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 MEM-4552

Gigabit Ethernet to ASI Network Interface Adapter

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	03/05/2010	AL	Original Issue.	Firmware version ≥ MEM4552v1.1
1	19/07/2010	AL	Correction to irt4552SetAsiPayloadRate description in the MEM-4552 SNMP Functions section.	Firmware version ≥ MEM4552v1.1
2	20/04/2011	AL	Equalisation specification updated to >250m.	Firmware version ≥ MEM4552v1.1

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Instruction Book

Table of Contents

This instruction book applies to units fitted with firmware version ≥ MEM4552v1.1.

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 MEM-4552

Gigabit Ethernet to ASI Network Interface Adapter

General Description

The MEM-4552 acts as a gateway between an Ethernet network and an ASI environment.

The MEM-4552 generates a compliant DVB ASI transport stream, with a settable Program Number identifier, at a fixed settable data rate. When Ethernet data is available to send it is encapsulated into ASI packets. When there is no Ethernet data available, NULL packets are used to stuff the ASI stream to the selected rate.

On the receive side packets containing Ethernet data are extracted from the ASI stream by reference to the assigned Program Number.

The Ethernet port is set up automatically to accommodate most network environments. The ASI output rate is SNMP selectable to operate at a payload data rate of between 1 Mb/s and 213 Mb/s.

The Ethernet port has automatic MDI/MDI-X detection. This detects whether the Ethernet interconnect cable is a straight through or cross over type and automatically switches itself to accommodate.

The output ASI stream is suitable for transfer by any ASI type of signal path, such as IRT's ASI single and MUX fibre link cards. G.703 rates can be set on the output to cooperate with ASI-G.703 products. For full duplex action a return link is required. Note that the return ASI rate is independent of the outgoing ASI rate.

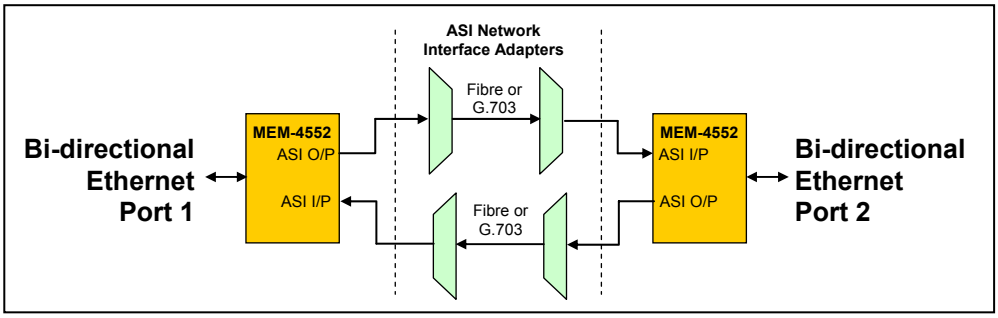
SNMP (Simple Network Management Protocol) is included for remote monitoring and control when used in conjunction with IRT's 4000 series frame fitted with SNMP capability.

The MEM-4552 is designed to fit IRT's standard 1RU and 4000 series 3RU Eurocard frames fitted with IRT's SNMP system.

Standard features:

- **Ethernet to ASI / ASI to Ethernet conversion**
- **Ethernet port automatically set for 100 Base-T or 1000 Base-T (Gig-E) operation**
- **Automatic MDI/MDI-X port**
- **Selectable ASI rates between 1 Mb/s and 213 Mb/s**

Application Diagram:



Technical Specifications

IRT Eurocard module
Type MEM-4552

Ethernet

Type	Standard IEEE 802.3
Data Rate	100/1000 Mb/s.
Connector	RJ-45.

ASI Output

Type	1 x ASI-C 75Ω, 800 mVp-p, BNC connector.
Payload Rate	User selectable between 1 and 213 Mb/s (set by SNMP control).
Program Number	User selectable (set by SNMP control. Default program number is 4550).
Signal level	800 mV ± 10%.
Impedance	75 Ohm.
Return loss	>15 dB 5 MHz to 270 MHz.

