring

Optimux-1551’s monitoring mode is used for diagnostic purposes. The monitoring mode enables the user to monitor the received data of the selected channel, also referred to as sniffing. The data can be monitored on the Monitor connector located on the back panel (Figure 1-13). For E1 channels, only HDB3 is supported. For DS1 channels, only B8ZS is supported. Monitoring does not influence regular data flow. The following picture illustrates Optimux-1551’s monitoring feature.

![Figure 1-13. Monitoring Mode](image-url)
Timing

The SONET/SDH overhead terminator requires a 19.44 MHz reference source clock, which provides transmit direction timing. Three timing modes are available (software selectable):

- **INT (Internal)**
- **LBT (Loop Back Timing)**
- **EXT (External station clock – requires optional station clock card).**

**Figure 1-14. Timing**

*Internal*: An onboard free-running oscillator (19.44 MHz ±20 ppm) is the timing source for the transmit data toward the STS-3/OC-3/STM-1 uplink.

**Figure 1-15. Internal Clock Mode**
**Loopback:** The system transmit clock is locked to the recovered received clock signal coming from the STS-3/OC-3/STM-1. Systems that require a one-source clock function in this mode.

![Diagram](image)

**External:** The system is synchronized to an external E1/DS1 clock source. It requires an optional station clock daughterboard, which is installed on the OP-6384/OP-2128/OP-4256 card.

The station clock module performs clock regeneration for SEC (Synchronous Equipment Clock) and supports STRATUM 3 for the SONET/SDH equipment. The module can operate in free-run, locked and holdover modes.

For source input, an external E1 (2.048 MHz) or DS1 (1.544 Mbps) clock or data can be run to the shielded, RJ-45-type Clock connector on the Optimux-1551 back panel.

Alternatively, the E1/DS1 source input can be taken from one of the channels. The station clock module locks on the 2.048 MHz (or 1.544 MHz) source input and converts it to the 19.44 MHz required for the reference clock.

![Figure 1-16. Loopback Timing Mode](image)
Where two OP-6384/OP-2128/OP-4256 cards are installed, to maintain proper redundancy: if one has a station clock card installed the other must have a station clock card installed as well.

### Diagnostics

Two kinds of diagnostic tests can be carried out: Local Loop Back (LLB) and Remote Loop Back (RLB). These loops can be carried out on the channel layer as well as on the uplink layer. For more information on diagnostics see Chapter 5, Tests and Diagnostics.

### Alarms and Events

Optimux-1551 reports about events and about two types of alarms: major and minor. Events are changes in state, while alarms are caused by conditions that can be changed or terminated.

Each type of alarm (major and minor) activates a LED and a dry contact alarm relay. Events do not activate LEDs or alarm relays. Alarms and events are logged in the system log file.

An alarm cut-off (ACO) button is located on the back panel. Once pressed, the dry contact is disengaged and remains so until a new alarm of the same type occurs.

The user can configure each alarm to be considered Major, Minor or Off. Optimux-1551 also supports external alarm input via the Alarms connector.

For more information about alarms refer to Chapter 5, Tests and Diagnostics.

### Statistics

Optimux-1551 includes several counters for statistics concerning the uplink and channels. For more information about statistics see Chapter 4, Supervisory Port Software Configuration.
**Cooling**

Optimux-1551 includes a fan tray that provides cooling air to the internal circuits. Using cooling fans permits the unit to operate over a wide range of ambient temperatures, an advantage for equipment installed in curbside cabinets.

The fans operate when the unit’s internal temperature becomes excessive. The operation of the fans is monitored by the management subsystem.

The fan tray is hot-swap replaceable. It contains a Status LED that indicates the status of the four internal fans in the fan tray.

---

### 1.4 Technical Specifications

<table>
<thead>
<tr>
<th><strong>Electrical Uplink</strong></th>
<th><strong>Standards</strong></th>
<th>ITU-T G.703</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rate</strong></td>
<td>STS-3/OC-3/STM-1 (155.520 Mbps)</td>
<td></td>
</tr>
<tr>
<td><strong>Line Code</strong></td>
<td>CMI</td>
<td></td>
</tr>
<tr>
<td><strong>Impedance</strong></td>
<td>75Ω, unbalanced</td>
<td></td>
</tr>
<tr>
<td><strong>Range</strong></td>
<td>12.7 dB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>135m is attainable when using RG-59B/U (at 78 MHz – in accordance with the square root of frequency law)</td>
<td></td>
</tr>
<tr>
<td><strong>Connectors</strong></td>
<td>Two shielded BNC connectors</td>
<td></td>
</tr>
<tr>
<td><strong>Redundancy</strong></td>
<td>Optional additional electrical uplink</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Fiber Optic Uplink</strong></th>
<th><strong>Standards</strong></th>
<th>ITU-T G.957</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connectors</strong></td>
<td>ST, SC, FC, SC/APC</td>
<td></td>
</tr>
<tr>
<td><strong>Redundancy</strong></td>
<td>Optional additional fiber optic uplink</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Power Supply</strong></th>
<th><strong>Number of Supplies</strong></th>
<th>One or two (power sharing)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AC Power Module</strong></td>
<td>100 to 240 VAC, 50 or 60 Hz</td>
<td></td>
</tr>
<tr>
<td><strong>DC Power Module</strong></td>
<td>48 VDC nominal</td>
<td></td>
</tr>
<tr>
<td><strong>Power Consumption</strong></td>
<td>AC: 160 VA max, 1.6A max</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DC: 80W max, 2A max</td>
<td></td>
</tr>
</tbody>
</table>
### General Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POWER A, B</strong></td>
<td>Green:</td>
<td>Power is OK</td>
</tr>
<tr>
<td></td>
<td>Red:</td>
<td>Power fault</td>
</tr>
<tr>
<td></td>
<td>Off:</td>
<td>No power</td>
</tr>
<tr>
<td><strong>TST (yellow)</strong></td>
<td>On:</td>
<td>Unit is in test mode</td>
</tr>
<tr>
<td></td>
<td>Flashing:</td>
<td>Downloading software</td>
</tr>
<tr>
<td><strong>FLT (red)</strong></td>
<td>On:</td>
<td>OP-6384/OP-2128/OP-4256 card is in fault condition</td>
</tr>
<tr>
<td><strong>ON A/B (green)</strong></td>
<td>On:</td>
<td>Active OP-6384/OP-2128/OP-4256 card</td>
</tr>
<tr>
<td></td>
<td>Flashing:</td>
<td>During auto-baud detect process.</td>
</tr>
<tr>
<td><strong>MAJ (red)</strong></td>
<td>On:</td>
<td>Major Alarm</td>
</tr>
<tr>
<td></td>
<td>Flashing:</td>
<td>Major Alarm + ACO button pressed</td>
</tr>
<tr>
<td><strong>MIN (yellow)</strong></td>
<td>On:</td>
<td>Minor Alarm</td>
</tr>
<tr>
<td></td>
<td>Flashing:</td>
<td>Minor Alarm + ACO button pressed</td>
</tr>
<tr>
<td><strong>Uplink SYNC A/B LOSS (red)</strong></td>
<td>On:</td>
<td>Uplink electrical/optical signal not present or out-of-frame detected on uplink (A/B)</td>
</tr>
<tr>
<td><strong>Uplink AIS A/B (yellow)</strong></td>
<td>On:</td>
<td>AIS signal detected on uplink A/B</td>
</tr>
<tr>
<td><strong>Channel SYNC LOSS/AIS (red/yellow)</strong></td>
<td>Red:</td>
<td>Loss of signal detected on the respective non masked channel.</td>
</tr>
<tr>
<td></td>
<td>Yellow:</td>
<td>AIS signal detected on the respective non masked channel</td>
</tr>
<tr>
<td></td>
<td>Flashing:</td>
<td>The channel is masked and the LED status for the masked channels’ parameter is set to Blink by the user.</td>
</tr>
<tr>
<td></td>
<td>Off:</td>
<td>The channel is masked and the LED status for the masked channels’ parameter is set to Off by the user or when the channel is not masked and no Loss of Signal or AIS is detected on the respective channel.</td>
</tr>
<tr>
<td><strong>SIG</strong></td>
<td>Green:</td>
<td>Signal detected on the respective uplink card</td>
</tr>
</tbody>
</table>

### Control Port

<table>
<thead>
<tr>
<th>Interface</th>
<th>RS-232 (V.24)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>9,6 kbps, 19,200 kbps, 38,400 kbps, 57,600 kbps, 115,2 kbps</td>
</tr>
<tr>
<td>Connector</td>
<td>9-pin DB-9, female</td>
</tr>
<tr>
<td><strong>Ethernet Port</strong></td>
<td><strong>Physical Interface</strong></td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td><strong>Data rate</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Transmission mode</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Connector</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>E1 Channel Line Interface</strong></th>
<th><strong>Standards</strong></th>
<th>ITU-T G.703 and G.823</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data Rate</strong></td>
<td></td>
<td>2.048 Mbps</td>
</tr>
<tr>
<td><strong>Line Code</strong></td>
<td></td>
<td>HDB3 or AMI</td>
</tr>
<tr>
<td><strong>Impedance</strong></td>
<td></td>
<td>120Ω balanced or 75Ω unbalanced</td>
</tr>
<tr>
<td><strong>Range</strong></td>
<td></td>
<td>According to ITU-T Rec.G.703</td>
</tr>
<tr>
<td><strong>Jitter</strong></td>
<td></td>
<td>According to ITU-T Rec. G.824</td>
</tr>
<tr>
<td><strong>Connector</strong></td>
<td></td>
<td>64-pin unshielded telco</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>DS1 Channel Line Interface</strong></th>
<th><strong>Standards</strong></th>
<th>ITU-T G.703 and G.824</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data Rate</strong></td>
<td></td>
<td>1.544 Mbps</td>
</tr>
<tr>
<td><strong>Line Code</strong></td>
<td></td>
<td>B8ZS or AMI</td>
</tr>
<tr>
<td><strong>Impedance</strong></td>
<td></td>
<td>100Ω balanced</td>
</tr>
<tr>
<td><strong>Range</strong></td>
<td></td>
<td>According to ITU-T Rec.G.703</td>
</tr>
<tr>
<td><strong>Jitter</strong></td>
<td></td>
<td>According to ITU-T Rec. G.824</td>
</tr>
<tr>
<td><strong>Connector</strong></td>
<td></td>
<td>64-pin unshielded Telco</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Monitoring Channel</strong></th>
<th><strong>Data Rate</strong></th>
<th>2.048 Mbps for E1; 1.544 Mbps for DS1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Line Code</strong></td>
<td></td>
<td>HDB3 for E1; B8ZS for DS1</td>
</tr>
<tr>
<td><strong>Impedance</strong></td>
<td></td>
<td>120Ω balanced for E1; 100Ω balanced for DS1</td>
</tr>
<tr>
<td><strong>Range</strong></td>
<td></td>
<td>According to ITU-T Rec. G.703</td>
</tr>
<tr>
<td><strong>Connector</strong></td>
<td></td>
<td>Shielded RJ-45</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Alarm Relays</strong></th>
<th><strong>Maximum Rating</strong></th>
<th>60 VDC max or 30 VAC max, 1/2 A max</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connector</strong></td>
<td></td>
<td>9-pin DB-9, female</td>
</tr>
<tr>
<td>Physical Characteristics</td>
<td>Height</td>
<td>88 mm (3.46 in) (2U)</td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------</td>
<td>----------------------</td>
</tr>
<tr>
<td></td>
<td>Width</td>
<td>437.8 mm (17.24 in)</td>
</tr>
<tr>
<td></td>
<td>Depth</td>
<td>324.6 mm (12.78 in)</td>
</tr>
<tr>
<td></td>
<td>Weight</td>
<td>8 kg</td>
</tr>
</tbody>
</table>
Chapter 2

Installation and Setup

This chapter provides information on:

- Site requirements and prerequisites
- Package contents
- Preparation for installation
- Installation
- Interfaces and connections.

2.1 Introduction

Optimux-1551 is delivered completely assembled. After installing Optimux-1551, refer to Chapter 3 and Chapter 4 for system operating instructions. If a problem arises, refer to Chapter 5 for test and diagnostic instructions.

Warning

Card or cable replacement or other repairs should only be performed by a skilled technician who is aware of the hazards involved.

Always observe standard safety precautions during installation, operation, and maintenance of this product.

Warning

Optimux-1551 includes Class 1 lasers. For your safety:

- Do not look directly into the optical connectors while the unit is operating. The laser beams are invisible.
- Do not attempt to adjust the laser drive current.

The use of optical instruments with this product will increase eye hazard. Laser power up to 1 mW at 1300 nm and 1550 nm could be collected by an optical instrument.

Use of controls or adjustment or performing procedures other than those specified herein may result in hazardous radiation exposure.
2.2 Site Requirements and Prerequisites

AC-powered Optimux-1551 units should be installed within 1.5m (5 ft) of an easily accessible, grounded AC outlet capable of supplying voltage in the range of 90 to 260 VAC.

DC-powered Optimux-1551 units require a 48 VDC power source. Before operating the device, ensure that the input voltage at the end of the power cable is as required.

Allow at least 90 cm (36 in) of frontal clearance for operator access. Allow at least 10 cm (4 in) rear clearance for interface cable connections.

The ambient operating temperature of Optimux-1551 is 0°–50°C (32°–122°F) at a relative humidity up to 90%, non-condensing.

2.3 Package Contents

The Optimux-1551 package includes:

- Optimux-1551 unit
- Two mounting brackets for ANSI or ETSI rack installation
- Optimux-1551 Installation and Operation Manual
- DB9F-DB9M – crossover adaptor for the Control port
- CBL-SP-9 – DB9 to DB9 flat cable to be directly connected to the crossover adaptor.

2.4 Connecting the Interface Cables

Preparation for Installation

The Optimux-1551 is shipped ready for installation and equipped with all the internal cards ordered by the customer. Therefore, there are no internal settings to be made.

Replaceable Cards and Redundancy Options

Several cards are replaceable in the field. In some cases, an optional second card can be ordered and installed in the factory or the field for redundancy. Replaceable cards can be “hot swapped” – there is no need to shut off the Optimux-1551 when installing or removing them. The replacement and redundancy options for Optimux-1551 cards are listed in Table 2-1.
Table 2-1. Replacement and Redundancy Options for Optimux-1551 Cards

<table>
<thead>
<tr>
<th>Name</th>
<th>Replaceable</th>
<th>Redundancy Option</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back Plane</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>OP-63E1/OP-6384/OP-2128/OP-4256</td>
<td>Yes</td>
<td>Yes</td>
<td>Optional station clock daughter cards are installed on this card. Note: If a backup OP-63E1/OP-6384/OP-2128/OP-4256 is installed then, for redundancy, it must have the same daughter card(s) installed as the main OP-63E1/OP-6384/OP-2128/OP-4256 card.</td>
</tr>
<tr>
<td>Power Supply</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Uplink</td>
<td>Yes</td>
<td>Yes</td>
<td>Both uplink cards must be same media (electrical or optical).</td>
</tr>
<tr>
<td>Channel I/O Card</td>
<td>No</td>
<td>No</td>
<td>There are two, permanent channel I/O cards.</td>
</tr>
<tr>
<td>Fan Tray</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

In addition to the replaceable standard cards, an optional station clock card can be factory installed on the OP-63E1/OP-6384/OP-2128/OP-4256 card (or ordered later and field-installed).

**Caution**

ESD-Sensitive Devices. The Optimux-1551 contains components sensitive to electrostatic discharge (ESD). To prevent ESD damage, touch the frame of a grounded equipment before starting the device. Handle cards only by their metal frames and do not touch internal components and connectors.

**Removing and Installing the OP-63E1/OP-6384/OP-2128/OP-4256 Card**

The OP-63E1/OP-6384/OP-2128/OP-4256 card sits on the rails of the Optimux-1551 chassis and is fastened to the front panel of the unit by means of two handles on the card's front panel, as shown in Figure 2-1.

To install the OP-63E1/OP-6384/OP-2128/OP-4256 card, it is first necessary to unfasten and remove the card from the chassis.
To remove the OP-63E1/OP-6384/OP-2128/OP-4256 card:

1. Loosen the two screws at either end of the card’s front panel, next to the handles (see Figure 2-1).

2. Open the two handles all the way to the end of their axis of revolution, thereby releasing the card from the Optimux-1551 frame (see Figure 2-1).
3. Use the handles to pull the card till its rear connectors separate from the frame connectors.

4. Remove the card.

➢ To install the OP-63E1/OP-6384/OP-2128/OP-4256 card:

1. Verify that the handles are fully open so that the internal end of the handle does not impede insertion of the card by catching on the opening in the Optimux-1551 front panel.

2. Carefully align the back of the card in the Optimux-1551 frame, and push it in as far as it goes, till its rear connectors butt against the frame connectors (see Figure 2-1).

3. Close the handles by pushing them towards one another, thereby completing the insertion of the card’s connectors into the frame connectors and securing the card in place. At this stage, the card panel should be flush with the back panel of the Optimux-1551 unit.

4. Tighten the screws.

---

**Note**

When removing an OP-63E1/OP-6384/OP-2128/OP-4256 card, it has to be replaced with a blank panel.

---

**Removing/Installing the Blank Panel**

The blank panel is fastened to the front panel of the unit by means of two screws located on the ends of the blank panel (see Figure 2-1).

➢ To remove the blank panel:

1. Loosen the two screws at either end of the blank panel.

2. Remove the blank panel.

➢ To install the blank panel:

1. Carefully fit the blank panel on the Optimux-1551 front panel chassis.

2. Tighten the screws.

---

**Replacement of Power Supply Card**

➢ To avoid injury, always disconnect an AC or DC power supply's cable before removing the power supply.

The power supply card sits on rails in the Optimux-1551 chassis. It is held in place by spring-mounted bearings, and fastened to the front panel with two thumbscrews, as shown in Figure 2-1.

---

**Note**

When installing both an AC power supply and a DC power supply, adhere to the following guidelines:

- Jumper J1 on the DC power supply must be removed
- The DC power supply must be installed in power supply slot B and the AC power supply in power supply slot A.
To remove the power supply card
1. Unscrew the two power supply card thumbscrews (see Figure 2-1).
2. Pull on the screw heads till the spring-mounted bearings are pushed in, releasing the card.
3. Remove the card.

To install the power supply card
1. Insert the power supply card till it is locked in place in the Optimux-1551 chassis by the spring-mounted bearings.
2. Fasten the card in place with the two thumbscrews (see Figure 2-1).

Note
When removing a power supply card, it must be replaced with a blank panel.

Removing/Installing the Power Supply Blank Panel
The blank panel is fastened to the front panel of the unit with two screws located on the upper ends of the blank panel.

To remove the blank panel:
1. Loosen the two screws at either upper end of the blank panel (see Figure 2-1).
2. Remove the blank panel.

To install the blank panel:
1. Carefully fit the blank panel on the OP-1551 front panel chassis (see Figure 2-1).
2. Tighten the screws.

Replacement of Fan Tray
The fan tray rests on the rails in the Optimux-1551 chassis, is held in place by spring-mounted bearings, and fastened to the front panel by two thumbscrews screws, as shown in Figure 2-1.

To remove the fan tray:
1. Unscrew the two fan tray thumbscrews (see Figure 2-1).
2. Pull on the screw heads until the spring-mounted bearings are pushed in, releasing the fan tray (see Figure 2-1).
3. Remove the fan tray.

To install the fan tray:
1. Insert the fan tray card until it is locked in place in the Optimux-1551 chassis by the spring-mounted bearings.
2. Fasten the fan tray in place with the two thumbscrews.

Note
The Optimux-1551 chassis must be installed with a fan tray when operating.
Replacement of Uplink Card

The Uplink card rests on rails inside the Optimux-1551 chassis and is held in place in the back panel by two flat head screws, as shown in Figure 2-2. The figure shows a fiber optic uplink card. The procedure is the same for a coax uplink card.

Figure 2-2. Optimux-1551 Back Panel

Table 2-3. Optimux-1551 Back Panel

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Optimux-1551 back panel</td>
</tr>
<tr>
<td>2</td>
<td>Uplink card</td>
</tr>
<tr>
<td>3</td>
<td>Flat-head screw(s)</td>
</tr>
<tr>
<td>4</td>
<td>Uplink blank panel</td>
</tr>
</tbody>
</table>

➢ To remove the uplink card:
1. Unscrew the two flat head screws.
2. Remove the card.

➢ To install the uplink card:
1. Fit the uplink card into the internal rails of the Optimux-1551.
2. Push the card in all the way.
3. Fasten the card in place with the two screws.
Removing/Installing the Uplink Blank Panel

The blank panel sits on the Optimux-1551 chassis and is fastened to the back panel of the unit with two screws located on the side ends of the blank panel.

To remove the blank panel:
1. Loosen the two screws at either side end of the blank panel.
2. Remove the blank panel (see Figure 2-2).

To install the blank panel:
1. Carefully fit the blank panel on the Optimux-1551 back panel chassis.
2. Tighten the screws (see Figure 2-2).

Rack Installation

Optimux-1551 can be used as a standalone unit or mounted in a standard 19-inch rack.

*Note*
There are no jumpers or DIP switches on Optimux-1551. All the configurations are done through the software.

Two mounting brackets are provided with the Optimux-1551 for ANSI or ETSI rack installation. There are three rack installation configurations:

- Brackets at back of side panel for ANSI rack to fasten the unit from the back (see Figure 2-3).
- Brackets at front of side panel for ANSI rack to fasten the unit from the front (see Figure 2-4)
- Brackets towards the middle of side panel for ETSI rack to fasten the unit from the middle (see Figure 2-5).

![Figure 2-3. Brackets at the Back End of the Side Panels - for ANSI Rack](image)
Figure 2-4. Brackets at the Front End of the Side Panels - for ANSI Rack

Figure 2-5. Brackets towards the Middle of the Side Panels - for ETSI Rack
Interfaces and Connections

Figure 2-6. Optimux-1551 Back Panel

Figure 2-7. Optimux-1551 Front Panel - OP-63E1 Configuration

Figure 2-8. Optimux-1551 Front Panel - OP-6384 Configuration
Connecting the Serial Port

The Control port (Figure 2-6) provides a means for connecting an ASCII terminal or computer serial port to the Optimux-1551 and logging into the unit’s software. The serial interface is an RS-232 (V.24). The nominal cable length, for a data rate of 19.2 kbps, is up to 16m. Use a crossover adaptor DB9F-DB9M with a CBL-SP-9 flat cable, which are provided with the Optimux-1551.

**Caution** Terminal cables must have a frame ground connection. Use ungrounded cables when connecting a supervisory terminal to a DC-powered unit with floating ground. Using improper terminal cable may result in damage to supervisory terminal port.

➢ To connect the control cable:
- Attach the DB9F-DB9M crossover adaptor with the CBL-SP-9 flat cable to the Control connector on the back panel of Optimux-1551. Refer to Appendix A for cable information.
Connecting the Ethernet Port

The MNG-ETH connector on the back panel (Figure 2-6) is used to connect Optimux-1551 to an Ethernet LAN using a standard 10/100BaseT interface.

➢ To connect an Ethernet cable:
  • Attach a standard straight Ethernet cable terminated with an RJ-45 connector to the MNG-ETH connector on the back panel of Optimux-1551.

Connecting the Alarm Connector

An alarm cable can be run to a remote monitoring site from the back panel Alarms connector (Figure 2-6). The maximum rating of alarm relay contacts is 0.5A.

In calculating the maximum range to the monitoring site, the rating of the relay contacts, the cabling gauge, and the power source of the monitoring device should be considered.

This connector also supports the input of customer alarms up to 48 VDC (min. 10 VDC). For the Alarms connector pinout connections, refer to Appendix A.

➢ To connect an alarm cable to Optimux-1551:
  • Attach a cable terminated with a 9-pin D-type male connector to the Alarms connector located on the Optimux-1551 back panel.

Alarms Interface

The Optimux-1551 activates and reports two types of alarms to the management station: Major and Minor. Each type of alarm can be defined as Major or Minor (see Chapter 4).

Dry Contacts

There are two user-accessible relays (through the 9-pin connector) in the Optimux-1551. One relay presents Major Alarms, the other Minor Alarms.

Whenever the management reports a Minor alarm or Major alarm, the appropriate relay is activated. A cut-off button, ACO, enables user-cancellation of an alarm.

An external alarm input is also supported, to enable an external force alarm for customer use.

Connecting the Uplinks

Two types of cards can be installed in the uplink slots (Figure 2-6): fiber optic and electrical. The uplink redundancy mode is user defined. Both links (A and B) must be of the same type (either both electrical or both fiber optic).

Connecting the Fiber Optic Links

➢ To connect the fiber optic cable:
  1. Attach the fiber optic cable to the interface connector on the back panel of the Optimux-1551.
2. Attach the other end of the fiber optic cable to the far-end equipment.

3. Verify that the transmit end of the cable connects to the receive end of the uplink.

**Connecting the Electrical Links**

➢ To connect the coaxial cable:

1. First attach the coax cable to the interface connector on the back panel of the Optimux-1551.

2. Attach the other end of the electric cable to the far-end equipment.

3. Verify that the transmit end of the cable connects to the receive end of the uplink.

**Connecting the Channels**

---

### Caution

The E1/DS1 channels are not intended for direct connection to unprotected lines. Adequate protection against lightning surges should be provided in the building installation.

---

The channels connect to six Telco-64 unshielded connectors (Figure 2-6).

**Channel Connector Accessories**

Cabling accessories are listed in Table 2-4.

