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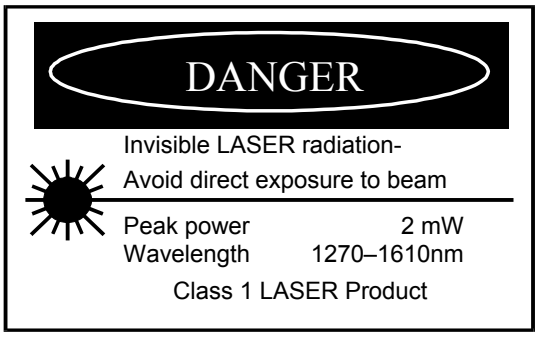
IRT Eurocard

Type DMM-4880 & DMX-4880

4 STM-1 to STM-4 Multiplexer / De-Multiplexer



Designed and manufactured in Australia

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

IRT Eurocard

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Multiplexer / De-Multiplexer

Revision History

Revision	Date	By	Change Description	Applicable to:
0	13/08/2010	AL	Original Issue.	Firmware versions ≥ DMM4880 F3V1 S3V1 & DMX4880 F3V1 S3V1

IRT Eurocard

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4 STM-1 to STM-4
Multiplexer / De-Multiplexer

Instruction Book

Table of Contents

This instruction book applies to firmware versions ≥ DMM4880 F3V1 S3V1 and DMX4880 F3V1 SV1.

Operational Safety:

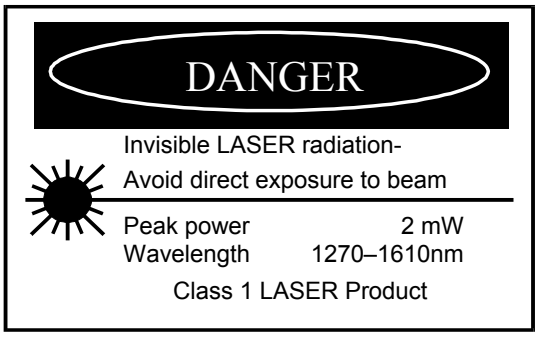
WARNING

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.

Optical Safety

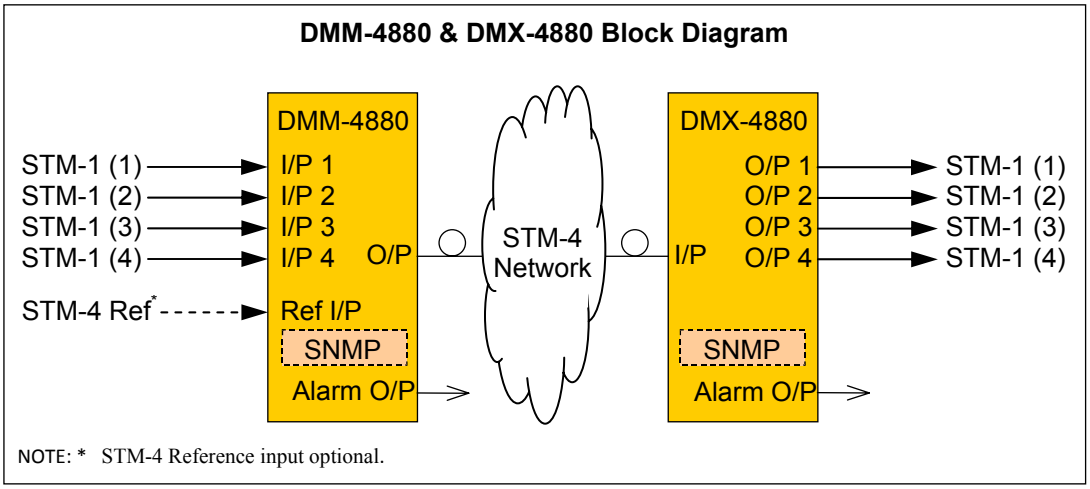
The light emitted from the LASER diode used in this system is invisible and may be harmful to the human eye. Avoid looking directly into the fibre optic cable or connectors or into the collimated beam along their axis when the device is in operation. Operating the LASER diode outside of its maximum ratings may cause device failure or a safety hazard.



