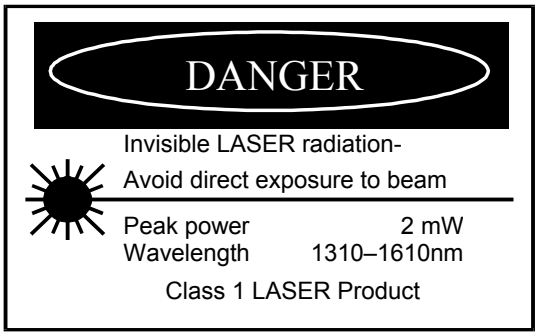
I R T Electronics Pty Ltd A.B.N. 35 000 832 575
26 Hotham Parade, ARTARMON N.S.W. 2064 AUSTRALIA
National: Phone: (02) 9439 3744 Fax: (02) 9439 7439
International: +61 2 9439 3744 +61 2 9439 7439
Email: sales@irtelectronics.com
Web: www.irtelectronics.com

IRT Eurocard

Type DDT-4690 & DDR-4690

ASI / SDI 8 Channel Mux Fibre Link



Designed and manufactured in Australia

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

IRT Eurocard

Type DDT-4690 & DDR-4690

ASI / SDI 8 Channel Mux Fibre Link

Revision History

Revision	Date	By	Change Description	Applicable to:
0	20/10/2011	AL	Original Issue.	Firmware versions ≥ DDT4690F2V1S1V1 & DDR4690F3V1S1V1

IRT Eurocard

Type DDT-4690 & DDR-4690

ASI / SDI 8 Channel Mux Fibre Link

Instruction Book

Table of Contents

This instruction book applies to firmware versions ≥ DDT4690F2V1S1V1 & DDR4690F3V1S1V1.

Operational Safety:

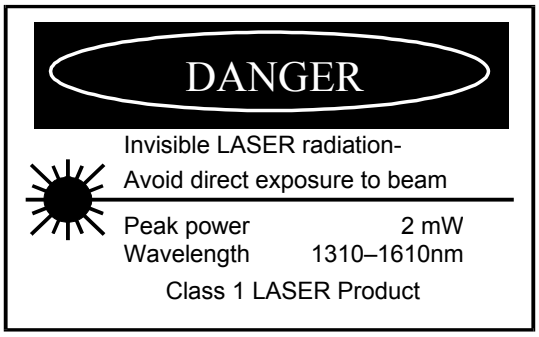
WARNING

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.