ASI Input

Type	1 x ASI-C 75Ω, BNC connector.
Return Loss	>15 dB 5 MHz to 270 MHz.
Equalisation	>250 metres at 270 Mb/s for Belden 8281 or equivalent cable.

Alarms

Minor	Open circuit on loss of ASI or loss of power.
Major	Open circuit on loss of Ethernet link or loss of power.

Front Panel Indicators

270Mb	ASI input present – Green.
LINK	LAN Activity – Green.
100B	Rate – 100 Mb/s – Green.
1000B	Rate – 1000 Mb/s – Green.
ALARM	General Alarm present – Red.

Power Requirements

	28 Vac CT (14-0-14) or ±16 Vdc.
Power consumption	<5 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, 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.
Optional accessories		SMU-4000 plug in SNMP Management Information Base (MIB) module.

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

Configuration

Setup is via Simple Network Management Protocol (SNMP).

MEM-4552 is required to be mounted in either IRT's current 1RU or 3RU 4000 series frame fitted with SNMP capability. A Network Management System (NMS) software is also required to interface and set the MEM-4552 parameters.

SNMP Configuration Settings:

irt4552SetPrgmNo	Assign a program number of the ASI signal. The MEM-4552 is designed to operate as a pair. The program number must be set the same on both units. Default setting is 4550. Having a high value program number reduces the chance of having numbers automatically being re-assigned in an ASI MUX due to less chance of conflicting program numbers in a live environment.
irt4552SetAsiPayloadRate	Set the ASI output payload rate anywhere between 1Mb/s and the full allowable ASI payload rate of 213Mb/s. Unlike the program number, the ASI payload rate does not have to be set the same on both units.

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.

Ethernet Connection:

The Ethernet port on the rear assembly is for a standard non-crossover Ethernet cable fitted with an RJ-45 connector. This port connects directly to an Ethernet link, or via an Ethernet router or Ethernet switch. The Ethernet link must either be 100 base-T or 1000 base-T (Gig-E) connection.

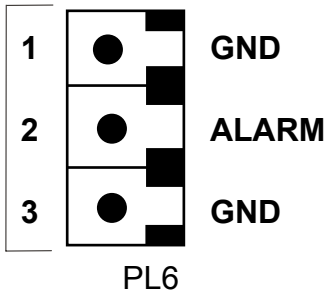
ASI Connections:

Both ASI input and output is a 75 Ω BNC type for connection with high quality 75 Ω coaxial cable.

Alarm Output Connections:

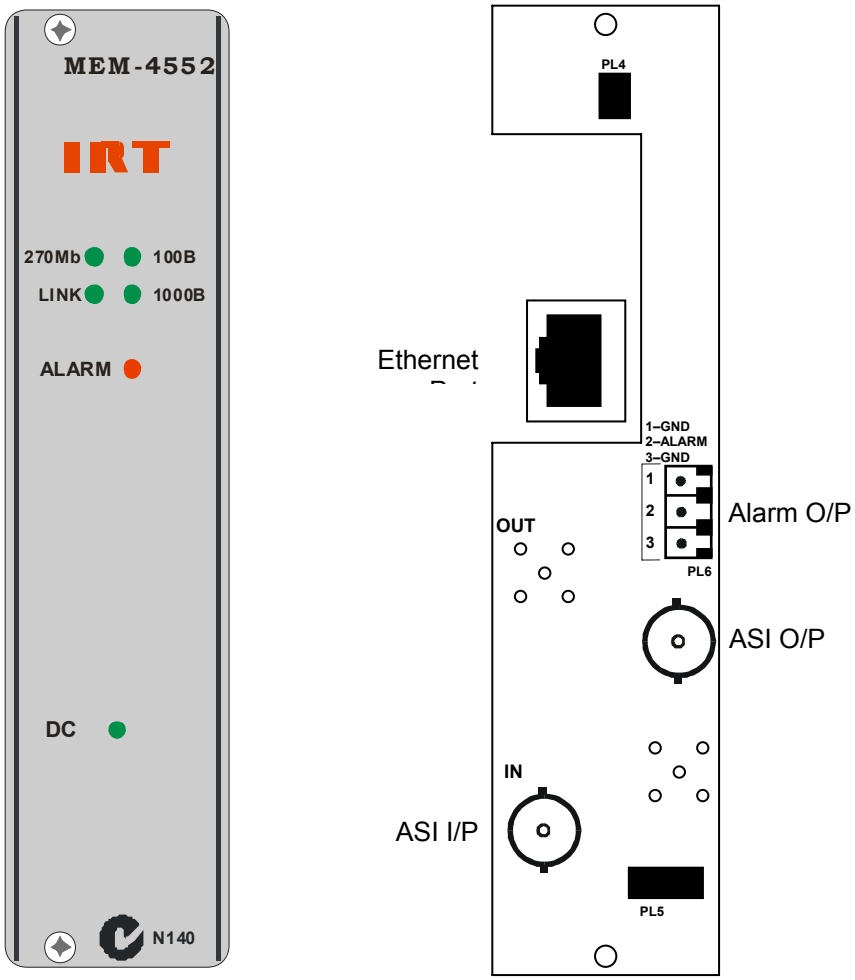
An opto-coupled alarm output via a 3 pole Phoenix style screw terminal block (PL6) on the rear connector assembly switches to open circuit on loss of either ASI Input, or Ethernet link loss.

