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IRT Eurocard

Type OFS-4020

Optical Fibre Switcher

Designed and manufactured in Australia

IRT can be found on the Internet at:
http://www.irtelectronics.com

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Revision History

Revision	Date	By	Change Description	Applicable to:
0	22/09/2010	AL	Original Issue.	Firmware version OFS4020i3

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Instruction Book

Table of Contents

This instruction book applies to units fitted with firmware version OFS4020i3.

Operational Safety:

WARNING

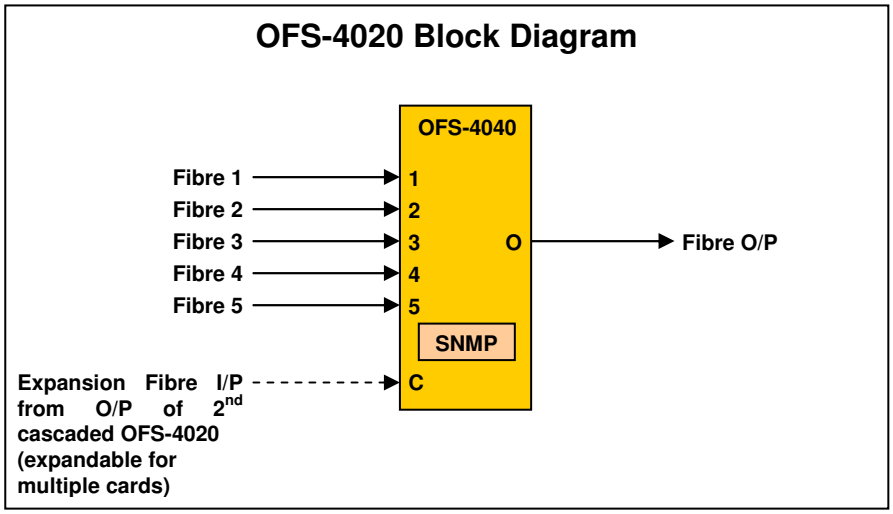
Operation of electronic equipment involves the use of voltages and currents that may be dangerous to human life. Note that under certain conditions dangerous potentials may exist in some circuits when power controls are in the **OFF** position. Maintenance personnel should observe all safety regulations.

Do not make any adjustments inside equipment with power **ON** unless proper precautions are observed. All internal adjustments should only be made by suitably qualified personnel. All operational adjustments are available externally without the need for removing covers or use of extender cards.

IRT Eurocard

Type OFS-4020
Optical Fibre Switcher

General Description



The OFS-4020 optical fibre switcher allows 5 x optical input signals to be switched to a single output.

OFS-4020 cards can be cascaded for expanded operation. Cards can be added sequentially with no user configurations needed.

Rather than having a receiver for each optical path and monitoring or switching the resultant electrical outputs, the OFS-4020 allows a single common optical receiver to monitor multiple optical signals.

When used at the signal transmit end, for example, and used in conjunction with optical splitters, the OFS-4020 ensures that each optical transmitter card is not only transmitting correctly, but is also being fed with the correct signal source.

Likewise, using the OFS-4020 at the receive side allows monitoring of multiple signals coming out of the fibres before being fed into the receive end system.

Local control is provided by front panel pushbutton switches that select and illuminate to indicate the switcher position status.

Simple Network Management Protocol (SNMP) monitoring and control is possible when operated in a frame fitted with SNMP capability.

The OFS-4020 is designed to fit IRT's 1000 series 1RU or 4000 series 3RU Eurocard frames.

Standard features:

- **5 x 1 optical switcher.**
- **May be cascaded for expanded operation.**
- **Wideband operation 1260nm to 1620nm.**
- **Front panel local control.**
- **SNMP monitoring and control.**

Technical Specifications

IRT Eurocard module
Type OFS-4020

Signal inputs:

Number	5 (+ 1 Carry In), expandable.
Type	Fibre, 9/125µm single mode.
Connector type	LC/PC (standard).

Signal outputs:

Number	1.
Type	Fibre, 9/125µm single mode.
Connector type	LC/PC (standard).