IRT Eurocard

Type DMM-4880 & DMX-4880
4 STM-1 to STM-4
Multiplexer / De-Multiplexer

General Description



The DMM-4880 and DMX-4880 are part of a family of network adapters for converting between STM-1 and STM-4 formats.

With the DMM-4880 up to four 155Mb/s STM-1 electrical signals can be multiplexed together and converted into a single 622Mb/s STM-4 optical NRZ signal.

Inputs are automatically equalised for lengths of up to 200m of Belden 8281 or equivalent cable.

Front panel indications on the DMM-4880 multiplexer shows if valid STM-1 signals are present.

Optional STM-4 reference input for synchronizing to STM-4 network, if required.

The DMX-4880 separates the 622Mb/s STM-4 signal back into the original four 155Mb/s STM-1 signals.

Front panel indications on the DMX-4880 de-multiplexer shows if valid encoded STM-1 signals are present.

SNMP (Simple Network Management Protocol) is available for monitoring and control when used in an IRT frame fitted with SNMP capability.

The DMM-4880 and DMX-4880 are designed to fit IRT's standard Eurocard frames and may be used alongside any other of IRT's analogue or digital Eurocards.

Standard features:

- **Up to 4 STM-1 electrical streams on one STM-4 link**
- **Automatic Input equalisation > 200m**
- **Recovers transmitted STM-1 signals with minimal user setup**
- **Monitoring and control via SNMP**
- **Eurocard format**

Technical Specifications

DMM-4880:

Inputs:

Type 1	4 x STM-1 (OC-3), 75Ω, 1Vp-p, BNC connector.
Electrical Characteristics	CMI encoded.
Data Rate	155.52 Mb/s.
Equalisation	Automatic, > 200m at 155Mb/s for Belden 8281 or equivalent cable.
Type 2 (Optional)	1 x optical STM-4 (OC-12), LC/PC (standard) optical connector.
Optical Characteristics	NRZ encoded.
Data Rate	622.08 Mb/s.

Output:

Type	1 x optical STM-4 (OC-12), SC/PC (standard) optical connector[1].
Optical Characteristics	NRZ encoded.
Data Rate	622.08 Mb/s.

Alarm Output:	MAJOR	Not used. Open circuit on loss of power.
	MINOR	Open circuit on no valid input STM-1 streams present, or loss of power.

DMX-4880:

Input:

Type	1 x STM-4 (OC-12), optical, SC/PC optical connector (standard).
Optical Characteristics	NRZ encoded.
Data Rate	622.08 Mb/s.

Outputs:

Type	4 x STM-1 (OC-3) 75Ω, 1Vp-p, BNC connector.
Data Rate	155.52 Mb/s.

Alarm Output:	MAJOR	Open circuit on no valid STM-4 input present, or loss of power.
	MINOR	Open circuit on no valid output STM-1 streams present, or loss of power.

Optical

Optical path loss[2]	3 to 18 dB with PIN detector (typically 20dB),
Optical fibre	Designed for use with 9/125 µm single mode fibre.
Optical wavelength	1310nm (DFB laser - standard).
Optical connectors	SC/PC (standard).
DMM-4880 optical output	0 dBm +3/-0 dB standard DFB laser,
DMX-4880 optical input	PIN detector, -3 to -18 dBm input level

Power Requirements

	28 Vac CT (14-0-14) or ±16 Vdc.
Power consumption	7 VA.

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, 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.

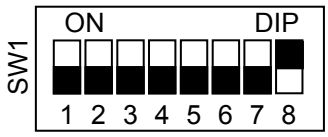
NOTE:	1	If optional STM-4 reference fitted, standard output optical connector is an LC/PC type.
	2	Optical attenuator required for optical paths <3dB optical loss.

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

Configuration

Other than the following DIP switch settings, there are no user configurable settings.

DMM-4880:



SW1-1		Not used.
SW1-2		Not used.
SW1-3		Not used.
SW1-4		Not used.
SW1-5		Not used.
SW1-6		Not used.
SW1-7		Not used.
SW1-8	OFF	Enable major and minor SNMP alarms to the frame Agent (CDM card)[3].
	ON	Disable major and minor SNMP alarms to the frame Agent (CDM card)[3].

