MDR2400-SR, MDR5800-SR and Orion 5825-SR Digital Radios

User Manual

Document Number:

PLESSEY

Issue Status

Issue	Revised Pages/Amendments
1	1
2	31
3	2
4	General – terminology definition PER used instead of BER to remove interpretation ambiguity between Block Error Rate and Bit Error Rate. Note Block (equivalent to packet) concept is still maintained within sections describing G.826 parameters to maintain consistency with G.826 terminology.
5	MIB Description chapter added, RESET Button Additions, chapter on setup of a serial connection between a PC/Laptop and the Element Management Port, IP network address description diagrams.
6	Amendments related to customer furnished equipment, Outdoor Unit temperature range update, Maintenance and Ordering section updates, Appendix added regarding Antennas.
7	Update on RESET Button functionality description, MIB definition additions, product receive sensitivity level adjustment, FCC notice updates (Warning – this page, Antenna Information – Appendix E), NMS picture update. Appendix D Indoor Unit firmware Upgrade Notice added. Appendix B MIB Elements ResetAllRFPerfomanceData and ResetAllG826 deprecated.
8	Added detail for new MDR2400 Outdoor Unit Added detail for new Indoor Unit – balanced and unbalanced connectors
9	Added detail for Orion 5825 – SR radio (16 QAM radio), 1+1 system. Changed to American English. Updated MIB as well as NMS, now JAVA based. Support for Windows XP, 2000 added. Added ftp firmware upload, Appendix G Added text required by the ATCB with regards to the Orion 5825 – SR.
10	Added additional text required by the ATCB to adhere to FCC requirements.

FEDERAL COMMUNICATIONS COMMISSION NOTICE

The equipment has been tested and found to comply with the limits for a Class A digital devices, pursuant to Part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

WARNING- To comply with FCC RF exposure limits, the antennas for this transmitter must be fix-mounted to provide a separation distance of 2 meters (6.6 ft) or more from all persons to satisfy RF exposure requirements.

Equipment installation and use

This equipment must be professionally installed. The operator of the spread spectrum or digitally modulated intentional radiator, or the installer if the equipment is professionally installed, is responsible for ensuring that the system is used exclusively for fixed, point-to-point operations.

NOTE 1 The MDR2400 frequency output must be limited to between 2412MHz and 2458MHz and the power to a maximum of +22dBm (2412-2426MHz) and +18dBm (2458MHz) for the required antennas for compliance to FCC standards, U.S. only.
NOTE 2 The center frequencies of the ORION5850 radio is limited by firmware between 5731MHz and 5844MHz as outlined in Sections 2.2.1.4 and 2.2.1.5 and the transmit power is limited to +24dBm. The device must be used with one of the antennas listed below to comply with FCC standards:

1) Gabriel Electronics parabolic antenna, model number SSP2-52B
2) Harris Corporation flat panel antenna, model number MT-20004.

INDUSTRY CANADA NOTICE

This device has been designed to operate with an antenna having a maximum gain of 33 dBi. Antenna having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is 50 ohms.

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Exposure of Humans to RF Fields

The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website: www.hc-sc.gc.ca/rpb

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Table of Contents

List of Abbreviations

BIT	Built-in-Test
AIS	Alarm Indication Signal
PER	Packet (or Block) Error Rate
DC	Direct Current
DCE	Data Communications Equipment
DRL	Digital Radio Link
DRS	Digital Radio Station
DTE	Data Terminal Equipment
GUI	Graphical User Interface
IU	Indoor Unit
ISM	Industrial, Scientific and Medical
LED	Light Emitting Diode
LOS	Loss of signal
Mbps	Megabits per second
N.C	Normally-closed
N.O	Normally-open
NMS	Network Management System
OU	Outdoor Unit
PC	Personal Computer
RF	Radio Frequency
RSSI	Received Signal Strength Indication
SNMP	Simple Network Management Protocol

1 Introduction

1.1 Radio Description

The MDR2400-SR and MDR5800-SR are ISM band digital radio systems that provide short to medium range, point-to-point digital communication with high data security at rates of T1, 2T1 or 4T1. Alternatively, the radio can be software configured to convey E1, 2E1 or 4E1. The radio can also be configured to bridge or route IP via a 10BaseT port. The data rates scale depending on the number of enabled T1/E1 tributaries and whether the data is being bridged or routed. The products make use of spread spectrum technology and may be operated license-free in the 2.4GHz and 5.8GHz ISM bands.