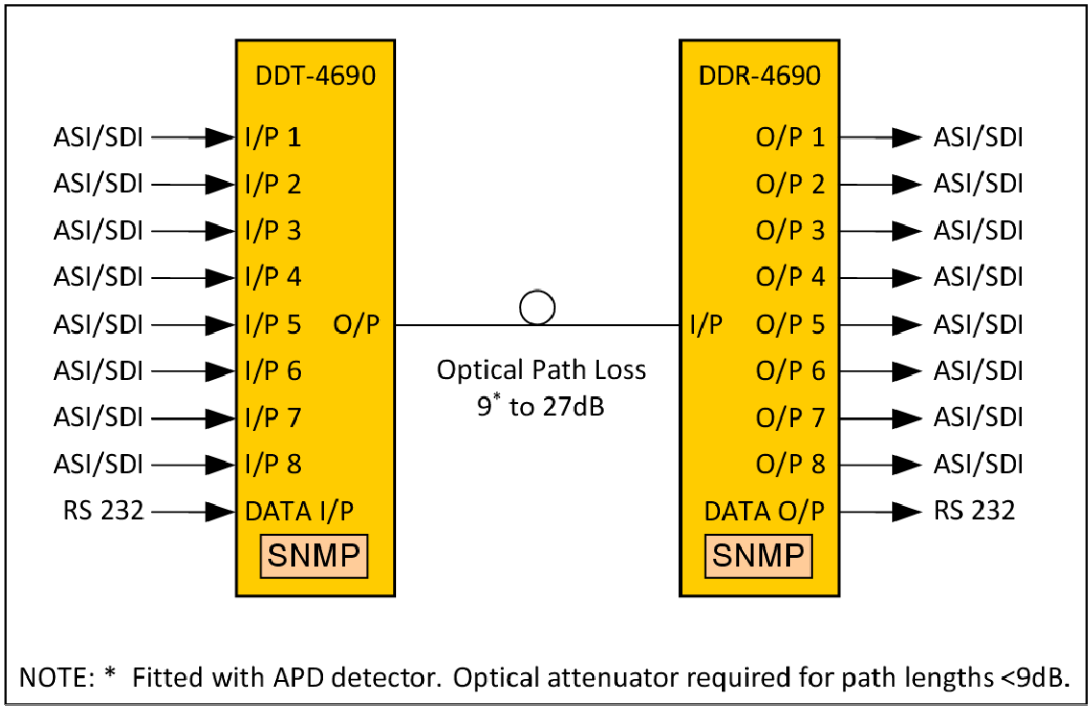


IRT Eurocard

Type DDT-4690 & DDR-4690

ASI / SDI 8 Channel Mux Fibre Link

General Description



The DDT-4690 accepts up to eight 270 Mb/s input signals which may be ASI, SDI or a mixture of each type. The signals need not be phase or frequency synchronous.

The signals are multiplexed into a single 2.97 Gb/s stream and transmitted optically via a single mode fibre. The DDR-4690 receiver performs the reverse operation and restores correct 270 Mb/s timing.

In addition to the eight 270 Mb/s channels, a single data channel is included for uni-directional transmission of auxiliary data.

The DDT-4690/DDR-4690 system is primarily designed for use with a 9/125µm single mode fibre and will allow an optical path loss up to 27dB.

The DDT-4690 transmitter comes standard with a 1310nm DFB laser. Other CWDM wavelengths are available. The DDR-4690 receiver comes standard with an APD detector.

SNMP (Simple Network Management Protocol) is available for monitoring and control when used in an IRT frame fitted with SNMP capability. Channels can be individually enabled or disabled via SNMP.

The modules are designed to fit IRT's standard Eurocard frames as well as IRT's 4000 series frame for use with IRT's SNMP system and may be used alongside any other of IRT's analogue or digital Eurocards.

Standard features:

- **ASI and SDI capability.**
- **Automatic cable equalisation for up to 300m on each input.**
- **Optical path loss ≥ 27dB.**
- **External urgent and non-urgent alarms for system monitoring.**
- **SNMP monitoring module built in.**

Technical Specifications

DDT-4690:

Inputs:

Type	8 x independent ASI or SDI.
Equalisation	automatic for up to 300 m of Belden 8281 or equivalent cable.
Connectors	BNC 75Ω.

Data:

Type	1 x RS-232 uni-directional (up to 230 kBaud).

Outputs:

Type	1 x 2.97 Gb/s optical, or electrical.

Alarms:

Major	O/C relay for loss of power, or LASER fail.
Minor	O/C relay if no channels are present.

DDR-4690:

Inputs:

Type	1 x 2.97 Gb/s optical, or electrical.

Outputs:

Type	8 x independent ASI or SDI.
Connectors	BNC 75Ω.

Data:

Type	1 x RS-232 uni-directional.

Alarms:

Major	O/C relay for loss of power, Rx lock error or optical input fail.
Minor	O/C relay if no channels are present

Optical:

DDT-4690 optical output	0 dBm +3/-0 dB CWDM DFB laser,
DDR-4690 optical input	APD detector (standard), -9 to -27 dBm input level.
Available wavelengths	CWDM DFB laser - 1270nm, 1290nm, 1310nm (standard), 1330nm, 1350nm, 1410nm, 1430nm, 1450nm, 1470nm, 1490nm, 1510nm, 1530nm, 1550nm, 1570nm, 1590nm & 1610nm.
Optical path loss[1]	9 to 27 dB APD detector (standard), 3 to 18 dB PIN detector.
Optical fibre	Designed for use with 9/125 µm single mode fibre.
Optical connectors	SC/PC (standard).

Power requirement:

Voltage	28 Vac CT (14-0-14) or ±16 Vdc.
Consumption	DDT-4690 <9 VA, DDR-4690 <9 VA.

Other:

Temperature range		0 - 50° C ambient
Mechanical		Suitable for mounting in IRT 19" rack chassis with all connections at the rear.
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 Optical attenuator supplied for DDR-4690 when optical path loss is less than 9dB.

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

Configuration

Switch Settings:

DDT-4690:

SW1-1 OFF Laser O/P enabled (default position).
ON Electrical O/P enabled.

SW1-2 Not Used.