Optical Performance:

Operating Wavelength	1260 – 1620nm.
Insertion loss	< 2.0 dB max. (typically 1.3 dB)
Return Loss	> 50 dB.
Polarization Dispersion Loss	< 0.16 dB.
Cross talk	> 50 dB.
Switch time	< 8 ms.

Control inputs/outputs:

Type	Front panel; or SNMP.
Data Bus	1 input & 1 output.

Power Requirements:

Power Requirements	28 Vac CT (14-0-14) or ± 16 Vdc.
Power consumption	< 2VA.

Connectors:

Optical		LC/PC.
Control		Samtec ERF8 edge rate socket strip. (Mates with Samtec ERCD connector).

Other:

Temperature range		0 - 50° C ambient.
Mechanical		Suitable for mounting in IRT 19" rack chassis with input, output and power connections on the rear panel.
Finish:	Front panel	Grey background, silk-screened black lettering & red IRT logo.
	Rear assembly	Detachable silk-screened PCB with direct mount connectors to Eurocard and external signals.
Dimensions		6 HP x 3 U x 220 mm IRT Eurocard.
Supplied accessories		LC/PC to LC/PC 300mm optical patch lead for cascading of cards. ERCD cable for cascading of control bus when cascading cards.

Due to our policy of continuing development, these specifications are subject to change without notice.

Configuration

No configurable settings.

For expanded operation (10x1, 15x1, 20x1, etc.) using multiple OFS-4020 cards, automatic control is assigned to each card when linked together via the control cables interconnecting between each card's rear assembly, as described in the *Installation* section of this manual. First card in the chain assumes the role of 'Master'. Following cards automatically assume roles of 'Slave'.

All SNMP controls are done via the 'Master' card only.

Installation

Pre-installation:

Handling:

This equipment may contain or be connected to static sensitive devices and proper static free handling precautions should be observed.

Where individual circuit cards are stored, they should be placed in antistatic bags. Proper antistatic procedures should be followed when inserting or removing cards from these bags.

Power:

AC mains supply: Ensure that operating voltage of unit and local supply voltage match and that correct rating fuse is installed for local supply.

DC supply: Ensure that the correct polarity is observed and that DC supply voltage is maintained within the operating range specified.

Earthing:

The earth path is dependent on the type of frame selected. In every case particular care should be taken to ensure that the frame is connected to earth for safety reasons. See frame manual for details.

Signal earth: For safety reasons a connection is made between signal earth and chassis earth. No attempt should be made to break this connection.

Installation in frame or chassis:

See details in separate manual for selected frame type.

Connections:

Fibre connections for 5x1 operation:
For 5x1 operation, fibre inputs 1 to 5 are via LC/PC connectors (standard) using single mode fibre optic cable corresponding to the top five input designators '1' to '5' respectively on the rear assembly.

The fibre output connection is via the bottom LC/PC connector (standard) using single mode optic cable marked with the designator 'O'.

The designator marked 'C' is an LC/PC (standard) Carry-In fibre connection for use with a second OFS-4020 card for expanded operation.

The undesignated fibre connector is not used.

Fibre connections for expanded operation:
For expanded operation (10x1, 15x1, 20x1 etc.), fibre inputs and output are as per 5x1 operation description except input designators correspond to inputs 6 to 10, 11 to 15, 16 to 20, etc. on each subsequent OFS-4020 card.

The output (O) of the first OFS-4020, in the chain that corresponds to inputs 1 to 5, is the main output. All switched inputs are outputted here.

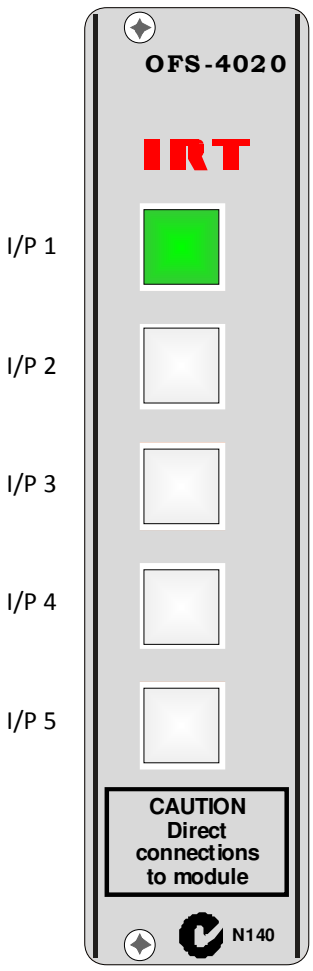
Outputs from each of the other OFS-4020 cards are to connect to the Carry-In (C) connector of the preceding OFS-4020.