---

### Note

*Cabling accessories are not supplied with the Optimux-1551 – they must be ordered separately.*

---

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBL-TELCO-TELCO/2M</td>
<td>Telco-Telco cable. This cable has two Telco connectors (one at each end), one for the Optimux-1551 I/O jacks and the other for a patch panel (see later in this table).</td>
</tr>
<tr>
<td>CBL-TELCO-OPEN/2M</td>
<td>Telco open cable. This cable has a Telco connector at one end for the Optimux-1551 I/O jacks and loose wires at the other end for user-installed connectors, like RJ-45.</td>
</tr>
<tr>
<td>CBL-TELCO-RJ45/2M</td>
<td>Telco-RJ45 cable. This cable has a Telco connector at one end for the Optimux-1551 I/O jacks and RJ-45 male connectors at the other end for user E1s or T1s direct connection.</td>
</tr>
<tr>
<td>OP-A/ADAPTOR/21BNC</td>
<td>Patch panel with 21 BNC Tx and 21 BNC Rx. Supports 21 unbalanced E1 channels.</td>
</tr>
<tr>
<td>OP-A/ADAPTOR/28RJ</td>
<td>Patch panel with 28 RJ-45. Supports 21 balanced E1 channels or 28 balanced DS1 channels.</td>
</tr>
</tbody>
</table>

See cable diagrams in Appendix A.
For patch panel connection of all 63 supported unbalanced E1 channels, three OP-A/ADAPTOR/21BNC are required (3 x 21 channels).

For patch panel connection of 42 supported unbalanced E1 channels, two OP-A/ADAPTOR/21BNC are required (2 x 21 channels).

For patch panel connection of 21 supported unbalanced E1 channels, one OP-A/ADAPTOR/21BNC is required (1 x 21 channels), (see Figure 2-11).

For patch panel connection of all 63 supported balanced E1 channels or of all 84 supported balanced DS1 channels, three OP-A/ADAPTOR/28RJ cables are required – 3 x 21 (E1) or 28 (DS1) channels.

For patch panel connection of 42 supported balanced E1 channels or of all 56 supported balanced DS1 channels, two OP-A/ADAPTOR/28RJ cables are required – 2 x 21 (E1) or 28 (DS1) channels.

For patch panel connection of 21 supported balanced E1 channels or of all 28 supported balanced DS1 channels, one OP-A/ADAPTOR/28RJ cable is required – (1 x 21 (E1) or 28 (DS1) channels, (see Figure 2-12).

There are two Telco-type connectors, I/O 1 and I/O 2, on the back of each patch panel (Figure 2-13) for connecting to channel connectors on the back panel of the Optimux-1551. The operation of the patch panel I/O connectors depends on the patch panel model and the channel type:

- OP-A/ADAPTOR/21BNC: I/O 1 provides connection for 14 E1 unbalanced channels and I/O 2 for 7 E1 unbalanced channels
- OP-A/ADAPTOR/28RJ: I/O 1 provides connection for 14 E1/DS1 balanced channels and I/O 2 provides connection for 7 E1 or 14 DS1 balanced channels.

For patch panel wiring details (see Appendix A).
Connecting the Power

Connecting the AC Power

AC power should be supplied to Optimux-1551 through the 5 ft (1.5m) standard power cable terminated by a standard 3-prong plug.

The AC outlet should be grounded properly. Ensure that supply voltage is in the range 100 VAC to 240 VAC.

➢ To connect AC power:
  • Connect the power cable to the back panel connector first, and then to the AC mains outlet.

Caution

Do not connect or disconnect the power cable from the device while the cable is connected to the power main!

Connecting the DC Power

The DC power supply must conform to the prevailing safety regulations. In order to prevent fire hazards, the ungrounded DC supply line must be equipped with a suitable fuse or circuit breaker.

➢ To connect DC power:
  Refer to the DC Power Supply Connection Supplement.

Connecting the External Station Clock Line (Option)

➢ To connect station clock line:
  Connect a male RJ-45 connector to the plug. See Appendix A for the pinout.
Chapter 3
Operation

This chapter provides information on:
• Back panel indicators
• Front panel indicators
• Turn-on procedure
• Operating instructions
• Turn-off procedure.

3.1 Turning On Optimux-1551

When both power supplies are functional and are ON, power consumption by Optimux-1551 is shared between the two power supplies.

➢ To turn ON Optimux-1551 with a single power supply module:
  1. Plug the power cable into the Power A connector on the front panel of Optimux-1551.
  2. Plug the other side of the cable into the mains.
     The PWR A indicator on the back panel lights in green.

➢ To turn ON Optimux-1551 with two power supply modules:
  1. Plug at least one of the two power cables into one of the Power interfaces on the front panel of Optimux-1551.
  2. To achieve power supply redundancy, plug the second power cable into the second Power interface on the front panel of Optimux-1551.
  3. The PWR A and PWR B indicator(s) on the back and front panels light in green indicating that both power supplies are operational and not faulty.

Note
Before operation, make sure that the timing configuration at both ends of the uplink is valid:
• In a point-to-point application, one end must be configured to loopback timing. The other end can use internal timing or (if the optional station clock card is installed) external timing.
• In a fan-out application, the local Optimux-1551 must be configured to loopback timing.
Before operation, make sure that the fan tray is installed.
3.2 Controls and Indicators

This chapter describes Optimux-1551 back and front panel indicators and powering procedures.

Back Panel

![Back Panel Diagram]

Figure 3-1. Optimux-1551 Back Panel

The Optimux-1551 back panel provides the uplink, alarm, management, optional station clock, and channel connections, as well as the status indications associated with these connections as shown in Figure 3-1.

The Optimux-1551 back panel LED status indicators are detailed in Table 3-1.

Table 3-1. Optimux-1551 Back Panel LEDs

<table>
<thead>
<tr>
<th>Name</th>
<th>Color</th>
<th>Functionality</th>
</tr>
</thead>
</table>
| Uplink SYNC LOSS A, B | Red   | On: Out-of-frame detected on the active uplink or signal loss detected on the respective uplink  
  Note: If uplink card B is not installed or if redundancy is set to Off, then if a loss condition occurs, SYNC LOSS B LED remains Off.  
  (Duplicate LED on front panel) |
| Uplink AIS A, B     | Yellow| On: AIS signal detected on the respective uplink  
  (Duplicate LED on front panel) |
### Table 3-1. Optimux-1551 Back Panel LEDs (Cont.)

<table>
<thead>
<tr>
<th>Name</th>
<th>Color</th>
<th>Functionality</th>
</tr>
</thead>
</table>
| FLT  | Red   | On: OP-63E1/OP-6384/OP-2128/OP-4256 card is in fault condition  
(Duplicate LED on front panel) |
| TST  | Yellow | On: active OP-63E1/OP-6384/OP-2128/OP-4256 card is in test condition  
Blinking: Software being downloaded to the unit  
(Duplicate LED on front panel) |
| ON A/B | Green | On: OP-63E1/OP-6384/OP-2128/OP-4256 card active  
Blinking: Automatic baud detection in progress  
Off: OP-63E1/OP-6384/OP-2128/OP-4256 card on standby  
(Duplicate LED on front panel) |
| PWR A | Green and Red | Green: Power Supply A OK  
Red: Power Supply A faulty  
Off: Power Supply A not installed  
(Duplicate LED on front panel) |
| PWR B | Green and Red | Green: When Power Supply OK  
Red: Power Supply B faulty  
Off: Power Supply B not installed  
(Duplicate LED on front panel) |
| ACO  | Button | Cuts off the existing alarm relays but doesn’t stop reporting them to the management software |
| 100  | Green | On: Ethernet working at 100 Mbps  
Off: Ethernet working at 10 Mbps |
| LINK/ACT | Green and Yellow | Green: Only Ethernet link integrity exists  
Yellow: Traffic activity exists on Ethernet |
| ACT  | Yellow | On: Channel selected for sniffing |
| OK   | Green | On: External E1/DS1 clock source exists on clock connector |
| SIG  | Green | On: Signal detected on the respective main uplink card |

### Front Panel

*Table 3-2* lists the functions of the LEDs located on the Optimux-1551 front panel.
Figure 3-2. Optimux-1551 Front Panel OP-63E1 Configuration

Figure 3-3. Optimux-1551 Front Panel OP-6384 Configuration

Figure 3-4. Optimux-1551 Front Panel OP-2128 Configuration

Figure 3-5. Optimux-1551 Front Panel - OP-4256 Configuration
Table 3-2. Optimux-1551 Front Panel LEDs

<table>
<thead>
<tr>
<th>Name</th>
<th>Color</th>
<th>Functionality</th>
</tr>
</thead>
</table>
| PWR A | Green and Red | - Green: Power Supply A OK  
- Red: Power Supply A faulty  
- Off: Power Supply A not installed  
    (Duplicate LED on back panel) |
| PWR B | Green and Red | - Green: Power Supply B OK  
- Red: Power Supply B faulty  
- Off: Power Supply B not installed  
    (Duplicate LED on back panel) |
| FLT   | Red         | On: OP-63E1/OP-6384/OP-2128/OP-4256 card is in fault condition  
        (Duplicate LED on back panel) |
| TST   | Yellow      | On: active OP-63E1/OP-6384/OP-2128/OP-4256 card is in test condition  
        Blinking: Software being downloaded to the unit  
        One TST indicator per OP-63E1/OP-6384/OP-2128/OP-4256 card  
        (Duplicate LED on back panel) |
| ON A/B| Green       | On: OP-63E1/OP-6384/OP-2128/OP-4256 card active  
        Blinking: During autobaud detect process.  
        Off: OP-63E1/OP-6384/OP-2128/OP-4256 card on standby  
        (Duplicate LED on back panel) |
Table 3-2. Optimux-1551 Front Panel LEDs (Cont.)

<table>
<thead>
<tr>
<th>Name</th>
<th>Color</th>
<th>Functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uplink SYNC LOSS A,B</td>
<td>Red</td>
<td>On: Out of frame is detected on the active uplink or signal loss is detected on the respective uplink.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note:</strong> If uplink card B is not installed or if redundancy is set to Off, then if a loss condition occurs, SYNC LOSS B LED remains Off.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Duplicate LED on back panel)</td>
</tr>
<tr>
<td>Uplink AIS A,B</td>
<td>Yellow</td>
<td>On: AIS signal detected on the respective uplink. (Duplicate LED on back panel)</td>
</tr>
<tr>
<td>MAJ</td>
<td>Red</td>
<td>On: Major alarm exists.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blinking: Major alarm exists and ACO has been pressed.</td>
</tr>
<tr>
<td>MIN</td>
<td>Yellow</td>
<td>On: Minor alarm exists.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blinking: Minor alarm exists and ACO has been pressed.</td>
</tr>
<tr>
<td>Channel SYNC LOSS/AIS</td>
<td>Red and Yellow</td>
<td>Red: Loss of signal detected on non-masked channel.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yellow: AIS signal detected on non-masked channel.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blinking: Channel is masked and the LED status for the masked channels is set to BLINK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off: For non-active channels, for a masked channel with a LED status, for the masked channel parameter set to OFF, and for a non-masked channel when not detecting Loss of Signal or AIS.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Examples for not active channel: Channels 22 – 28 on OP-2128 card when it is configured to E1 operation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Channels 43 – 56 on OP-4256 card when it is configured to E1 operation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Channels 64 – 84 on OP-6384 card when it is configured to E1 operation.</td>
</tr>
<tr>
<td>Status</td>
<td>Red and Green</td>
<td>Red: One or more of the fan tray's fan(s) is/are faulty.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green: All internal fan tray fans are operating properly.</td>
</tr>
</tbody>
</table>
3.3 Default Settings

During normal operation, the following indications (Table 3-3) should appear:

Table 3-3. Normal Indications

<table>
<thead>
<tr>
<th>LED</th>
<th>State</th>
<th>Indicates</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWR A, B</td>
<td>ON, green</td>
<td>Power supplies of the Optimux-1551 unit active and OK</td>
</tr>
<tr>
<td>FLT</td>
<td>OFF</td>
<td>No fault occurred during the power up self-test</td>
</tr>
<tr>
<td>TST</td>
<td>OFF</td>
<td>No loop performed</td>
</tr>
<tr>
<td>LINK/ACT</td>
<td>ON, green</td>
<td>Link integrity of the Ethernet port</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Only active if Ethernet link is connected and operating</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note:</strong> Ethernet link is only required for managing Optimux-1551 via Ethernet</td>
</tr>
<tr>
<td>100</td>
<td>ON</td>
<td>100 Mbps rate</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
<td>10 Mbps rate</td>
</tr>
<tr>
<td>ACT</td>
<td>Blinking, yellow</td>
<td>Ethernet port traffic</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note:</strong> Ethernet link is only required for managing Optimux-1551 via Ethernet</td>
</tr>
<tr>
<td>Channel SYNC</td>
<td>OFF</td>
<td>Receive signal detected on channel ports or non-active port.</td>
</tr>
<tr>
<td>LOSS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Channel AIS</td>
<td>OFF</td>
<td>AIS signal not received on channel ports</td>
</tr>
<tr>
<td>OK</td>
<td>ON, green</td>
<td>Reference clock applied to clock connector. Required only when working with an external clock source.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>OFF</td>
<td>Monitoring mode not selected.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major</td>
<td>OFF</td>
<td>Major alarm not detected (depending on alarm configuration)</td>
</tr>
<tr>
<td>Minor</td>
<td>OFF</td>
<td>Minor alarm not detected (depending on alarm configuration)</td>
</tr>
<tr>
<td>SIG</td>
<td>ON, green</td>
<td>Signal detected on respective main uplink card.</td>
</tr>
<tr>
<td>Status</td>
<td>ON, green</td>
<td>The fans are working properly.</td>
</tr>
</tbody>
</table>
3.4 Configuration Alternatives

This section describes how to prepare Optimux-1551 and a supervisory application for a control session.

Note
Optimux-1551 can support the following multiple management sessions simultaneously:

- One session via terminal application connected directly to the unit’s Control port
- Up to two sessions via Telnet and/or web browser connected to the unit’s Ethernet port
- Multiple (maximum quantity depends on network resources) sessions via SNMP-based application (for example, RADview) connected to the unit’s Ethernet port.

When a terminal interface is used, the number of users is displayed in the bottom right of every menu. In the web interface, the number of users can be displayed by clicking the Status button.

Managing Optimux-1551 via Terminal Port

Optimux-1551 includes a V.24/RS-232 asynchronous DTE port, designated Control and terminated in a 9-pin D-type female connector. The Control port continuously monitors the incoming data stream and immediately responds to any input string received through this port. The port requires a cross-cable (provided with Optimux-1551) for the ASCII terminal connection.

The Optimux-1551 control port can be configured to communicate at the following rates: 9.6, 19.2, 38.4, 57.6 or 115.2 kbps.

The word format consists of one or two stop bits and 7 or 8 data bits parity can be odd, even or disabled.

Note
At 115.2 kbps data rate, only 8 data bits and disabled parity are supported.

Preparing the Terminal

Any standard ASCII terminal (a “dumb” terminal or a personal computer running a terminal emulation application) equipped with a V.24/RS-232 communication interface can be used to configure Optimux-1551. Appendix A details the pin assignment and control signal directions of the Optimux-1551 Control connector.

Starting Terminal Session

To start a terminal session:

1. Connect a terminal cross-cable to the Control connector of Optimux-1551.
2. Turn on the control terminal.
3. Press <Enter> several times.
Optimux-1551 automatically adjusts itself to the current terminal baud rate and responds with a string of dots.

**Note**

*When the ON LED flashes on the Optimux-1551, the autobaud detect process is active. Press <Enter> until dots appear, then press the <.> key until the Optimux-1551 login screen is displayed.*

4. Continue pressing the <.> key until Optimux-1551 displays the user name and password entry form.
5. Enter your user name and password and proceed with the management session. (If no user name and password have been defined, press <Enter> twice.)

### Managing a Local Optimux-1551 via the Ethernet Port

Optimux-1551 is equipped with a management Ethernet port (MNG-ETH), which enables communication with the Optimux-1551 management subsystem using the IP protocol. The Ethernet management port is configured for a LAN cross-over connection.

➢ **To prepare Optimux-1551 for network management:**

1. Connect a LAN network management station to the Optimux-1551 Ethernet port designated MNG.
2. Configure IP host parameters of the Optimux-1551 units via an ASCII terminal.
3. Do one of the following:
   - Run an SNMP management application (such as RADview)
   - Open a Telnet session (for example, Windows Start menu | Run | Telnet <IP_address>)
   - Open a Web Browser to: http://<IP_address>
     where <IP_address> is Optimux-1551’s IP address.

### Managing a Far-End Optimux-1551 via the Ethernet Port

A far-end Optimux-1551 can be managed via a local unit’s Ethernet port (MNG).

➢ **To prepare a far-end Optimux-1551 for network management:**

1. Open a DCC channel between the units.
2. Define Management IP addresses on the near- and far-end units on the same subnetwork as the Host IP of the near-end unit.
3. When there is a direct connection between a PC and the Optimux-1551 Ethernet connector, set the default gateway in the Optimux-1551 to the PC Ethernet card IP address.
4. Define the far-end unit Host IP as 0.0.0.0.

**Note**

*The far-end unit must not be connected to a LAN.*
3.5 Menu Map

Figure 3-6 illustrates the Optimux-1551 menu map.

Notes

- * - Menu items in the menu map (see Figure 3-6) marked with a single asterisk (*) are for SDH only.
- ** - Menu items in the menu map marked with two asterisks (**) are for SONET only.
- The menus for E1 and DS1 channels are described together unless otherwise noted (where a field in a menu applies only for one or the other channel type, it is so noted).
Figure 3-6. Optimux-1551 Menu Tree
Navigating the Management Menus

This section provides a general description of the software menu operation and conventions for navigating the menus. Figure 3-6 lists all menus of the Optimux-1551 management software.

Choosing Options

To choose an option:

1. Type the number corresponding to the option and press <Enter>.

   Optimux-1551 immediately updates its database with a new value or displays a new menu for the selected option.

2. When a menu option has two values, type the option number and press <Enter>.

   This toggles the available values.

3. Confirm the action requiring confirmation.

   A prompt line is added to the menu display.

4. Save all values simultaneously if required (i.e., Serial Port menu).

   A “Save All” prompt is added to the menu display.

   **Note**

   When using a Web browser, values that you enter are not saved unless you press <Enter>. If you click a link before doing so, your changes are lost.

Correcting Entries

To correct an erroneous entry:

- Press <Backspace> to clear the error, then enter the correct characters
- Press <Esc> to exit the current menu, and then return to the menu to re-enter the required value.
Navigating Screens

Some of the Optimux-1551 management software screens require scrolling to navigate between parameters.

Use the following keys (case-sensitive) for navigation:

- ✈️ – move left; CTRL + L – scroll left
- ➡️ – move right; CTRL + R – scroll right
- ⬆️ – move up; CTRL + U – scroll up
- ⬇️ – move down; CTRL + D – scroll down
- Tab – select next changeable cell
- N – display next part of menu, P – display previous part of menu

Note

Type ‹?› to display the navigation keys from a menu.

3.6 Turning Off Optimux-1551

Unplug Optimux-1551 front panel power supply/supplies from the mains.
Chapter 4

Configuration

The configuration of Optimux-1551 is performed via menu-driven embedded software. A configuration session can be performed using the following methods:

- Standard ASCII terminal or PC running a terminal emulation application connected to the back panel Control port
- Telnet, Web browser, or RADview application connected to the back panel MNG port.

4.1 Configuring Optimux-1551

Upon completion of the Optimux-1551 installation and operation procedures described in Chapter 2 and Chapter 3, a control session can be started.

Entering the User Name and Password

Enter a user name and password in order to start the Optimux-1551 management software:

```
Optimux-1551
USER NAME: 
PASSWORD: 
```

*Figure 4-1. Login Window*

To enter the user name and password:

1. Type in your user name and press <Enter>.
2. Type in your password (up to ten characters).
   
   Optimux-1551 responds to your entry with asterisks.

   *Enter SU for user name with Read/Write permission or enter USER for Read permission only.*
   
   *Enter 1234 for the (default) password.*

3. Press <Enter>.

   The Main menu is displayed:
Chapter 4  Configuration Installation and Operation Manual

Optimux-1551

Main Menu

1. Inventory  []>
2. Configuration  >
3. Monitoring  >
4. Diagnostics  >
5. File Utilities  >

>  Please select item <1 to 5>
ESC-prev. menu; !-main menu; &-exit

Figure 4-2. Main Menu

Note
Monitoring system and ports is described in Chapter 5.

Configuring the System

The Optimux-1551 management software allows you to perform the following:

- Selecting clock source
- Configuring redundancy of uplink and OP-63E1/OP-6384/OP-2128/OP-4256 cards
- Selecting a channel to monitor
- Defining management parameters
- Defining control port parameters
- Defining alarm severity and masking alarms
- Setting date and time
- Resetting Optimux-1551 to the default values
- Performing an overall reset of the device.

To display the Configuration menu:

- From the Main Menu, choose Configuration.
The Configuration menu appears:

![Configuration Menu](image)

To display the System Configuration menu:
- From the Configuration Menu, choose System Configuration.

The System Configuration menu appears:

![System Configuration Menu](image)

**Configuring the Master Clock**

Optimux-1551 features a number of clocking options (see Chapter 1).

**Note**

There is no alarm indication to notify that the clock input has been incorrectly defined.

- To choose the clock source:
  1. From the System Configuration menu, choose Master Clock.
The Master Clock menu appears:

```
Optimux-1551
Configuration>System Configuration>Master Clock

1. Internal
2. External Reference E1
3. External Reference T1
4. External Tributary
5. LBT

> Please select item <1 to 3>
ESC-prev. menu; !-main menu; &-exit
```

**Figure 4-5. Master Clock (LBT) Menu**

2. To set the clock mode to internal, choose **Internal**.
3. To set the clock mode to loop back timing, choose **LBT** (default).
4. To set the clock mode to external, choose External Reference E1 or External Reference T1 or External Tributary.

**Note**
The **External** choice appears in the menu only if the optional station clock module is assembled on the Optimux-1551.

When selecting the External tributary source clock, the External Tributary menu appears:

```
Optimux-1551
Configuration>System Configuration>Master Clock>External Tributary

Master Clock  (Station Clock Tributary)
1. Station Clock Tributary [1 – 28]   ...  (2)

> Please select item <1 to 2>
ESC-prev. menu; !-main menu; &-exit
```

**Figure 4-6. External Tributary Menu**

In external mode, the External Tributary can be either one of the channels or the Clock connector located on the back panel. (See description of clock source in **Chapter 1**.)

5. Select **Station Clock Tributary** from 1 to **21/43/63** (E1) or from 1 to **28/56/84** (DS1), depending on the installed card.
• If the tributary line type is set to DS1, then the station clock type is set automatically to DS1. Similarly, for E1 tributary line type, the station clock type is set to E1.

Configuring the Redundancy

Optimux-1551 features a number of redundancy options (see Chapter 1).

➢ To display the Redundancy menu:
  • From the System Configuration menu, choose Redundancy. The Redundancy menu appears:

```
Optimux-1551
Configuration>System Configuration>Redundancy

1. Uplink Redundancy    >
2. Main Card Redundancy >

Please select item <1 to 2>
ESC-prev. menu; !-main menu; &-exit
```

Figure 4-7. Redundancy Menu

Configuring the Uplink Card Redundancy

The uplink card redundancy is unidirectional 1+1, in accordance with ITU G.841.

➢ To configure the Uplink card redundancy:
  1. From the Redundancy Menu, choose Uplink Redundancy, (see Chapter 1.) The Uplink Redundancy menu appears:

```
Optimux-1551
Configuration>System Configuration>Redundancy>Uplink Redundancy

1. Redundancy Mode      > (Auto)
2. Flip On SD           (Yes)

Please select item <1 to 2>
ESC-prev. menu; !-main menu; &-exit
```

Figure 4-8. Uplink Redundancy Menu

2. To set the Redundancy Mode, choose Auto (default), Manual, or Off.
3. To set the Flip on SD (signal degradation), choose Yes (default) or No. This determines that an SD level fault will be enough to cause the active link to change.
**OP-63E1/OP-6384/OP-2128/OP-4256 Card Replacement Instructions**

When two OP-63E1/OP-6384/OP-2128/OP-4256 cards are installed, only the standby card may be removed without interrupting data service. Prior to removing the standby card, it should be set to shutdown state (see Configuring the Redundancy). When a card is in shutdown state, all the indicator LEDs on its front panel blink.

Once the standby card is set to shutdown, it can be extracted without interrupting service. The standby card will go back from shutdown state to normal state in the following cases:

1. The standby card is extracted and inserted again.
2. The active card is extracted and inserted again.

**Configuring the OP-63E1/OP-6384/OP-2128/OP-4256 (Access and Control) Card Redundancy**

For the unit to support redundancy, both OP-63E1/OP-6384/OP-2128/OP-4256 cards must have the same station clock daughter card configuration (a daughter card on each of them or no daughter cards at all). Also the backup OP-63E1/OP-6384/OP-2128/OP-4256 card's software version and configuration has to be updated (see below) to match those of the main card.

> To configure the OP-63E1/OP-6384/OP-2128/OP-4256 card redundancy:

1. From the Redundancy menu, choose **Main Card Redundancy**.

   The Main Card menu appears:

   ![Figure 4-9. Main Card Redundancy Menu](image)

   - **Actual Main Card**: (Card A)
   - **Redundancy Status**: (Redundancy available)
   - **Standby Shutdown Status**: (Normal)
   - **1. Main Card**: (Card A)
   - **2. Redundancy Mode**: (Auto)
   - **3. Restore Timeout [0 - 60]**: (5)
   - **4. Channel Fail Limit [1 - 63]**: (5)
   - **5. Update SW Version**: >
   - **6. Update Configuration**: >
   - **7. Standby Card State**: (Normal)

   ➤ Please select item <1 to 6>

   ESC-prev. menu; !-main menu; &-exit
### Note

**Redundancy Status** is displayed if two OP-63E1/OP-6384/OP-2128/OP-4256 cards are installed and redundancy is set to automatic.