SW1-3 Not Used.

SW1-4 OFF Default position.
ON Reset Reclocker after SNMP Reset.

SW1-5 Not Used.

SW1-6 Not Used.

SW1-7 OFF SNMP Control – Can disable individual channels.
ON DIP Switch Control – All channels are enabled.

SW1-8 OFF Enable Major and Minor SNMP alarms to the frame Agent (CDM card)[2].
ON Disable Major and Minor SNMP alarms to the frame Agent (CDM card)[2].

DDR-4690:

SW1-1 OFF Select Optical I/P.
ON Select Electrical I/P.

SW1-2 Not Used.

SW1-3 Not Used.

SW1-4 Not Used.

SW1-6 Not Used.

SW1-7 OFF SNMP Control – settings can be made via SNMP.
ON DIP Switch Control – can be interrogated via SNMP, but SNMP settings are not functional. Note: all channels are enabled.

SW1-8 OFF Enable Major and Minor SNMP alarms to the frame Agent (CDM card)[2].
ON Disable Major and Minor SNMP alarms to the frame Agent (CDM card)[2].

NOTE: 2 When using TRAPS via SNMP, depending on how system is set up, in order to avoid double reporting of alarms via the DDT-4690 or DDR-4690 itself 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.

270Mb/s / ASI / SDI Inputs and Outputs:

Up to eight 270Mb/s type of signals, such as ASI, SDI, or a combination of both, are fed into 75 Ω BNC connectors on the rear connector panel of the DDT-4690. Unused inputs are best terminated with a 75 Ω termination to avoid spurious noise being sent to the receiver where the front panel LEDs could illuminate and give the false impression that there is a signal on that line.

The corresponding outputs are by 75 Ω BNC connectors on the DDR-4690 rear connector panel. Output numbers on the DDR-4690 correspond to the input numbers on the DDT-4690. There is no need to terminate the unused channel outputs on the DDR-4690.

Fibre Optic Connection:

Warning

Optical Connections

The optical connectors on the DDT-4690 & DDR-4690 are attached to the main module PCB, NOT the rear connector assembly.

When installing the optical fibre sufficient slack should be allowed for the module to be withdrawn with the optical fibre attached until the connector is clear of the frame and can be disconnected.

If this is not done, the module will not be able to be removed without first disconnecting the optical fibre at the rear. Attempting to remove the module without first disconnecting the fibre may result in damage to the fibre and / or the module.

Alarm Outputs:

Two relay alarm output states are provided via a phoenix style 4-pin plug. Pin 3 is designated as Major, pin 4 is designated as Minor, and both pins 1 & 2 are ground. Both alarms are referenced to ground.

Alarm conditions are as follows:

DDT-4690:

Major switch to Open Circuit if LASER fails;
Minor switch to Open Circuit if no inputs are present.
Both Major and Minor alarms switch to Open Circuit on power failure.

When using TRAPS via SNMP, depending on how system is set up, in order to avoid double reporting of alarms via the DDT-4690 card itself 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 with DIP switch SW1-8 set to ON.

DDR-4690:

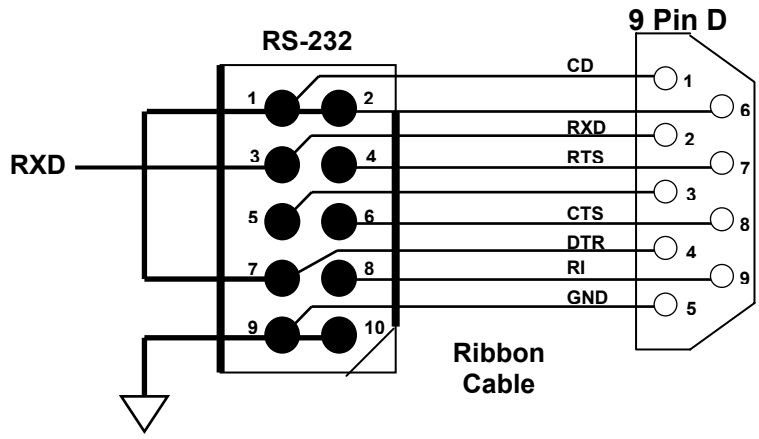
Major switch to Open Circuit on Receiver lock error or optical input fail;
Minor switch to Open Circuit if no channels are present
Both Major and Minor alarms switch to Open Circuit on power failure.