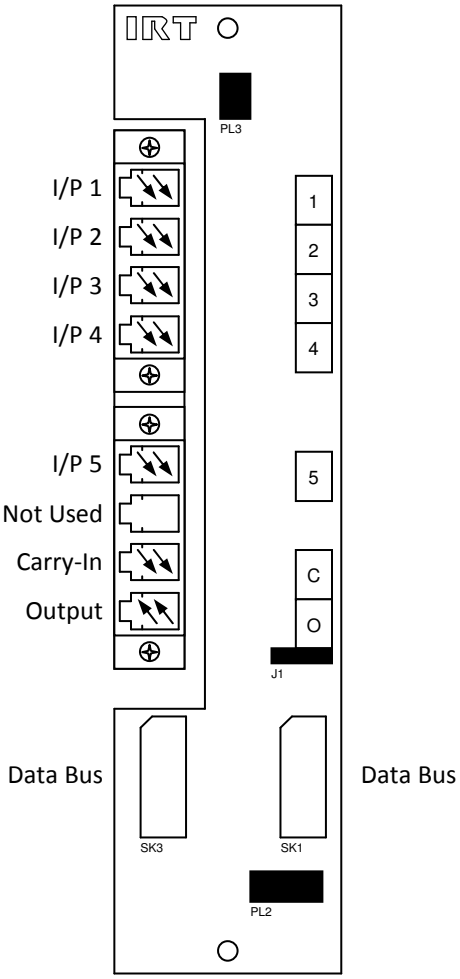
Data bus connection:
For 5x1 operation the ERCD data bus cable is not used.

For expanded operation an ERCD data bus cable connects between the bus connector SK3 on the first OFS-4020 rear assembly (inputs 1 to 5) and the bus connector SK1 of the following OFS-4020 rear assembly (inputs 6 to 10). SK3 of this following OFS-4020 rear assembly (inputs 6 to 10) then connects to SK1 of the next following OFS-4020 rear assembly (inputs 11 to 15), etc.

Front & rear panel connector diagrams

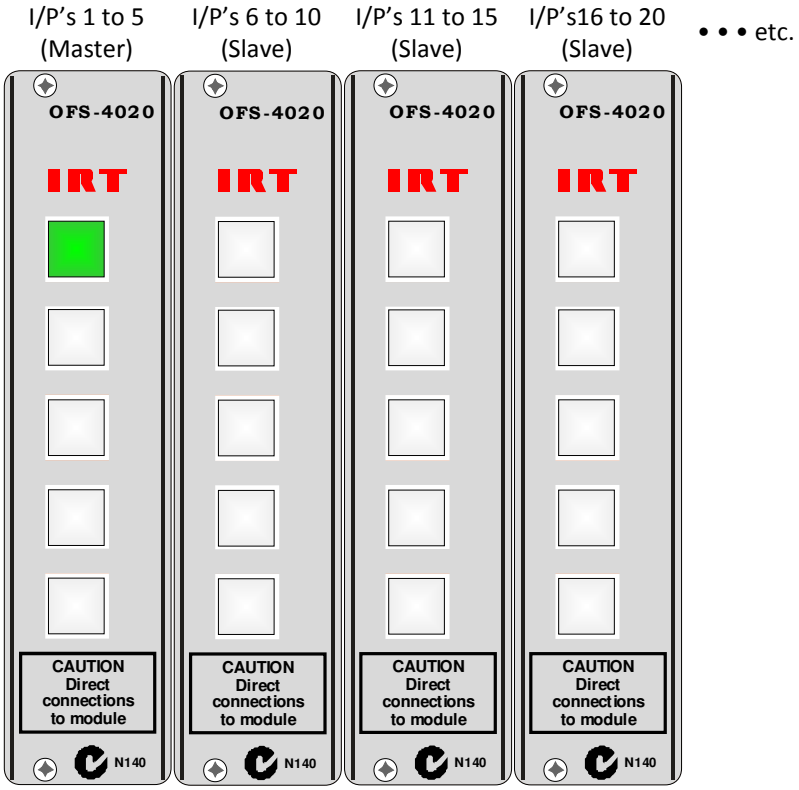
The following front panel and rear assembly drawings are not to scale and are intended to show connection order and approximate layout only.