The Orion 5825-SR is a similar radio also operating in the 5.8GHz ISM band. Modulation can be switched between 16 and 32 QAM with digital output scalable up to 8T1/E1.

The radios are ideal for applications such as:

- Cellular/PCS base station interconnects.
- Telecommunications companies, cellular operators and private carriers.
- State Local and Federal Government communication systems.
- Video surveillance data distribution.
- Power utilities.
- Petroleum/gas collection companies.
- Rural communications.
- Emergency/disaster telephone service restoration.
- Internet distribution.

The radio consists of two main parts:

a. An Outdoor Unit operating in the 2.4 GHz or 5.8 GHz ISM frequency bands.

   This could be an MDR2400ET, an MDR5800 or an Orion 5850 unit.

b. An Indoor Unit, available with a Telecommunications (1, 2 or 4T1/E1 and up to 8T1/E1 on the Orion 5825) interface and a Data interface (10BaseT Ethernet).

   This could be an MDRTE, an MDRETU (75 Ohm BNC) or an Orion 25 unit. The MDRTE and MDRTEU units operate with the MDR2400ET *and* the MDR5800 Outdoor Unit.

Interconnection between the Outdoor Unit and Indoor Unit is achieved using a low-cost UV-protected STP (Screened Twisted Pair: 4 pairs) data cable and a UV-protected 2-core power cable. The split Indoor Unit and Outdoor Unit configuration is used for the lowest loss between the antenna and the transceiver, thereby ensuring optimal long-range performance.

The Outdoor Units use a Type-N RF (female) output connector for connection to a coaxial cable jumper when co-located with a 2.4 GHz or a 5.8 GHz antenna for applications where long range is required.

The Outdoor Unit can also be located remote from the antenna (tower base or indoor mounted). The RF connector is then connected to the

antenna via a coaxial transmission line. An optional indoor rack mounting adapter is available for mounting the OU, indoors.

The system is available for use in FCC regulated countries.

Model variants

Table 1. MDR2400 model variants		
Model Number	**Interfaces**	**Antenna Coupling**
MDR2400-ET1	T1/E1 10BaseT Ethernet	N-type Female
MDR2400-ET2	2 x T1 / 2 x E1 10BaseT Ethernet	N-type Female
MDR2400-ET4	4 x T1 / 4 x E1 10BaseT Ethernet	N-type Female

Table 2. MDR5800-SR model variants		
Model Number	**Interfaces**	**Antenna Coupling**
MDR5800-ET1	T1/E1 10BaseT Ethernet	N-type Female
MDR5800-ET2	2 x T1 / 2 x E1 10BaseT Ethernet	N-type Female
MDR5800-ET4	4 x T1 / 4 x T1 10BaseT Ethernet	N-type Female

Table 3. Orion 5825-SR model variants		
Model Number	**Interfaces**	**Antenna Coupling**
Orion 5825-ET8	currently only: 8 x T1 / 8 x E1 10BaseT Ethernet	N-type Female

Refer to section 8.6, page 59 for ordering details.

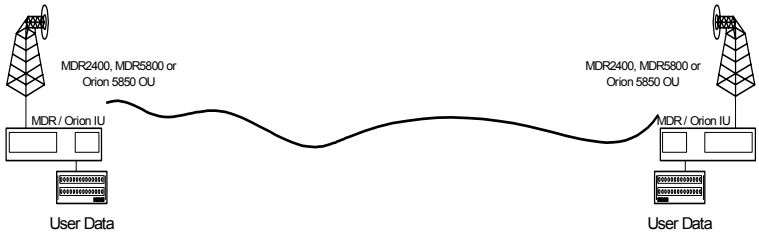
The Network Management System provides control and management of the product. SNMP support via an SNMP agent in the Indoor Unit ensures open network management compatibility.

Comprehensive data and RF loop-back functions ensure that the system is easy to install and maintain.

2 Technical Description

2.1 System Overview

A digital radio link (DRL) consists of a pair of MDR / Orion radio stations.