When using TRAPS via SNMP, depending on how system is set up, in order to avoid double reporting of alarms via the DDR-4690 card itself 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 with DIP switch SW1-8 set to ON.

Data Port:

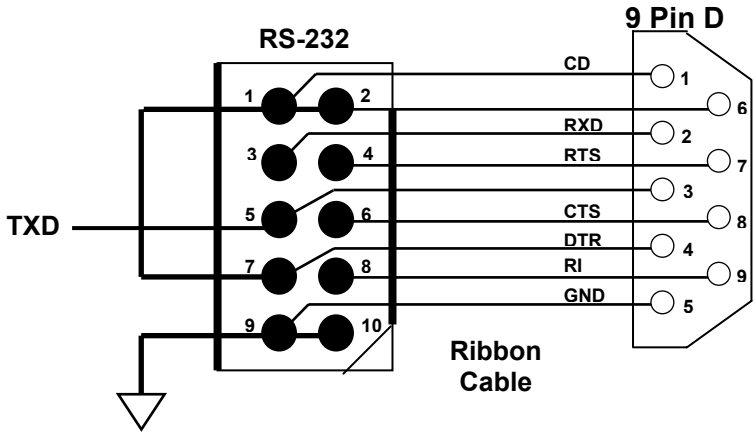
DDT-4620 RS-232 Data Input:
The RS-232 data input port is via a 10 pin HE14 style of header. Pins 1, 2 and 7 are connected together on the PCB. Pins 9 and 10 are both earthed. Pin 3 is the RS-232 *receive data* (RXD) connection. Data rates may be up to 230k baud. Note that data transfer is unidirectional only, i.e. there is no direct data return path.

For connection to a standard RS-232 9 pin D connector, wire as per the diagram below:



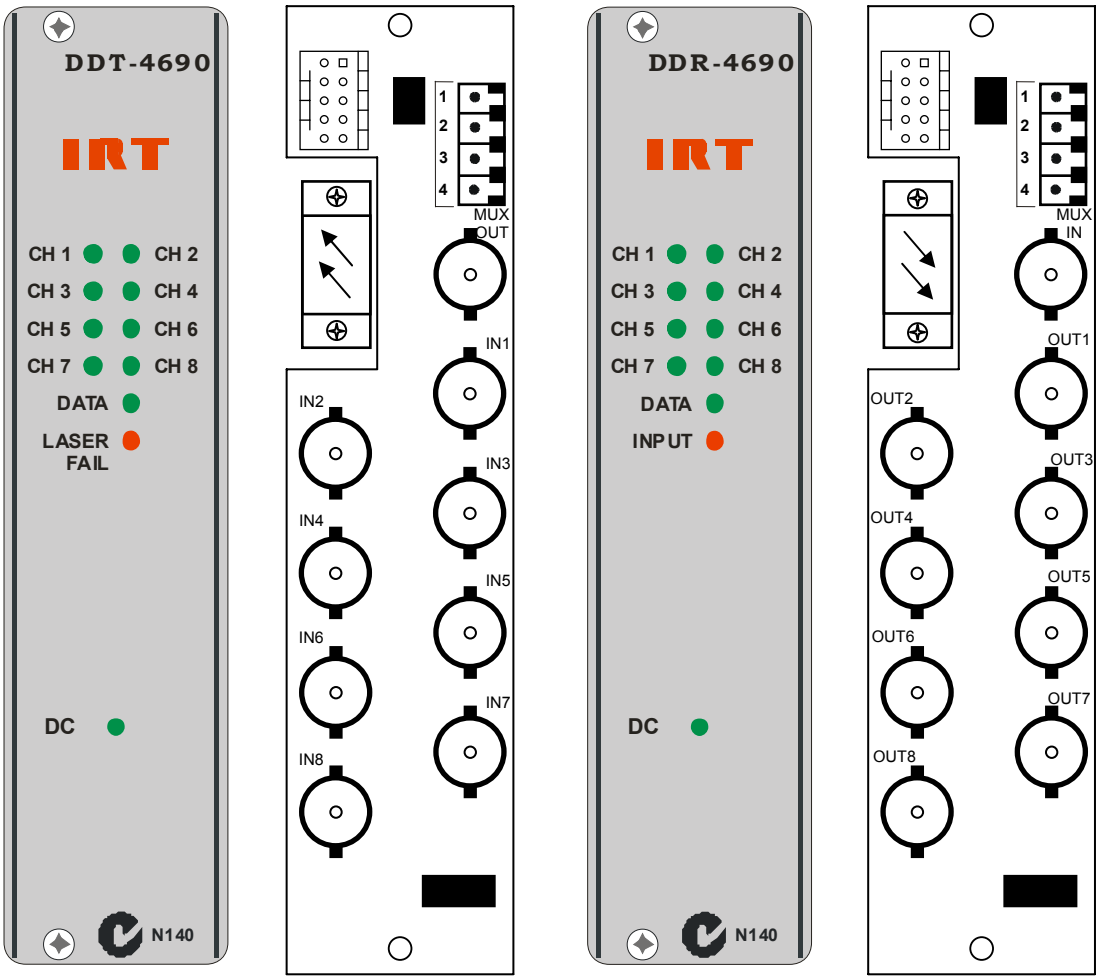
DDR-4690 RS-232 Data Output
The RS-232 data output port is via a 10 pin HE14 style of header. Pins 1, 2 and 7 are connected together on the PCB. Pins 9 and 10 are both earthed. Pin 5 is the RS-232 *transmit data* (TXD) connection. Data transfer is unidirectional only, this is a receive path only.

