IRT

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 DDA-4008

270 Mb/s ASI/SDI & 155Mb/s STM-1 8 O/P
Reclocking / Non-Reclocking Distribution Amplifier

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	12/11/2009	AL	Original Issue.	S/N: >1002001
1	09/02/2010	AL	Link setting sub-board module information added.	S/N: >1002001

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Instruction Book

Table of Contents

This instruction book applies to units later than S/N 1002001.

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
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270 Mb/s ASI/SDI & 155Mb/s STM-1 8 O/P
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General Description

BLOCK DIAGRAM DDA-4008 SIGNAL PATH
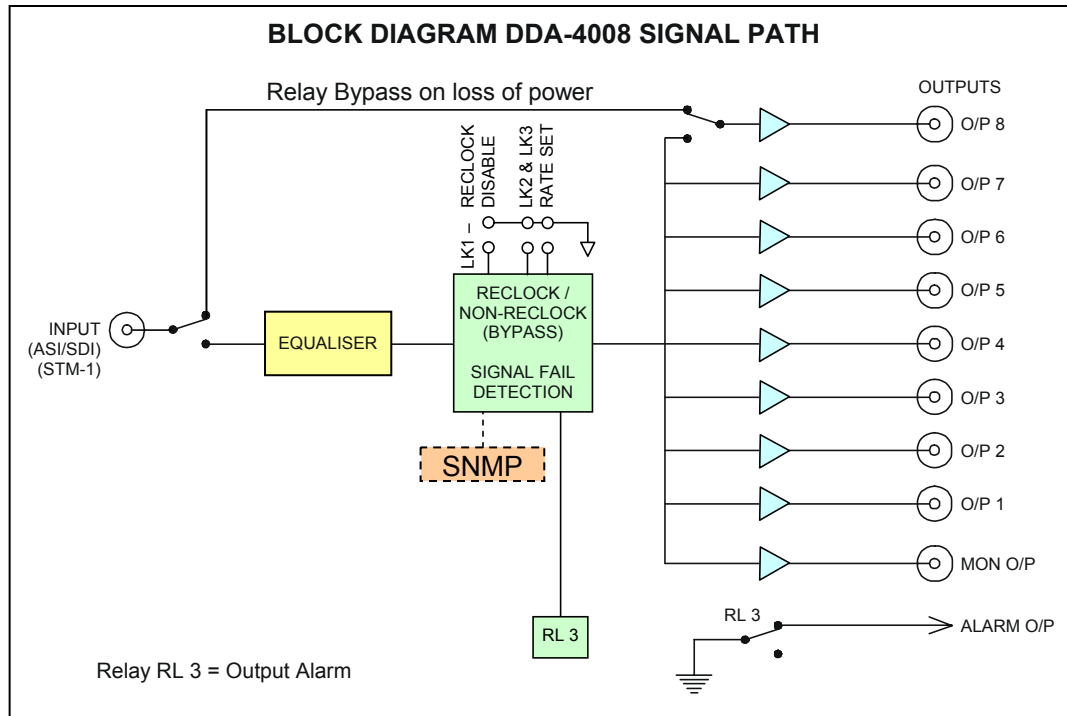
The DDA-4008 serial digital data distribution amplifier provides the user with a single module to cover a wide range of distribution and monitoring functions for ASI, SDI or STM-1 signals.

Serial digital signals suffer severe deterioration over relatively short cable distances. The DDA-4008 provides a means of extending the working distances that can be achieved by equalising, reclocking and re-transmitting the data mid-route.

Where non-reclocking is required, on-board link settings select between reclocking and non-reclocking modes.

The rear assembly includes a bypass relay to switch the Input to Output 8 in the event of a power failure.

An optional Simple Network Management Protocol (SNMP) plug-in module is available for remote setup and monitoring of input status and alarm state when used in an IRT frame fitted with SNMP capability.

The DDA-4008 is designed to fit IRT's standard Eurocard frames and may be used alongside any other of IRT's Eurocards.