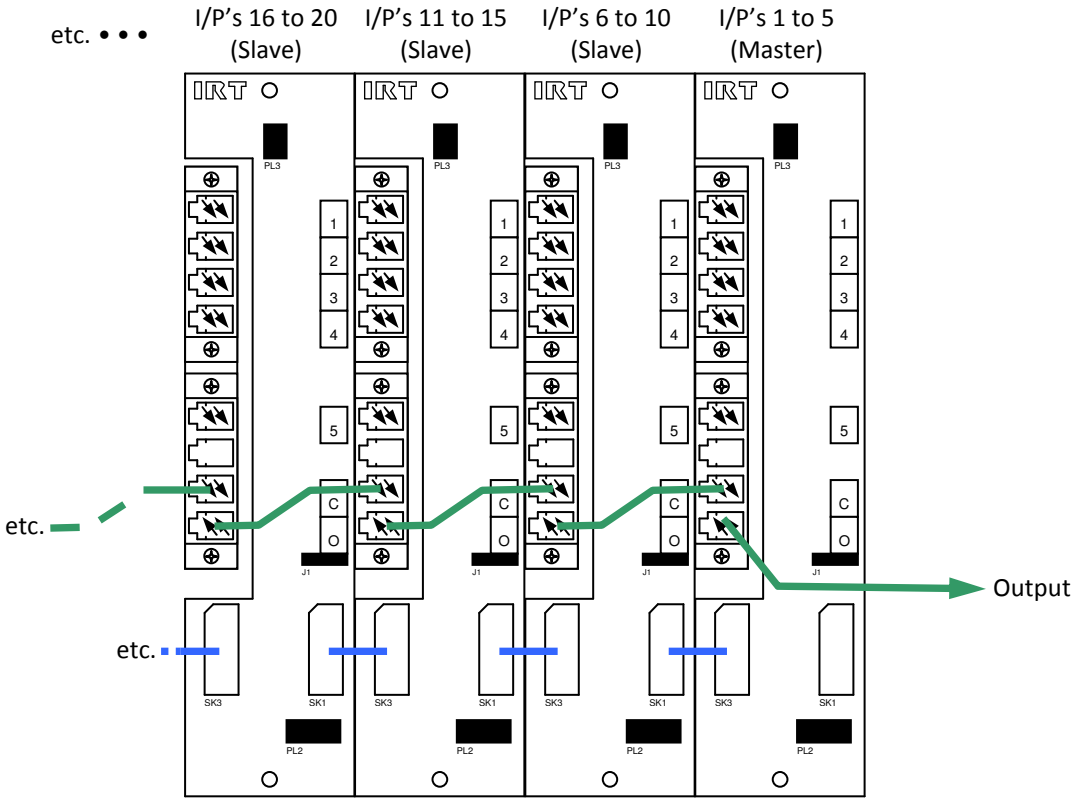


Expansion Connection Diagram

First unit in the chain (inputs 1 to 5) automatically assumes the MASTER role. Following units assume SLAVE roles. This is the same for all expansion modes (10x1, 15x1, 20x1, etc.). Example shown below is a 20x1 configuration.



Front Panel View



Rear Panel View Connections

The main switched fibre output is from the MASTER unit. All outputs (O) from SLAVE units connect to the carry-in (C) of the preceding unit, as shown above.

Data bus connection is between SK3 of the MASTER unit to SK1 of the following SLAVE unit. Subsequent data bus connections are from SK3 of the SLAVE units to SK1 of the immediate following SLAVE units, as shown above.

SNMP

What Is It?

SNMP stands for Simple Network Management Protocol. It is an application layer protocol for managing IP (Internet Protocol) based systems. SNMP enables system administrators to manage system performance, and to find and solve system problems. SNMP runs over UDP (User Datagram Protocol), which in turn runs over IP.