For connection to a standard RS-232 9 pin D connector, wire as per the diagram below:



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.

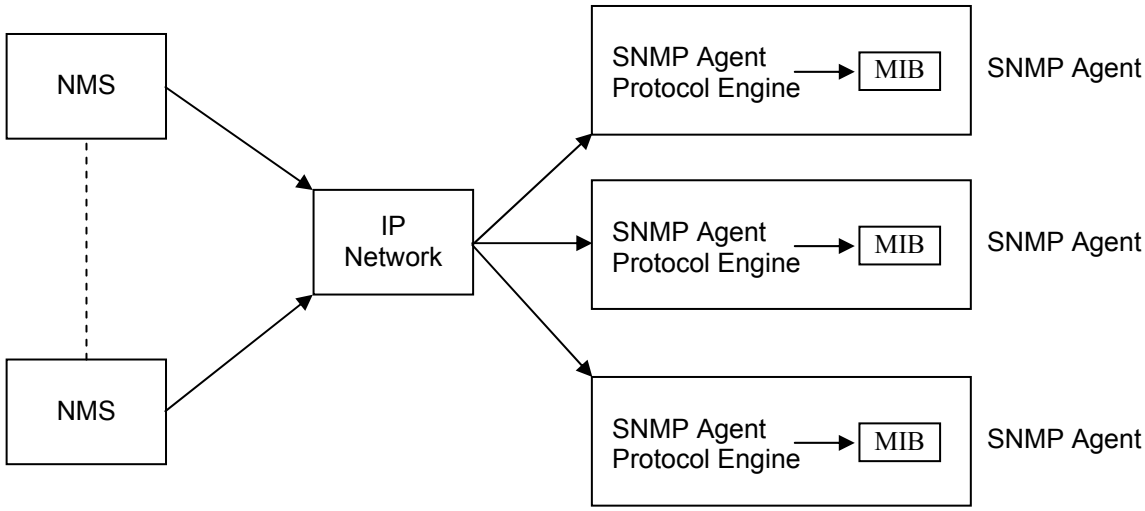
An *NMS* polls, or communicates with, an *agent*. An *agent* is a network management software module that resides in a *managed device*. An *agent* has local knowledge of management information and translates that information into a form compatible with SNMP. The *agent*, therefore, acts as an interface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

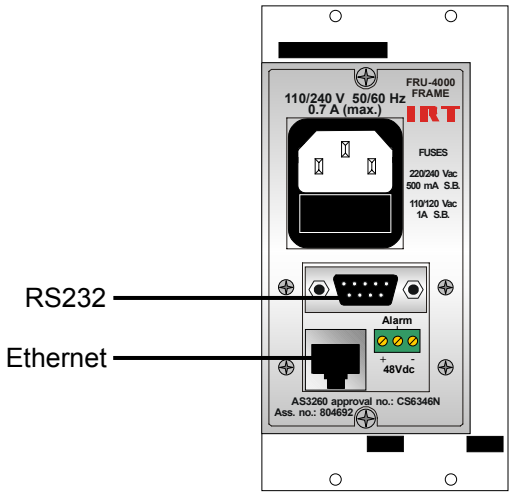
IRT Electronics currently employs SNMPv1 with its SNMP capable frames. The frame acts as an *agent* when fitted with a CDM-xxxx module. This module has its own designated slot next to the power supply so as to not affect the number of modules that the frame will take. Communication between the *NMS*,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