Standard features:

- **For use as buffer or distribution amplifier.**
- **8 x in-phase reclocked / non-reclocked outputs.**
- **Selectable for either ASI / SDI or STM-1 applications.**
- **Automatic input equalisation to 250 metres.**
- **Automatic output muting on no input.**
- **Relay bypass on loss of power.**
- **Front panel indicators provide monitoring of presence of input signal at 270 Mb/s (ASI/SDI) or 155 Mb/s (STM-1).**
- **Optional plug-in SNMP monitoring and control module.**

Technical Specifications

IRT Eurocard module
Type DDA-4008

Data input:

Number	1.
Impedance	75 Ω, BNC.
Type	270Mb/s ASI / SDI, or 155Mb/s STM-1.
Return loss	>15 dB 5 MHz to 270 MHz.
Equalisation	Automatic, better than 250 metres at 270 Mb/s for Belden 8281 or equivalent cable (reduces to approx. 200m when LK4 is closed).

Data outputs:

Number	8 ASI / SDI, or STM-1, plus one front panel monitoring output.
Type	Reclocked or non-reclocked, link selectable.
Level	800 mV ±10% into 75 Ω (270Mb/s ASI / SDI / STM-1 NRZ encoded); or 1.0 V. ±10% into 75 Ω (STM-1 CMI encoded)
Impedance	75 Ω, BNC.
Return loss	>15 dB 5 MHz to 270 MHz.
DC offset	Nil.

Performance:

Reclocking	Selectable for 270 Mb/s ASI / SDI, or 155 Mb/s STM-1 operation.
Rise time	<1.0 ns, (850 ps typically).
Intrinsic jitter	<0.1 UI (measured with up to 300m of Belden 8281 or equivalent cable – reclocked mode).

Indicators:

DC	LED (green) for +5 V.
SIGNAL	LED (green) when signal present.
270Mb	LED (green) for 270Mb/s ASI/SDI input lock.
STM-1	LED (green) for STM-1 input lock.

Alarm:

Signal / Power loss	Open circuit on loss of input or loss of power.

Power requirement:

Voltage	28 Vac CT (14-0-14) or ±16 Vdc
Consumption	9 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.
Standard accessories	Rear connector assembly with matching connector for alarm output.
Optional accessories	SMU-4000 SNMP plug-in module for use with 4000 series frame fitted with SNMP "Agent".

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

Configuration

The DDA-4008 is configured with either[1] a plug-in link setting sub-board or via a plug-in SMU-4000 plug-in sub-board.

Link Settings:

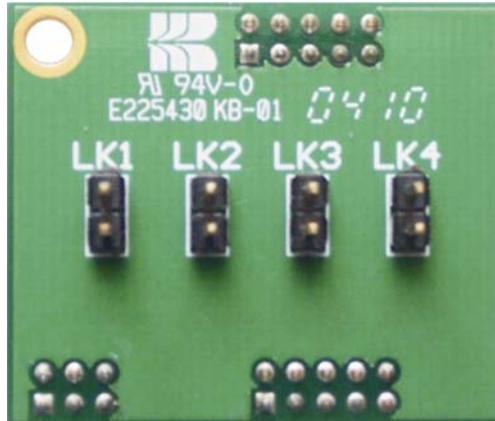With the plug-in link setting board fitted, link settings are as follows:

Figure 1: Link configuration layout

LK1 IN   Reclocking disabled (Non-reclocking mode);
       OUT   Reclocking enabled (Reclocking mode).

Input signal type (rate set)	LK2	LK3
ASI / SDI (270Mb/s)	OUT	OUT
STM-1 (155Mb/s) NRZ[2]	IN	OUT
STM-1 (155Mb/s) CMI encoded	IN	IN

LK4 IN   Reduced cable equalisation (for use with shorter cable runs or use in a noisy environment);
       OUT   Normal cable equalisation.

NOTE: 1   Only one type of plug-in sub-board can, and must, be fitted at a time. See *Installation* section of this manual for fitting instructions.

       2   For optical transmission, the STM-1 signal presents an NRZ format, without the CMI encoding used in electrical transmission. In this instance it is not an actual optical interface, but an electrical signal that can be fed into an electrical to optical converter to create a true optical STM-1 signal.

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:

Input & Outputs:

Input and outputs are 75 Ω BNC type for connection with high quality 75 Ω coaxial cable. Input is self-terminating.

A relay bypass is provided on the rear assembly between the Input and Output 8, the output connector closest to the input connector. Should the card be removed from the rear assembly mounted within the frame, or if a power failure occurs, the input signal will still pass through to this output. For situations requiring a "critical" path, connect to Output 8.

Alarm Output:

A two pin Phoenix style screw connector gives a switch to open circuit when there is no input signal present, or a loss of power. The non-alarm state is a connection to ground via a FET relay.