**Standby Shutdown Status** reports the shutdown status of the standby card. The possible values are:

- **No Card** – no standby card installed
- **Normal** – standby card fully operational
- **Shutdown** – standby card shut down
- **Not Supported** – this feature not supported by standby card.

2. To set the **Main Card**, choose **Card A** (default) or **Card B**.
3. To set the **Redundancy Mode**, choose **Auto** (default) or **Off**.
4. To set the **Restore Timeout**, choose from **0** to **60** seconds.

### Note

**0** determines that the system will swap cards once only (no restore).

5. To set the **Channel Fail Limit**, choose from channel 1 to 63 (OP-63E1 card), 1 to 84 (OP-6384 card), 1 to 28 (OP-2128 card), or 1 to 56 (OP-4256 card). This parameter determines how many channels must fail before the unit switches to the backup card.

### Note

If two OP-63E1/OP-6384/OP-2128/OP-4256 cards are installed, then one of the following options can appear in the menu (depending on the states of the cards):

- If the cards have different software versions, the **Update SW Version** field is displayed.
- If the cards have the same software version but different configurations, the **Update Configuration** field is displayed.

6. To set the **Update SW Version**, choose **From Card A** or **From Card B**. The active software of the selected card is copied to the other card. (The field is not displayed if both cards have the same software version.)

7. To **Update Configuration**, choose **From Card A** or **From Card B**. The configuration of the selected card is copied to the other card. (The field is not displayed if both cards have the same configuration.)

8. To set **Standby Card State**, choose **Normal** (default) or **Shutdown**.

### Note

The **Standby Card State** field is not displayed if there is no standby card or if there is a card but it does not support this feature.

---

### Monitoring (Sniffing) a Channel

Traffic on a selected channel can be monitored via the Monitor port on the Optimux-1551 back panel.

- **To select a channel for monitoring:**
  1. From the System Configuration menu, choose **Sniffing**.
     
     The Sniffing menu appears:
Optimux-1551
Configuration>System Configuration>Sniffing

1. Monitor Channel [0 – 63] ... (0)

> Please select item <1 to 1>
ESC-prev. menu; !-main menu; &-exit

Figure 4-10. Sniffing Menu

2. Select a Monitor Channel by typing the number of the channel: choose from channel 1 to 63 (OP-63E1 card), 1 to 28 (OP-2128 card), or 1 to 56 (OP-4256 card).

Note
0 disables the monitoring function.

Configuring Management Parameters

Optimux-1551 can be managed from a workstation located on a LAN connected to the unit’s MNG-ETH port. To establish a proper connection, it is necessary to configure the following parameters:

- host IP address
- subnet mask
- default gateway
- traps
- read community
- write community.

Note
Changes made to SNMP parameters take effect immediately.

To configure the Management parameters:

- From the System Configuration menu, choose Management.

The Management menu appears:
To configure the Device Information parameters:

1. From the Management menu, choose Device Info.

   The Device Info menu appears:

   ![Figure 4-12. Device Info Menu](image)

   System Description... (OP-1551 HW Version: 0.0 SW Version: 1.0)
   1. System Contact ... ()
   2. System Name ... ()
   3. System Location ... ()

   Please select item <1 to 3>
   ESC-prev. menu; !-main menu; &-exit

2. To define the System Contact, enter a string up to 35 chars (default: null).
3. To define the System Name, enter a string up to 12 chars (default: null).
4. To define the System Location, enter a string up to 35 chars (default: null).

To configure the Host IP parameters:

1. From the Management menu, choose Host IP.

   The Host IP menu appears:
2. From the Host IP menu, choose **Host IP List**.

   The Host IP List menu appears:

```
Optimux-1551

Configuration>System Configuration>Management>Host IP>Host IP List

1. IP Address    ... (0.0.0.0)
2. IP Mask       ... (255.255.255.255)

> 
Please select item <1 to 2>
ESC-prev. menu; !-main menu; &-exit
```

3. Enter an **IP Address** in an X.X.X.X format, where X is a decimal number from 0 to 255 (default: **0.0.0.0**).

4. Enter an **IP LAN Mask** (default: **255.255.255.255**).

5. On the Host IP Menu, to define a Default Gateway, choose **Default Gateway** and enter an IP address (default: **0.0.0.0**).

6. To define a Read Community, choose **Read Community** and enter a string up to 35 chars (default: **public**).

7. To define a Write Community, choose **Write Community** and enter a string up to 35 chars (default: **NULL**).

8. To define a Trap Community, choose **Trap Community** and enter a string up to 35 chars (default: **NULL**).
Trap Recipients

The manager list defines the network management stations that will receive traps from the SNMP agent of the Optimux-1551. Up to ten managers can be defined. A manager can be masked to temporarily prevent it from receiving traps.

► To configure the Manager List parameters:
1. From the Management menu, choose Manager List.

The Manager List menu appears:

```
Optimux-1551
Configuration>System Configuration>Management>Manager List

<table>
<thead>
<tr>
<th>Num</th>
<th>IP</th>
<th>TrapMask</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0.0.0</td>
<td>NO</td>
</tr>
<tr>
<td>2</td>
<td>0.0.0.0</td>
<td>NO</td>
</tr>
<tr>
<td>3</td>
<td>0.0.0.0</td>
<td>NO</td>
</tr>
<tr>
<td>4</td>
<td>0.0.0.0</td>
<td>NO</td>
</tr>
<tr>
<td>5</td>
<td>0.0.0.0</td>
<td>NO</td>
</tr>
</tbody>
</table>

1. Change cell                    ... <0.0.0.0>

Manager List Table
ESC-prev. menu; !-main menu; &-exit; ?-help
```

Figure 4-15. Manager List Menu

2. To change the IP addresses, use the navigation keys.
3. To set (Yes) or release (No) the Trap Masks, use the navigation keys.

Management Access

You can enable or disable access to the Optimux-1551 management system via SNMP, Telnet or Web-based applications. By disabling SNMP, Telnet or Web, you prevent unauthorized access to the system when security of the Optimux-1551 IP address has been compromised. When SNMP, Telnet and Web access is disabled, Optimux-1551 can be managed via an ASCII terminal only.

► To configure Management Access parameters:
1. From the Management menu, choose Management Access.
The Management Access menu appears:

<table>
<thead>
<tr>
<th>Optimux-1551</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration&gt;System Configuration&gt;Management&gt;Management Access</td>
</tr>
</tbody>
</table>

1. TELNET > (Enable)
2. SNMP > (Enable)
3. WEB > (Enable)

> Please select item <1 to 3>
ESC-prev. menu; !-main menu; &-exit

Figure 4-16. Management Access Menu

Note
The communication medium on which you are currently connected to the Optimux-1551 will not be displayed. This is to prevent you from accidentally disconnecting yourself. To disable access for your current medium, connect via one of the other media.

2. Select Telnet for Telnet access by selecting Enable (default), Disable, or Managers Only. Managers Only limits access to the communication originating at an IP addresses listed in the Managers List Menu. (This option is not displayed if you are on a Telnet connection.)

3. Select SNMP for SNMP access by selecting Enable (default), Disable, or Managers Only. (This option is not displayed if you are on an SNMP connection.)

4. Select Web for web access by selecting Enable (default), Disable, or Managers Only. (This option is not displayed if you are on a web connection.)

Configuring the Control Ports

Optimux-1551 enables you to configure the Ethernet and serial port parameters. For the serial port, in addition to communication parameters, you can define login and dial-out parameters.

To configure the control ports:
- From the System Configuration menu, choose Control port.
  The Control Port menu appears:
Configuring the Ethernet Port

Ethernet port configuration is the same as MNG-ETH port configuration.

To configure the Ethernet port:

1. From the Control Port menu, choose Ethernet Port.
   
   The Ethernet Port menu appears:

   ![Figure 4-18. Ethernet Port Menu]

   2. Set Autonegotiation to Enable (default) or Disable.

   *Note* When autonegotiation is enabled, the *Ethernet Mode* and *LAN Speed* parameters are read-only and are displayed in the top of the menu.

   3. If Autonegotiation is set to Disable, the Ethernet Mode parameter can be edited: select Full Duplex (default) or Half Duplex.

   4. If Autonegotiation is set to Disable, the LAN Speed parameter can be edited: select 10 Mbps or 100 Mbps.
Configuring the Serial Port

Serial port configuration is the same as Control port configuration.

➢ To configure the Serial port:

1. From the Control Port menu, choose Serial Port.

   The Serial Port menu appears:

   ![Figure 4-19. Serial Port Menu](image)

   - If the Mode is configured to Dial Out, the Control (serial) port becomes inaccessible for further configuration. In that case configuration will have to be continued through the MNG-ETH (Ethernet) port until the serial port is reconfigured to Terminal mode. Therefore, if you intend to configure the serial port to Dial Out, first configure the unit with a valid IP address so that you will be able to manage the unit via the Ethernet.

   - If you mistakenly switch the port to Dial Out mode before you have assigned an IP address, then the only way to regain Terminal mode for the serial port is (while still in this menu) to use a connected terminal to enter Q (for quit).

2. Determine the Mode for the Control (serial) port: Terminal (default) or Dial Out. Terminal enables (further) configuring Optimux-1551 through the port, Dial Out changes the use of the port to serving as a channel for dial out modem access for reporting alarms.
**Configuring Terminal Parameters**

- From the Serial Port menu, choose **Terminal**.

  The Terminal menu appears:

  ![Terminal Menu](image)

  > To configure user access to the Terminal:
  
  1. From the Terminal Menu, choose **User Access**.

    The User Access menu appears with a password query.

    ![User Access Menu](image)

  2. Choose **Change Password**.

    The full Change Password menu appears.
Optimux-1551

1. User Name  ... (user)
2. Password   ... (*****)
3. New Password ... (*****)
4. Confirm New Password ... (*****)

>  
Please select item <1 to 2>
ESC-prev. menu; !-main menu; &-exit

Figure 4-22. Change Password Menu

The default settings are:

- User Name: can be either SU or USER
- Password: 1234.

The SU account has permission to view and change all the configuration parameters. The USER account has permission only to view parameters.

To configure the password for management access:

1. On the Change Password menu, confirm that the current user name is displayed: USER or SU.
2. Enter a current Password.
3. Select a new password and assign a new password to the current user.
4. Select Confirm New Password to confirm the new password.
   If the new password and confirm password do not match, an error messages is displayed.
5. Reassign the new password.

Note

The password is up to 10 characters and is case sensitive.

To view users with permission to access the system:

- Select User Info (Main Menu > Configuration > Control Port > Serial Port > Terminal > User Access > User Info) from the User Access menu.

The User Info table appears.
Optimux-1551

...>Control Port>Serial Port>Terminal>User Access>User Info

<table>
<thead>
<tr>
<th>User Name</th>
<th>Access level</th>
<th>Dynamic/Permanent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>USER</td>
<td>RO</td>
</tr>
<tr>
<td>2</td>
<td>SU</td>
<td>RW</td>
</tr>
</tbody>
</table>

> Please select item <1 to 2>
ESC-prev. menu; !-main menu; &-exit

Figure 4-23. User Info Table Screen

The User Info Table displays the users with permission to access Optimux-1551 and the users’ access level (Read Only or Read/Write).

**Caution**

To avoid being locked out of the system, write your User Name and Password and keep it for later reference.

**Obtaining a New Password**

If a user forgets a password, a new password has to be obtained.

➤ **To obtain a new password:**

1. Log in with user name **CHNGPASS**.
   
   A random identification number (dynamic key) is displayed at the bottom of the screen.

2. Contact RAD Technical Support and refer to this key. You will be given a temporary password.

3. Log in using a temporary password. You will be prompted to enter and confirm a new password for the next session.

➤ **To configure the terminal settings:**

1. On the Terminal Menu, choose the desired **Baud Rate**: 9600, 19200, 38400, 57600, 115200 (default) bps.

2. Select the number of **Data** bits: 7 or 8 (default).

3. Choose the **Parity**: None (default), Odd, Even.

**Enabling and Disabling Pop-up Messages**

When the pop-up function is enabled, Optimux-1551 displays messages as they are generated by the system or received by the interfaces. The messages are displayed at the bottom of the terminal screen.

➤ **To enable or disable pop-up alarms:**

1. From the Terminal menu, select **Scrolling Window**.

   This activates the pop-up messages mode.
2. Select **Appear** to enable the pop-up messages or select **Not Appear** to disable the pop-up messages.

**Configuring Security Timeout**

The timeout specifies a time interval after which Optimux-1551 automatically disconnects from the supervisory terminal (or Telnet or Web application) if no input from the user is detected. The timeout can be set to 10 minutes or disabled.

➢ To configure the security timeout:

- From the Terminal menu, select **Security Timeout** to disable it (**OFF**) or set to 10 minutes (**10 min**).

  The display is refreshed and a new value appears.

**Saving Changes to Terminal Parameters**

➢ To save changes to the terminal settings:

- On the Terminal Menu, select **Save All**.

  All changes that you have made in the Terminal Menu take effect and the display is refreshed.

**Configuring Dial Out Parameters**

➢ To configure the Control port dial out properties:

1. From the Serial Port menu, choose **Dial Out**.

   The Dial Out menu appears:

   ![Figure 4-24. Dial Out Menu](image)

2. Choose the **Number of Retries**: (2 to 8). This is the number of times that the unit will attempt to call the **Primary Number**. After this number of tries, the unit will move on to try the **Alternate Number** (if one is defined).
3. Choose the **Wait for Connect** time: **30 sec, 45 sec, or 60 sec**. This is the amount of time that the unit will wait between dialing attempts.

4. Choose the **Dial Mode**: **Tone** or **Pulse**.

5. Choose the **Alternate Number Mode**: **Yes** or **No**.

6. Enter the **Primary Number**. Phone numbers can be composed of both digits and these two characters: “*” and “#”.

7. If **Alternate Number Mode** is **Yes**, then Alternate Number will appear in the menu. Enter the **Alternate Number**.

8. Choose the **Call Out Mode**: **None**, **All**, or **Major**. This parameter configures how alarms trigger a call out. **None** will not trigger a call out, **All** will trigger a call out for any alarm, **Major** will trigger a call out only for a major alarm.

### Configuring the Physical Ports

► To configure the physical ports:

- From the **Configuration menu**, choose **Physical Ports Configuration**.

  The Physical Ports Configuration menu appears:

  ![Figure 4-25. Physical Ports Configuration Menu](image)

#### Configuring the Uplink

Masking and severity of the Optimux-1551 alarms is user controlled. For each alarm group there is also the option to reset the masking and severity to their default values (in the group’s Alarm Configuration Menu).

**Note**

*The uplink menus for SONET and SDH are described separately.*

► To configure the uplink:

1. From the Physical Ports Configuration menu, choose **Uplink Configuration**.

   The Uplink Configuration menu appears:
Optimux-1551

Configuration>Physical Ports Configuration>Uplink Configuration

1. Management DCC > (D1-D3)
2. Management IP ()
3. Link Type (SDH)
4. SOH Configuration >
5. HVC Configuration >
6. LVC Configuration >

> Please select item <1 to 6>
ESC-prev. menu; !-main menu; &-exit

Figure 4-26. Uplink Configuration Menu

2. If D1-D3, or D4-D12 are chosen for the Management DCC, then Management IP is added to the menu. Enter a Management IP address.

Note

The Management DCC can be used to network manage a far end unit.

3. Choose the Link Type: SDH (default when OP-63E1 installed) or SONET (default when OP-6384, OP-2128, or OP-4256 is installed).

Note

Changing the Link Type sets some parameters to their default values and clears the log file.

Optimux-1551 displays a confirmation request.

SOH Configuration for SONET Uplink

SOH or the start of heading character used as the first character for a message heading has to be configured for SONET uplink.

➢ To configure the SOH bytes:

1. From the Uplink Configuration menu, choose SOH Configuration.

   The SOH Configuration menu appears.
2. **Enable** (default) or **Disable** the **AIS & RDI on EED** option to send or not send an **AIS** (Alarm Indication Signal) & **RDI** (Remote Defect Indication) **On EED** (Excessive Error Defect). The EED threshold is determined by the **EED Threshold** parameter.

3. Select whether to enable **J0 TX Path Trace**: **Enable** or **Disable** (default). This field controls insertion of a user-defined trace identifier into the transmit path (J0 byte).

4. If **J0 TX Path Trace** is enabled, **J0 Value** is displayed in the menu. Enter a hex value: 0 to FF (default: 1).

5. Select an **EED** (excessive error defect) **Threshold** according to the exponential value $1^n$, where $n = 3, 4, \text{ or } 5$. An EED is reported if the BER (bit error rate) exceeds the EED threshold. The EED is cleared if the equivalent BER is greater than the exponential value $1^{(EED + 1)}$.

6. Select an **SD** (Signal Degraded Defect) **Threshold**: **n5**, **n6**, **n7**, **n8**, or **n9**. Where "n5" = the exponential value $1^5$, etc. An SD is detected if the BER exceeds the selected SD threshold. The SD is cleared if the BER is greater than the exponential value $1^{(SD+1)}$.

**SOH Alarms Configuration (SONET)**

Alarm masks and severity can be configured or reset to their default values.

➢ To display the SOH Alarms Configuration menu:
  - From the SOH Configuration menu, choose **Alarm Configuration**.

    The Alarm Configuration menu appears:
To configure the SOH alarms:

1. From the Alarm Configuration menu, choose **SOH Alarms**.

   The SOH Alarms menu appears:

   ```plaintext
   Optimux-1551
   ...
   >SOH Configuration>Alarm Configuration>SOH Alarms
<table>
<thead>
<tr>
<th>Alarm Name</th>
<th>Severity</th>
<th>Mask</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Loss Of Signal Uplink A</td>
<td>Major</td>
<td>Off</td>
</tr>
<tr>
<td>2 Loss Of Signal Uplink B</td>
<td>Major</td>
<td>Off</td>
</tr>
<tr>
<td>3 Out Of Frame</td>
<td>Minor</td>
<td>Off</td>
</tr>
<tr>
<td>4 Loss Of Frame</td>
<td>Major</td>
<td>Off</td>
</tr>
<tr>
<td>5 Line AIS occurred</td>
<td>Major</td>
<td>Off</td>
</tr>
<tr>
<td>6 Far End Receive Fail (RDI)</td>
<td>Minor</td>
<td>Off</td>
</tr>
<tr>
<td>7 Excessive Bit Error Rate</td>
<td>Major</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
   1. Minor
   2. Major
   >
   Please select item <1 to 2>
   ESC-prev. menu; !-main menu; &-exit
   ```

   *Figure 4-29. SOH Alarms Menu*

2. Use the navigation keys to change the **Severities** and **Mask**, as necessary.

3. For alarm descriptions, see Chapter 5. **Severity** determines which relay to activate in the event that the alarm occurs: **Major** or **Minor**.

4. If an alarm **Mask** is on, then when the alarm occurs, it is not entered in the log file, a trap is not sent, and the alarm relays are not affected. However, the alarm still appears in the active alarm list. Choose **On** or **Off**.

   To reset the SOH alarms:

   1. From the Alarm Configuration menu, choose **Default Alarms Setting**.
2. Confirm the confirmation request to reset all the SOH alarms to their default mask and severity values.

**SOH Configuration for an SDH Uplink**

**To configure the SOH bytes:**

1. From the Uplink Configuration menu, choose **SOH Configuration**.
   
   The SOH Configuration menu (for an SDH Uplink) appears:

   ![SOH Configuration Menu](image)

   **Figure 4-30. SOH Configuration Menu**

2. Select whether to send an **AIS** (Alarm Indication Signal) & **RDI** (Remote Defect Indication) **On EED** (Excessive Error Defect): **Enable** (default) or **Disable**. (The EED threshold is determined by the **EED Threshold** parameter.)

3. Select whether to send an **AIS & RDI on Path Trace Mismatch**: **Enable** (default) or **Disable**.

   **Note**
   
   The **AIS & RDI on Path Trace Mismatch** parameter is displayed only if **J0 RX Path Trace** is enabled.

4. Select whether to enable **J0 TX Path Trace**: **Enable** or **Disable** (default). This field controls insertion of a user-defined trace string (J0 value) into the transmit path.

5. Select whether to enable **J0 RX Path Trace**: **Enable** or **Disable** (default). This field controls receiving and comparison of a user-defined trace string (J0 value). If the strings do not match a mismatch alarm is declared. If the receive string is unstable, an out of lock alarm is declared.

6. If **J0 TX Path Trace** or **J0 RX Path Trace** is enabled, **J0 Value** is displayed in the menu. Enter a string up to 15 chars (default: **MS-PATH TRACE**).
7. Select an **EED Threshold** according to the exponential value $1^{-n}$, where $n = 3, 4, \text{ or } 5$. An EED is reported if the BER (bit error rate) exceeds the EED threshold. The EED is cleared if the equivalent BER is greater than the exponential value $1^{-(EED + 1)}$.

8. Select an **SD (Signal Degraded Defect) Threshold**: $n5$, $n6$, $n7$, $n8$, or $n9$. Where “$n5$” = the exponential value $1^{-5}$, etc. An SD is detected if the BER exceeds the selected SD threshold. The SD is cleared if the BER is greater than the exponential value $1^{-(SD+1)}$.

**SOH Alarms Configuration (SDH)**

Alarm masks and severity can be configured or reset to their default values.

➤ **To display the SOH Alarms Configuration menu:**
- From the SOH Configuration menu, choose **Alarm Configuration**.

The Alarm Configuration menu appears:

<table>
<thead>
<tr>
<th>Optimux-1551</th>
</tr>
</thead>
<tbody>
<tr>
<td>...&gt;Uplink Configuration&gt;SOH Configuration&gt;Alarm Configuration</td>
</tr>
<tr>
<td>1. SOH Alarms [ ] &gt;</td>
</tr>
<tr>
<td>2. Default Alarms Setting</td>
</tr>
</tbody>
</table>

Please select item <1 to 2>
ESC-prev. menu; !-main menu; &-exit

*Figure 4-31. Alarm Configuration Menu*

➤ **To configure the SOH alarms:**

1. From the Alarm Configuration menu, choose **SOH Alarms**.

The SOH Alarms menu appears:
### Optimux-1551

#### Configuration

**Alarm Configuration > SOH Alarms**

<table>
<thead>
<tr>
<th>Alarm Name</th>
<th>Severity</th>
<th>Mask</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of signal uplink A</td>
<td>Major</td>
<td>Off</td>
</tr>
<tr>
<td>Loss of signal uplink B</td>
<td>Major</td>
<td>Off</td>
</tr>
<tr>
<td>Out of frame</td>
<td>Minor</td>
<td>Off</td>
</tr>
<tr>
<td>Loss of frame</td>
<td>Major</td>
<td>Off</td>
</tr>
<tr>
<td>Line AIS occurred</td>
<td>Major</td>
<td>Off</td>
</tr>
<tr>
<td>Far end receive fail (RDI)</td>
<td>Minor</td>
<td>Off</td>
</tr>
<tr>
<td>Excessive bit error rate</td>
<td>Major</td>
<td>Off</td>
</tr>
</tbody>
</table>

1. **Minor**
2. **Major**

> Please select item <1 to 2>

ESC—prev. menu; !—main menu; &—exit; ?—help

![Figure 4-32. SOH Alarms Menu](image)

2. Use the navigation keys to change the **Severities** and **Mask**, as necessary.

3. For alarm descriptions, see Chapter 5. **Severity** determines which relay to activate in the event that the alarm occurs: **Major** or **Minor**.

4. If an alarm **Mask** is on, then when the alarm occurs, it is not entered in the log file, a trap is not sent, and the alarm relays are not affected. However, the alarm still appears in the active alarm list. Choose **On** or **Off**.

**To reset the SOH alarms:**

1. From the Alarm Configuration menu, choose **Default Alarms Setting**.
2. Confirm the confirmation request to reset all the SOH alarms to their default mask and severity values.

### HVC Configuration for a SONET Uplink

The HVC bytes have to be configured for SONET uplink. The SDH bytes can also be configured for SONET uplink with the addition of the following parameters on the menu (see Figure 4-33):

- AIS and RDI on path trace
- J1 Rx path trace.

**To configure the HVC bytes:**

1. From the Uplink Configuration menu, choose **HVC Configuration**.

The HVC Configuration menu appears:
Optimux-1551

...>Physical Ports Configuration>Uplink Configuration>HVC
Configuration

1. AIS & RDI On EED                (Enable)
2. AIS & RDI On Signal Label       (Enable)
3. J1 Tx Path Trace                (Enable)
4. J1 Value                       >   (HP-PATH TRACE)
5. EED Threshold                  >   (n5)
6. SD Threshold                   >   (n5)
7. Alarm Configuration            >

> Please select item <1 to 6>
ESC-prev. menu; !-main menu; &-exit

Figure 4-33.  HVC Configuration Menu

2. Select whether to send an AIS (Alarm Indication Signal) and RDI (Remote Defect Indication) on an EED (Excessive Error Defect): Enable (default) or Disable.

3. Select whether to send an AIS and RDI on a Signal Label: Enable (default) or Disable.

4. Select whether to enable J1 TX Path Trace: Enable or Disable (default). This field controls insertion of a user-defined testing string (trace) into the transmit path (J1 byte).

5. If J1 TX Path Trace is enabled, J1 Value is displayed in the menu. Enter a string up to 62 chars (default: HP-PATH TRACE).

6. Select an EED (excessive error defect) Threshold according to the exponential value 1^n, where n = 3, 4, or 5. An EED is reported if the BER (bit error rate) exceeds the EED threshold. The EED is cleared if the equivalent BER is greater than the exponential value 1^(EED + 1).