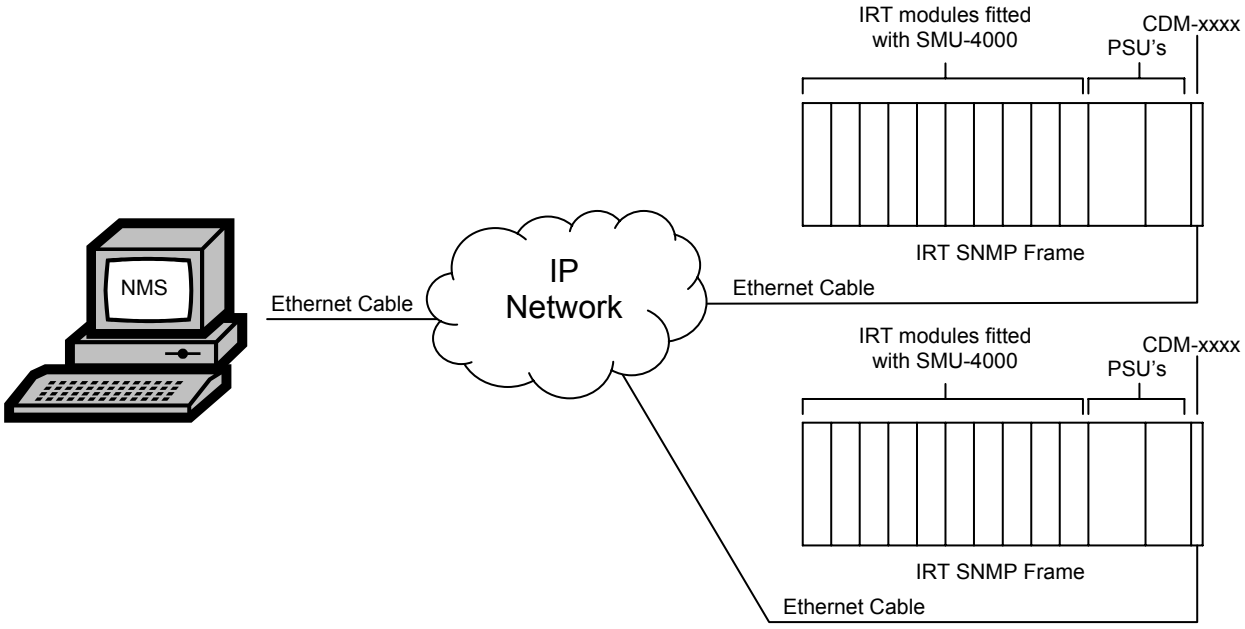
Frame parameters, such as Name, Address and Location, are set via an RS232 interface, a D9 connector on the rear of the frame below the mains inlet. A software terminal emulator, such as Tera Term or HyperTerminal, is used for setting and reading the parameters of the frame.

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

DDT-4690 & DDR-4690 SNMP Functions:

The following SNMP functions are capable of being controlled and monitored by an SNMP Network Management System (NMS):

DDT-4690:

alarms - An indication of the current state of the Urgent and Non Urgent alarms:
(1) noAlarm: No Urgent and no Non Urgent alarms present.
(2) urgentAlarm: fault detected in laser.
(3) nonUrgentAlarm: no fault detected in laser, all channels absent.

opticalStatus - An indication that the laser is functioning:
(1) normal: no fault detected in laser.
(2) laserFail: fault detected in laser.

laserWavelength - Wavelength of installed laser.

ctrlMode - An indication of whether SNMP control or local DIP switch control is set. Set by SW1-7:
(1) localDIPsw: SW1-7 ON. No SNMP control. All channels are enabled regardless of SNMP setting.
(2) remote SNMP: SW1-7 OFF. Settable functions via SNMP possible.

channelTable - Information and control of the channel inputs.

channelNo - Input Channel Number, 1-8.

status - An indication that the channel input signal is present or not:
(1) notPresent: No input signal present on channel.
(2) present: Input signal is present on channel.