PL8

1   ●   **Alarm on loss of input or power.**

2   ●   **Ground.**
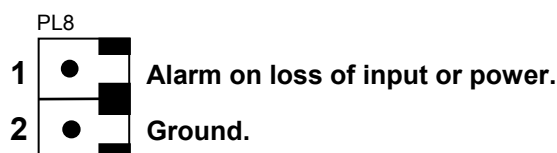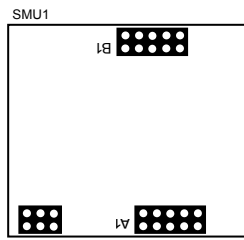
Front Panel Indicators:

The presence of an input signal is indicated by the 'SIGNAL' front panel LED (green).

The type of signal present when locked is indicated by either the "270Mb" front panel LED (green) for 270Mb/s signals such as ASI or SDI, or the "STM-1" front panel LED (green) for 155Mb/s STM-1 signals (CMI encoded or NRZ).

The presence of the internal +5 Vdc supply is indicated by the 'DC' front panel LED (green).

Link Configuration Sub-Board Installation

For use with link settings, the plug-in link configuration sub-board[3] must be installed. On the main board there is a a square section that is silk screened and fitted with three multipin sockets – as shown below

This is where the link configuration sub-board is fitted. The three sets of multipins on the underside of the sub-board line up with the three sets of multipin sockets on the main board. Align all pins and then gently press the link configuration sub-board all the way down into place.

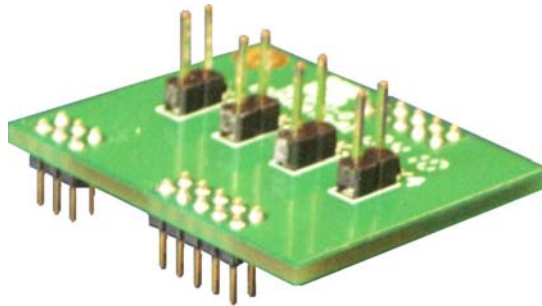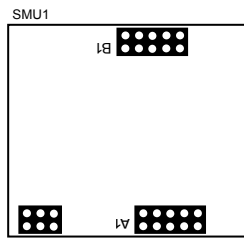Note that installation will generally be done by IRT Electronics at the time of ordering.

Figure 2: Link configuration module

NOTE: 3   With link configuration sub-board fitted, it is not possible for the SMU-4000 SNMP sub-board module to also be fitted. Thus there are no SNMP monitoring or controls available. All settings are made with the link settings only.

SMU-4000 Installation

For use with SNMP, the plug-in SMU-4000 SNMP sub-board[4] must be installed. On the main board there is a square section that is silk screened and fitted with three multipin sockets – as shown below

This is where the SMU-4000 SNMP sub-board is fitted. The three sets of multipins on the underside of the sub-board line up with the three sets of multipin sockets on the main board. Align all pins and then gently press the link configuration sub-board all the way down into place.

Note that installation will generally be done by IRT Electronics at the time of ordering.

Note also that an SMU-4000 will only be functionally operational when the main module that it is plugged into is fitted into an IRT SNMP capable frame fitted with a CDM-xxxx SNMP agent and being interrogated by a suitable Network Management System.
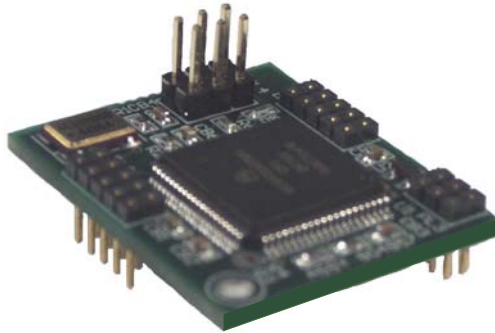

Figure 3: SMU-4000 module

NOTE: 4   With SMU-4000 fitted, it is not possible for link configuration sub-board module to also be fitted. All settings are made via SNMP and as such needs to be fitted into an IRT frame fitted with SNMP capability.