7. Select an SD (Signal Degraded Defect) Threshold: n5, n6, n7, n8, or n9. Where "n5" = the exponential value 1^5, etc. An SD is detected if the BER exceeds the selected SD threshold. The SD is cleared if the BER is greater than the exponential value 1^(SD+1).
**HVC Alarms Configuration**

Alarm masks and severity can be configured or reset to their default values.

► To display the HVC Alarms Configuration menu:
- From the HVC Configuration menu, choose Alarm Configuration.

The Alarm Configuration menu appears:

```
Optimux-1551
...>Uplink Configuration>HVC Configuration>Alarm Configuration

1. HVC Alarms               [] >
2. Default Alarms Setting   >

> Please select item <1 to 2>
ESC-prev. menu; !-main menu; &-exit
```

*Figure 4-34. Alarm Configuration Menu*

► To configure the HVC alarms:
1. From the Alarm Configuration menu, choose HVC Alarms.

The HVC Alarms menu appears:

```
Optimux-1551
...>HVC Configuration>Alarm Configuration>HVC Alarms

Path   Alarm Name                    Severity     Mask
1  HVC 1  Path AIS occurred          Minor        Off
2         Loss of pointer            Minor        On
v 3         Far end receive fail (RDI) Major        Off
| 4         Excessive bit error rate  Minor        Off
5         Signal degraded            Major        Off
6         Signal label mismatch      Major        Off
7         Unequipped signal label    Major        On

1. HVC 1
2. HVC 2
3. HVC 3

> Please select item <1 to 3>
ESC-prev. menu; !-main menu; &-exit: ?-help
```

*Figure 4-35. HVC Alarms Menu*
2. Select the relevant Path (see lists of E1/DS1 path mapping in Chapter 1).
3. Use the navigation keys to change the Sevities and Masks, as necessary.
4. For alarm descriptions, see Chapter 5. Severity determines which relay to activate in the event that the alarm occurs: Major or Minor.
5. If an alarm Mask is on, then when the alarm occurs, it is not entered in the log file, a trap is not sent, and the alarm relays are not affected. However, the alarm still appears in the active alarm list. Choose On or Off.

➤ To reset the HVC alarms:
   1. From the Alarm Configuration menu, choose Default Alarms Setting.
      
      The Default Alarms Setting menu appears:

      | Optimux-1551 |
      |-------------|
      | ...>Uplink Configuration>HVC Configuration>Default Alarms Setting |
      | 1. Enter First HVC [1 - 3] ... (1) |
      | 2. Enter Last HVC [1 - 3] ... (1) |
      | 3. Set To Default |
      | > |
      | Please select item <1 to 3> |
      | ESC-prev. menu; !-main menu; &-exit |

      Figure 4-36. Default Alarms Setting Menu

2. Choose a range of HVC path alarms to reset by selecting the First HVC and the Last HVC in the range (see Multiplexing and Mapping).
3. Select Set to Default, and approve the confirmation message that is displayed, to reset all the HVC alarms in the chosen range to their default mask and severity values

HVC Configuration for an SDH Uplink

➤ To configure the HVC bytes:
   1. From the Uplink Configuration menu, choose HVC Configuration.
      
      The HVC Configuration menu appears:
2. Select whether to send an **AIS** (Alarm Indication Signal) and **RDI** (Remote Defect Indication) on an **EED** (Excessive Error Defect): **Enable** (default) or **Disable**. The EED threshold is set by the **EED Threshold** parameter.

3. Select whether to send an **AIS** and **RDI** on a **Signal Label Mismatch**: **Enable** (default: HP-PATH TRACE) or **Disable**.

4. Select whether to send an **AIS** and **RDI** on a **Path Trace Mismatch**: **Enable** (default) or **Disable**. This parameter is only displayed when **J1 RX Path Trace** is enabled.

5. Select whether to enable **J1 TX Path Trace**: **Enable** or **Disable** (default). This field controls insertion of a user-defined trace string (J1 value) into the transmit path.

6. Select whether to enable **J1 RX Path Trace**: **Enable** or **Disable** (default). This field controls receiving and comparison of a user-defined trace string (J1 value). If the strings do not match a mismatch alarm is declared. If the receive string is unstable, an out of lock alarm is declared.

7. If **J1 TX Path Trace** and/or **J1 RX Path Trace** are enabled, **J1 Value** is displayed in the menu. Enter a string up to 15 chars (default: HP-PATH TRACE).

8. Select an **EED** (excessive error defect) **Threshold** according to the exponential value $1^n$, where $n = 3, 4, 5$. An EED is reported if the BER (bit error rate) exceeds the EED threshold. The EED is cleared if the equivalent BER is greater than the exponential value $1^{-[EED+1]}$.

9. Select an **SD** (Signal Degraded Defect) **Threshold**: n5, n6, n7, n8, or n9. Where "n5" = the exponential value $1^5$, etc. An SD is detected if the BER exceeds the selected SD threshold. The SD is cleared if the BER is greater than the exponential value $1^{-[SD+1]}$.

---

**Figure 4-37. HVC Configuration Menu**
**HVC Alarms Configuration**

Alarm masks and severity can be configured or reset to their default values.

To display the HVC Alarms Configuration menu:

- From the HVC Configuration menu, choose **Alarm Configuration**.

  The Alarm Configuration menu appears:

  ![Figure 4-38. Alarm Configuration Menu](image)

To configure the HVC alarms:

1. From the Alarm Configuration menu, choose **HVC Alarms**.

  The HVC Alarms menu appears:

  ![Figure 4-39. HVC Alarms Menu](image)

2. Use the navigation keys to change the **Severities** and **Masks**, as necessary.
3. For alarm descriptions, see Chapter 5. Severity determines which relay to activate in the event that the alarm occurs: Major or Minor.

4. If an alarm Mask is on, then when the alarm occurs, it is not entered in the log file, a trap is not sent, and the alarm relays are not affected. However, the alarm still appears in the active alarm list. Choose On or Off.

➢ To reset the HVC alarms:
   1. From the Alarm Configuration menu, choose Default Alarms Setting.
   2. Confirm the confirmation request to reset all the HVC alarms to their default mask and severity values.

LVC Configuration for a SONET Uplink

➢ To configure the LVC bytes:
   1. From the Uplink Configuration menu, choose LVC Configuration.

      The LVC Configuration menu appears:

      ![LVC Configuration Menu]

      Figure 4-40. LVC Configuration Menu

      2. Select whether to send an AIS (Alarm Indication Signal) & RDI (Remote Defect Indication) On a Signal Label: Enable (default) or Disable.

      3. Select whether to enable J2 TX Path Trace: Enable or Disable (default). This field controls insertion of a user-defined trace string (J2 value) into the transmit path.

      4. If J2 TX Path Trace and/or J2 RX Path Trace are enabled, J2 Value is displayed in the menu. Enter a string up to 62 chars (default: LP-PATH TRACE).

      5. Select an EED (excessive error defect) Threshold according to the exponential value $1^n$, where $n = 3, 4, \text{ or } 5$. An EED is reported if the BER (bit error rate) exceeds the EED threshold. The EED is cleared if the equivalent BER is greater than the exponential value $1^{-(EED + 1)}$. 
6. Select an SD (Signal Degraded Defect) Threshold: n5, n6, n7, n8, or n9.
   Where “n5” = the exponential value \( 1^{-5} \), etc. An SD is detected if the BER
   exceeds the selected SD threshold. The SD is cleared if the BER is greater
   than the exponential value \( 1^{-(SD+1)} \).

**LVC Alarms Configuration**

Alarm masks and severity can be configured or reset to their default values.

➢ To display the LVC Alarms Configuration menu:
  - From the LVC Configuration menu, choose **Alarm Configuration**.

    The Alarm Configuration menu appears:

    ![Figure 4-41. Alarm Configuration Menu](image)

➢ To configure the LVC channel alarms:
  1. From the Alarm Configuration menu, choose **Tributary Alarms**.

    The Tributary Alarms menu appears:
## Tributary Alarms

![Tributary Alarms Menu](image)

<table>
<thead>
<tr>
<th>Port</th>
<th>Alarm Name</th>
<th>Severity</th>
<th>Mask</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VT AIS occurred</td>
<td>Major</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>Loss of pointer</td>
<td>Major</td>
<td>Off</td>
</tr>
<tr>
<td>3</td>
<td>Far end receive fail (RDI)</td>
<td>Minor</td>
<td>Off</td>
</tr>
<tr>
<td>4</td>
<td>Excessive bit error rate</td>
<td>Major</td>
<td>Off</td>
</tr>
<tr>
<td>5</td>
<td>Signal degraded</td>
<td>Minor</td>
<td>Off</td>
</tr>
<tr>
<td>6</td>
<td>Signal label mismatch</td>
<td>Minor</td>
<td>Off</td>
</tr>
<tr>
<td>7</td>
<td>Unequipped signal label</td>
<td>Minor</td>
<td>Off</td>
</tr>
</tbody>
</table>

1. Change cell [1 - 63] ... (1)

> Please select item <1 to 1>

ESC-prev. menu; !-main menu; &-exit; ?-help

---

### Note

The range of ports depends on the card used, for the OP 63E1: 63 ports (shown); and for the OP 84T1: 84 ports.

2. In the **Change cell** field, select a port.
3. Use the navigation keys to change the **Severities** and **Masks**, as necessary.
4. For alarm descriptions, see **Chapter 5**. **Severity** determines which relay to activate in the event that the alarm occurs: **Major** or **Minor**.
5. If an alarm **Mask** is on, then when the alarm occurs, it is not entered in the log file, a trap is not sent, and the alarm relays are not affected. However, the alarm still appears in the active alarm list. Choose **On** or **Off**.

➤ **To configure alarm masks for multiple tributaries simultaneously:**

1. From the Alarm Configuration menu, choose **Multiple Mask**.

The Multiple Mask menu appears:
Optimux-1551

...>LVC Configuration>Alarm Configuration>Multiple Mask

1. Enter First Port[1 - 63] ... (1)
2. Enter Last Port [1 - 63] ... (1)
3. VT AIS Occurred > (-)
4. Loss Of Pointer > (-)
5. Far End Receive Fail (RDI) > (-)
6. Excessive Bit Error Rate > (-)
7. Signal Degraded > (-)
8. Signal Label Mismatch > (-)
9. Unequipped Signal Label > (-)

> Please select item <1 to 9>
ESC-prev. menu; !-main menu; &-exit

Figure 4-43. Multiple Mask Menu

Note
The range of ports in the domain of menu choices 1 and 2 depends on the card used, for the OP 63E1: 63 ports (shown); and for the OP 84T1: 84 ports.

2. Select group of ports by selecting a port in the Enter First Port field (the first port in the group) and a port in the Enter Last Port field (the last port in the group).

3. If an alarm Mask is on, then when the alarm occurs, it is not entered in the log file, a trap is not sent, and the alarm relays are not affected. However, the alarm still appears in the active alarm list. For each alarm, select On or Off.

➢ To configure severities for multiple tributaries simultaneously:

1. From the Alarm Configuration menu, choose Multiple Severity.

   The Multiple Severity menu appears:
Optimux-1551

...>LVC Configuration>Alarm Configuration>Multiple Severity

1. Enter First Port [1 - 63]  ... (1)
2. Enter Last Port [1 - 63]   ... (1)
3. VT AIS Occurred            >   (-)
4. Loss Of Pointer           >   (-)
5. Far End Receive Fail (RDI) >   (-)
6. Excessive Bit Error Rate  >   (-)
7. Signal Degraded           >   (-)
8. Signal Label Mismatch     >   (-)
9. Unequipped Signal Label   >   (-)

> 
Please select item <1 to 9>
ESC-prev. menu; !-main menu; &-exit

Figure 4-44. Multiple Severity Menu

Note

The range of ports in the domain of menu choices 1 and 2 depends on the card used:
- OP-63E1: 63 ports (shown)
- OP-6384: 63 ports when set to E1 and 84 ports when set to T1
- OP-4256: 42 ports when set to E1 and 56 ports when set to T1
- OP-2128: 21 ports when set to E1 and 28 ports when set to T1
- OP-63E1: 63 ports (shown); for the OP 84T1: 84 ports.

2. Select group of ports by selecting a port in the Enter First Port field (the first port in the group) and a port in the Enter Last Port field (the last port in the group).
3. For each alarm, select the severity (Minor or Major).

➢ To configure default alarm settings:
1. From the Alarm Configuration menu, choose Default Alarm Settings.

   The Default Alarm Settings menu appears:
Optimux-1551

...>LVC Configuration>Alarm Configuration>Default Alarms

Settings

1. Enter First Port[1 - 63]        ... (1)
2. Enter Last Port[1 - 63]         ... (1)
3. Set To Default

>
Please select item <1 to 3>
ESC-prev. menu; !-main menu; &-exit

Figure 4-45. Default Alarm Settings Menu

Note
The range of ports in the domain of menu choices 1 and 2 depends on the card used:
• **OP-63E1**: 63 ports (shown)
• **OP-6384**: 63 ports when set to E1 and 84 ports when set to T1
• **OP-4256**: 42 ports when set to E1 and 56 ports when set to T1
• **OP–2128**: 21 ports when set to E1 and 28 ports when set to T1.

2. Select group of ports by selecting a port in the Enter First Port field (the first port in the group) and a port in the Enter Last Port field (the last port in the group). This is the group of ports to be configured with their default alarm settings.

3. To confirm the selection, select **Set to Default** and confirm by entering Y.

**LVC Configuration for an SDH Uplink**

To configure the LVC bytes:

1. From the Uplink Configuration menu, choose **LVC Configuration**.

The LVC Configuration menu appears:
Optimux-1551

...>Physical Ports Configuration>Uplink Configuration>LVC Configuration

1. AIS & RDI On Path Trace (Enable)
2. J2 Tx Path Trace (Enable)
3. J2 Rx Path Trace (Enable)
4. J2 Value ... (LP-PATH TRACE)
5. EED Threshold > (n5)
6. SD Threshold > (n5)
7. Alarm Configuration 

> Please select item <1 to 7>
ESC-prev. menu; !-main menu; &-exit

Figure 4-46. LVC Configuration Menu

2. Select whether to send an AIS (Alarm Indication Signal) & RDI (Remote Defect Indication) On a Path Trace Mismatch: Enable (default) or Disable. This parameter is only displayed when J2 RX Path Trace is enabled.

3. Select whether to enable J2 TX Path Trace: Enable or Disable (default). This field controls insertion of a user-defined trace string (J2 value) into the transmit path.

4. Select whether to enable J2 RX Path Trace: Enable or Disable (default). This field controls receiving and comparison of a user-defined trace string (J2 value). If the strings do not match a mismatch alarm is declared. If the receive string is unstable, an out of lock alarm is declared.

5. If J2 TX Path Trace and/or J2 RX Path Trace are enabled, J2 Value is displayed in the menu. Enter a string up to 15 chars (default: LP-PATH TRACE).

6. Select an EED (excessive error defect) Threshold according to the exponential value $1^n$, where $n = 3, 4, \text{ or } 5$. An EED is reported if the BER (bit error rate) exceeds the EED threshold. The EED is cleared if the equivalent BER is greater than the exponential value $1^{(\text{EED} + 1)}$.

7. Select an SD (Signal Degraded Defect) Threshold: n5, n6, n7, n8, or n9. Where “n5” = the exponential value $1^{-5}$, etc. An SD is detected if the BER exceeds the selected SD threshold. The SD is cleared if the BER is greater than the exponential value $1^{(\text{SD} + 1)}$. 
**LVC Alarms Configuration**

Alarm masks and severity can be configured or reset to their default values.

- To display the LVC Alarms Configuration menu:
  - From the LVC Configuration menu, choose **Alarm Configuration**.

The Alarm Configuration menu appears:

```
Optimux-1551

...>Uplink Configuration>LVC Configuration>Alarm Configuration

1. Tributary Alarms
2. Multiple Mask
3. Multiple Severity
4. Default Alarms Setting

> Please select item <1 to 1>
ESC-prev. menu; !-main menu; &-exit
```

*Figure 4-47. Alarm Configuration Menu*

- To configure the LVC channel alarms:
  1. From the Alarm Configuration menu, choose **Tributary Alarms**.

The Tributary Alarms menu appears:

```
Optimux-1551

...>LVC Configuration>Alarm Configuration>Tributary Alarms

<table>
<thead>
<tr>
<th>Port</th>
<th>Alarm Name</th>
<th>Severity</th>
<th>Mask</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VT AIS occurred</td>
<td>Major</td>
<td>On</td>
</tr>
<tr>
<td>2</td>
<td>Loss of pointer</td>
<td>Major</td>
<td>On</td>
</tr>
<tr>
<td>3</td>
<td>Far end receive fail (RDI)</td>
<td>Minor</td>
<td>Off</td>
</tr>
<tr>
<td>4</td>
<td>Lower order path trace mismatch</td>
<td>Minor</td>
<td>Off</td>
</tr>
<tr>
<td>5</td>
<td>Excessive bit error rate</td>
<td>Major</td>
<td>Off</td>
</tr>
<tr>
<td>6</td>
<td>Signal degraded</td>
<td>Minor</td>
<td>Off</td>
</tr>
<tr>
<td>7</td>
<td>Signal label mismatch</td>
<td>Minor</td>
<td>Off</td>
</tr>
</tbody>
</table>

1. Change cell [1 - 63] ... (1)

> Please select item <1 to 1>
ESC-prev. menu; !-main menu; &-exit
```

*Figure 4-48. Tributary Alarms Menu*
2. In the **Change cell** field, select a port.

3. Use the navigation keys to change the **Severity** and **Masks**, as necessary.

4. For alarm descriptions, see **Chapter 5. Severity** determines which relay to activate in the event that the alarm occurs: **Major** or **Minor**.

5. If an alarm **Mask** is on, then when the alarm occurs, it is not entered in the log file, a trap is not sent, and the alarm relays are not affected. However, the alarm still appears in the active alarm list. Choose **On** or **Off**.

**To configure alarm masks for multiple tributaries simultaneously:**

1. From the Alarm Configuration menu, choose **Multiple Mask**.

The Multiple Mask menu appears:

```plaintext
Optimux-1551

...>LVC Configuration>Alarm Configuration>Multiple Mask

1. Enter First Port [1 - 63] ... (1)
2. Enter Last Port [1 - 63] ... (1)
3. VT AIS Occurred      >   (-)
4. Loss Of Pointer      >   (-)
5. Far End Receive Fail (RDI) >   (-)
6. Lower Order Path Trace Mismatch >   (-)
7. Excessive Bit Error Rate >   (-)
8. Signal Degraded      >   (-)
9. Signal Label Mismatch >   (-)
10. V5 VC AIS            >   (-)
11. Unequipped Signal Label >   (-)

> 
Please select item <1 to 11>
ESC-prev. menu; !-main menu; &-exit
```

*Figure 4-49. Multiple Mask Menu*

**Note**

The range of ports in the domain of menu choices 1 and 2 depends on the card used:

- **OP-63E1**: 63 ports (shown)
- **OP-6384**: 63 ports when set to E1 and 84 ports when set to T1
- **OP-4256**: 42 ports when set to E1 and 56 ports when set to T1
- **OP–2128**: 21 ports when set to E1 and 28 ports when set to T1.

2. Select group of ports by selecting a port in the **Enter First Port** field (the first port in the group) and a port in the **Enter Last Port** field (the last port in the group).

3. If an alarm **Mask** is on, then when the alarm occurs, it is not entered in the log file, a trap is not sent, and the alarm relays are not affected. However,
the alarm still appears in the active alarm list. For each alarm, choose On or Off.

➢ To configure severities for multiple tributaries simultaneously:
1. From the Alarm Configuration menu, choose Multiple Severity.

The Multiple Severity menu appears:

```
Optimux-1551
...>LVC Configuration>Alarm Configuration>Multiple Severity
1. Enter First Port[1 - 63]           ... (1)
2. Enter Last Port[1 - 63]            ... (1)
3. VT AIS Occurred                    >   (-)
4. Loss Of Pointer                    >   (-)
5. Far End Receive Fail (RDI)         >   (-)
6. Lower Order Path Trace Mismatch    >   (-)
7. Excessive Bit Error Rate           >   (-)
8. Signal Degraded                    >   (-)
9. Signal Label Mismatch              >   (-)
10. V5 VC AIS                         >   (-)
11. Unequipped Signal Label           >   (-)
>
Please select item <1 to 11>
ESC-prev. menu; !-main menu; &-exit
```

*Figure 4-50. Multiple Severity Menu*

**Note**
The range of ports in the domain of menu choices 1 and 2 depends on the card used:
- **OP 63E1**: 63 ports (shown)
- **OP-6384**: 63 ports when set to E1 and 84 ports when set to T1
- **OP-4256**: 42 ports when set to E1 and 56 ports when set to T1
- **OP–2128**: 21 ports when set to E1 and 28 ports when set to T1.

2. Select group of ports by selecting a port in the Enter First Port field (the first port in the group) and a port in the Enter Last Port field (the last port in the group).

3. For each alarm, select the severity (Minor or Major).

➢ To configure default alarm settings:
1. From the Alarm Configuration menu, choose Default Alarm Settings.

The Default Alarm Settings menu appears:
Installation and Operation Manual  

Chapter 4  Configuration

Optimux-1551

...>LVC Configuration>Alarm Configuration>Default Alarms

Settings

1. Enter First Port[1 - 63] ... (1)
2. Enter Last Port[1 - 63] ... (1)
3. Set To Default

> 

Please select item <1 to 3>
ESC-prev. menu; !-main menu; &-exit

Figure 4-51. Default Alarm Settings Menu

Note

The range of ports in the domain of menu choices 1 and 2 depends on the card used:

- OP 63E1: 63 ports (shown)
- OP-6384: 63 ports when set to E1 and 84 ports when set to T1
- OP-4256: 42 ports when set to E1 and 56 ports when set to T1
- OP–2128: 21 ports when set to E1 and 28 ports when set to T1.

2. Select group of ports by selecting a port in the Enter First Port field (the first port in the group) and a port in the Enter Last Port field (the last port in the group). This is the group of ports to be configured with their default alarm settings.

3. To confirm the selection, select Set to Default and confirm by entering Y.

Monitoring Optimux-1551 Operation

The Optimux-1551 software enables display of system and port status and alarms. These menus are described in Chapter 5.

Note

The range of ports in the domain of menu choices 1 and 2 depends on the card used:

- OP 63E1: 63 ports (shown)
- OP-6384: 63 ports when set to E1 and 84 ports when set to T1
- OP-4256: 42 ports when set to E1 and 56 ports when set to T1
- OP–2128: 21 ports when set to E1 and 28 ports when set to T1.

Configuring System Alarms

To configure the system alarms:

1. From the System Configuration menu, choose Alarm Configuration.

The Alarm Configuration menu appears:

Optimux-1551 Ver. 2.2  Configuring Optimux-1551  4-41
2. From the Alarm Configuration menu, choose *System Alarms*. The System Alarms menu appears:

```
Optimux-1551
Configuration>System Configuration>Alarm Configuration>System Alarms

<table>
<thead>
<tr>
<th>Alarm Name</th>
<th>Severity</th>
<th>Mask</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Self test failure</td>
<td>Major</td>
<td>Off</td>
</tr>
<tr>
<td>2  Signal loss on station clock</td>
<td>Major</td>
<td>Off</td>
</tr>
<tr>
<td>3  Real time clock battery failure</td>
<td>Major</td>
<td>Off</td>
</tr>
<tr>
<td>4  High temperature</td>
<td>Major</td>
<td>Off</td>
</tr>
<tr>
<td>5  Uplink redundancy not available</td>
<td>Major</td>
<td>Off</td>
</tr>
<tr>
<td>6  Input alarm</td>
<td>Minor</td>
<td>Off</td>
</tr>
<tr>
<td>7  Power supply A failure</td>
<td>Major</td>
<td>Off</td>
</tr>
</tbody>
</table>
```

3. The alarms are described in *Chapter 5*. For each alarm, select whether the **Severity** is **Major** or **Minor** and whether the **Mask** for that alarm is **On** or **Off**. If an alarm is masked then when the alarm occurs it is not entered in the log file, a trap is not sent, and the alarm relays are not affected. However, the alarm still appears in the active alarm list.
### 4.2 Additional Tasks

#### Displaying an Inventory of the Optimux-1551

The Optimux-1551 inventory displays information on the functional blocks of the unit, according to RFC 2737 – Entity MIB.

Optimux-1551 consists of the following components:

- Chassis
- Uplink card (up to two cards) supporting one STS-3/OC-3/STM-1 uplink
- Power supply (up to two cards)
- Main OP-63E1/OP-6384/OP-2128/OP-4256 (access and control) card (up to two cards)
- Six 64-pin Telco connectors supporting up to 63 channels
- Fan
- Temperature sensor
- Management Ethernet port
- Terminal control port
- Alarm input port
- Monitor port
- Station clock (option)
- CPU.