Pins 1 and 3 are grounds, pin 2 switches to ground when an alarm status has been raised.



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.



Operation

The MEM-4552 is designed to operate as a pair with a second MEM-4552. Each unit does the Ethernet to ASI conversion and the reciprocal ASI to Ethernet conversion.

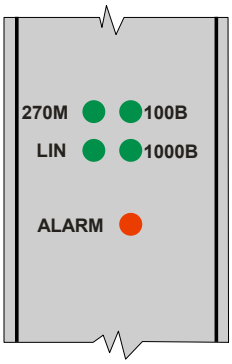
The MEM-4552 Ethernet port will automatically configure itself to match the Ethernet link whether it be 100 Base-T or 1000 Base-T operation. It also automatically sets itself up for MDI or MDI-X operation, so there are no setup options required for connecting to an Ethernet link. 10 Base-T is not supported.

In order for the output ASI signal to be distinguishable from other ASI signals in an ASI environment a program number needs to be set via the SNMP interface control. The default program number given is 4550. If changing this value it is recommended, but not mandatory, to use a number of the same order of magnitude of this default value so as to limit the possibility of having this program number re-assigned automatically in an ASI MUX should a conflict with another ASI stream with the same number occur in a live environment.

The output ASI payload data rate must be set to the desired rate by the SNMP configuration control. The ASI output payload data rate can be set anywhere between 1 Mb/s and the fully allowable ASI payload rate of 213 Mb/s. If connecting the ASI output to another network interface, such as an E3 or DS3 converter for example, then the ASI rate can be set to match the desired input rate of the converter.

As previously mentioned, the MEM-4552 is designed to operate as a pair with a second MEM-4552. Both units must be configured with the same program number setting otherwise the unit that is acting as the decoding unit will not recognize the incoming ASI signal and hence not convert it back to the existing Ethernet stream.

Front Panel LEDs give an indication of Ethernet and ASI settings and attributes, as described below:

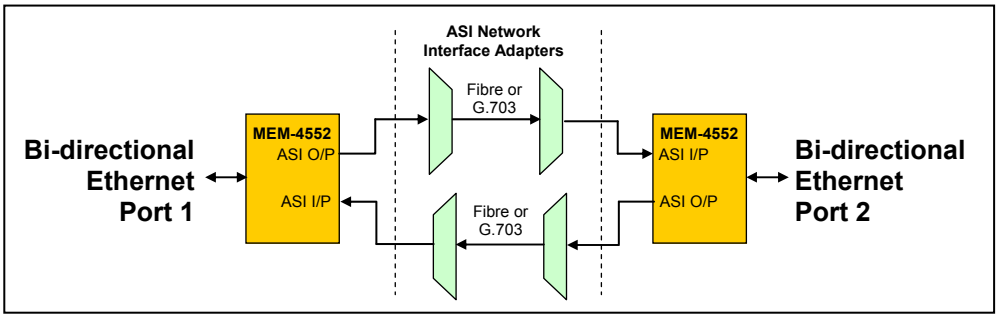


270Mb	ASI input present – Green.
LINK	LAN Activity – Green.
100B	Rate – 100 Mb/s – Green.
1000B	Rate – 1000 Mb/s – Green.
ALARM	General Alarm present – Red.