The radio stations consists of two main parts:

- An Outdoor Unit operating in the 2.4GHz or 5.8 GHz ISM frequency bands. The Outdoor Unit provides the radio transceiver functionality by accepting radio link data from the Indoor Unit and converting it to the 2.4GHz or 5.8 GHz ISM frequency band using spread spectrum or QAM modulation. The received signal is de-modulated and transmitted to the Indoor Unit in a digital format.
- An Indoor Unit, available with 1, 2, 4 or 8 T1 and 1, 2, 4 or 8 E1 data interfaces (choice of T1 or E1 is software selectable). The Indoor Unit combines nT1 or nE1 data with Wayside Service Channel serial data and link IP data to be transmitted across the radio link. The Indoor Unit also provides power to the Outdoor Unit.

Interconnection between Outdoor Unit and Indoor Unit is achieved using low cost data and power cables.

2.2 Outdoor Unit

The MDR2400 and MDR5800 Outdoor Units make use of Spread Spectrum modulation technology for license-free operation in the 2.4GHz and 5.8 GHz ISM bands. The Orion5850 Outdoor unit uses three software selectable bandwidths for license-free operation in the 5.8 GHz ISM band.

For operation, the ISM bands are divided into upper and lower frequency sub-bands. A ‘High Band’ Outdoor Unit transmits in the higher frequency sub-band and receives in the lower frequency sub-band, while a ‘Low Band’ Outdoor Unit transmits in the lower sub-band and receives in the higher sub-band. An MDR / Orion radio link will use a ‘Low Band’ Outdoor Unit on one end of the link to communicate with a ‘High Band’ Outdoor Unit on the other end.

The Outdoor Units use a Type-N RF output connector for connection to suitable 2.4GHz and 5.8GHz antennas for applications where long range is required.

The system is available for use in FCC regulated countries.

2.2.1 Frequency plans

The MDR5800 and the Orion 5850 Outdoor Units operate in the 5.725 GHz to 5.850 GHz ISM frequency band with predefined frequency channel plans (termed A, B, C and D). Channel plan D is user selectable / adjustable.

The MDR2400 Outdoor Units operate in the 2.400 GHz to 2.4835 GHz ISM frequency band with predefined frequency channel plans (termed A, B and D). Channel plan D is user selectable / adjustable.

2.2.1.1 MDR5800 Frequency Channel Plan A, B and C

The channel spacing is based on the bandwidth occupied by the spread spectrum signal (approximately 17 MHz) and is used to optimise link performance. In the case of plan A, plan B and C, note that both Outdoor Units of a link must be set up to the same frequency channel plan (i.e. A, B or C).

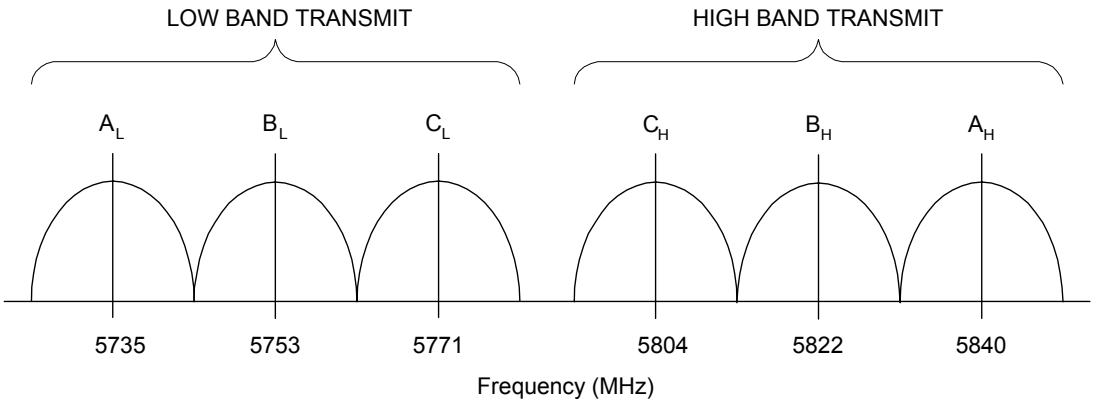


Figure 1. MDR5800 Frequency channel plans A, B and C

2.2.1.2 MDR2400 Frequency Channel Plan A, B (non-FCC)

The channel spacing is based on the bandwidth occupied by the spread spectrum signal (approximately 17 MHz) and is used to optimise link performance. In the case of plan A and B, note that both Outdoor Units of a link must be set up to the same frequency channel plan (i.e. A or B).