To display an inventory of the Optimux-1551:

1. From the Main menu, select **Inventory**.

   The Inventory menu is displayed (shown in part below).
Inventory

<table>
<thead>
<tr>
<th>Index</th>
<th>Description</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RAD.Optimux-155.Chassis</td>
<td>Chassis</td>
</tr>
<tr>
<td>2</td>
<td>RAD.Optimux-155.Uplink Slot</td>
<td>Container</td>
</tr>
<tr>
<td>3</td>
<td>RAD.Optimux-155.Uplink Slot</td>
<td>Container</td>
</tr>
<tr>
<td>4</td>
<td>RAD.Optimux-155.PS Slot</td>
<td>Container</td>
</tr>
<tr>
<td>5</td>
<td>RAD.Optimux-155.PS Slot</td>
<td>Container</td>
</tr>
<tr>
<td>6</td>
<td>RAD.Optimux-155.Main Card Slot</td>
<td>Container</td>
</tr>
<tr>
<td>7</td>
<td>RAD.Optimux-155.Main Card Slot</td>
<td>Container</td>
</tr>
<tr>
<td>8</td>
<td>RAD.Optimux-155.PS</td>
<td>Power Supply</td>
</tr>
<tr>
<td>9</td>
<td>RAD.Optimux-155.PS</td>
<td>Power Supply</td>
</tr>
</tbody>
</table>

2. Scroll up/down and left right to view all the data. Move to editable fields by pressing TAB.

Configuring Date and Time

To configure the system date and time:

1. From the System Configuration menu, choose Date/Time.

The Date/Time menu appears:

```
Configuration>System Configuration>Date/Time
```

1. Set Date   ... (2003-01-01)
2. Set Time   ... (00:00:00)

Please select item <1 to 2>
ESC-prev. menu; !-main menu; &-exit

2. Set the Date: (format is yyyy:mm:dd).
3. Set the Time: (format is hh:mm:ss).

Resetting the Unit

Optimux-1551 supports two types of reset:

- Reset parameters to their default settings
Resetting the Parameters to their Factory Defaults

The reset to default can be done in either of two ways:

- All parameters back to default values
- All parameters back to default values except for management parameters (IP address, community, manager list, management access, management DCC, mask and default gateway).

**Note**

The uplink **Link Type** parameter (page 4-19) is not affected by either type of factory reset:

- If the link type is SONET, the tributary line type default value will be DS1
- If the link type is SDH, the tributary line type default value will be E1.

The same behavior applies for the station clock source:

- If tributary line type is set to DS1, station clock input is set to DS1
- If tributary line type is set to E1, station clock input is set to E1.

To reset the unit to factory defaults:

1. From the System Configuration Menu, choose **Factory Default**.
   
   The Factory Default menu appears:

   ![Optimux-1551 Configuration>System Configuration>Factory Default](image)

   - 1. All
   - 2. W/O MNG

   Please select item <1 to 2>

   ESC-prev. menu; !-main menu; &-exit

   Figure 4-56. Factory Default Menu

2. From the Factory Default Menu, perform one the following steps:
   - Select **All** to include the management parameters in the reset.
   - Select **W/O MNG** to reset all parameters, except for the management parameters.

   Optimux-1551 displays a confirmation request.

3. Type **Y** to confirm the reset.

   Optimux-1551 sets the parameters to their factory defaults.

Resetting the Entire Unit

To reset Optimux-1551:

1. From the System Configuration menu, select **Reset Device**.
Optimux-1551 displays a confirmation request.

2. Type Y to confirm the reset.

   The unit switches to the backup OP-63E1/OP-6384/OP-2128/OP-4256 card and the former active OP-63E1/OP-6384/OP-2128/OP-4256 card resets itself. It takes about a minute for the reset, after which the former active OP-63E1/OP-6384/OP-2128/OP-4256 card is ready to function as the new backup card.

### Configuring the Channels

To configure the channel ports:

1. From the Physical Ports Configuration menu, choose **Channel Configuration**.

   The Channel Configuration menu appears:

   ![Channel Configuration Menu](image-url)

2. From the Channel Configuration menu, choose **Channel Configuration**.

   The Channel Configuration menu changes. If the **Line Type** is configured to E1, the menu is as follows:
### Channel Configuration Table

<table>
<thead>
<tr>
<th>Port</th>
<th>Port Description</th>
<th>Line Type</th>
<th>Channel Active</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>E1</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>E1</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>E1</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>E1</td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>E1</td>
<td>Yes</td>
</tr>
</tbody>
</table>

---

3. Use the navigation keys to move through the menu and edit fields.
4. Move the cursor to the selected Port row.
5. Move the cursor to the Port description column and enter a string up to 15 characters.

---

**Figure 4-58. Channel Configuration Menu (E1)**

If the Line Type is configured to DS1, the menu is as follows:

### Channel Configuration Table

<table>
<thead>
<tr>
<th>Port</th>
<th>Port Description</th>
<th>Line Type</th>
<th>DS1 Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>DS1</td>
<td>0 - 133 feet</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>DS1</td>
<td>0 - 133 feet</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>DS1</td>
<td>0 - 133 feet</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>DS1</td>
<td>0 - 133 feet</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>DS1</td>
<td>0 - 133 feet</td>
</tr>
</tbody>
</table>

---

**Figure 4-59. Channel Configuration Menu (DS1)**
6. Move the cursor to the Line Type column and choose No to mask the channel or Yes to keep the channel unmasked (transfer data).

7. Move the cursor to the Line Type column and choose Low or High priority. This setting affects the redundancy operation between the OP-63E1/OP-6384/OP-2128/OP-4256 cards: loss on a port that is configured High will cause immediate switching between the OP-63E1/OP-6384/OP-2128/OP-4256 cards (assuming that the new active card is functioning normally).

8. DS1 only: Move the cursor to the DS1 Length column and select a line length from one of the following values:
   - 0 - 133 feet (default)
   - 134 - 266 feet
   - 267 - 399 feet
   - 400 - 533 feet
   - 534 - 655 feet.

➢ To change the LIU line coding:

   1. From the Channel Configuration menu, choose LIU Configuration.

   2. The LIU Configuration menu appears. If the Line Type is configured to E1, the menu is as follows:

   ![LIU Configuration Table]

   **Figure 4-60. LIU Configuration Menu (E1)**

   If the Line Type is configured to DS1, the menu is as follows:
### LIU Configuration Table

<table>
<thead>
<tr>
<th>LIU number</th>
<th>Line Type</th>
<th>Line Coding</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIU1 [Ports 1-7]</td>
<td>DS1</td>
<td>B8ZS</td>
</tr>
<tr>
<td>LIU2 [Ports 8-14]</td>
<td>DS1</td>
<td>B8ZS</td>
</tr>
<tr>
<td>LIU3 [Ports 15-21]</td>
<td>DS1</td>
<td>B8ZS</td>
</tr>
<tr>
<td>LIU4 [Ports 22-28]</td>
<td>DS1</td>
<td>B8ZS</td>
</tr>
<tr>
<td>LIU5 [Ports 29-35]</td>
<td>DS1</td>
<td>B8ZS</td>
</tr>
<tr>
<td>LIU6 [Ports 36-42]</td>
<td>DS1</td>
<td>B8ZS</td>
</tr>
</tbody>
</table>

#### Note

The LIU number that appears on Figure 4-60 and Figure 4-61 depends on the card that is installed. For example: For the OP-2128 card, only LIUs 1, 2, 3, 4 will appear on the screens.

1. E1
2. DS1

Figure 4-61. LIU Configuration Menu (DS1)

#### Note

A change in the **Line Type** does the following:
- Resets **Sniffing** to its default value
- Sets **Station Clock Source** to Reference if **Station Clock Type** is External Channel
- Clears all statistics.

*For OP-63E1 card Line Type field is read-only with value E1.*

3. To change the **Line Type** for an LIU in the OP-6384, OP-2128 and OP-4256 cards, move the cursor to the appropriate column and select **E1** or **DS1** (default for OP-6384, OP-2128 and OP-4256 cards).

#### Note

The **Interface Type** setting only changes the line impedance. When the Interface Type is set to Unbalanced external patch panels, the OP-A/ADAPTOR/21BNC needs to be attached to the product in order to enable the connection of a coax cable to the product.
To configure the masking and priority for multiple ports:

1. From the Channel Configuration menu, choose **Multiple Port Configuration**.

   The Multiple Port Configuration menu appears. If an OP-63E1 card is installed, the menu is as follows:
   
   ![Optimux-1551 Multiple Port Configuration Menu (OP-63E1 Card Installed)]

   If an OP-84T1 card is installed, the menu is as follows:
   
   ![Optimux-1551 Multiple Port Configuration Menu (OP-84T1 Card Installed)]

   - The range of ports in the domain of menu choices 1 and 2 depends on the card used:
     - **OP 63E1**: 63 ports (shown)
     - **OP-6384**: 63 ports when set to E1 and 84 ports when set to T1
     - **OP-4256**: 42 ports when set to E1 and 56 ports when set to T1
     - **OP–2128**: 21 ports when set to E1 and 28 ports when set to T1.

2. **DS1 only**: From the Multiple Port Configuration Menu, open the DS1 Length Menu and select the **First Port**, the **Last Port**, and the **DS1 Line Length**.

3. From the Multiple Port Configuration menu, open the Administrative Status menu and select the **First Port**, the **Last Port**, and the Administrative Status (Up or Down).
4. From the Multiple Port Configuration Menu, open the Channel Priority Menu and select the First Port, the Last Port, and the Channel Priority Configuration (Low or High).

➤ To set the LED status for masked channels:
- From the Channel Configuration menu choose LED Status for Masked Channels.
  - Off - the channel SYNC LOSS/AIS LED is constantly off for all masked channels.
  - Blinking (yellow) - the channel SYNC LOSS/AIS yellow LED blinks for all masked channels.

➤ To configure alarms:
1. From the Channel Configuration menu, choose Alarm Configuration.
   The Alarm Configuration menu appears:

   ![Figure 4-64. Alarm Configuration Menu](image)

   2. From the Alarm Configuration menu, choose Channel Alarms.
      The Channel Alarms menu appears:
3. Select a port by moving the cursor to the Port column and selecting Change cell.

4. Select severity for the port by moving the cursor to the Severity column and selecting Major or Minor.

5. If an alarm Mask is on, then when the alarm occurs, it is not entered in the log file, a trap is not sent, and the alarm relays are not affected. However, the alarm still appears in the active alarm list. Choose On or Off.

To configure the alarm masks for multiple channels:

1. From the Alarm Configuration menu, choose Multiple Mask.

The Multiple Mask Configuration menu appears:

2. Select the First Port, the Last Port, and the AIS and LOS mask (On or Off).
The range of ports in the domain of menu choices 1 and 2 depends on the card used:

- **OP 63E1**: 63 ports (shown)
- **OP-6384**: 63 ports when set to E1 and 84 ports when set to T1
- **OP-4256**: 42 ports when set to E1 and 56 ports when set to T1
- **OP–2128**: 21 ports when set to E1 and 28 ports when set to T1.

To configure the alarm severities for multiple channels:

1. From the Alarm Configuration menu, choose **Multiple Severity**.

   The Multiple Severity menu appears:

   ![Multiple Severity Menu](image)

   **Figure 4-67. Multiple Severity Menu**

2. For each alarm, select the **First Port**, the **Last Port**, and the **AIS** and **Loss** severity (**Major** or **Minor**).

   **Note**

   The range of ports in the domain of menu choices 1 and 2 depends on the card used:

   - **OP 63E1**: 63 ports (shown)
   - **OP-6384**: 63 ports when set to E1 and 84 ports when set to T1
   - **OP-4256**: 42 ports when set to E1 and 56 ports when set to T1
   - **OP–2128**: 21 ports when set to E1 and 28 ports when set to T1.

   **To configure default channel alarm settings:**

   1. From the Alarm Configuration menu, choose **Alarm Configuration**.

      The Alarm Configuration menu appears:
Optimux-1551

...>Channel Configuration>Alarm Configuration>Default Alarms Setting

1. Enter First Port [1 - 63] ... (1)
2. Enter Last Port [1 - 63] ... (1)
3. Set To Default

> 
Please select item <1 to 3>
ESC-prev. menu; !-main menu; &-exit

Figure 4-68. Default Alarms Setting Menu

2. Select the First Port and the Last Port.
3. Select Set to Default and enter Y to confirm.

Software Updates

Note

If a backup OP-63E1/OP-6384/OP-2128/OP-4256 (access and control) card is installed, then any software download should be done to both cards to maintain support for automatic redundancy.

This section presents procedures for installing new software releases on Optimux-1551, as well as swapping existing software versions (where a backup OP-63E1/OP-6384/OP-2128/OP-4256 card is installed).

The Optimux-1551 system software is stored in nonvolatile memory. There are two memory partitions (referred to as 0 and 1) in which to store a set of software files. The software is stored in compressed format. The active version is decompressed and loaded into the Optimux-1551 RAM upon power-up. The passive software is kept for the backup purposes. When performing any kind of download/upload, the TST LED blinks during the operation.

The user can select which partition is active and which serves as backup.

Each time that software is downloaded, it goes to the backup partition, which then becomes active. The previous active partition becomes backup (with its previous version of the software).

➢ To work with the software files on the Optimux-1551:

1. From the Main menu, choose File Utilities.
The File Utilities menu appears:

```
Optimux-1551

File Utilities

1. File System  >
2. S/W & File Transfer  >

>  
Please select item <1 to 2>
ESC-prev. menu; !-main menu; &-exit
```

*Figure 4-69. File Utilities Menu*

2. Choose **File System**.

The File System menu appears:

```
Optimux-1551

File Utilities>File System

1. SW Files  []
2. Swap SW Files

>  
Please select item <1 to 2>
ESC-prev. menu; !-main menu; &-exit
```

*Figure 4-70. File System Menu*

**Viewing Software Status**

- To view the status of the software:
  - Choose **SW Files** to view the current status of the memory partitions, including which partition is active and what software version it holds.

**Swapping Active Software**

- To swap the active software files on the Optimux-1551:
  1. To swap the software files on the partitions, select **Swap SW Files**.
      
      Optimux-1551 displays a confirmation request.
  2. Type **Y** to confirm.
      
      The swap is performed. The software that was active before the swap becomes the backup and the former backup software becomes active. Optimux-1551 is then reset automatically.
3. At this point redundancy is lost because the partitions on only one of the cards have been switched. Wait about a minute until “Redundancy Not Available” is displayed.

4. Repeat the software swapping procedure on the remaining card to regain redundancy.

**Note**

*It is important to wait for the “Redundancy Not Available” message because it indicates that first card has come back up. If the software swap for the remaining card is done before that, service will be interrupted.*

### Downloading Software

New software releases are distributed on diskettes as *.img files, which can be downloaded to the local Optimux-1551 using the TFTP or XMODEM protocol.

**Note**

*Once an active card has been updated with new software, and the unit has switched to the other card (was the backup card), there are two ways to update that other card:*

- Perform another download to the other card.
- Select **Update SW Version** from the Main Card Redundancy menu (see Figure 4-9).

During a download, the following occurs:

1. The backup software is erased (unless this is the first download, in which case there is no backup software yet.

2. The new software is downloaded to the partition that formerly held the backup software.

3. The unit resets itself (see **Resetting the Unit**, page 4-44).

4. The new software is decompressed.

5. The new software becomes active.

6. The software that was active before the download becomes the backup.

If a failure occurs during downloading of the new software, the process is aborted (no reset is performed).

If a failure occurs during decompression of the new software, it is deleted and the software that was active before the download attempt remains active.

In both failure cases, only one software version remains in the flash memory (the software that was active before the download attempt).
To download software to the Optimux-1551:
From the File Utilities menu, choose S/W & File Transfer.

The S/W & File Transfer menu appears:

![Figure 4-71. S/W & File Transfer Menu](image)

Transferring Software via TFTP

To transfer software to/from the Optimux-1551 using TFTP protocol:

*In order to use TFTP, the unit’s IP address must be configured.*

*For best results, before using TFTP, configure the MNG-ETH port for full duplex (if supported by the network; see Configuring the Ethernet Port, page 4-13).*

1. Store the software distribution file on the TFTP server.
2. From the S/W & File Transfer menu, choose Via TFTP to download software using the TFTP protocol.

The Via TFTP Transfer menu appears:

![Figure 4-72. Via TFTP Transfer Menu](image)

3. From the Via TFTP menu, perform the following steps:
1. Select **TFTP File Name** and enter the name of the software file (for example, `op1551.img`).

2. Select **TFTP IP Server** and enter the IP address of the TFTP server.

4. From the Via TFTP Menu, select the **TFTP Command**. (This menu option is displayed only after the **TFTP File Name** and **TFTP IP Server** have been entered).

   The TFTP Command menu appears:

   ![TFTP Command Menu](image)

   **Figure 4-73. TFTP Command Menu**

5. From the TFTP Command menu, select **Download User File** to start downloading file to Optimux-1551.

   During the download, the **Transfer Status** is displayed. If the download fails, the **Transfer Error** that caused the failure is displayed (see **Table 4-1**).

   ![](image)

   **Table 4-1. Transfer Errors**

<table>
<thead>
<tr>
<th>Error</th>
<th>Description</th>
<th>Error</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No error</td>
<td>No error</td>
<td>Error access</td>
<td>Access violation allocation</td>
</tr>
<tr>
<td>Error resources</td>
<td>Resources unavailable</td>
<td>Error disk full</td>
<td>Disk full or allocation exceeded</td>
</tr>
<tr>
<td>Error timeout</td>
<td>Timed out</td>
<td>Error illegal op</td>
<td>Illegal TFTP operation</td>
</tr>
<tr>
<td>Error use msg</td>
<td>Aborted by client request</td>
<td>Error bad tid</td>
<td>Unknown transfer ID</td>
</tr>
<tr>
<td>Error nofile</td>
<td>File not found</td>
<td>Error exists</td>
<td>File already exists</td>
</tr>
<tr>
<td></td>
<td>Error no user</td>
<td>No such user</td>
<td>No such user</td>
</tr>
</tbody>
</table>

Optimux-1551 automatically erases the backup partition. Once the downloading is completed, Optimux-1551 saves the new release as an active partition; the former active partition becomes backup.

If the downloading is completed successfully, Optimux-1551 displays the download successful message.

Optimux-1551 saves the new release as an active partition. The former active partition becomes backup. Then the unit resets itself, which causes the new software to be loaded into the unit's RAM.
6. After downloading, the OP-63E1/OP-6384/OP-2128/OP-4256 card resets automatically and switch to the backup card (if available).

**Transferring Software via X-Modem**

➢ To download software to the Optimux-1551 via X-Modem protocol:

1. From the S/W & File Transfer menu, choose **Via X-Modem**.
2. Start the communication software.
3. Select XMODEM protocol.
4. Enter the name and path of the software distribution file to be downloaded.
5. Press Enter.

   The new software version is loaded to the flash memory. Status messages appear in the bottom of the S/W & File Transfer menu.

6. After downloading, the OP-63E1/OP-6384/OP-2128/OP-4256 card resets automatically and switch to the backup card (if available).

**Note**

*Downloading with XMODEM is unavailable through Telnet.*

To minimize software download time, it is recommended to configure the Control port to the highest available data rate.

**Note**

*Once an active card has been updated with new software, there are two ways to update the other (formerly the backup) card:*

- **Perform another download to the other card.**
- **Select Update SW Version** from the Main Card Redundancy Menu *(see Figure 4-9).*
Chapter 5

Configuring Typical Applications

This chapter gives detailed instructions for configuring Optimux-1551 units for typical point-to-point and fan-out connections.

A terminal can be used to configure a local Optimux-1551. However, to configure remote units, a Telnet, web, or SNMP application is required.

5.1 Configuring a Point-to-Point Application

Figure 5-1 illustrates a point-to-point connection extended by a pair of Optimux-1551 units.

![Figure 5-1. Point-to-Point Application](image)

In most of the configuration procedure the same parameter values are used for both the Near End (NE) and Far End (FE) Optimux-1551 units. The exceptions are selecting the clock source and the IP address, both of which differ for the two units.

In this application example, the NE unit can be configured for an internal or external (requires optional station clock card) clock source and the FE unit for LBT clock source. The NE unit is connected to a LAN, thereby enabling remote management.

**Note**

The following procedure is first applied to the NE Optimux-1551. Then see step 16 for how to proceed with the FE unit.
To configure the Optimux-1551 system parameters:

1. Configure an ASCII terminal to:
   - 115.2 kbps
   - one start bit
   - eight data bits
   - no parity
   - one stop bit
   - no flow control
   - VT100 emulation.

   *Rate, start bit, and data bit values do not have to have the values stated here: Optimux-1551 automatically detects the user-assigned values and configures itself to work with them.*

2. Connect a terminal application to the Control port of the NE Optimux-1551 unit.

   The unit automatically configures itself to communicate with the terminal application and displays a password prompt.

3. Enter the password.

4. Select the Link Type: SONET or SDH (Main Menu > Configuration > Physical Port Configuration > Uplink Configuration > Link Type).

5. Perform SOH Configuration, HVC Configuration, and LVC Configuration (SDH only) according to the selected Link Type (Main Menu > Configuration > Physical Port Configuration > Uplink Configuration).

6. Configure the Channel Type: E1 or DS1 (Main Menu > Configuration > Physical Port Configuration > Channel Configuration > LIU Configuration > Line Type).

   *The Channel Type value applies for all the channels.*

7. Set channel Priority, Activity, and Length (Length parameter is not required for E1). This can be done for each channel individually or as a group (Main Menu > Configuration > Physical Port Configuration > Channel Configuration > Multiple Port Configuration).

8. Configure Uplink Redundancy parameters (Main Menu > Configuration > System Configuration > Uplink Redundancy).


10. Set Date and Time (Main Menu > Configuration > System Configuration > Date/Time).

11. Update Ethernet Port parameters according to the LAN configuration (Main Menu > Configuration > System Configuration > Control Port > Ethernet Port).

12. For the Serial Port, configure Mode, Parameters, and Dial Out Capability (Main Menu > Configuration > System Configuration > Control Port > Serial Port).

13. Configure the Management DCC parameters to create a management band between the NE and FE unit (Main Menu > Configuration > Physical Port Configuration > Uplink Configuration > Management DCC). The management
band serves to TELNET/web browser/MIB browser/RADview management sessions with the FE Optimux-1551.

14. On the NE unit, choose the appropriate timing mode: Internal, or External (requires optional Station Clock card) (Main Menu > Configuration > System Configuration > Master Clock).

15. Configure Management parameters (Main Menu > Configuration > System Configuration > Management) to prepare the NE unit for TELNET/web browser/MIB browser/RADview management sessions with the FE unit.

16. Repeat steps 1 to 14 for the FE Optimux-1551 unit, assigning it:
   - A far-end IP address
   - An LBT clock source.

5.2 Configuring a E1/DS1 Fan-Out for SONET/SDH Network Application

Figure 5-1 illustrates a E1/DS1 Fan-Out connection to a/an SONET/SDH network for an Optimux-1551 unit.

![Diagram of E1/DS1 Fan-Out for SONET/SDH Network](image)

Figure 5-2. E1/DS1 Fan-Out for SONET/SDH Networks

To configure the Optimux-1551 system parameters:

1. Configure an ASCII terminal to:
   - 115.2 kbps*
   - one start bit*
   - eight data bits*
   - no parity
   - one stop bit
   - no flow control
   - VT100 emulation.

* Rate, start bit, and data bit values do not have to have the values stated here: Optimux-1551 automatically detects the user-assigned values and configures itself to work with them.
2. Connect a terminal application to the Control port of the NE Optimux-1551 unit.

   The unit automatically configures itself to communicate with the terminal application and displays a password prompt.

3. Enter the password.

4. Select the Link Type: SONET or SDH (Main Menu > Configuration > Physical Port Configuration > Uplink Configuration > Link Type).

5. Perform SOH Configuration, HVC Configuration, and LVC Configuration (SDH only) according to selected Link Type (Main Menu > Configuration > Physical Port Configuration > Uplink Configuration).

6. Configure the Channel Type: E1 or DS1 (Main Menu > Configuration > Physical Port Configuration > Channel Configuration > Line Type).

   **Note**
   
   *The Channel Type value applies for all the channels.*

7. Set channel Priority, Activity, and Length (Length parameter is not required for E1). This can be done for each channel individually or as a group (Main Menu > Configuration > Physical Port Configuration > Channel Configuration > Multiple Port Configuration).

8. Configure Uplink Redundancy parameters (Main Menu > Configuration > System Configuration > Uplink Redundancy).


10. Set Date and Time (Main Menu > Configuration > System Configuration > Date/Time).

11. Update Ethernet Port parameters according to the LAN configuration (Main Menu > Configuration > System Configuration > Control Port > Ethernet Port).

12. For the Serial Port, configure Mode, Parameters, and Dial Out Capability (Main Menu > Configuration > System Configuration > Control Port > Serial Port).

13. Select LBT timing mode (Main Menu > Configuration > System Configuration > Master Clock).

   **Note**
   
   *LBT is the default timing mode.*

14. Configure Management parameters (Main Menu > Configuration > System Configuration > Management) to prepare the unit for TELNET/web browser/MIB browser/RADview management sessions.
Chapter 6
Troubleshooting and Diagnostics

This chapter provides information on monitoring:
- Monitoring Performance
- Detecting Errors
- Handling Alarms
- Troubleshooting
- Testing the Optimux-1551
- Frequently Asked Questions
- Technical Support.

6.1 Monitoring Performance

Physical Port Statistics

Note

Only complete intervals are displayed in the statistic tables.

Statistics collection is according to:
- RFC 3592 for the SONET/SDH uplink
- RFC 3895 for the E1/DS1 channels.

➢ To monitor the physical port statistics:
1. From the Main menu, select Monitoring.
2. From the Monitoring menu, select Physical Port Monitoring.
3. From the Physical Port Monitoring menu, choose Physical Port Statistics.

The Physical Port Statistics menu appears:
**Clearing Statistics**

Interval statistics (which are logged for up to the past 24 hours) can be cleared for just tributaries (see Figure 6-12, Tributary Statistics Menu), just channels (see Figure 6-16, Channel Statistics Menu) or for all the ports.

To clear interval statistics for all ports:

- From the Physical Port Statistics menu, choose Clear All Statistics and confirm by entering Y.

  This will clear all the statistics buffers.

**Uplink Statistics**

Detailed SOH performance statistics are available for the current 15 minute interval or for all 15-minute intervals for the last 24 hour period.

To display the current uplink port SOH statistics:

1. From the Physical Port Statistics menu, choose Uplink Statistics.

   The Uplink Statistics menu appears:
2. From the Uplink Statistics menu, choose Link Statistics.