Each MEM-4552 is able to act concurrently as an encoder and decoder. For bi-directional Ethernet traffic a bi-directional ASI path is needed, that is a separate forward and reverse ASI path, to allow data to flow both ways.

The ASI path can be a direct ASI path, such as is the case with an ASI to fibre link, or the ASI signal could be converted to another format such as G.703 for transmission on a Telco G.703 link. The ASI signal can even be included within a multiplexed ASI stream to make use of existing spare capacity within an ASI link.

Application Diagram:



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.

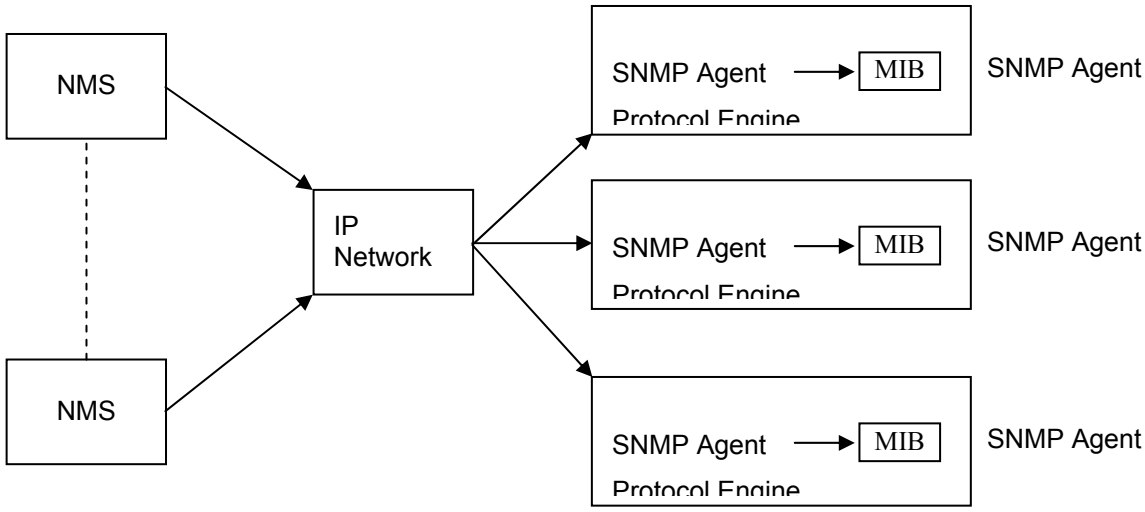
An *NMS* polls, or communicates with, an *agent*. An *agent* is a network management software module that resides in a *managed device*. An *agent* has local knowledge of management information and translates that information into a form compatible with SNMP. The *agent*, therefore, acts as an interface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

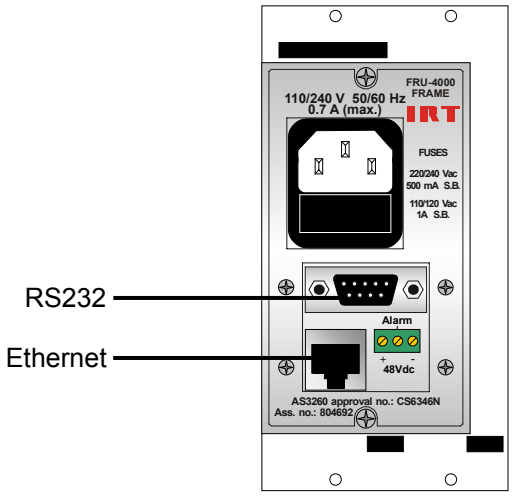
IRT Electronics currently employs SNMPv1 with its SNMP capable frames. The frame acts as an *agent* when fitted with a CDM-xxxx module. This module has its own designated slot next to the power supply so as to not affect the number of modules that the frame will take. Communication between the *NMS*,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