Three types of SNMP exist: SNMP version 1 (SNMPv1), SNMP version 2 (SNMPv2) and SNMP version 3 (SNMPv3). It is not the intention here to discuss the differences between various versions, only to bring attention to the fact that IRT Electronics modules, fitted with SNMP capability, use SNMPv1.

An SNMP managed network consists of three key components: Network Management Systems (*NMS*), *agents*, and *managed devices*.

An *NMS* is the console through which the network administrator performs network management functions, such as monitoring status (e.g. alarm states) and remote controlling, of a set of managed devices. One or more *NMS*s must exist on any managed network. Generally the *NMS* is a computer running third party SNMP control software. There are a number of third party SNMP software applications currently available on the market.

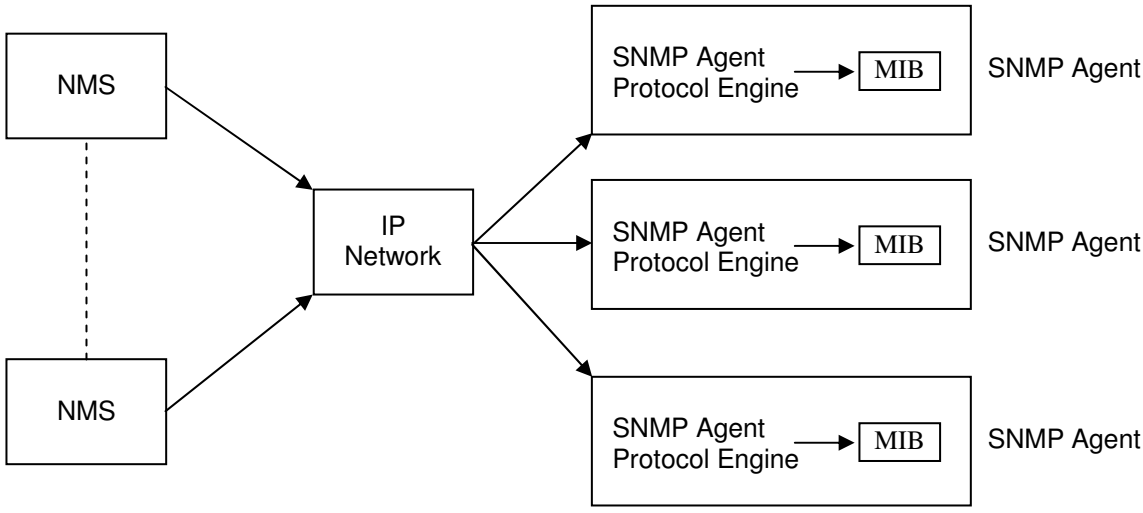
An *NMS* polls, or communicates with, an *agent*. An *agent* is a network management software module that resides in a *managed device*. An *agent* has local knowledge of management information and translates that information into a form compatible with SNMP. The *agent*, therefore, acts as an interface between the *NMS* and the managed devices. The *NMS* sends a request message, and control commands for the managed devices, to the *agent*, which in turn sends a response message, containing information about the *managed devices*, back to the *NMS*.

A *managed device* contains an SNMP *agent* and resides on a managed network. *Managed devices* collect and store management information and make this information available to *NMS*s using SNMP.

Managed device agent variables are organised in a tree structure known as a Management Information Base (*MIB*). Within the *MIB* are parameters pertaining to the *managed device*. An Object Identifier (OID) number within the *MIB* defines the managed device type. This is a unique number specific to the model of *managed device*. Other information relating to the device is also stored, information such as alarm states, controllable settings, etc. The *MIB* tree is organised in such a way that there will be no two *MIB* files with conflicting placements.

Normally an *NMS* polls an *agent* for information relating to the *MIB* in a managed device to be sent back to the *NMS*. When certain conditions are met within the *MIB*, such as major alarm conditions, for example, the *agent* automatically sends what is known as a *trap* to the *NMS* without any prompting from the *NMS*. This allows automatic notification of a predetermined event.