NOTE: 3 When using TRAPS via SNMP, depending on how system is set up, in order to avoid double reporting of alarms via the DMM-4880 card and the CDM card (SNMP Agent) of the frame, major and minor SNMP alarms that are reported to the CDM card of the frame can be disabled.

DMX-4880:

SW1-1		Not used.
SW1-2		Not used.
SW1-3		Not used.
SW1-4		Not used.
SW1-5		Not used.
SW1-6		Not used.
SW1-7		Not used.
SW1-8	OFF	Enable major and minor SNMP alarms to the frame Agent (CDM card)[4].
	ON	Disable major and minor SNMP alarms to the frame Agent (CDM card)[4].

NOTE: 4 When using TRAPS via SNMP, depending on how system is set up, in order to avoid double reporting of alarms via the DMX-4880 card and the CDM card (SNMP Agent) of the frame, major and minor SNMP alarms that are reported to the CDM card of the frame can be disabled.

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.

Signal Connections:

DMM-4880:

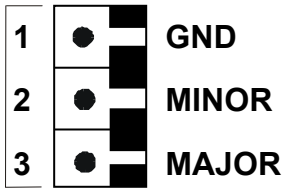
STM-1 Inputs:
STM-1 inputs are by BNC connectors each terminated in 75Ω. Input cable equalisation is automatic for up to 200m of high quality 75Ω coaxial cable (Belden 8281 or equivalent). No adjustments are required.

STM-4 Reference Input:
The STM-4 reference input is an option that is fitted at time of ordering. The connector type is an LC/PC (standard) optical connector that sits next to the STM-4 output, which will be the same connector type. If the STM-4 reference input option is not fitted the STM-4 output connector is an SC/PC (standard) type.

The standard optical detector used is a PIN detector and is rated for an optical input between -3dBm and -18dBm. If the input signal strength is greater than -3dBm an optical attenuator (5 or 10 dB recommended) must be used to avoid overdriving the detector.

STM-4 Output:
One STM-4 NRZ encoded output is provided by an SC/PC (standard) optical connector. Should the optional STM-4 reference input be fitted the connector type will be an LC/PC (standard) type to match that of the STM-4 reference input.

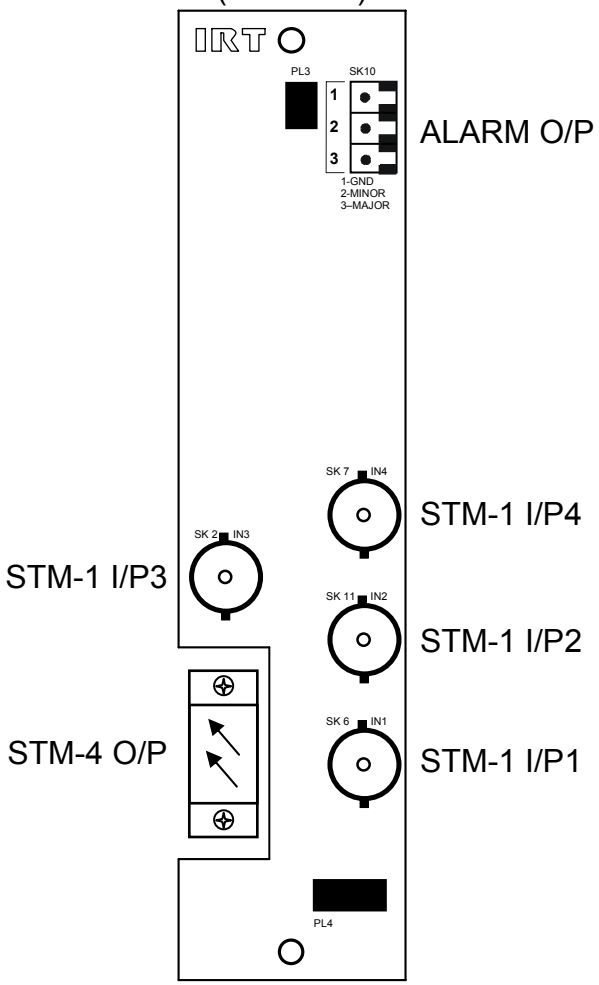
Alarm Outputs:
Two relay alarm output states are provided via a phoenix style 3-pin plug. Pin 3 is designated as Major, pin 2 is designated as Minor, and pin 1 is ground. Both alarms are referenced to ground.