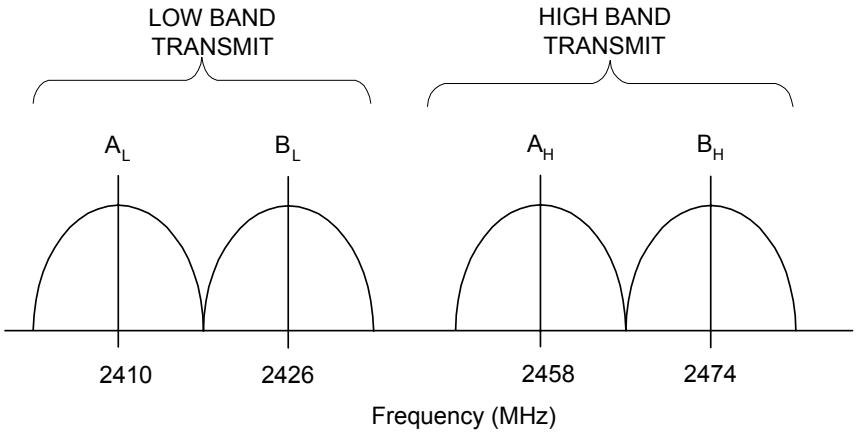


Figure 2. MDR2400 Frequency channel plans A and B

2.2.1.3 MDR2400 FCC Compliant Frequency Channels for the U.S. only

In countries where FCC compliance is required, only the following frequencies may be used:
Low band outdoor unit – 2412MHz to 2426MHz,
High band outdoor unit – 2458MHz.
Use frequency plan D (variable frequency) to set the outdoor unit.

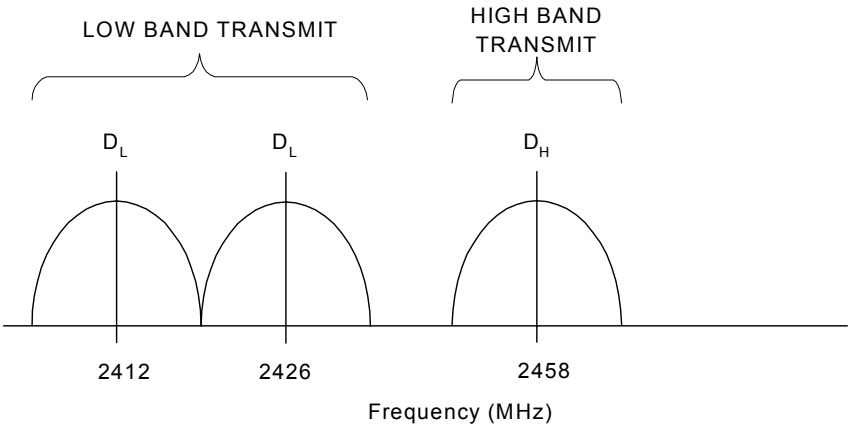


Figure 3. MDR2400 FCC Compliant Frequency Channels for the U.S. only

2.2.1.4 Orion 5850 Frequency Channels Plan A, B and C (FCC Compliant)

The channel spacing is based on the transmit bandwidth, either 3 MHz, 6 MHz, or 10 MHz, software selectable. Different bandwidths can be selected dependent on the optimum link performance; required system sensitivity versus data transfer rate.

Only channel frequencies that are FCC compliant can be selected through the configuration software. The channel frequency ranges are programmed into the radio firmware and cannot be adjusted by the user.

The radios were tested and approved for FCC compliance with the frequency ranges below, see Figure 4.

Low band Outdoor Unit:

Modulation Type	**Lowest Center Freq. (MHz)**	**Highest Center Freq. (MHz)**
8464kbps / 16-QAM	5731	5774
16928 kbps / 16-QAM	5732	5773
25392 kbps / 16-QAM	5734	5771

High band Outdoor Unit:

Modulation Type	**Lowest Center Freq. (MHz)**	**Highest Center Freq. (MHz)**
8464kbps / 16-QAM	5801	5844
16928 kbps / 16-QAM	5802	5843
25392 kbps / 16-QAM	5804	5841

NOTE 1 Both Outdoor Units in a link must be set to the same frequency channel plan (i.e. A, B, C or D) and modulator type. Also note that the frequencies differ for different transmit bandwidths, i.e. the frequency of channel A changes according to the transmit bandwidth.