SNMP Block Diagram



SNMP with IRT Products:

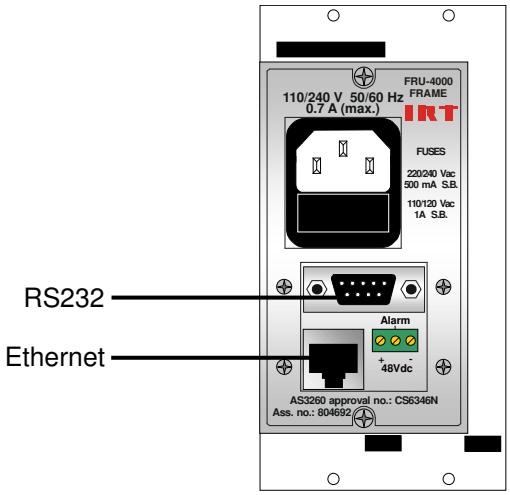
IRT Electronics currently employs SNMPv1 with its SNMP capable frames. The frame acts as an *agent* when fitted with a CDM-xxxx module. This module has its own designated slot next to the power supply so as to not affect the number of modules that the frame will take. Communication between the *NMS*, the frame and its loaded modules are via this CDM-xxxx module. Note that the *NMS* software is third party and not supplied by IRT Electronics.

Ethernet connection for SNMP operation is via an RJ45 connector on the rear of the frame, below the mains inlet. Ethernet rate runs at either 10 baseT or 100 baseT.

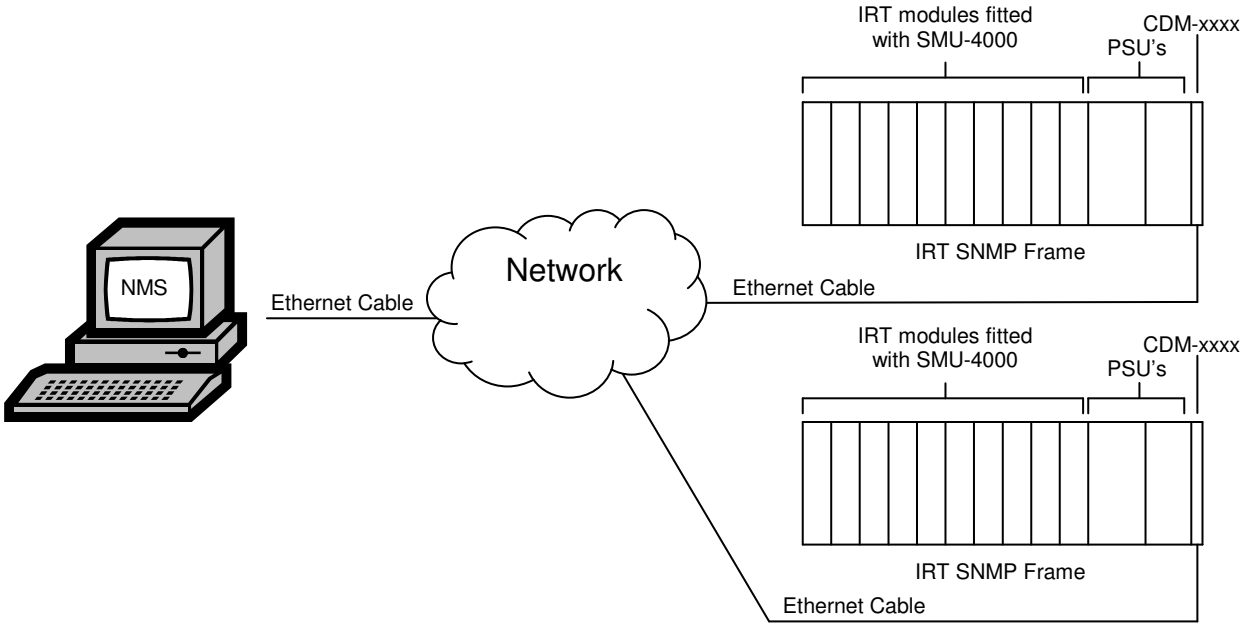
Frame parameters, such as Name, Address and Location, are set via an RS232 interface, a D9 connector on the rear of the frame below the mains inlet. A software terminal emulator, such as Tera Term or HyperTerminal, is used for setting and reading the parameters of the frame.