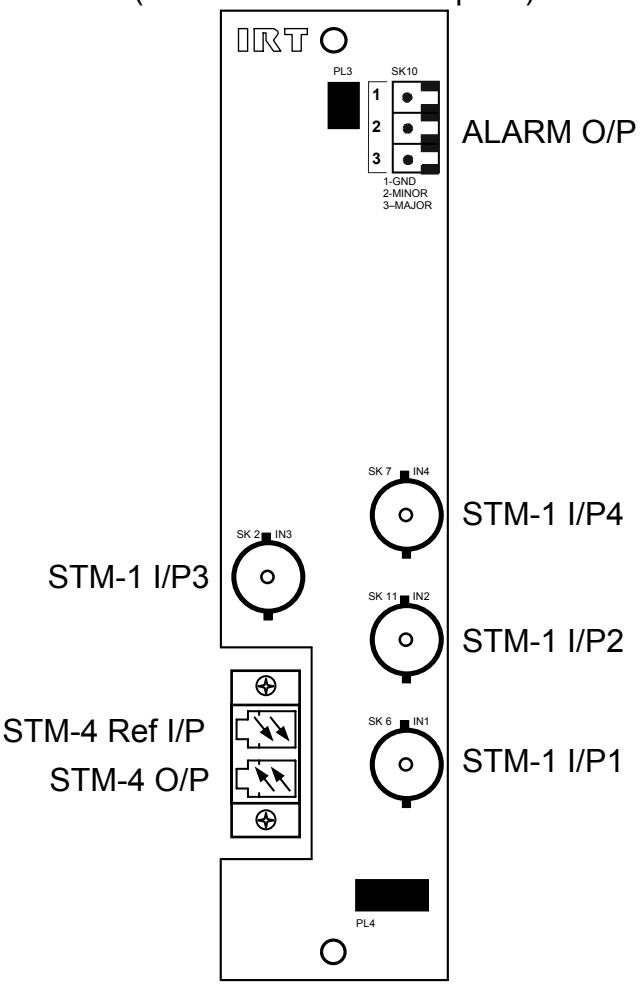
Alarm conditions are as follows:

Major	Not used;
Minor	Switch to Open Circuit on no valid input STM-1 streams present. Both Major and Minor alarms switch to Open Circuit on power failure.

DMM-4880
Rear Assembly Connections
(Standard)



DMM-4880
Rear Assembly Connections
(With STM-4 Ref. I/P option)



DMX-4880:

STM-4 Input:

The optical STM-4 input port on the rear of the unit is an SC/PC (standard) optical connector for use with single mode fibre.

The standard optical detector used is a PIN detector and is rated for an optical input between -3dBm and -18dBm. If the input signal strength is greater than -3dBm an optical attenuator (5 or 10 dB recommended) must be used to avoid overdriving the detector.

STM-1 Outputs:

Four STM-1 electrical outputs are provided as 75Ω output BNC connectors. Each STM-1 output is equivalent to the corresponding STM-1 electrical input on the matching DMM-4880.

Alarm Outputs:

Two relay alarm output states are provided via a phoenix style 3-pin plug. Pin 3 is designated as Major, pin 2 is designated as Minor, and pin 1 is ground. Both alarms are referenced to ground.