The Link Statistics menu appears:

```
Optimux-1551
...>Physical Port Monitoring>Physical Port Statistics>Uplink Statistics>Link Statistics

1. Current Statistics>
2. Interval Statistics>

> Please select item <1 to 2>
ESC-prev. menu; !-main menu; &-exit
```

Figure 6-3. Link Statistics Menu

3. From the Link Statistics menu, choose Current Statistics.

The Current Statistics menu appears:

```
Optimux-1551
...>Uplink Statistics>Link Statistics>Current Statistics

1. SOH Statistics>
2. HVC Statistics>

> Please select item <1 to 2>
ESC-prev. menu; !-main menu; &-exit
```

Figure 6-4. Current Statistics Menu


The (current) SOH Statistics screen is displayed:
5. Refer to Table 6-1 for a complete description of the details in the SOH screen.

Table 6-1. SOH Statistics

<table>
<thead>
<tr>
<th>Display</th>
<th>Description</th>
<th>Range [15 min]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Elapsed</td>
<td>Seconds elapsed in current interval.</td>
<td>0 – 899</td>
</tr>
<tr>
<td>LOS Link A</td>
<td>Number of seconds that Loss of Signal errors occurred on uplink A during the current interval.</td>
<td>0 – 900</td>
</tr>
<tr>
<td>LOS Link B</td>
<td>Number of seconds that Loss of Signal errors occurred on uplink B during the current interval.</td>
<td>0 – 900</td>
</tr>
<tr>
<td>Section CV</td>
<td>Number of Coding Violations (B1) that occurred during the current interval.</td>
<td></td>
</tr>
<tr>
<td>Section ES</td>
<td>Number of Errored Seconds that occurred during the current interval.</td>
<td>0 – 900</td>
</tr>
<tr>
<td></td>
<td>A Section Errored Second is a second that contains one or more B1 BIP-8 errors or during which at least one or more incoming defects at that layer (LOS, LOF) has occurred.</td>
<td></td>
</tr>
<tr>
<td>Section SES</td>
<td>Number of Severely Errored Seconds that occurred during the current interval.</td>
<td>0 – 900</td>
</tr>
<tr>
<td></td>
<td>A Section Severely Errored Second is a second that contains more than 16 B1 BIP-8 errors or during which at least one or more incoming defects at that layer (LOS, LOF) has occurred.</td>
<td></td>
</tr>
<tr>
<td>Display</td>
<td>Description</td>
<td>Range [15 min]</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Section SEFS</td>
<td>Number of Severely Errored Frame Seconds that occurred during the current interval. This counter is incremented by one for each second containing LOF defect.</td>
<td>0 – 900</td>
</tr>
<tr>
<td>Section Status</td>
<td>No detect, LOS, LOF</td>
<td></td>
</tr>
<tr>
<td>Line CV</td>
<td>Number of Line Coding Violations (B2) that occurred during the current interval. Line CV is not counted during line UAS.</td>
<td></td>
</tr>
<tr>
<td>Line ES</td>
<td>Number of Line Errored Seconds that occurred during the current interval. A Line Errored second is a second that contains one or more B2 BIP-8 errors or during which at least one or more incoming defects at that layer (Line AIS) has occurred. Line ES is not counted during Line UAS.</td>
<td>0 - 900</td>
</tr>
<tr>
<td>Line SES</td>
<td>Number of Line Severely Errored Seconds that occurred during the current interval. A Line Severely Errored second is a second that contains more than 32 B2 BIP-8 errors or during which at least one or more incoming defects at that layer (Line AIS) has occurred. Line SES is not counted during Line UAS.</td>
<td>0 – 900</td>
</tr>
<tr>
<td>Line UAS</td>
<td>Number of Line Unavailable Seconds that occurred during the current interval. The line becomes unavailable if 10 contiguous Line SES appear. The 10 Line SES are included in the Line UAS time. The line becomes available after 10 contiguous seconds without Line SES. The 10 seconds without Line SES are excluded from the Line UAS.</td>
<td>0 - 900</td>
</tr>
<tr>
<td>Far End Line ES</td>
<td>Number of Errored Seconds that occurred during the current interval. A Far End Line Errored second is a second that contains one or more Line REI or during which at least one or more incoming defects at that layer (Line RD) has occurred. Far End Line ES is not counted during Far End Line UAS.</td>
<td>0 – 900</td>
</tr>
<tr>
<td>Line Status</td>
<td>No detect, AIS, RDI</td>
<td></td>
</tr>
<tr>
<td>Far End Line SES</td>
<td>Number of Far End Line Severely Errored Seconds that occurred during the current interval. A Far End Line Severely Errored second is a second that contains more than 32 Line REI errors or during which at least one or more incoming defects at that layer (Line RDI) has occurred. Far End Line SES is not counted during Far End Line UAS.</td>
<td>0 – 900</td>
</tr>
</tbody>
</table>
Table 6-1. SOH Statistics (Cont.)

<table>
<thead>
<tr>
<th>Display</th>
<th>Description</th>
<th>Range [15 min]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Far End Line UAS</td>
<td>Number of Far End Line Unavailable Seconds that occurred during the current interval. The far end line becomes unavailable if 10 contiguous Far End Line SES appear. The 10 Far End Line SES are included in the Far End Line UAS time. The far end line becomes available if 10 contiguous seconds are with no Far End Line SES. The 10 seconds with no Far End Line SES are excluded from the Far End Line UAS.</td>
<td>0 - 900</td>
</tr>
</tbody>
</table>

To display the current HVC statistics:

1. From the Current Statistics menu, choose HVC Statistics.
   
   The (current) HVC Statistics screen appears. For a SONET uplink the menu is as follows:

<table>
<thead>
<tr>
<th>Optimux-1551</th>
</tr>
</thead>
<tbody>
<tr>
<td>...&gt;Uplink Statistics&gt;Link Statistics&gt;Current Statistics&gt;HVC Statistics</td>
</tr>
<tr>
<td>Time Elapsed     (31) Path CV                        ... (960)</td>
</tr>
<tr>
<td>Path ES          ... (0) Far End Path ES            ... (0)</td>
</tr>
<tr>
<td>Path SES         ... (0) Far End Path SES           ... (0)</td>
</tr>
<tr>
<td>Path UAS         ... (14) Far End Path UAS          ... (15)</td>
</tr>
<tr>
<td>Path Status       &gt; (No Defect)</td>
</tr>
</tbody>
</table>

   1. Current Path       > (HVC 1)                      |

   Please select item <1 to 1>

   ESC-prev. menu; !-main menu; &-exit

Figure 6-6. HVC Statistics Menu for a SONET Uplink
For an SDH uplink the menu is as follows:

<table>
<thead>
<tr>
<th>Optimux-1551</th>
</tr>
</thead>
<tbody>
<tr>
<td>...&gt;Uplink Statistics&gt;Link Statistics&gt;Current Statistics&gt;HVC Statistics</td>
</tr>
<tr>
<td>Time Elapsed   (0)  Path CV               . (0)</td>
</tr>
<tr>
<td>Path ES        ... (0)  Far End Path ES . (0)</td>
</tr>
<tr>
<td>Path SES       ... (0)  Far End Path SES .. (0)</td>
</tr>
<tr>
<td>Path UAS       ... (0)  Far End Path UAS .. (0)</td>
</tr>
<tr>
<td>Path Status    &gt; (No Defect)</td>
</tr>
</tbody>
</table>

> Please select item <1 to 1>  
ESC-prev. menu; !-main menu; &-exit

Figure 6-7. HVC Statistics Screen for an SDH Uplink

2. SONET only: Choose Current Path from the HVC Statistics menu:
   - HVC 1
   - HVC 2
   - HVC 3.

Note
See lists of E1/DS1 path mapping in Multiplexing and Mapping.

3. Refer to Table 6-2 for details on the HVC Statistic Parameters.
### Table 6-2. HVC Statistic Parameters

<table>
<thead>
<tr>
<th>Display</th>
<th>Description</th>
<th>Range [15 min]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Elapsed</td>
<td>Seconds elapsed in current interval.</td>
<td>0 – 899</td>
</tr>
<tr>
<td>Path CV</td>
<td>Number of Path Coding Violations (B3) that occurred during the current interval.</td>
<td></td>
</tr>
<tr>
<td>Path ES</td>
<td>Number of Path Errored Seconds that occurred during the current interval.</td>
<td>0 - 900</td>
</tr>
<tr>
<td></td>
<td>A Path Errored second is a second that contains one or more B3 BIP-8 errors or during which at least one or more incoming defects at that layer (Path AIS, LOP) has occurred.</td>
<td></td>
</tr>
<tr>
<td>Path SES</td>
<td>Number of path Severely Errored Seconds that occurred during the current interval. Path Severely Errored second is a second which contains more than 16 B3 BIP-8 errors, or a second during which at least one or more incoming defects at that layer (Path AIS, LOP) has occurred.</td>
<td>0 - 900</td>
</tr>
<tr>
<td>Path UAS</td>
<td>Number of path Unavailable Seconds that occurred during the current interval. The path becomes unavailable if 10 contiguous Path SES appears. The 10 Path SES are included in the Path UAS time. The path becomes available if 10 contiguous seconds are with no Path SES. The 10 seconds with no Path SES are excluded from the Path UAS.</td>
<td>0 - 900</td>
</tr>
<tr>
<td>Path Status</td>
<td>No defect, LOP, AIS, RDI, Unequipped, Signal Label Mismatch</td>
<td></td>
</tr>
<tr>
<td>Far End Path ES</td>
<td>Number of far end path Errored Seconds occurred during the current interval. Far End Path Errored second is a second, which contains one or more Path REI, or a second during which at least one or more incoming defects at that layer (Path RDI) has occurred. Far End Path ES is not counted during Far End Path UAS.</td>
<td>0 - 900</td>
</tr>
<tr>
<td>Far End Path SES</td>
<td>Number of far end path Severely Errored Seconds that occurred during the current interval. Far End Path Severely Errored second is a second, which contains more than 16 Path REI errors, or a second during which at least one or more incoming defects at that layer (Path RDI) has occurred. Far End Path SES is not counted during Far End Path UAS.</td>
<td>0 - 900</td>
</tr>
<tr>
<td>Far End Path UAS</td>
<td>Number of far end path Unavailable Seconds that occurred during the current interval. The far end path becomes unavailable if 10 contiguous Far End Path SES appears. The 10 Far End Path SES are included in the Far End Path UAS time. The far end path becomes available if 10 contiguous seconds are with no Far End Path SES. The 10 seconds with no Far End Path SES are excluded from the Far End Path UAS.</td>
<td>0 - 900</td>
</tr>
</tbody>
</table>
To display SOH statistics of up to the last 24 hours:

1. From the Link Statistics menu, choose **Interval Statistics**.

   The Interval Statistics menu appears:

   ![Interval Statistics Menu](image)

2. From the Interval Statistics menu, choose **SOH Interval Statistics**.

   The SOH Interval Statistics screen appears (the menu does not fit in a single screen):

   ![SOH Internal Statistics Screen](image)

3. Use the menu navigation keys described in *Chapter 4*.

4. Refer to *Table 6-1* for details on SOH statistics.

To display the HVC statistics of up to the last 24 hours:

1. From the Interval Statistics menu, choose **HVC Interval Statistics**.
The HVC Interval Statistics menu appears. For a SONET uplink the menu is as follows:

![HVC Interval Statistics Menu for a SONET Uplink](image)

For an SDH uplink the menu is as follows:

![HVC Interval Statistics Menu for an SDH Uplink](image)

**Note**

See lists of E1/DS1 path mapping in Chapter 1.

2. Use the menu navigation keys described in Chapter 4.

3. Refer to Table 6-2 for details on HVC statistics parameters.
To display current tributary statistics:

1. From the Physical Port Statistics menu, select Uplink Statistics.

   The Uplink Statistics menu appears.

2. From the Uplink Statistics menu, select Tributary Statistics.

   The Tributary Statistics menu appears.

   ![Figure 6-12. Tributary Statistics Menu]

3. From the Tributary Statistics menu, choose Current Statistics.

   The Current Statistics menu appears:

   ![Figure 6-13. Current Statistics Menu]

4. Select a port by choosing Current Port and typing the port number.

5. Refer to Table 6-3 for the description of the LVC statistics parameters.
<table>
<thead>
<tr>
<th>Display</th>
<th>Description</th>
<th>Range [15 min]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Elapsed</td>
<td>Seconds elapsed in current interval.</td>
<td>0 – 899</td>
</tr>
<tr>
<td>VT CV</td>
<td>Number of Path Coding Violation (V5) seconds that occurred during the current interval.</td>
<td></td>
</tr>
<tr>
<td>VT ES</td>
<td>Number of VT Errored Seconds that occurred during the current interval.</td>
<td>0 - 900</td>
</tr>
<tr>
<td>VT SES</td>
<td>Number of VT Severely Errored Seconds that occurred during the current interval. A VT Severely Errored Second is a second that contains more than six B3 errors or a second in which one or more incoming defects at that layer (VT AIS, LOP) has occurred.</td>
<td>0 - 900</td>
</tr>
<tr>
<td>VT UAS</td>
<td>Number of VT Unavailable Seconds that occurred during the current interval. The VT becomes unavailable if 10 contiguous VT SES appear. The 10 VT SES are included in the VT UAS time. The VT becomes available if 10 contiguous seconds pass with no VT SES. The 10 seconds with no VT SES are excluded from the VT UAS.</td>
<td>0 – 900</td>
</tr>
<tr>
<td>VT Status</td>
<td>No defect, LOP, AIS, RDI, RFI (only in SDH), Unequipped, Signal label mismatch.</td>
<td></td>
</tr>
<tr>
<td>Far End VT ES</td>
<td>Number of Far End VT Errored Seconds that occurred during the current interval. A Far End VT Errored Second is a second that contains one or more VT REI or a second in which one or more incoming defects at that layer (VT RDI) has occurred. Far End VT ES are not counted during Far End VT UAS.</td>
<td>0 – 900</td>
</tr>
<tr>
<td>Far End VT SES</td>
<td>Number of Far End VT Severely Errored Seconds that occurred during the current interval. A Far End VT Severely Errored Second is a second that contains more than six VT REI errors or a second in which at least one or more incoming defects at that layer (VT RDI) has occurred. Far End VT SES are not counted during Far End VT UAS.</td>
<td>0 – 900</td>
</tr>
</tbody>
</table>
Table 6-3. LVC Statistic Parameters (Cont.)

<table>
<thead>
<tr>
<th>Display</th>
<th>Description</th>
<th>Range [15 min]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Far End VT UAS</td>
<td>Number of Far End VT Unavailable Seconds that occurred during the current interval. The Far End VT becomes unavailable if 10 contiguous Far End VT SES occur. The 10 Far End VT SES are included in the Far End VT UAS time. The Far End VT becomes available if 10 contiguous seconds pass with no Far End VT SES. The 10 seconds with no Far End VT SES are excluded from the Far End VT UAS.</td>
<td>0 – 900</td>
</tr>
</tbody>
</table>

To display the tributary statistics for up to the past 24 hours:

1. From the Tributary Statistics menu, choose Interval Tributary Statistics.

   The Interval Statistics menu appears:

   ![Figure 6-14. Interval Statistics Screen](image)

   1. Change cell [1 – 63] … (1)

To clear the tributary statistics:

1. From the Tributary Statistics menu, choose Clear Tributary Statistics.

   The Clear Interval Statistics menu appears:

   ![LVC Interval Statistics Table](image)

   2. Use the menu navigation keys described in Chapter 4.

   3. Select a port by choosing Change Cell and entering the port number.
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---

**Optimux-1551**

...>Uplink Statistics>Tributary Statistics>Clear Tributary Statistics

1. Enter First Port [1 – 63]   … (1)
2. Enter Last Port [1 – 63]    … (1)
3. Clear Statistics

>
Please select item <1 to 3>
ESC-prev. menu; !-main menu; &-exit

*Figure 6-15. Clear Tributary Statistics Menu*

**Note**

The range of ports depends on the card used:
- For the OP 63E1: 63 ports (shown)
- For the OP-6384: 84 ports
- For the OP-2128: 28 ports
- For the OP-4256: 56 ports.

2. Enter a range by specifying the **First Port** and the **Last Port**.
3. Select **Clear Statistics** to clear the tributary statistics and confirm by entering Y.

**Channel Statistics**

➢ To display the current channel statistics:
1. From the Physical Port Statistics menu, choose **Channel Statistics**.

   The Channel Statistics menu appears:

   ---

   **Optimux-1551**

   ...>Physical Port Monitoring>Physical Port Statistics>Channel Statistics

   1. Current Statistics >
   2. Interval Statistics [] >
   3. Total Interval Statistics >
   4. Clear Statistics >

   >
   Please select item <1 to 4>
   ESC-prev. menu; !-main menu; &-exit

   *Figure 6-16. Channel Statistics Menu*

2. From the Channel Statistics menu, choose **Current Statistics**.
The Current Statistics screen appears:

```
Optimux-1551

...>Physical Port Statistics>Channel Statistics>Current Statistics

Time Elapsed (120)
SES (0)
UAS (0)
BPV ... (0)

1. Current Port [1 - 63] ... (1)

> Please select item <1 to 1>
ESC-prev. menu; !-main menu; &-exit
```

Figure 6-17. Current Statistics Screen

3. Select a port by choosing **Change Cell** and entering the port number.

4. Refer to **Table 6-4** for details on the E1/DS1 channel statistics.

### Table 6-4. E1/DS1 Channel Statistics

<table>
<thead>
<tr>
<th>Display</th>
<th>Description</th>
<th>Range [15 min]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Elapsed</td>
<td>Seconds elapsed in current interval.</td>
<td>0 – 899</td>
</tr>
<tr>
<td>BPV</td>
<td>Number of Bipolar Violations that occurred during the current interval.</td>
<td></td>
</tr>
<tr>
<td>SES</td>
<td>Number of Severely Errored Seconds that occurred during the current interval. A Severely Errored Second is a second containing more than 2048 BPV errors for E1 or 1544 BPV for DS1.</td>
<td>0 - 900</td>
</tr>
<tr>
<td>UAS</td>
<td>Number of Unavailable Seconds that occurred during the current interval. The channel becomes unavailable if 10 contiguous SES occur or at least one or more incoming defects (Channel AIS, Channel LOS) occurred in the past second. The 10 SES are included in the UAS time. The channel becomes available if 10 contiguous seconds are with no SES or if a second goes by without any more incoming defects. The 10 seconds with no SES are excluded from the UAS.</td>
<td>0 – 900</td>
</tr>
</tbody>
</table>

➤ **To display the interval statistics:**

1. From the Channel Statistics menu, choose **Interval Statistics**.

   The Interval Statistics menu appears:
2. Select a port by choosing **Change Cell** and entering the port number.

To display the total interval statistics for a channel:
1. From the Channel Statistics menu, choose **Total Interval Statistics**.

The Total Interval Statistics menu appears:

```
Optimus-1551

...>Physical Port Statistics>Channel Statistics>Total Interval Statistics

<table>
<thead>
<tr>
<th>Port</th>
<th>Interval</th>
<th>SES</th>
<th>UAS</th>
<th>BPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>4</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>0</td>
<td>19</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>7</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>10</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>10</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>10</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>10</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>10</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>0</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

1. Change cell [1 - 63] ... (1)

> LVC Interval Statistics Table
ESC-prev. menu; !-main menu; &-exit
```

---

```
Figure 6-18. Internal Statistics Menu
```

```
2. Select a port by choosing **Change Cell** and entering the port number.

To display the total interval statistics for a channel:
1. From the Channel Statistics menu, choose **Total Interval Statistics**.

The Total Interval Statistics menu appears:

```
Optimus-1551

...>Physical Port Statistics>Channel Statistics>Total Interval Statistics

Number of intervals (1)
Total SES (0)
Total UAS (0)
Total BPV ... (0)

1. Current Port [1 - 63] ... (1)

> Total Interval Statistics Table
ESC-prev. menu; !-main menu; &-exit
```

---

```
Figure 6-19. Total Interval Statistics Menu
```
The range of ports depends on the card used:
- For the OP 63E1: 63 ports (shown)
- For the OP-6384: 84 ports
- For the OP-2128: 28 ports
- For the OP-4256: 56 ports.

2. Select a port by choosing Change Cell and entering the port number.

➢ To clear statistics for one or more channels:
1. From the Physical Statistics menu, choose Clear Statistics.
   The Clear Statistics menu appears:

```
Optimux-1551

...>Physical Port Statistics>Channel Statistics>Clear Statistics

1. Enter First Port ... (1)
2. Enter Last Port ... (1)
3. Clear Statistics

>
Please select item <1 to 3>
ESC-prev. menu; !-main menu; &-exit
```

Figure 6-20. Clear Statistics Menu

The range of ports depends on the card used:
- For the OP 63E1: 63 ports (shown)
- For the OP-6384: 84 ports
- For the OP-2128: 28 ports
- For the OP-4256: 56 ports.

2. Select a group of ports by choosing the First Port in the group and the Last Port in the group.
3. Select Clear Statistics to clear the channel statistics for the selected group and confirm by entering Y.

➢ To clear all physical port statistics:
   From the Physical Port Statistics menu, choose Clear All Statistics and confirm by entering Y.
6.2 Detecting Errors

Power-Up-Self-Test

Optimux-1551 performs hardware self-test upon power-on. The self-test sequence checks the critical circuit functions of Optimux-1551. If Optimux-1551 fails the self-test, the self-test failure alarm is stored in the alarm buffer and the FLT indicator turns red. In the System Status menu you can see what went wrong in the hardware status field.

If two OP-63E1/OP-6384/OP-2128/OP-4256 cards are installed, each card periodically performs a self-test on its components and sends the results to the other card. If the following three conditions hold, the unit will switch to the backup card:

- The self-test on the active card detects a problem
- Redundancy mode is set to automatic
- The self-test on the backup card detects no problem or a less serious problem.

System Log File

Optimux-1551 maintains alarm log files for alarms and events. The file stores up to 200 alarm messages. The log file specifies source, alarm or event name, status (major, minor, or OFF), and time and date when the alarm was initiated. An "OFF" status indicates that the fault condition that caused the alarm is cleared.

- To display the system log file:
  1. From the System Monitoring menu, choose System Log File.

    The System Log File screen appears. For a SONET uplink, the screen is as follows:
### Optimux-1551

#### Monitoring>System Monitoring>System Log File

<table>
<thead>
<tr>
<th>Source</th>
<th>Alarm</th>
<th>Status</th>
<th>Time</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>^ 137</td>
<td>HVC 1 Far End Receive Fail (ROI)</td>
<td>Minor</td>
<td>2:1:13</td>
<td>2002-9-9</td>
</tr>
<tr>
<td>] 138</td>
<td>HVC 1 Unequipped Signal Label</td>
<td>Minor</td>
<td>5:17:11</td>
<td>2002-9-8</td>
</tr>
<tr>
<td>] 139</td>
<td>LVC 1 Unequipped Signal Label</td>
<td>Minor</td>
<td>1:19:13</td>
<td>2002-9-7</td>
</tr>
<tr>
<td>v 140</td>
<td>LVC 1 Unequipped Signal Label</td>
<td>Major</td>
<td>6:19:13</td>
<td>2002-9-6</td>
</tr>
<tr>
<td>141 LVC</td>
<td>Unequipped Signal Label Major</td>
<td>8:19:13</td>
<td>2002-9-5</td>
<td></td>
</tr>
<tr>
<td>142 LVC</td>
<td>Unequipped Signal Label Minor</td>
<td>5:19:13</td>
<td>2002-9-4</td>
<td></td>
</tr>
<tr>
<td>143 LVC</td>
<td>Unequipped Signal Label Major</td>
<td>7:19:13</td>
<td>2002-9-3</td>
<td></td>
</tr>
<tr>
<td>144 LVC</td>
<td>Unequipped Signal Label Major</td>
<td>5:19:13</td>
<td>2002-9-2</td>
<td></td>
</tr>
<tr>
<td>145 LVC</td>
<td>Unequipped Signal Label Major</td>
<td>5:19:13</td>
<td>2002-9-1</td>
<td></td>
</tr>
</tbody>
</table>

> ESC-prev. menu; !-main menu; &-exit; ^D-down; ^G-start

**Figure 6-21. System Log File Screen for a SONET Uplink**

For an SDH uplink, the menu is as follows:

### Optimux-1551

#### Monitoring>System Monitoring>System Log File

<table>
<thead>
<tr>
<th>Source</th>
<th>Alarm</th>
<th>Status</th>
<th>Time</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 SOH</td>
<td>Line AIS occurred</td>
<td>OFF</td>
<td>2:1:13</td>
<td>2002-9-9</td>
</tr>
<tr>
<td>2 HVC</td>
<td>Loss Of Pointer</td>
<td>OFF</td>
<td>5:17:11</td>
<td>2002-9-8</td>
</tr>
<tr>
<td>3 HVC</td>
<td>Far End Receive Fail</td>
<td>OFF</td>
<td>5:19:13</td>
<td>2002-9-7</td>
</tr>
<tr>
<td>4 Device</td>
<td>Input Alarm</td>
<td>Minor</td>
<td>9:1:14</td>
<td>2002-9-6</td>
</tr>
<tr>
<td>5 LVC2</td>
<td>Signal Label Mismatch</td>
<td>Major</td>
<td>13:34:14</td>
<td>2002-9-5</td>
</tr>
<tr>
<td>6 LVC60</td>
<td>Unequipped Signal Label</td>
<td>OFF</td>
<td>15:41:12</td>
<td>2002-9-4</td>
</tr>
<tr>
<td>7 CH15</td>
<td>LOS</td>
<td>OFF</td>
<td>16:22:14</td>
<td>2002-10-3</td>
</tr>
<tr>
<td>8 CH45</td>
<td>AIS</td>
<td>Minor</td>
<td>22:3:14</td>
<td>2002-11-1</td>
</tr>
<tr>
<td>9 Event</td>
<td>Buffer Overflow</td>
<td>Minor</td>
<td>23:41:14</td>
<td>2002-12-1</td>
</tr>
</tbody>
</table>

> ESC-prev. menu; !-main menu; &-exit; ^D-down; ^G-start

**Figure 6-22. System Log File Menu for an SDH Uplink**

2. Refer to *Table 6-6* and *Table 6-5* for descriptions of alarms and events respectively.
Table 6-5. System Events

<table>
<thead>
<tr>
<th>Terminal Message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password changed</td>
<td>User changed password</td>
</tr>
<tr>
<td>Software download</td>
<td>The unit is performing software download</td>
</tr>
<tr>
<td>Software download fail</td>
<td>Software download failed</td>
</tr>
<tr>
<td>Log file buffer overflow</td>
<td>Log file is full – next entry will replace the oldest entry</td>
</tr>
<tr>
<td>Primary call fail</td>
<td>Call attempt to the primary dial-out number failed.</td>
</tr>
<tr>
<td>Alternate call fail</td>
<td>Call attempt to the alternate dial-out number failed.</td>
</tr>
<tr>
<td>Dial call fail</td>
<td>Current cycle of call attempts, both to primary and alternate number failed.</td>
</tr>
<tr>
<td>Uplink changed</td>
<td>Change in the actual uplink because of redundancy between the two uplinks.</td>
</tr>
<tr>
<td>Main card changed</td>
<td>Change in the actual OP-63E1/OP-6384/OP-2128/OP-4256 card because of redundancy between the two uplinks.</td>
</tr>
<tr>
<td>LOS defect</td>
<td>Loss of signal detected on uplink.</td>
</tr>
<tr>
<td>LOF defect</td>
<td>Loss of frame detected on uplink.</td>
</tr>
<tr>
<td>L-AIS defect</td>
<td>Line AIS detected on uplink.</td>
</tr>
<tr>
<td>Far end device event</td>
<td>Received burst of B2 errors due to change in remote device.</td>
</tr>
<tr>
<td>Link type change event</td>
<td>User changed link type (SDH to SONET or vice versa).</td>
</tr>
</tbody>
</table>

➢ To clear the system log file:
  • From the System Monitoring menu, choose Clear Log File. Confirm by pressing Y.
6.3 Handling Alarms

Alarms and Events

Optimux-1551 reports about events and about two types of alarms: major and minor. Events are changes in state, while alarms are caused by fault conditions that can be changed or terminated. The following types of events and alarms are reported: system, SOH, HVC, tributary (LVC), and channel.

Each type of alarm (major and minor) activates a LED and a dry contact alarm relay. Events do not activate LEDs or alarm relays.

Optimux-1551 maintains a log file for up to 200 event and alarm entries. When a fault condition becomes true, an "alarm on" entry is added to both the relevant alarm menu and the log file. The condition also activates the corresponding MAJ (major) or MIN (minor) relay and LED. When the fault condition that caused the alarm is cleared, the alarm is removed from the alarm menu, and an "alarm off" entry is added to the log file. The log file preserves a history of the unit's operation, maintaining both the record of when a fault occurred and when it ceased.

If an alarm is masked, then when the alarm occurs it is not entered in the log file, a trap is not sent, and the alarm relays are not affected. However, the alarm still appears in the active alarm list.

An alarm cutoff (ACO) button is located on the back panel. Once pressed, the dry contact is disengaged and remains so until a new alarm of the same type occurs.

Optimux-1551 also supports external alarm input via the Alarms connector.

The user can configure each alarm's severity (major, minor or none). See Chapter 4.

Note

In the alarm menus, only (currently) active alarms are displayed.

The Optimux-1551 software enables display of system and port information. This section describes only status information of the Optimux-1551 device.

To monitor Optimux-1551 operation:
- From the Main menu, choose Monitoring.
  The Monitoring menu appears:
System Status Monitoring

To monitor at the system level:
- From the Monitoring menu, choose System Monitoring.

The System Monitoring menu appears:

From the System Monitoring menu, it is possible to access status information. If two OP-63E1/OP-6384/OP-2128/OP-4256 cards are installed with redundancy enabled, the status of both cards is displayed.

The content of the submenus can vary depending on whether a second, backup OP-63E1/OP-6384/OP-2128/OP-4256 card is installed and whether communication exists between the two cards.

To display the system status when one OP-63E1/OP-6384/OP-2128/OP-4256 card is installed:

1. From the System Monitoring menu, choose System Status.

The first part of the System Status screen appears:
2. Type **N** to view the rest of the screen and **P** to return to this screen.

When you type **N**, the second part of the System Status screen appears:

```
Optimux-1551
Monitoring>System Monitoring>System Status

... (P)
PSA Status > (OK)
PSB Type > (Not Exist)
MAC Address > (0020d2209e2b)
IP Address on > (172.17.154.64)
Alarm Indication > (Major)
Test Indication > (Off)
HW Status > (NO HARDWARE FAILURE)

> 
ESC-prev. menu; !-main menu; &-exit
```

*Figure 6-26. System Status Screen*

If at least one alarm condition with major severity is currently true, the **Alarm Indication** value is **Major**. If there are no major severity alarms but there is at least one minor severity alarm, the **Alarm Indication** value is **Minor**. Otherwise the value is **None**. Configuring alarm severities is described in **Chapter 4**.

➢ To display system status when two OP-63E1/OP-6384/OP-2128/OP-4256 cards are installed and redundancy is enabled:

1. From the System Monitoring menu, choose **System Status**.
The following System Status menu appears:

```
Optimux-1551
Monitoring>System Monitoring>System Status

1. Active Card System Status  >
2. Standby Card System Status  >

Please select item <1 to 2>
ESC-prev. menu; !-main menu; &-exit
```

*Figure 6-27. System Status Menu*

2. From the System Status menu, choose **Active Card System Status**.

   The first part of the Active Card System Status screen appears:

```
Optimux-1551
Monitoring>System Monitoring>System Status>Active Card System Status

   Clock Source  > (Internal)
   SW Version    (1.00)
   HW Version    (0.0A)
   BOOT Version  (2.00)
   CPLD Version  > (0.1)
   FAN1          > (OK)
   FAN2          > (OK)
   FAN3          > (OK)
   FAN4          > (OK)
   Station Clock > (OK)
   Station Version > (0.0A)
   PSA Type      > (AC)

   (N)

ESC-prev. menu; !-main menu; &-exit
```

*Figure 6-28. Active Card System Status Screen (Part 1)*

3. Type **N** to view the rest of the screen and **P** to return to this menu.

   When you type **N**, the second part of the Active Card System Status screen appears:
Optimum-1551

Monitoring>System Monitoring>System Status>Active Card System Status

... (P)
PSA Status > (OK)
PSB Type > (None)
MAC Address (0020d2209e2b)
IP Address on (172.17.154.64)
Alarm Indication > (Major)
Test Indication > (Off)
HW Status > (NO HARDWARE FAILURE)

> ESC-prev. menu; !-main menu; &-exit

Figure 6-29. Active Card System Status Screen (Part 2)

4. From the System Status screen, choose **Standby Card System Status**.

   The following Standby Card System Status screen appears:

<table>
<thead>
<tr>
<th>Monitoring&gt;System Monitoring&gt;System Status&gt;Standby Card System Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW Version</td>
</tr>
<tr>
<td>HW Version</td>
</tr>
<tr>
<td>CPLD Version</td>
</tr>
<tr>
<td>Station Clock</td>
</tr>
<tr>
<td>HW Status</td>
</tr>
</tbody>
</table>

> ESC-prev. menu; !-main menu; &-exit

Figure 6-30. Standby Card System Status Screen

### System Alarms

The Optimux-1551 management software allows you to change alarm severity and perform alarm masking.

### Displaying System Alarms

The menu structure for displaying system alarms differs depending whether a second OP-63E1/OP-6384/OP-2128/OP-4256 card is installed and redundancy is enabled.
To display system alarms when only one OP-63E1/OP-6384/OP-2128/OP-4256 card is installed:

1. From the Main menu, select **Monitoring**.
2. From the Monitoring menu, select **System Monitoring**.
3. From the System Monitoring menu, choose **System Alarms**.

The following System Alarms menu appears:

<table>
<thead>
<tr>
<th>Alarm Name</th>
<th>Severity</th>
<th>Mask</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Self-test failure</td>
<td>Major</td>
<td>OFF</td>
</tr>
<tr>
<td>2. Signal loss on station clock</td>
<td>Major</td>
<td>ON</td>
</tr>
<tr>
<td>3. Real time clock battery failure</td>
<td>Major</td>
<td>OFF</td>
</tr>
</tbody>
</table>

> ESC-prev. menu; !-main menu; &-exit

*Figure 6-31. System Alarms Menu*

4. Only alarms that are currently activated are displayed. For each alarm, the **Severity** (Major or Minor) and the status of the **Mask** (ON or OFF), is shown.

To display system alarms when two OP-63E1/OP-6384/OP-2128/OP-4256 cards are installed:

1. From the Main menu, select **Monitoring**.
2. From the Monitoring menu, select **System Monitoring**.
3. From the System Monitoring menu, select **System Alarms**.

The following System Alarms menu appears:

1. Active Card System Alarm >
2. Standby Card System Alarms >

> Please select item <1 to 2>
ESC-prev. menu; !-main menu; &-exit

*Figure 6-32. System Alarm Menu (with Two OP-63E1/OP-6384/OP-2128/OP-4256 Cards Installed)*

4. From the System Alarms menu, choose **Active Card System Status**.
The following Active Card System Status menu appears:

<table>
<thead>
<tr>
<th>Alarm Name</th>
<th>Severity</th>
<th>Mask</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Self-test failure</td>
<td>Major</td>
<td>OFF</td>
</tr>
<tr>
<td>2 Signal loss on station clock</td>
<td>Major</td>
<td>ON</td>
</tr>
<tr>
<td>3 Real time clock battery failure</td>
<td>Major</td>
<td>OFF</td>
</tr>
</tbody>
</table>

> ESC-prev. menu; !-main menu; &-exit

*Figure 6-33. Active Card System Alarms Menu*

5. Only alarms that are currently activated are displayed. For each alarm, the **Severity** (Major or Minor) and the status of the **Mask** (ON or OFF), is shown. See **Table 6-6** for alarm descriptions.

6. From the System Alarms menu, choose **Standby Card System Status**.
   The following Standby Card System Status menu appears:

<table>
<thead>
<tr>
<th>Alarm Name</th>
<th>Severity</th>
<th>Mask</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Self-test failure</td>
<td>Major</td>
<td>OFF</td>
</tr>
<tr>
<td>2 Signal loss on station clock</td>
<td>Major</td>
<td>ON</td>
</tr>
<tr>
<td>3 Real time clock battery failure</td>
<td>Major</td>
<td>OFF</td>
</tr>
</tbody>
</table>

> ESC-prev. menu; !-main menu; &-exit

*Figure 6-34. Standby Card System Alarms Menu*

7. Only alarms that are currently activated are displayed. For each alarm, the **Severity** (Major or Minor) and the status of the **Mask** (ON or OFF), is shown. See **Table 6-6** for alarm descriptions.
<table>
<thead>
<tr>
<th>Terminal Message</th>
<th>Description</th>
<th>Default Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-test failure</td>
<td>Failure occurred while testing the device hardware components.</td>
<td>Major</td>
</tr>
<tr>
<td>Uplink redundancy not unavailable</td>
<td>The backup uplink is either not installed or there is a failure detection.</td>
<td>Major</td>
</tr>
<tr>
<td>Signal loss on station clock</td>
<td>Signal loss detected on clock input located on back panel.</td>
<td>Major</td>
</tr>
<tr>
<td>Station clock in holdover state</td>
<td>Station clock in holdover state</td>
<td>Major</td>
</tr>
<tr>
<td>Input alarm</td>
<td>Input alarm on input Alarms connector</td>
<td>Minor</td>
</tr>
<tr>
<td>Power supply A failure</td>
<td>Failure in Power supply A</td>
<td>Major</td>
</tr>
<tr>
<td>Power supply B failure</td>
<td>Failure in power supply B</td>
<td>Major</td>
</tr>
<tr>
<td>High temperature</td>
<td>The ambient temperature inside the unit's box is too high.</td>
<td>Major</td>
</tr>
<tr>
<td>Fan 1 failure</td>
<td>Failure in fan 1</td>
<td>Major</td>
</tr>
<tr>
<td>Fan 2 failure</td>
<td>Failure in fan 2</td>
<td>Major</td>
</tr>
<tr>
<td>Fan 3 failure</td>
<td>Failure in fan 3</td>
<td>Major</td>
</tr>
<tr>
<td><strong>Note:</strong> This applies only if a fan tray exists.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fan 4 failure</td>
<td>Failure in fan 4</td>
<td>Major</td>
</tr>
<tr>
<td><strong>Note:</strong> This applies only if a fan tray exists.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real time clock battery failure</td>
<td>Failure in real time clock chip battery</td>
<td>Major</td>
</tr>
<tr>
<td>Loss connection between cards</td>
<td>Set to ON upon not receiving any message from the other OP-63E1/OP-6384/OP-2128/OP-4256 card.</td>
<td>Major</td>
</tr>
<tr>
<td>Configuration not identical</td>
<td>The configurations stored in the OP-63E1/OP-6384/OP-2128/OP-4256 cards are not identical.</td>
<td>Major</td>
</tr>
<tr>
<td>SW version not identical</td>
<td>The software version in the OP-63E1/OP-6384/OP-2128/OP-4256 cards are not identical.</td>
<td>Major</td>
</tr>
<tr>
<td>Fan tray does not exist</td>
<td>The fan tray does not exist in a product that supports a fan tray.</td>
<td>Major</td>
</tr>
<tr>
<td>Hardware not identical</td>
<td>The two cards have different hardware components (OP-63E1/OP-6384/OP-2128/OP-4256 card type, station clock card).</td>
<td>Major</td>
</tr>
</tbody>
</table>
Physical Port Status and Alarms

Port Monitoring

➢ To monitor at the port level:

1. From the Monitoring menu, choose Physical Port Monitoring.

   The Physical Port Monitoring menu appears:

   | Optimux-1551 |
   | Monitoring>Physical Port Monitoring |
   | 1. Physical Port Status > |
   | 2. Physical Port Alarms > |
   | 3. Physical Port Statistics > |

   Please select item <1 to 3>
   ESC-prev. menu; !-main menu; &-exit

   Figure 6-35. Physical Port Monitoring Menu

2. From this menu, it is possible to access statistics about physical port operation, including alarms. If two uplinks, or two OP-63E1/OP-6384/OP-2128/OP-4256 cards, are installed, statistics are provided for active uplink/card.

Physical Port Status

➢ To monitor the physical port status:

1. From the Physical Port Monitoring menu, choose Physical Port Status.

   The Physical Port Status menu appears:

   | Optimux-1551 |
   | Monitoring>Physical Port Monitoring>Physical Port Status |
   | 1. Uplink Status > |
   | 2. Channel Status > |

   Please select item <1 to 2>
   ESC-prev. menu; !-main menu; &-exit

   Figure 6-36. Physical Port Status Menu

2. From the Physical Port Status menu, choose Uplink Status.

   The Uplink Status screen appears:
3. From the Physical Port Status menu, choose Channel Status.

   The Channel Status menu appears:

   ![Figure 6-38. Channel Status Menu](image)

4. Select a port in the Current Port field to view the port’s status.

**Physical Port Alarms**

**Uplink Alarms**

To monitor the physical port alarms:

1. From the Main menu, select Monitoring.
2. From the Monitoring menu, select Physical Port Monitoring.
3. From the Physical Port Monitoring menu, choose Physical Port Alarms.

   The Physical Port Alarms menu appears:
If two OP-63E1/OP-6384/OP-2128/OP-4256 cards are installed, the physical port alarms for the active card or for the standby card can be displayed.

Monitor the uplink alarms:
1. From the Physical Port Alarms menu, choose **Uplink Alarms**.
   
   The Uplink Alarms menu appears:

   ![Uplink Alarms Menu](image)

2. From the Uplink Alarms menu, choose **Link Alarms**.
   
   The Link Alarms menu appears:

   ![Link Alarms Menu](image)
To monitor the SOH alarms:

1. From the Link Alarms menu, choose **SOH Alarms**.

   The SOH Alarms menu appears:

   ![SOH Alarms Menu](image)

2. Only alarms that are currently activated are displayed. For each alarm, the **Severity** (Major or Minor) and the status of the **Mask** (ON or OFF), is shown. See **Table 6-7** for alarm descriptions.

**SOH Alarms**

**Table 6-7. SOH Alarms**

<table>
<thead>
<tr>
<th>Terminal Message</th>
<th>Description</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of signal uplink A</td>
<td>Loss of signal defect is detected in uplink A</td>
<td>Major</td>
</tr>
<tr>
<td>Loss of signal uplink B</td>
<td>Loss of signal defect is detected in uplink B</td>
<td>Major</td>
</tr>
<tr>
<td>Loss of frame</td>
<td>Loss of frame defect is detected.</td>
<td>Major</td>
</tr>
<tr>
<td>Out of frame</td>
<td>Out of frame defect is detected.</td>
<td>Minor</td>
</tr>
<tr>
<td>Line AIS occurred</td>
<td>Line AIS defect (“111” pattern in bits 6, 7 &amp; 8 of K2) is detected.</td>
<td>Major</td>
</tr>
<tr>
<td>Far End Receive Fail (RDI)</td>
<td>Line RDI defect (“110” pattern in bits 6, 7 &amp; 8 of K2) is detected.</td>
<td>Minor</td>
</tr>
<tr>
<td>Excessive bit error rate</td>
<td>EED defect (based on B2) is detected.</td>
<td>Major</td>
</tr>
<tr>
<td>Signal Degraded</td>
<td>SD defect (based on B2) is detected.</td>
<td>Minor</td>
</tr>
<tr>
<td>SDH only: Path Trace ID Mismatch</td>
<td>Incoming path trace identifier (J0) is different from the transmitted path trace</td>
<td>Minor</td>
</tr>
<tr>
<td>SDH only: Path trace loss of lock</td>
<td>The alignment of path trace identifier (J0) has not been established.</td>
<td>Major</td>
</tr>
</tbody>
</table>
To monitor the HVC alarms:

1. From the Link Port Alarms menu, choose HVC Alarms.

   The HVC Alarms menu appears. For a SONET uplink the menu is as follows:

   ![HVC Alarm Menu](Figure 6-43. HVC Alarm Menu)

   For an SDH uplink, the screen is as follows:

   ![HVC Alarm Screen](Figure 6-44. HVC Alarm Screen)

   **Note**

   See lists of E1/DS1 path mapping in Chapter 1.

2. Select the HVC path to monitor.

3. Only alarms that are currently activated are displayed. For each alarm, the Severity (Major or Minor) and the status of the Mask (ON or OFF), is shown. Refer to Table 6-8 for alarm descriptions.
### Table 6-8. HVC Alarms

<table>
<thead>
<tr>
<th>Terminal Message</th>
<th>Description</th>
<th>Default Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Path AIS occurred</td>
<td>Path AIS defect (all ones in H1 and H2) is detected.</td>
<td>Major</td>
</tr>
<tr>
<td>Loss of pointer</td>
<td>Loss of pointer defect is detected HVC (POH) layer.</td>
<td>Major</td>
</tr>
<tr>
<td>Far End Receive Fail (RDI)</td>
<td>Path RDI defect (occurrence of “1” in bit 5 of G1) is detected.</td>
<td>Minor</td>
</tr>
<tr>
<td>Excessive bit error rate</td>
<td>EED defect (based on B3) is detected.</td>
<td>Major</td>
</tr>
<tr>
<td>Signal Degraded</td>
<td>SD defect (based on B3) is detected.</td>
<td>Minor</td>
</tr>
<tr>
<td>SDH only: Path Trace ID Mismatch</td>
<td>Incoming path trace identifier (J1) is different from the transmitted path trace</td>
<td>Minor</td>
</tr>
<tr>
<td>SDH only: Path trace loss of lock</td>
<td>The alignment of path trace identifier (J1) has not been established.</td>
<td>Major</td>
</tr>
<tr>
<td>Unequipped signal label</td>
<td>Signal label unequipped defect (C2 byte is zero) is detected.</td>
<td>Minor</td>
</tr>
<tr>
<td>Signal label mismatch</td>
<td>Incoming signal label (C2 byte) is different from the transmitted signal label.</td>
<td>Minor</td>
</tr>
<tr>
<td>SDH only: C2 VC-AIS occurred</td>
<td>C2 VC-AIS defect (C2 byte is all ones) is detected.</td>
<td>Major</td>
</tr>
<tr>
<td>SONET only: C2 PDI occurred</td>
<td>Incoming payload defect indication detected in C2 byte.</td>
<td>Major</td>
</tr>
</tbody>
</table>

**To monitor the tributary alarms:**

1. From the Uplink Port Alarms menu, choose **Tributary Alarms**.

   The Tributary Alarms menu appears:

**Note**

*Only alarms that are currently active are displayed.*
Optimux-1551

...>Active Physical Port Alarms>Uplink Alarms>Tributary Alarm

<table>
<thead>
<tr>
<th>Port</th>
<th>Alarm Name</th>
<th>Severity</th>
<th>Mask</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Loss Of Pointer</td>
<td>Minor</td>
<td>OFF</td>
</tr>
</tbody>
</table>

1. Change cell [1 – 63] ... (1)

> Please select item <1 to 1>
ESC-prev. menu; !-main menu; &-exit; ?-help

Figure 6-45. Tributary Alarm Menu

Note
The range of ports depends on the card used:
- For the OP 63E1 card: 63 ports (shown)
- For the OP-6384 card: 63 ports when set to E1 and 84 ports when set to T1
- For the OP-4256 card: 42 ports when set to E1 and 56 ports when set to T1
- For the OP-2128: 21 ports when set to E1 and 28 ports when set to T1.

2. Select a channel in the Change Cell field.
3. Only alarms that are currently activated are displayed. For each alarm, the Severity (Major or Minor) and the status of the Mask (ON or OFF), is shown. Refer to Table 6-9 for alarm descriptions.

LVC Alarms

<table>
<thead>
<tr>
<th>Terminal Message</th>
<th>Description</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of pointer</td>
<td>Loss of pointer defect is detected in LVC (VT) layer.</td>
<td>Major</td>
</tr>
<tr>
<td>VT AIS occurred</td>
<td>Path AIS defect (occurrence of all ones in V1 and V2) is detected.</td>
<td>Major</td>
</tr>
<tr>
<td>Far End Receive Fail (RDI)</td>
<td>Path RDI defect (occurrence of “1” in bit 8 of V5) is detected.</td>
<td>Minor</td>
</tr>
<tr>
<td>Excessive bit error rate</td>
<td>EED defect (based on V5) is detected.</td>
<td>Major</td>
</tr>
<tr>
<td>Signal Degraded</td>
<td>SD defect (based on V5) is detected.</td>
<td>Minor</td>
</tr>
<tr>
<td>SDH only: Lower order Path Trace ID Mismatch</td>
<td>Incoming path trace identifier (J2) is different from the transmitted path trace</td>
<td>Minor</td>
</tr>
<tr>
<td>Unequipped signal label</td>
<td>Signal label unequipped defect (occurrence of “000” in bit 5,6 &amp; 7 of V5) is detected.</td>
<td>Minor</td>
</tr>
</tbody>
</table>
### Terminal Message Description Severity

<table>
<thead>
<tr>
<th>Terminal Message</th>
<th>Description</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal label mismatch</td>
<td>Incoming signal label (bits 5, 6 &amp; 7 of V5) is different from the transmitted signal label.</td>
<td>Minor</td>
</tr>
<tr>
<td>SDH only: V5 VC-AIS</td>
<td>V5 VC-AIS defect (occurrence of “111” in bit 5, 6 &amp; 7 of V5) is detected.</td>
<td>Major</td>
</tr>
</tbody>
</table>

### Channel Alarms

To monitor the channel alarms:

1. From the Main menu, select Monitoring.
2. From the Monitoring menu, select Physical Port Monitoring.
3. From the Physical Port Monitoring menu, choose Physical Port Alarms.
4. From the Physical Port Alarms menu, choose Channel Alarms.

The Channel Alarms menu appears:

```
Optimux-1551

...>Physical Port Alarms>Active Physical Port Alarms>Alarms

<table>
<thead>
<tr>
<th>Port</th>
<th>Alarm Name</th>
<th>Severity</th>
<th>Mask</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AIS</td>
<td>Minor</td>
<td>OFF</td>
</tr>
</tbody>
</table>

1. Change cell [1 – 63] ... (1)

>                  
Please select item <1 to 1>          
ESC-prev. menu; !-main menu; &-exit; ?-help