NOTE 2 Figure 4 reflects all the frequency bands that could be obtained with the ORION5850 OU. Pre-programmed frequency ranges in the radio firmware prevent the user from selecting transmission options that will not meet FCC requirements.

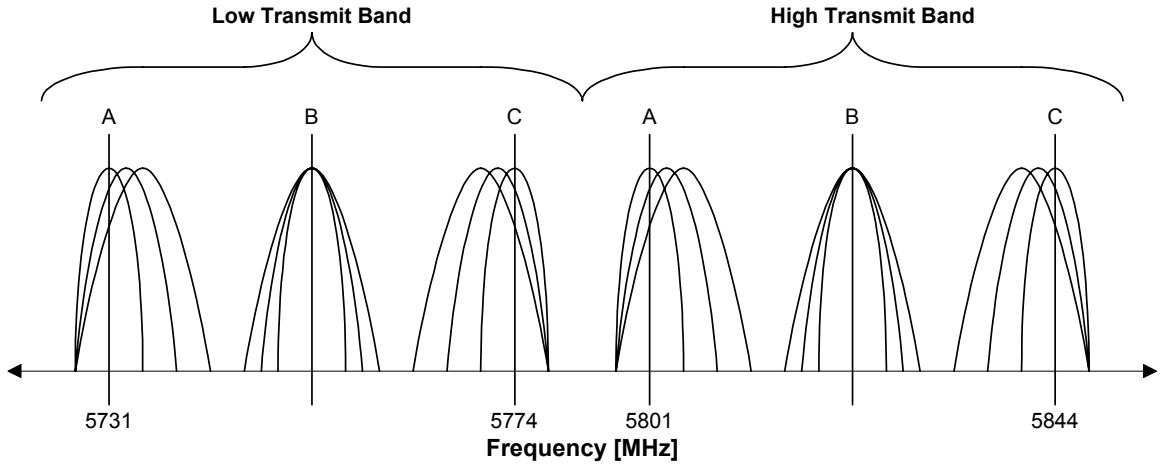


Figure 4. Orion 5850 Frequency channel plans A, B and C. Refer to NOTE 2 above with regards to FCC standards compliance of the different band plans.

2.2.1.5 Frequency Channel Plan D (FCC Compliant)

Frequency plan D allows independent control of transmit and receive frequencies. This allows a flexible frequency plan and can be used to overcome interference in the 2.4GHz and 5.8 GHz ISM bands.

The frequencies that can be used in the lower or upper sub-bands can be selected in 1 MHz increments. Performance degradation can be expected when operating using channel plan D mode with the chosen frequencies close to the sub-band edges i.e. a choice of one of the high frequencies in the lower sub-band and one of the lower frequencies in the upper sub-band.

The allocation of Channel plan D frequencies is shown in Table 4, Table 5 and Table 6.The Orion 5825 has up to three different sets of minimum and maximum frequencies, which are determined by the data rate setting of the OU.

Only channel frequencies that are FCC compliant can be selected through the configuration software. The channel frequency ranges are programmed into the radio firmware and cannot be adjusted by the user.

The radios ware tested and approved for FCC compliance with the frequency ranges below, see Figure 4.

Table 4. MDR2400 Channel plan D channel frequencies

Sub-band	Center Frequency (MHz)
L	2410-2426
H	2458-2474

NOTE the allowable operation range in FCC countries, page 16.

Table 5. MDR5800 Channel plan D channel frequencies

Sub-band	Center Frequency (MHz)
L	5735-5771
H	5804-5840

Table 6. Orion 5850 Channel plan D channel frequencies

RF BW [MHz] / Data Rate [kbps]	Center Frequency (MHz)	
	Lower Sub-band	Upper / Higher Sub-band
2.6 / 8464	5731-5774	5801-5844
5.4 / 16928	5732-5773	5802-5843
8.0 / 25392	5734-5771	5804-5841

2.2.1.6 Orion 5850 Modulator Types

The Orion 5850 can operate with different modulator types, the trade-offs being better radio performance versus higher data throughput. The changes can be made via software, using either the Orion NMS / GUI or an SNMP client application.

Modulator types and frequency bands that were tested and approved for compliance with FCC regulations are specified in Sections 2.2.1.4 and 2.2.1.5.