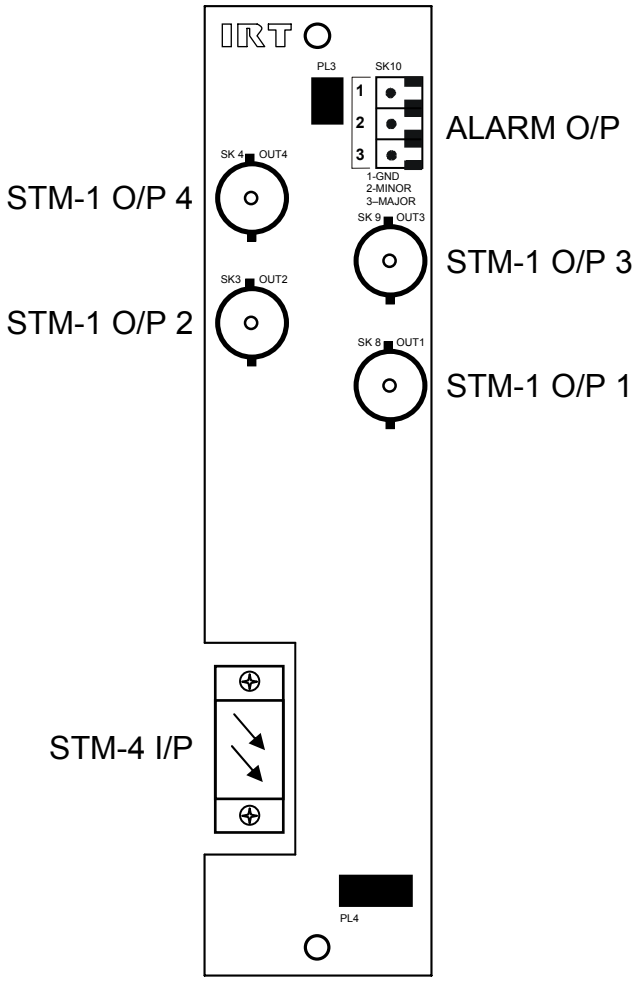
Alarm conditions are as follows:

Major switch to Open Circuit on no valid STM-4 input present;

Minor switch to Open Circuit on no valid output STM-1 streams present, or no valid STM-4 input present.

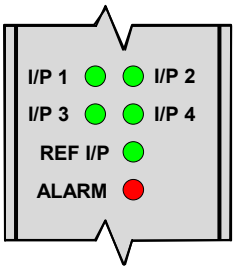
Both Major and Minor alarms switch to Open Circuit on power failure.

DMX-4880
Rear Assembly Connections



Front Panel LEDs:

DMM-4880:

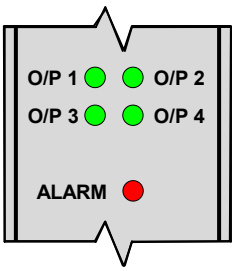


I/P 1, I/P 2, I/P 3 and I/P 4 LEDs correspond to STM-1 inputs 1, 2, 3 and 4 respectively. When a valid STM-1 input is present corresponding LED will illuminate green.

The REF I/P LED illuminates green when there is a valid STM-4 input signal being used as a reference for the STM-4 output signal to synchronize with. Only valid for DMM-4880 fitted with optional STM-4 reference input port.

The ALARM LED does not illuminate as there is no Major Alarm associated with the DMM-4880.

DMX-4880:

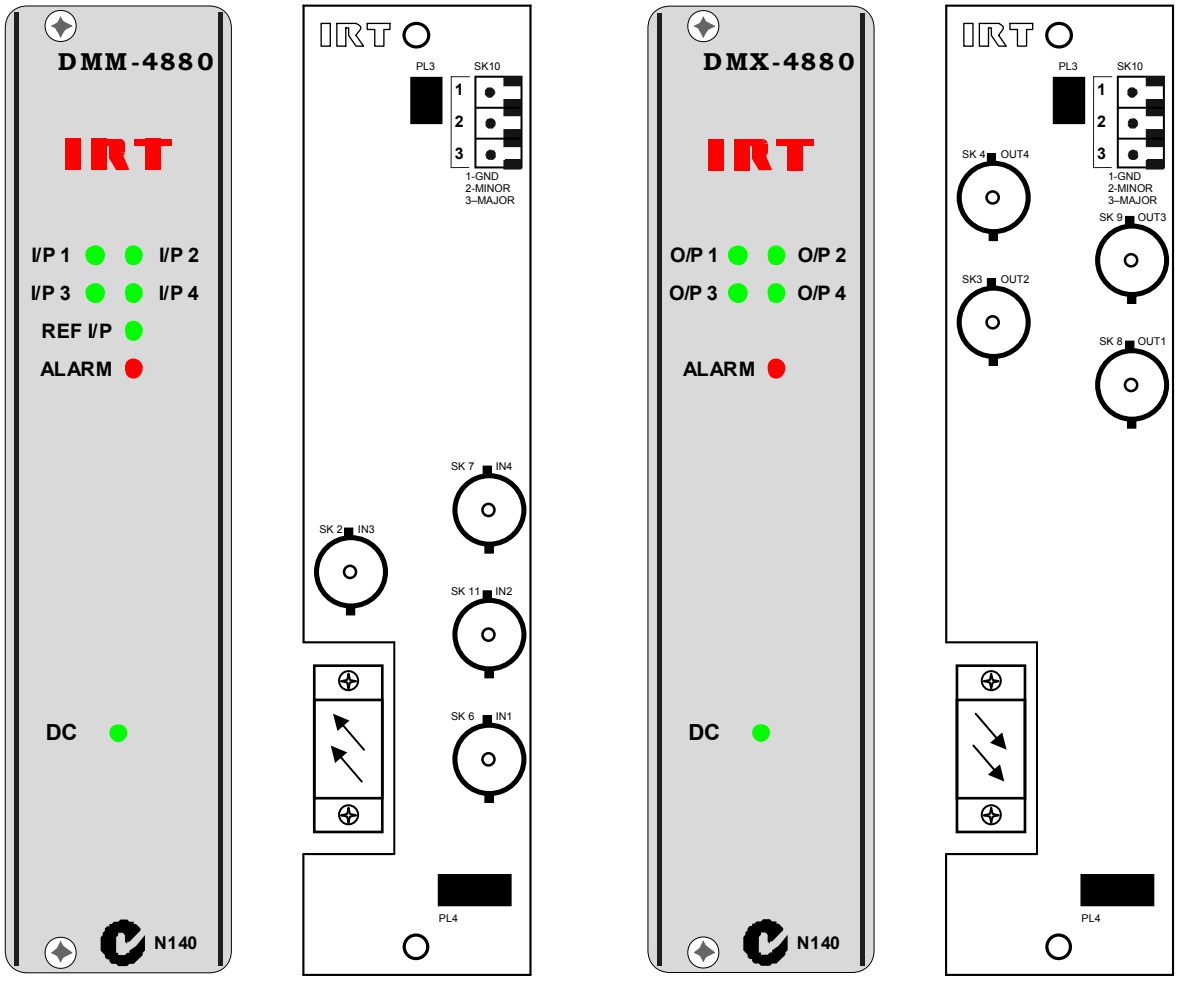


O/P 1, O/P 2, O/P 3 and O/P 4 LEDs correspond to STM-1 outputs 1, 2, 3 and 4 respectively. When a valid STM-1 signal is present within the incoming STM-4 signal corresponding LED will illuminate green.

The ALARM LED illuminates RED when there is no valid STM-4 input present.

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.



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.