Figure 6-46. Channel Alarms Menu
```

5. Select a channel in the Change cell field.
6. Only alarms that are currently active are displayed. For each alarm, the Severity (Major or Minor) and the status of the Mask (ON or OFF), is shown.

**Note**

The range of the ports depends on the card used:

- For the OP-63E1 card: 63 ports (shown)
- For the OP-6384 card: 63 ports when set to E1 and 84 ports when set to T1
- For the OP-4256 card: 42 ports when set to E1 and 56 ports when set to T1
- For the OP-2128 card: 21 ports when set to E1 and 28 ports when set to T1.
6.4 Troubleshooting and Diagnostics

If a problem arises, check the displayed instructions and refer to this section to interpret and solve it.

Identify the trouble symptoms and perform the actions listed under “Corrective Measures” in the order given in Table 6-10, until the problem is solved.

Table 6-10. Troubleshooting Chart

<table>
<thead>
<tr>
<th>Trouble Symptoms</th>
<th>Probable Cause</th>
<th>Corrective Measures</th>
</tr>
</thead>
</table>
| Optimux-1551 is “dead”.           | No Power       | 1. Check that both ends of the power cable are properly connected.  
                                 |                | 2. If Optimux-1551 is powered from DC, check the polarity of the power connections. |
|                                   | Defective Power Supply | Replace Power Supply |
|                                   | Defective Optimux-1551 | Replace Optimux-1551 |
| One of the PWR LEDs is red        | A/B PWR LED     | 1. If the PWR LED in one of the OP-63E1/OP-6384/OP-2128/OP-4256 cards in the front panel is red, replace the card.  
                                 |                | 2. If the PWR LED is red just in the back panel, have the active OP-63E1/OP-6384/OP-2128/OP-4256 card repaired. |
|                                   | Power connection | Check the connection of the power supply |
|                                   | Defective Power Supply | Replace Power Supply |
| The LINK SYNC LOSS LED is ON      | Defective Removable Card | 1. Set the clock source to INT.  
                                 |                | 2. Loop the link connection [SONET/SDH] with a short fiber/coax.  
                                 |                | 3. If the LED is still ON replace the Uplink card.  
                                 |                | 4. If the LED is still ON replace the OP-63E1/OP-6384/OP-2128/OP-4256 card.  
                                 |                | 5. If the LED is still ON, have Optimux-1551 repaired. |
|                                   | External problem | Check the link connections |
### Table 6-10. Troubleshooting Chart (Cont.)

<table>
<thead>
<tr>
<th>Trouble Symptoms</th>
<th>Probable Cause</th>
<th>Corrective Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>The channel SYNC LOSS LED is ON for one or all of the channels</td>
<td>Defective Removable Card</td>
<td>1. Loop the channels connection (E1/DS1) with a short cable (transmit to receive).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. If the LEDs are still ON replace the OP-63E1/OP-6384/OP-2128/OP-4256 card.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. If the LEDs are still ON, have Optimux-1551 repaired.</td>
</tr>
<tr>
<td></td>
<td>External problem</td>
<td>Check the equipment that connected to the problematic channels</td>
</tr>
<tr>
<td>One or more of “Loss of pointer”, “Path AIS”, “Excessive bit error rate”, “Signal degraded” “Path trace loss of lock” (SDH) alarms appear</td>
<td>Defective Optimux-1551</td>
<td>1. Set the clock source to INT.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Loop the link connection with a short fiber/coax.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. If the alarm still exist, have Optimux-1551 repaired.</td>
</tr>
<tr>
<td></td>
<td>External Problem</td>
<td>1. Check cable connection.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Check the remote units.</td>
</tr>
<tr>
<td>&quot;Unequipped signal label&quot; and/or &quot;Signal label mismatch&quot; alarms appear</td>
<td>External Problem</td>
<td>Network mapping problem exists at corresponding level.</td>
</tr>
<tr>
<td>&quot;Path trace mismatch&quot; alarm appears</td>
<td>Configuration problem</td>
<td>Config Optimux-1551: Main Menu &gt; Configuration &gt; Physical Ports Configuration &gt; Uplink Configuration &gt; SOH Configuration/HVC configuration &gt; J0 Tx/Rx path trace enable/J1 Tx/Rx path trace enable</td>
</tr>
<tr>
<td>Standby card extraction causes errors in the data</td>
<td>Configuration problem</td>
<td>Config Optimux-1551: Main Menu &gt; Configuration &gt; System Configuration &gt; Redundancy &gt; Main Card Redundancy &gt; ‘Standby Card State’ to ‘Shutdown’ prior to removing standby card</td>
</tr>
</tbody>
</table>
6.5 Testing Optimux-1551

Both local and remote loopback tests can be run on the channels and on the uplinks.

When performing any kind of diagnostic test, the TST LED lights ON.

Loopback tests can be performed on one or more channels simultaneously. However they cannot be performed on both the uplink and channels simultaneously.

**Channel LLB**

This diagnostic test is used for checking the connections between a specific user tributary channel and the local Optimux-1551. This loop can be run on each channel independently. An AIS signal (All 1s) is transmitted on the relevant channel toward the uplink if it is enabled.

*Note*

*When performing LLB on all channels, the device will transmit MS AIS towards the uplink.*

*Figure 6-47* illustrates the channel LLB loop.

---

**Running an LLB on a Channel**

- To activate an LLB on a channel:
  1. From the Optimux-1551 Main menu, select *Diagnostics*.

*The Diagnostics menu appears:*
2. Select **Channel Test**.

   The Channel Test menu appears:

   ![Figure 6-49. Channel Test Menu](image)

   **Note**

   The range of ports depends on the card used:
   - For the OP 63E1 card: 63 ports (shown)
   - For the OP-6384 card: 84 ports
   - For the OP-2128 card: 28 ports
   - For the OP-4256 card: 56 ports.

3. In the Current Port, select the channel for test.
4. Select **LLB** to activate LLB (toggles to ON state).
5. Select **LLB** again to stop the LLB (toggles to OFF state).

**Channel RLB**

This diagnostic test is used for checking the connections of the far-end user to the Optimux-1551, and the connections between the two Optimux-1551s. This loop can be run on each channel independently. An AIS signal (All 1s) is generated on the relevant channel toward the tributary channel output, if it is enabled.
Running an RLB on a Channel

To activate an RLB on a channel
1. In the Channel Test menu, for the Current Port, select the channel for test.
2. Select RLB to activate RLB (toggles to ON state).
3. Select RLB again to stop the RLB (toggles to OFF state).

Uplink LLB

This loop is performed on the uplink. It loops the uplink transmit signal back toward its receive path. Figure 6-51 illustrates the STS-3/OC-3/STM-1 LLB loop.

**Note**

Uplink local loop back is unavailable if Clock Source is configured to LBT.
Running an LLB on the Uplink

To run an LLB on the uplink:

**Note**
When LBT mode is selected, this loop cannot be performed.

**Caution**
Do not enter 0 for the Test Timeout value if managing an uplink LLB on a far end Optimux-1551 via the local Optimux-1551 over the DCC channel. During the LLB, the DCC channel is down and there is no means for canceling the test.

1. On the Diagnostics menu select Uplink Test.
   The Uplink Test menu appears:

   ![Figure 6-52. Uplink Test Menu](image)

   1. LLB (Off)
   2. RLB (Off)
   3. Test Timeout(min) [0 - 4095] ... (5)

   > Please select item <1 to 3>
   ESC-prev. menu; !-main menu; &-exit

2. Select LLB to activate LLB (toggles to ON state).
3. Select LLB again to stop the LLB (toggles to OFF state).

**Uplink RLB**

This loop is performed on the uplink. It loops back the uplink received signal, which arrived from the far-end unit, and transmits it back toward the far-end Optimux-1551 on uplink A (and uplink B if installed). AIS signal (All 1s) is generated toward the downstream E1 tributary channels if it is enabled.

*Figure 6-53* illustrates the STS-3/OC-3/STM-1 RLB loop.
Running an RLB on the Uplink

To run an RLB on the uplink

1. From the Uplink menu, select RLB to activate RLB (toggles to ON state).
2. Select RLB again to stop the RLB (toggles to OFF state).

6.6 Frequently Asked Questions

**Question:** In Optimux-1551, how can I manage the device when the serial port is configured to dial-out mode?

**Answer:** In Optimux-1551, when setting the serial port to dial-out mode, it is not possible to manage the device from terminal connected to the serial port. In order to manage the device it is recommended to set IP address before setting the dial-out mode, and to manage the device using Telnet over the Ethernet management port.

**Question:** How do I connect my E1s or T1s to a telco connector?

**Answer:** Telco connectors are quite popular in telecom companies. They can be acquired in any electronic store or the cable can be bought from RAD.

There are three options for this type of connection:

- **Telco-Open:** This cable has a Telco connector on one side, and loose wires on the other. You can use these wires and RJ-45 (female) connectors, and you will have a solution for connecting your E1s or T1s to the Optimux-1551. The ordering option for this cable is CBL-TELCO-OPEN/2M.

- **Telco-Telco:** This is a cable that has two Telco connectors (one at each end of the cable). One Telco connector you connect to the Optimux-1551, and the other to an adaptor (a box) from Telco to RJ-45. The adaptor is a box made by RAD, which will perform the conversion from Telco to RJ-45. It has 28 female RJ-45 connectors. You then will only have to connect your E1s or T1s to the RJ-45s in the adaptor. The ordering option for this solution is OP-A/ADAPTOR/28RJ. When ordering the adaptor, you also get the Telco-Telco cable; therefore it is not necessary to enter a separate order for this cable.

- **Telco-RJ45:** This cable has a Telco connector on one side, and 14 RJ-45 male connectors on the other. You can use the RJ-45 male connectors to connect your E1s or T1s to the Optimux-1551. The ordering option for this cable is: CBL-TELCO-RJ45/2M.

**Question:** Can I connect Optimux-1551 to an STM-1?

**Answer:** Yes. Optimux-1551 is fully compatible with the STM-1 standard, both for Coax and Fiber Optic (no matter what type of FO interface). You just have to make sure that the other equipment is fully STM-1 compatible.

**Question:** Where can I find definitions of the cable colors for CBL-Telco-Open?

**Answer:** For a detailed description of each wire, see Appendix A (the section titled I/O Telco Cables) on page A-16.
6.7 Technical Support

Technical support for Optimux-1551 can be obtained from the local distributor from whom it was purchased.

For further information, please contact the RAD distributor nearest you or one of RAD’s offices worldwide.

This information can be found at RAD’s Web site: http://www.rad.com/ (for offices location, click About RAD > Worldwide Offices; for distributors location, click Where to Buy > End Users).
Appendix A

Interface Specification

A.1 E1/DS1 64-Pin Telco Connectors

Two tributary interface cards are assembled in the Optimux-1551.
Each one of the tributary interface cards includes three Telco-64 unshielded connectors.
Both cards are placed on the back panel and are used for connecting the E1/DS1 channels.
In total, six Telco-64 connectors are supported and are marked as I/O 1 through I/O 6.

- I/O 1 connector connects channels 1-14 for both E1 and DS1.
- I/O 2 connector connects channels 15-21 for E1 and 15-28 for DS1.
- I/O 3 connector connects channels 22-35 for E1 and 29-42 for DS1.
- I/O 4 connector connects channels 36-42 for E1 and 43-56 for DS1.
- I/O 5 connector connects channels 43-56 for E1 and 57-70 for DS1.
- I/O 6 connector connects channels 57-63 for E1 and 71-84 for DS1.

Patch panel and cabling accessories are listed in Table A-1. Patch panel connections are provided on page A-8, cabling diagrams are provided on page A-16.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP-A/ADAPTOR/21BNC</td>
<td>Patch panel with 21 BNC Tx and 21 BNC Rx. Supports 21 unbalanced E1 channels.</td>
</tr>
<tr>
<td>OP-A/ADAPTOR/28RJ</td>
<td>Patch panel with 28 RJ-45. Supports 21 balanced E1 channels or 28 balanced DS1 channels.</td>
</tr>
<tr>
<td>CBL-TELCO-TELCO/2M</td>
<td>Telco-Telco cable</td>
</tr>
<tr>
<td>CBL-TELCO-OPEN/2M</td>
<td>Telco open cable</td>
</tr>
<tr>
<td>CBL-TELCO-RJ45/2M</td>
<td>Telco-RJ45 cable</td>
</tr>
</tbody>
</table>

Note

**OP-A/ADAPTOR/28RJ** has 28 channel ports. For balanced DS1 channels, all 28 ports are supported. For balanced E1 channels, only the first 21 ports are supported.
## I/O Connectors

<table>
<thead>
<tr>
<th>Channel</th>
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<th>Pin No.</th>
<th>Pin Name</th>
<th>Pin No.</th>
</tr>
</thead>
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<td>TRING1</td>
<td>33</td>
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<tr>
<td></td>
<td>RTIP1</td>
<td>2</td>
<td>RRING1</td>
<td>34</td>
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<tr>
<td>CH2 E1 &amp; DS1</td>
<td>TTIP2</td>
<td>3</td>
<td>TRING2</td>
<td>35</td>
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<tr>
<td></td>
<td>RTIP2</td>
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<td>RRING2</td>
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<td>TTIP3</td>
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<td>TRING3</td>
<td>37</td>
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<td>CH5 E1 &amp; DS1</td>
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<td>TRING5</td>
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</table>
## Table A-3. I/O 2 Connector

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</thead>
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### Table A-4. I/O 3 Connector

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<th>Pin Name</th>
<th>Pin No.</th>
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I/O Patch Panel Connectors (Option)

The front of the patch panel has 21 BNC ports for unbalanced E1 channels (P/N: OP-A/ADAPTOR/21BNC) or 28 RJ-45 ports (P/N: OP-A/ADAPTOR/28RJ) for 21 balanced E1 or 28 balanced DS1 channels. The pin-out for the RJ-45 ports is provided in Table A-8.

Table A-8. OP-A/ADAPTOR/28RJ: RJ-45-Type Channel Connector Pin-Out

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The back of the patch panel has two Telco-connector I/O ports (I/O 1 and I/O 2). These ports connect the patch panel to I/O ports (I/O 1 to I/O 6) on the Optimux-1551.

A total of three patch panels are required to connect the full number of E1 (63) or DS1 (84) channels supported by the Optimux-1551. The connection order for three patch panel units is given in Table A-9.

Table A-9. Patch Panel Connections

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</table>
The pin-out from a patch channel connector to the corresponding patch I/O connector and on to the corresponding Optimux-1551 I/O connector depends on the patch panel model, the channel type, and the number of patch panel units.

The Telco connector pin-out for the I/O 1 and I/O 2 connectors on the back of the patch panel is the same as that for the I/O 1 (Table A-2) and I/O 2 (Table A-3) connectors on the Optimux-1551, with the following differences between I/O 2 of the patch panel and I/O 2 of the Optimux-1551:

- **OP-A/ADAPTOR/21BNC:** I/O 2 supports seven E1 channels

The connection between the channel connectors on the front of the patch panel and the Optimux-1551’s I/O connectors are given in the group of tables starting with **Table A-8.**

**Example: Determine how to run channel 29 of a balanced DS1 connection:**

Since the connection is balanced DS1, the OP-A/ADAPTOR/28RJ is required. Since each patch panel supports only 28 channels, two units will be required.

From **Table A-8:** the channel should be connected to channel connector 1 of the second patch panel and will interface from the patch panel’s I/O 1 connector to the Optimux-1551’s I/O 3 connector.

From **Table A-2** the patch panel’s I/O 1 connector pins are 1, 2, 33, and 34.

From **Table A-4:** the Optimux-1551’s I/O 3 connector pins are also 1, 2, 33, and 34.

**Note**

*DS1 channels are supported only by OP-A/ADAPTOR/28RJ units (28 balanced channels).*

*E1 channels are supported by both OP-A/ADAPTOR/28RJ units (21 balanced) and by OP-A/ADAPTOR/21BNC units (21 unbalanced).*
<table>
<thead>
<tr>
<th>DS1 Channel</th>
<th>OP-A/ADAPTOR/28RJ Channel Connector</th>
<th>OP-A/ADAPTOR/28RJ I/O Connector</th>
<th>Optimux-1551 I/O Connector</th>
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### Table A-12. DS1 Channel Connections for Third OP-A/ADAPTOR/28RJ Unit

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Table A-13. E1 Channel Connections for First OP-A/ADAPTOR/28RJ or OP-A/ADAPTOR/21BNC Unit

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### Table A-14. E1 Channel Connections for Second OP-A/ADAPTOR/28RJ or OP-A/ADAPTOR/21BNC Unit

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<td>&quot;</td>
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</tr>
<tr>
<td>57</td>
<td>15</td>
<td>I/O 2</td>
<td>I/O 6</td>
</tr>
<tr>
<td>58</td>
<td>16</td>
<td>&quot;</td>
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</tr>
<tr>
<td>59</td>
<td>17</td>
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<td>60</td>
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<td>62</td>
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<tr>
<td>63</td>
<td>21</td>
<td>&quot;</td>
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</tr>
</tbody>
</table>
I/O Telco Cables (Option)

Figure A-1. Telco-Open Cable (P/N: CBL-TELCO-OPEN/2M)
### Figure A-2. Telco-Telco Cable (P/N: CBL-TELCO-TELCO/2M)

<table>
<thead>
<tr>
<th>TELCO 64 PIN</th>
<th>TELCO 64 PIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
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<td>63</td>
<td>63</td>
</tr>
<tr>
<td>64</td>
<td>64</td>
</tr>
</tbody>
</table>

*Note: All pairs are twisted.*
Figure A-3. Telco-RJ45 Cable (P/N: CBL-TELCO-RJ45/2M)
A.2  MNG-ETH Connector

One LAN Ethernet RJ-45 connector is located on the back panel. The pinout is as follows.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ETH_RX_P</td>
<td>Ethernet positive Receive data</td>
</tr>
<tr>
<td>2</td>
<td>ETH_RX_N</td>
<td>Ethernet negative Receive data</td>
</tr>
<tr>
<td>3</td>
<td>ETH_TX_P</td>
<td>Ethernet positive transmit data</td>
</tr>
<tr>
<td>4</td>
<td>Not connected</td>
<td>Option to connect to GND through resistor</td>
</tr>
<tr>
<td>5</td>
<td>Not connected</td>
<td>Option to connect to GND through resistor</td>
</tr>
<tr>
<td>6</td>
<td>ETH_TX_N</td>
<td>Ethernet negative transmit data</td>
</tr>
<tr>
<td>7</td>
<td>Not connected</td>
<td>Option to connect to GND through resistor</td>
</tr>
<tr>
<td>8</td>
<td>Not connected</td>
<td>Option to connect to GND through resistor</td>
</tr>
</tbody>
</table>

A.3  Alarm Connector

The Optimux-1551 activates dry contact alarms. There are two relays: one for major alarms and the other for minor alarms.

Whenever the management software reports a minor or major alarm, the appropriate relay is activated. An external input alarm is also supported to enable the user to force an alarm externally.

To activate the input alarm, provide a minimum voltage of at least 10 VDC and a maximum of 48 VDC to pins 7 (INPUT_ALM_N) and 8 (INPUT_ALM_P).
### Table A-17. Alarms Connector Pin Designations

<table>
<thead>
<tr>
<th>Pin</th>
<th>Pin Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MIN_N_O</td>
<td>Connected to Pin no 6 when MINOR alarm relay is active. (Minor alarm OFF)</td>
</tr>
<tr>
<td>2</td>
<td>MIN_N_C</td>
<td>Connected to Pin no 6 when MINOR alarm relay is not active. (Minor alarm ON)</td>
</tr>
<tr>
<td>4</td>
<td>MAJ_N_O</td>
<td>Connected to Pin no 9 when MAJOR alarm relay is active. (Major alarm OFF)</td>
</tr>
<tr>
<td>5</td>
<td>MAJ_N_C</td>
<td>Connected to Pin no 9 when MAJOR alarm relay is not active. (Major alarm ON)</td>
</tr>
<tr>
<td>6</td>
<td>MIN_COMM</td>
<td>See Pins 1 and 2 for description.</td>
</tr>
<tr>
<td>7</td>
<td>INPUT_ALM_N</td>
<td>Input alarm negative input</td>
</tr>
<tr>
<td>8</td>
<td>INPUT_ALM_P</td>
<td>Input alarm positive input</td>
</tr>
<tr>
<td>9</td>
<td>MAJ_COMM</td>
<td>See Pins 4 and 5 for description.</td>
</tr>
<tr>
<td>3</td>
<td>Not connected</td>
<td>Option connection to GND through resistor</td>
</tr>
</tbody>
</table>

### A.4 Clock Connector

This input supports E1/DS1 external input clock sources for the station clock module. If a backup OP-63E1/OP-84T1 card is used and with it a backup station clock card, both station clock cards receive the incoming E1/DS1 reference clock signal.

### Table A-18. Station Clock Connector Pin Assignment

<table>
<thead>
<tr>
<th>Pin</th>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>STA_R_TIP</td>
<td>Input positive clock reference</td>
</tr>
<tr>
<td>2</td>
<td>STA_R_RING</td>
<td>Input negative clock reference</td>
</tr>
<tr>
<td>3</td>
<td>Not connected</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>STA_T_TIP</td>
<td>Output positive clock reference for cascading (AIS Signal only)</td>
</tr>
<tr>
<td>5</td>
<td>STA_T_RING</td>
<td>Output Negative clock reference for cascading (AIS Signal only)</td>
</tr>
<tr>
<td>6</td>
<td>Not connected</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Not connected</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Not connected</td>
<td></td>
</tr>
</tbody>
</table>
A.5 Control Connector

The terminal connector is used to connect a terminal to the Optimux-1551 with an asynchronous V24 interface connection. The terminal is used to monitor and control the unit. Alternatively, the connection can be connected to dial-up modems to support the call-in/call-out feature.

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Pin Name</th>
<th>Direction</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>TXD</td>
<td>O</td>
<td>TXD data to terminal</td>
</tr>
<tr>
<td>4</td>
<td>DTR</td>
<td>O</td>
<td>DTR data terminal ready</td>
</tr>
<tr>
<td>2</td>
<td>RXD</td>
<td>I</td>
<td>RXD data from terminal</td>
</tr>
<tr>
<td>5</td>
<td>Not connected</td>
<td></td>
<td>Option to connect to GND through resistor</td>
</tr>
<tr>
<td>1</td>
<td>DCD</td>
<td>I</td>
<td>DCD input control from terminal</td>
</tr>
<tr>
<td>7</td>
<td>RTS</td>
<td>O</td>
<td>RTS output command to terminal</td>
</tr>
<tr>
<td>8</td>
<td>CTS</td>
<td>I</td>
<td>CTS input control from terminal</td>
</tr>
<tr>
<td>6</td>
<td>DSR</td>
<td>I</td>
<td>Not used</td>
</tr>
<tr>
<td>9</td>
<td>RI</td>
<td>I</td>
<td>Not used</td>
</tr>
</tbody>
</table>

Crossover Adaptor (DB9F-DB9M)

Note: Crossover adaptor DB9F-DB9M is provided with Optimux-1551.

![Crossover Adaptor DB9F-DB9M Diagram]
A.6 Monitor Connector

The monitor channel enables the user to select one of the tributary inputs for monitoring on external test equipment.

*Table A-20. Pin-out for MONITOR Connector*

<table>
<thead>
<tr>
<th>Pin</th>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not connected</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Not connected</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Not connected</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Monitor_TTIP</td>
<td>Output positive data for monitoring</td>
</tr>
<tr>
<td>5</td>
<td>Monitor_TRING</td>
<td>Output Negative data for monitoring</td>
</tr>
<tr>
<td>6</td>
<td>Not connected</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Not connected</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Not connected</td>
<td></td>
</tr>
</tbody>
</table>
Appendix B

Glossary

AIS – Alarm Indication Signal – Special pattern used to notify connected equipment about a problem in the transmission lines

B8ZS – Zero suppression mechanism used in DS1

BER – Bit error

BPV – Bipolar Violation – A pulse with the same polarity as the previous pulse without being part of the zero suppression

EED – Excessive Error Defect – Number of received errors (BER) exceeds a threshold defined as e-3 e-4 or e-5

ETSI – European Telecommunication Standard Institute

EXZ – Excessive Zeros – A string of zeros longer than what HDB3 or B8ZS allows

FE – Far End

FO – Fiber Optic

HDB3 – Zero suppression mechanism used in E1

HVC – Higher-Order Virtual Container

LCV – Line Code Violation

LIU – Line Interface Unit

LLB – Local Loop Back

LOF – Loss Of Frame

LOS – Loss Of Signal

LVC – Lower-Order Virtual Container

MIB – Management Information Base

MM – Multimode

MS–AIS – AIS alarm received on the Multilex section of the SDH, high level AIS

NE – Near End

OC-3 – (SONET) Optical Carrier (OC) level 3

OP-63E1/OP-6384/OP-2128/OP-4256 Card – Contains many of the Optimux-1551 unit’s primary circuits and accepts an optional station clock daughterboard. The OP-63E1 supports up to 63 E1 channels, the OP-6384 supports up to 63 E1 channels or up to 84 T1 channels, the OP-2128 supports up to 21 E1 channels or up to 28 T1 channels, and the OP-4256 supports up to 42 E1 channels or up to 56 T1 channels

PLL – Phase Lock Loop
RDI – Remote Defect Indication
RLB – Remote Loop Back
SD – Signal Degradation

SDH – Synchronous Digital Hierarchy – standard for telecommunications transport formulated by the International Telecommunication Union (ITU), previously called the International Telegraph and Telephone Consultative Committee (CCITT)

SM – Single-Mode
SOH – Section Overhead

SONET – Synchronous Optical Network – standard for optical telecommunications transport formulated by the Exchange Carriers Standards Association (ECSA) for the American National Standards Institute (ANSI), which sets industry standards in the US for telecommunications and other industries

STM-1 – (SDH) Synchronous Transport Module
STS-3 – (SONET) Synchronous Transport Signal level 3 - for electrical interface

WDM – Wavelength Division Multiplexer
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<td>LLB on the uplink running</td>
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<td>6-39</td>
<td>Loopback tests</td>
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<td>6-35</td>
<td>LVC alarms</td>
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<td>configuration</td>
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<td>6-12</td>
<td>statistics</td>
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</tbody>
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<th>Page</th>
<th>Section</th>
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<tbody>
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<td>1-8</td>
<td>Management access</td>
</tr>
<tr>
<td>4-11</td>
<td>access parameters</td>
</tr>
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<td>4-20</td>
<td>Ethernet port IP</td>
</tr>
<tr>
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