Table 7. Orion 5850 Modulator Types				
Data Rate [kbps]	**Modulation type**	**Raw data throughput [bit/sec]**	**Typical Payload**	**Approx. OU output spectrum BW**
8464	16-QAM	8 464 052	4T1/E1 + 150kbit Ethernet	2.6 MHz
16928	16-QAM	16 928 105	8T1/E1 + 150kbit Ethernet	5.4 MHz
25392	16-QAM	25 392 157	8T1/E1 + 9.5Mbit Ethernet	8 MHz

NOTE 1: Changing the modulator type of an Orion 5850 Outdoor Unit may take up to 30 seconds. During this period, the link will not be available. Changing the OU modulator type does not support Auto Recovery thus; the modulator type of the remote station must be changed before the modulator type of the local station is changed.

2.2.2 RF Power Output Options

The Outdoor Unit is designed for use in countries that have adopted FCC standards. It is possible to adjust the output power on the OU using the supplied NMS software or a SNMP Management application. The FCC standards for the MDR2400 unit require a limited output power as stated on page 2, U.S. only.

NOTE 1 The firmware on the Orion and MDR type OUs will not accept power level settings that fall outside the FCC compliant levels.

2.2.3 MDR2400, MDR5800 and Orion 5850 Outdoor Units

The Outdoor Units transmit and receive RF signals through a diplexer interfaced via an RF cable to an external antenna. The unit has a type-N connector for connection to the RF cable used between the OU and the antenna.

The Outdoor Unit houses the following main parts:

c. Transmit/Receive Modules
d. Baseband Modulator/Demodulator Circuitry
e. Microcontroller/Framing & Buffering Circuitry
f. Power Amplifier
g. Diplexer

2.3 Indoor Unit

The Indoor Unit is designed for mounting in a 19" rack, occupying a 1U slot. It can also be used as a table-top system.

The Indoor Unit accepts n x T1/nE1 user payload channels and combines it with Wayside Service Serial Data and IP data to be transmitted across the radio link.

The Indoor Unit is fitted with a DC power supply.

There are three types of Indoor Units:

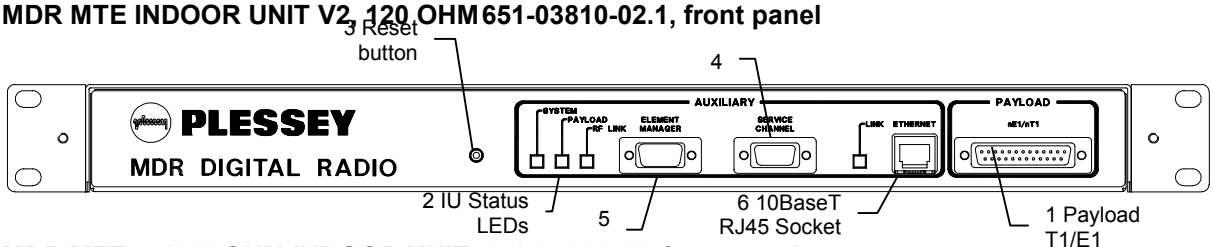
An MDR 120 Ohm (scalable up to 4 T1/E1),

an MDR 75 / 120 Ohm (scalable up to 4 T1/E1),

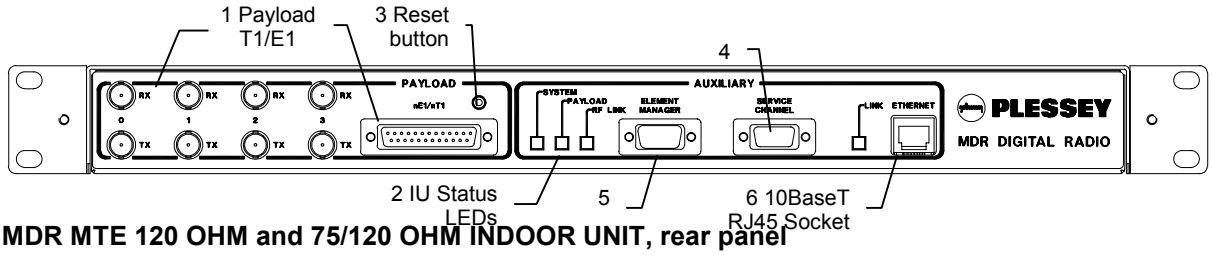
and an Orion 25 Indoor Unit (scalable up to 8 T1/E1).