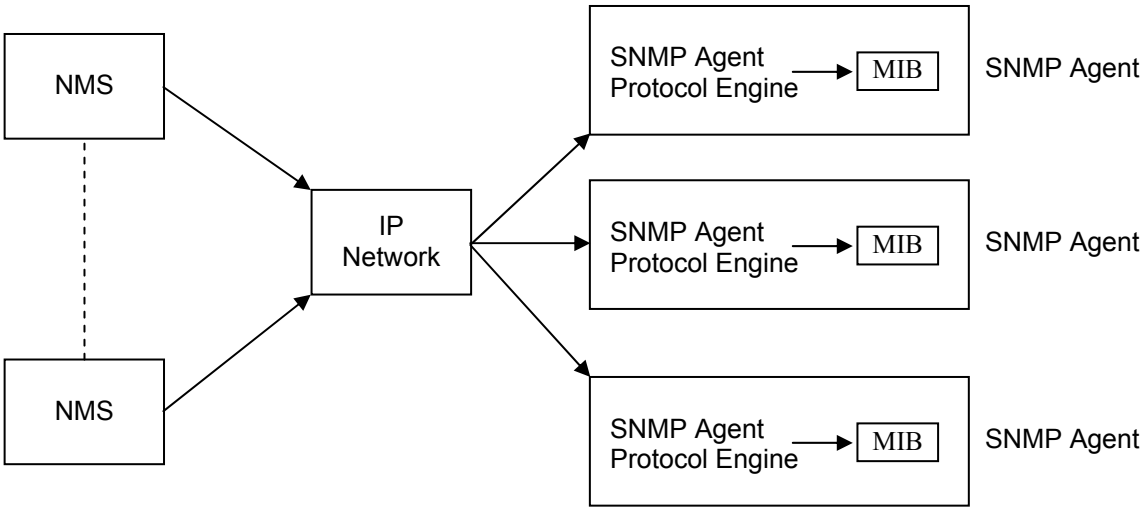
An *NMS* polls, or communicates with, an *agent*. An *agent* is a network management software module that resides in a *managed device*. An *agent* has local knowledge of management information and translates that information into a form compatible with SNMP. The *agent*, therefore, acts as an interface 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:

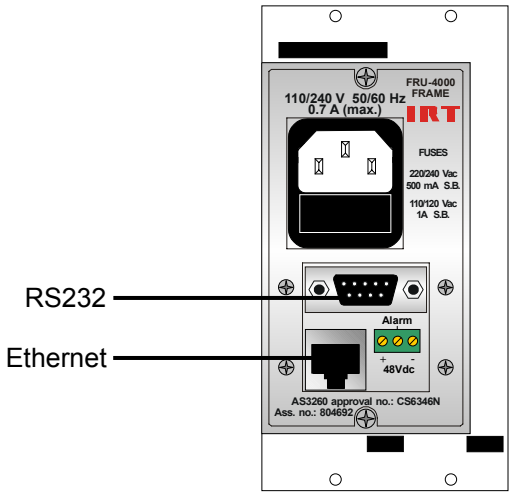
IRT Electronics currently employs SNMPv1 with its SNMP capable frames. The frame acts as an *agent* when fitted with a CDM-xxxx module. This module has its own designated slot next to the power supply so as to not affect the number of modules that the frame will take. Communication between the *NMS*,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

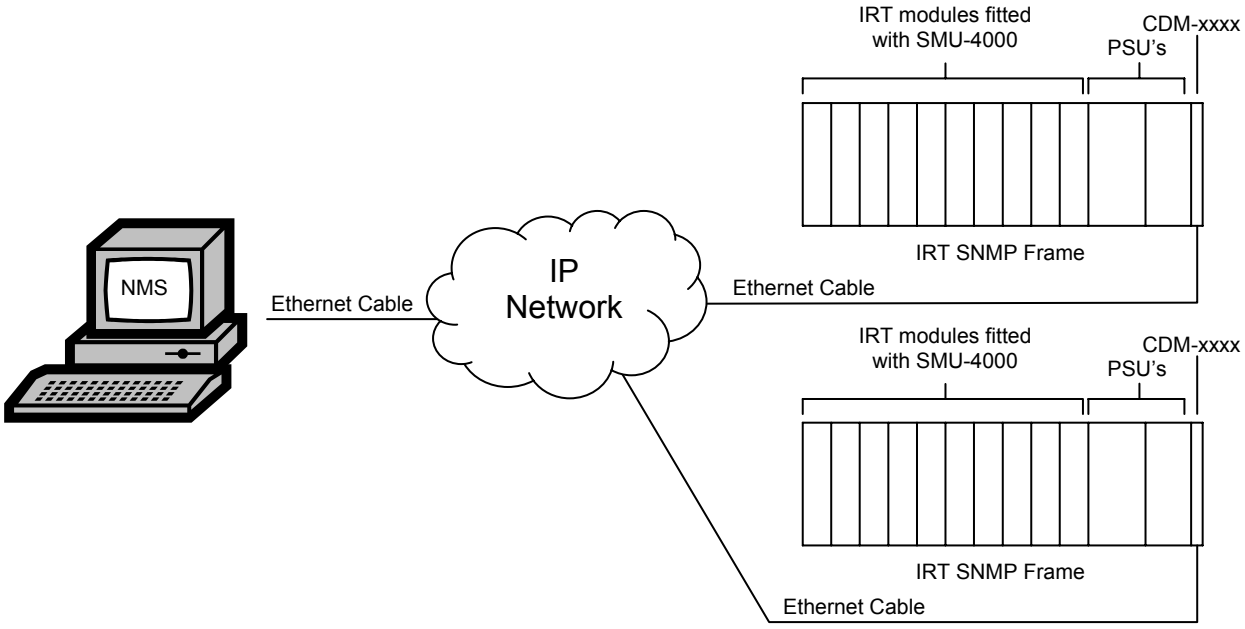
Frame parameters, such as Name, Address and Location, are set via an RS232 interface, a D9 connector on the rear of the frame below the mains inlet. A software terminal emulator, such as Tera Term or HyperTerminal, is used for setting and reading the parameters of the frame.