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.
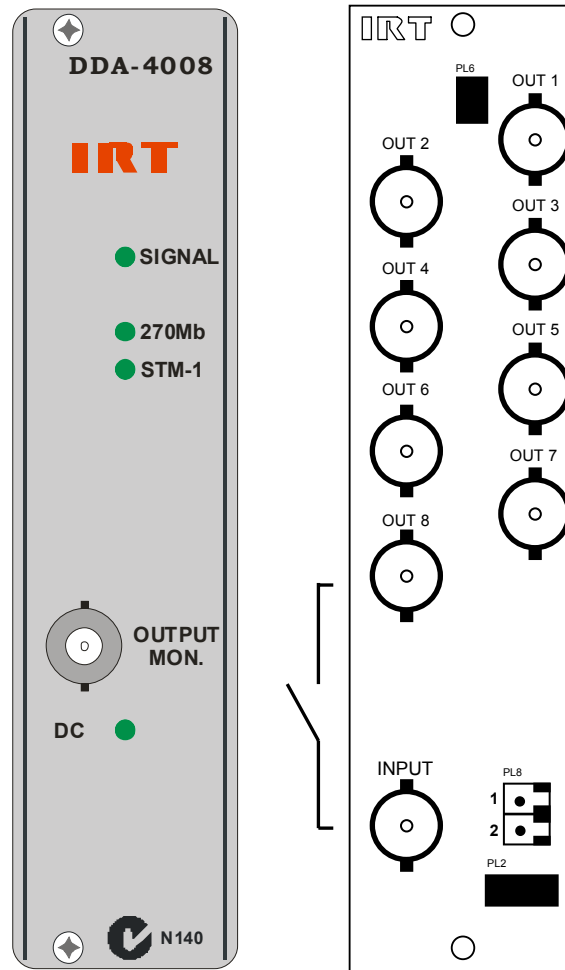
NOTE:
Relay bypass between INPUT and OUT 8 on loss of power.

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
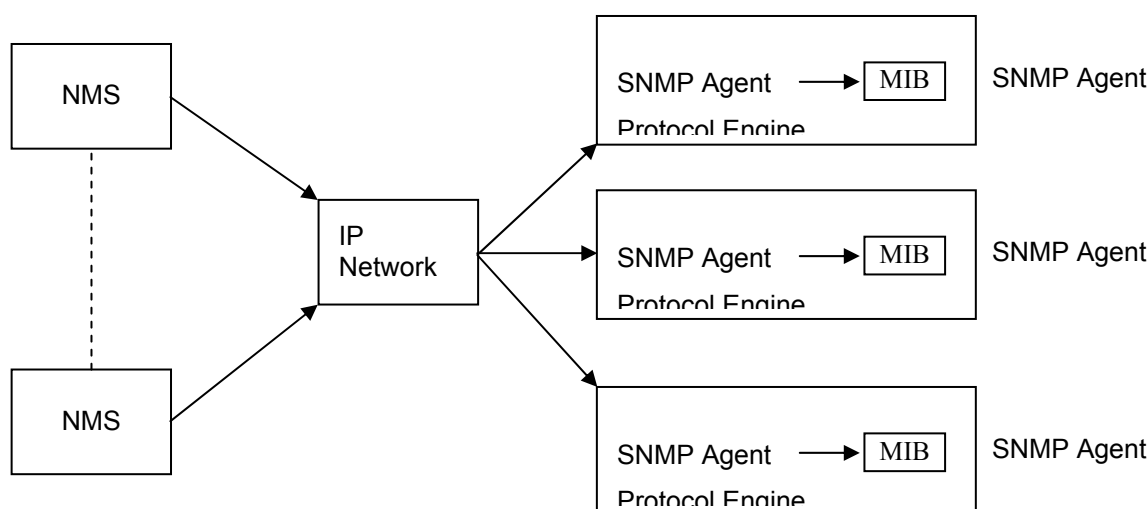
SNMP with IRT Products:

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.
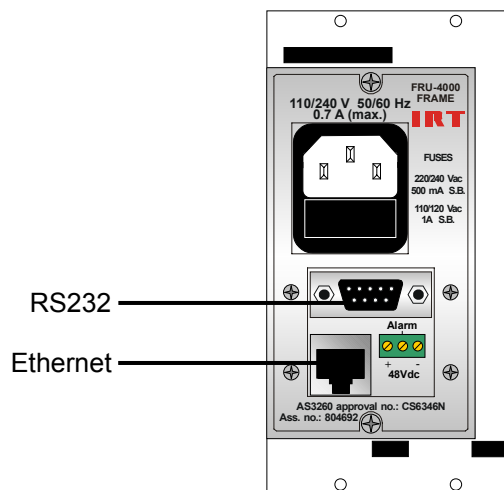
IRT SNMP Connections
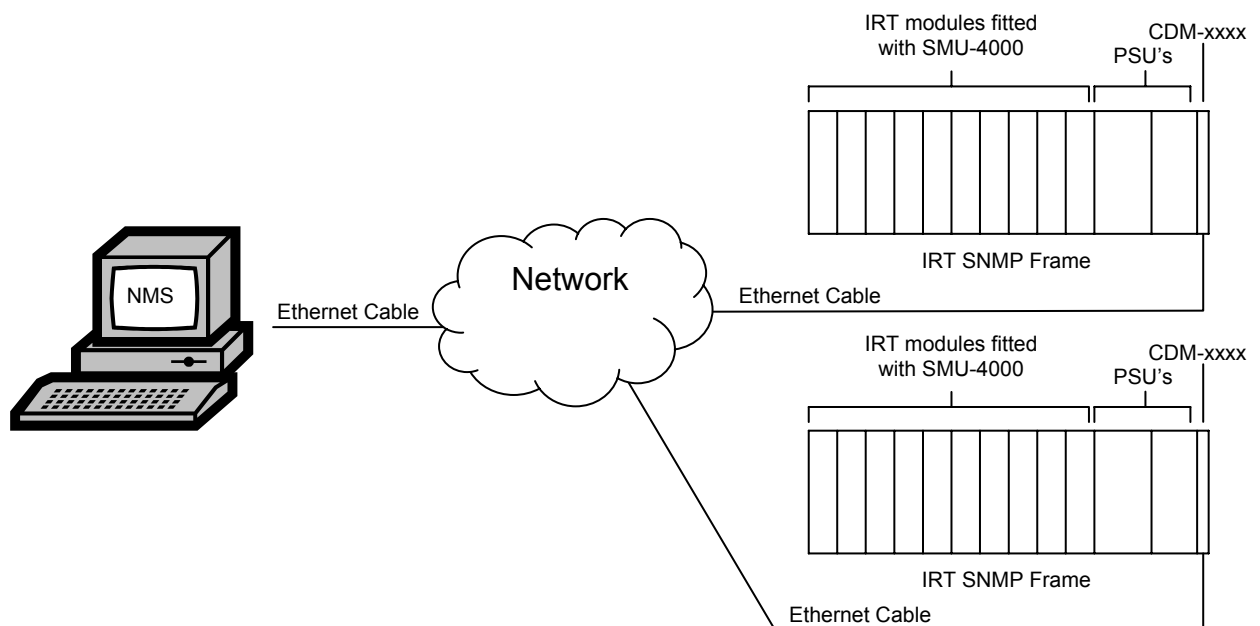
IRT SNMP Setup

DDA-4008 SNMP Functions:

With the DDA-4008 fitted with the optional plug-in SMU-4000 SNMP module, programmed with the firmware to suit and installed in an IRT frame fitted with SNMP capability, the following SNMP functions can be monitored and controlled by an SNMP Network Management System (NMS):

The current state of the Alarm (noAlarm (1), nonUrgentAlarm (2), UrgentAlarm (3));
(2) Non Urgent Alarm when an input signal is present but it does not match the set rate.
(3) Urgent Alarm when there is no input signal.
An indication that an input signal is present (notPresent (1), Present (2));
The status of the reclocker (notLocked (1), Locked (2));
(1)   Not Locked: Reclocker is unlocked or else input signal is not present.
(2)   Locked: Signal is present and reclocker is locked.
Set the input data rate for the reclocker (asi-sdi (1), stm1-nrz (2), stm1-cmi (3));
(1)   ASI-SDI: 270Mb/s.
(2)   STM-NRZ: 155Mb/s STM-1 optical NRZ standard.
(3)   STM-CMI: 155Mb/s STM-1 electrical CMI standard.
Set the reclocker mode (disable (1), enable (2));
(1)   Disabled: Signal routed straight to the outputs (non-reclocked mode).
(2)   Enabled: Reclocked signal to the outputs (reclocked mode).
Set the amount of cable equalisation to employ (normal (1), reduced (2));
(1)   Normal: Maximum available.
(2)   Reduced: Lower gain for use in a noisy environment (reduces to approximately 200m).
Unit reset control (inactive (1), reset (2));
Send a Trap whenever an alarm occurs or clears (onAlarm (1), disabled (2)).

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