input - An indication of the type of input detected:
(1) sdiPAL: SDI PAL coded signal.
(2) sdiNTSC: SDI NTSC coded signal.
(3) asi: ASI encoded signal.
(4) notValid: Invalid input signal – neither SDI or ASI.

channelEnable - An indication, and control of, whether the channel is enabled or not[3]:
(1) disabled: Channel not enabled
(2) enabled: Channel enabled.

alias - A 16 byte maximum Alias (name) for the channel can be read and set.

signalOnLoss - Substitute absent channel with a test signal (currently notAvailable(1): not available).

statusTrapEn - Send a Trap whenever channel status changes:
(1) disabled: No Trap sent on input channel status change.
(2) enabled: Trap automatically sent on input channel status change.

opticalStatusTrapEn - Send a Trap whenever 'opticalStatus' changes:
(1) disabled: No Trap sent whenever 'opticalStatus' changes.
(2) enabled: Trap automatically sent on whenever 'opticalStatus' changes.

firmwareVer - The firmware version of the main FPGA in the format 'x.y', where x is the major revision number and y the minor.

softwareVer - The software version of the processor software in the format 'x.y', where x is the major revision number and y the minor.

reset - Unit reset control - resets the module to power-up default settings. A set with a value of 2 sent to this OID will cause a system reset to occur. When queried returns a normal (1) status.

NOTE: 3 When a channel is disabled via SNMP, if a signal is present at this channel, the front panel LED corresponding to the disabled channel will flash.

DDR-4690:

alarms - An indication of the current state of the Urgent and Non Urgent alarms:
(1) noAlarm: No Urgent and no Non Urgent alarms present.
(2) urgentAlarm: Input not valid or not detected.
(3) nonUrgentAlarm: Input valid, but all channels are absent.

inputStatus - An indication that a valid multiplexed input signal source is detected or not:
(1) notPresent: No valid input signal present.
(2) present: Valid input signal is present.

inputSource - An indication and control of the input source[4]. Set by SW1-1:
(1) optical: Optical input selected.
(2) electrical: Electrical input selected.

ctrlMode - An indication of whether SNMP settings are enabled or over-ridden by an on-board DIP switch. Set by SW1-7:
(1) localDIPsw: SNMP controls are over-ridden[5].
(2) remoteSNMP: SNMP controls are active.

channelTable - Information and control for the channel outputs.

channelNo - Output Channel Number, 1-8.

status - An indication that the channel input signal is present or not:
(1) notPresent: No signal present on channel.
(2) present: Signal is present on channel.

inputType - An indication of the type of signal detected:
(1) sdiPAL: SDI PAL coded signal.
(2) sdiNTSC: SDI NTSC coded signal.
(3) asi: ASI encoded signal.
(4) notValid: Invalid input signal – neither SDI or ASI.

channelEnable - An indication, and control of, whether the channel is enabled or not[6]:
(1) disabled: Channel not enabled
(2) enabled: Channel enabled.

alias - A 16 byte maximum Alias (name) for the channel can be read and set.

signalOnLoss - Substitute absent channel with a test signal (currently notAvailable(1): not available).

statusTrapEn - Send a Trap whenever channel status changes:
(1) disabled: No Trap sent on channel status change.
(2) enabled: Trap automatically sent on channel status change.

inputStatusTrapEn - Send a Trap whenever 'inputStatus' changes:
(1) disabled: No Trap sent whenever 'inputStatus' changes.
(2) enabled: Trap automatically sent on whenever 'inputStatus' changes.

firmwareVer - The firmware version of the main FPGA in the format 'x.y', where x is the major revision number and y the minor.

softwareVer - The software version of the processor software in the format 'x.y', where x is the major revision number and y the minor.

reset - Unit reset control - resets the module to power-up default settings. A set with a value of 2 sent to this OID will cause a system reset to occur. When queried returns a normal (1) status.

NOTE: 4 If the set input is absent and other input is present, input will automatically default to the available input. However the SNMP setting indication will still indicate the set SNMP setting. When control mode is set to local DIP switch control via SW1-7, input source indication is set by DIP switch SW1-1 position.

5 With the module set for local DIP switch control, SNMP monitoring is still possible, but SNMP controls are disabled. All channels are enabled.

6 When a channel is disabled via SNMP, if a signal is present at this channel, the front panel LED corresponding to the disabled channel will flash.

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