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

DMM-4880 & DMX-4880 SNMP Functions:

With the DMM-4880/DMX-4880 installed in an IRT frame with SNMP capability, the following SNMP functions are capable of being monitored and controlled by a Network Management System (NMS).

DMM-4880:

An indication of the current state of the Urgent and Non Urgent alarms
[noAlarms (1)],
[UrgentAlarms (2) – Not applicable],
[nonUrgentAlarms (3) – no valid STM-1 input on any channel];
Information about each channel:
Channel number,
An indication that the channel input signal is present[5] [notPresent (1), present (2)],
A 15 byte maximum Alias (name) for the channel can be read and set;
Trap automatically sent, if enabled, upon loss or restoration of an input signal
[notEnabled (1), enabled (2)];
The firmware version of the main FPGA in the format 'x.y', where x is the major rev. no. and y the minor:
The software version of the processor in the format 'x.y', where x is the major rev. no. and y the minor:
Unit reset control - resets system up time counter. A set with a value of 2 sent to this OID will cause a system reset to occur. When queried returns a Null (0).

NOTE: 5 When an STM-1 input is not present on a channel of the DMM-4880 the resultant STM-4 signal contains an AIS (Alarm Indication Signal) in the channel's allocated space. AIS is defined as being all 1's within the stream.

DMX-48800:

An indication of the current state of the Urgent and Non Urgent alarms
[noAlarms (1)],
[UrgentAlarms (2) – no, or invalid, STM-4 input signal present],
[nonUrgentAlarms (3) – no valid STM-1 signals encoded on any channel. All STM-1 signals are AIS];
An indication of the signal status of the STM-4 input {notpresent (1), present (2)];
Information about each channel:
Channel number,
An indication that the channel input signal is present[6] [AIS (1), present (2)],
A 15 byte maximum Alias (name) for the channel can be read and set;
An indication that either all encoded STM-1 signals are AIS, or at least one is an active STM-1
[normal (1) – at least one STM-1 signal is active, allInputAIS (2) – all STM-1 signals are AIS[7]]
Trap automatically sent, if enabled, upon loss or restoration of the STM-4 input signal
[notEnabled (1), enabled (2)];
Trap automatically sent, if enabled, upon detection or not detection of all AIS STM-1 input signals
[notEnabled (1), enabled (2)];
The firmware version of the main FPGA in the format 'x.y', where x is the major rev. no. and y the minor:
The software version of the processor in the format 'x.y', where x is the major rev. no. and y the minor:
Unit reset control - resets system up time counter. A set with a value of 2 sent to this OID will cause a system reset to occur. When queried returns a Null (0).

NOTE: 6 When an STM-1 input is not present on a channel of the DMM-4880 the resultant STM-4 signal contains an AIS (Alarm Indication Signal) in the channel's allocated space. AIS is defined as being all 1's within the stream. The resultant channel's STM-1 output will be an AIS.

7 No STM-1 signals present on all DMM-4880 inputs,

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