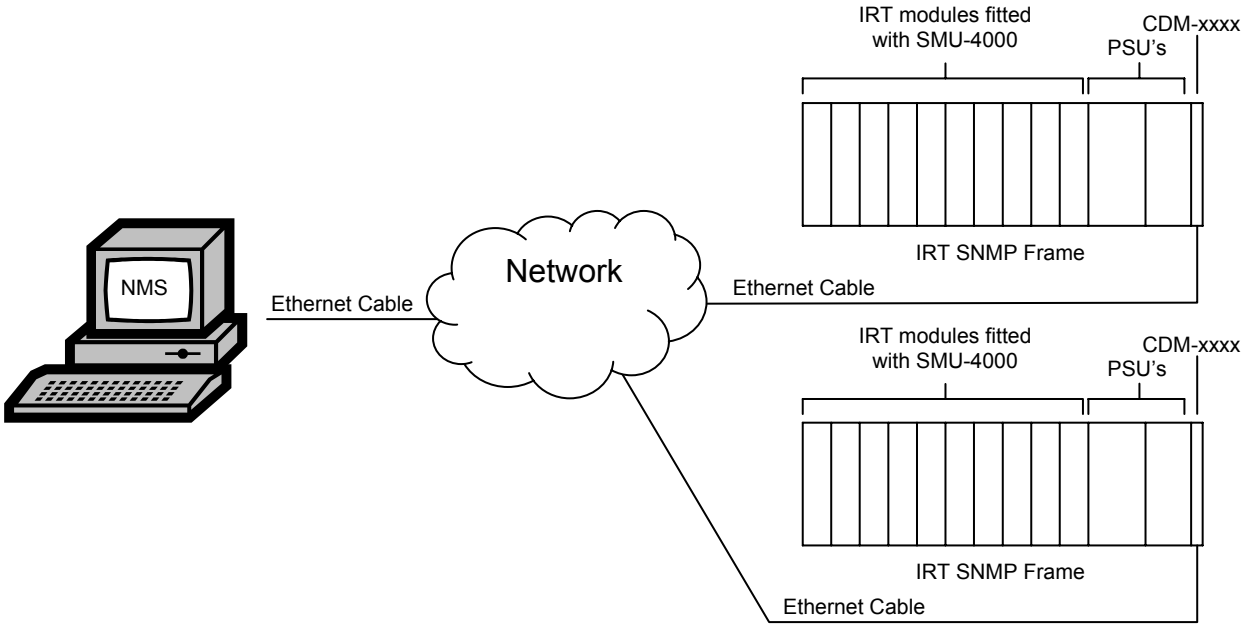
Frame parameters, such as Name, Address and Location, are set via an RS232 interface, a D9 connector on the rear of the frame below the mains inlet. A software terminal emulator, such as Tera Term or HyperTerminal, is used for setting and reading the parameters of the frame.

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

MEM-4552 SNMP Functions:

With the MEM-4552 installed in an IRT 4000 series frame with SNMP capability, the MEM-4552 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:

Alarm State:

- irt4552Alarms - An indication of the current state of the Urgent (ethernet) and Non-Urgent (ASI) alarms [noAlarms (1), ethernetAlarm (2), asiAlarm (3), enetAndAsiAlarms (4)].

Status:

- irt4552AsiInputPresent - An indication that the ASI input signal is present [notPresent (1), present (2)].
- irt4552EthernetLink - An indication that an Ethernet link has been established on the Ethernet port [inactive (1), active (2)].

Configuration:

- irt4552SetAsiPrgmNo - Set and read the program number that is being used for the ASI streams.
- irt4552SetAsiPayloadRate - Set and read the ASI output payload rate anywhere between 1Mb/s and the full allowable ASI payload rate of 213Mb/s. Unlike the program number, the ASI payload rate does not have to be set the same on both units.
- irt4552FpgaVersion - The firmware version of the main FPGA in the format ‘x.y’, where x is the major rev. no. and y the minor.
- irt4552SoftwareVersion - The software version of the main FPGA in the format ‘x.y’, where x is the major rev. no. and y the minor.
- irt4552Reset - Unit reset control. A set with a value of 2 sent to this OID will cause a system reset to occur. When queried returns 1.
- irt4552Trap - Trap automatically sent, if enabled, when an alarm occurs and when it clears [enabled (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