IRT modules that are SNMP compatible need a plug-in SMU-4000 module with a program relevant to the module that it is plugged into. Depending on the module, besides the module identification, parameters such as alarm states, inputs and controls etc. are communicated to the CDM-xxxx *agent* via a data bus on the rear of the frame. Thus the CDM-xxxx collects information on what is loaded within the frame, what positions they occupy, and their current status for communication to the *NMS* when the *NMS* sends a request for information.

In the event of a major alarm from any of the SNMP compatible modules, or power supplies, a *trap* is automatically sent by the CDM-xxxx *agent* to the *NMS* without any prompting by the *NMS*. This alerts the operator to any fault conditions that may exist that need immediate attention.



IRT SNMP Connections



IRT SNMP Setup

OFS-4020 SNMP Functions:

With the OFS-4020 installed in an IRT 4000 series frame with SNMP capability, the OFS-4020 can be configured and interrogated by an SNMP Network Management System (NMS).

The following SNMP functions are capable of being configured and monitored by an NMS:

irt4020MasterSlave	-	An indication of the unit is a Master or Slave unit [slave (1), master (2)];
irt4020iSwitchTotal	-	An indication of the total number of switches (5 for a single unit, 10 for two units, 15 for three, etc.);
irt4020ActiveSwitch	-	Read and control the position of the active switch;
irt4020FirmwareVersion	-	The firmware version of the main FPGA in the format 'x.y', where x is the major revision number and y the minor;
irt4020SoftwareVersion	-	The software version of the processor in the format 'x.y', where x is the major revision number and y the minor;
irt4020Reset	-	Unit reset control. A set with a value of 2 sent to this OID will cause a system reset to occur. When queried returns a null;
irt4020SwitchChangeTrapEnable	-	Trap automatically sent, if enabled, when the active switch position changes its current state [disabled (1), enabled (2)].

NOTE: The Master is the first card in the chain (input 1 to 5 card). All SNMP controls are done via the Master card only.

Maintenance & Storage

Maintenance:

No regular maintenance is required.

Care however should be taken to ensure that all connectors are kept clean and free from contamination of any kind. This is especially important in fibre optic equipment where cleanliness of optical connections is critical to performance.

Storage:

If the equipment is not to be used for an extended period, it is recommended the whole unit be placed in a sealed plastic bag to prevent dust contamination. In areas of high humidity a suitably sized bag of silica gel should be included to deter corrosion.

Where individual circuit cards are stored, they should be placed in antistatic bags. Proper antistatic procedures should be followed when inserting or removing cards from these bags.

Warranty & Service

Equipment is covered by a limited warranty period of three years from date of first delivery unless contrary conditions apply under a particular contract of supply. For situations when "No **Fault Found"** for repairs, a minimum charge of 1 hour's labour, at IRT's current labour charge rate, will apply, whether the equipment is within the warranty period or not.

Equipment warranty is limited to faults attributable to defects in original design or manufacture. Warranty on components shall be extended by IRT only to the extent obtainable from the component supplier.

Equipment return:

Before arranging service, ensure that the fault is in the unit to be serviced and not in associated equipment. If possible, confirm this by substitution.

Before returning equipment contact should be made with IRT or your local agent to determine whether the equipment can be serviced in the field or should be returned for repair.

The equipment should be properly packed for return observing antistatic procedures.

The following information should accompany the unit to be returned:

1. A fault report should be included indicating the nature of the fault
2. The operating conditions under which the fault initially occurred.
3. Any additional information, which may be of assistance in fault location and remedy.
4. A contact name and telephone and fax numbers.
5. Details of payment method for items not covered by warranty.
6. Full return address.
7. For situations when "No **Fault Found"** for repairs, a minimum charge of 1 hour's labour will apply, whether the equipment is within the warranty period or not. Contact IRT for current hourly rate.

Please note that all freight charges are the responsibility of the customer.

The equipment should be returned **to the agent who originally supplied the equipment** or, where this is not possible, to IRT direct as follows.

Equipment Service
IRT Electronics Pty Ltd
26 Hotham Parade
ARTARMON
N.S.W. 2064
AUSTRALIA

Phone: 61 2 9439 3744 Fax: 61 2 9439 7439
Email: service@irtelectronics.com