A firmware variant exists that determines whether the Outdoor Unit used with the MDR Indoor Unit is an MDR2400 or an MDR5800. The Indoor Unit hardware is independent of the type of Outdoor Unit i.e. whether it is an MDR2400 or MDR5800. The Orion 25 Indoor Unit is used with the Orion 5850 Outdoor Unit, but can also support the MDR2400 and MDR5800 OUs if the appropriate firmware version is loaded on the Indoor Unit.

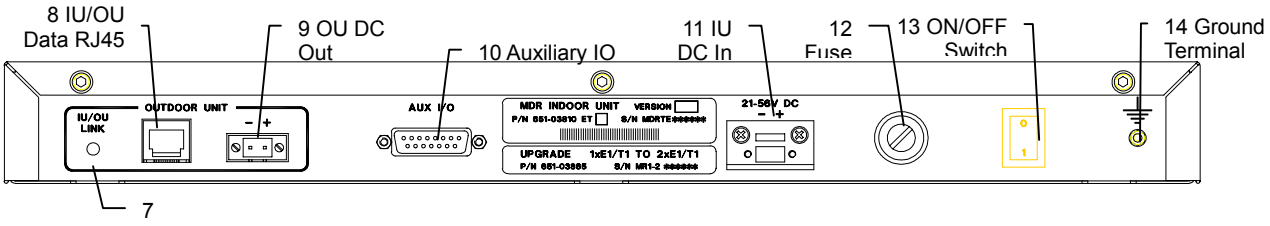
MDR MTE INDOOR UNIT V2, 120 OHM 651-03810-02.1, front panel



MDR MTE 75/120 OHM INDOOR UNIT 651-04008-02, front panel



MDR MTE 120 OHM and 75/120 OHM INDOOR UNIT, rear panel



Orion 25 INDOOR UNIT 651-04189-01 (front panel – no rear panel connectors)

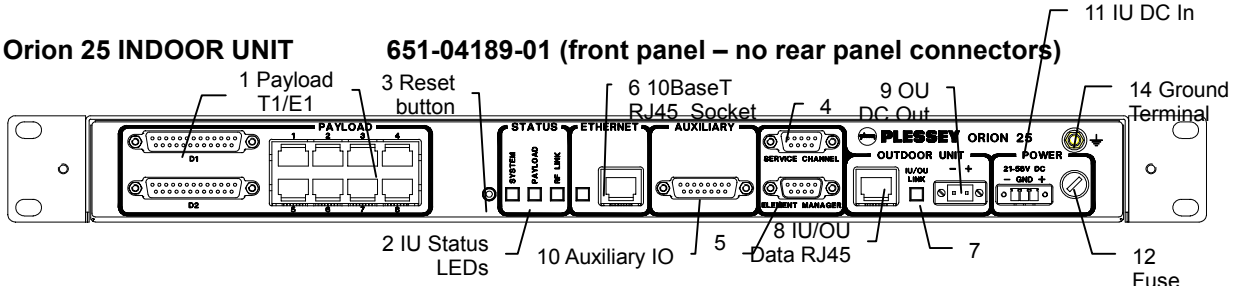


Figure 5. Indoor Unit Connector Panels (numbers refer to paragraph number 2.3.x)

2.3.1 Payload Interface Options

The Indoor Unit can be configured for nT1 or nE1 operation.

h. 1, 2, 4 or 8(Orion 25) x T1 (1.544 Mbps)
i. 1, 2, 4 or 8(Orion 25) x E1 (2.048 Mbps)

For T1 connectivity, bipolar AMI or B8ZS line coding is software selectable.
For E1 connectivity, bipolar AMI or HDB3 line coding is software selectable.

Line coding on the Orion 25 IU may be selected separately for tributary channels 1 to 4 and 5 to 8 when used with an Orion 5850 OU.

The payload can be connected on:

- Unbalanced 75 Ohm BNC connectors, 75/120 Ohm IU only (RX= In, TX= Out).
- Balanced 120 Ohm, 25 way D-type connectors (refer to paragraph 4.2.4 for the pin outs).
- Balanced RJ48C connectors (refer to paragraph 4.2.5 for the pin outs).

2.3.2 1+1 Redundancy Protected Payload System

The MDR and Orion radios can be used in a 1+1 redundant mode system to protect the tributary payload data carried over a radio link. This system detects the quality of the link over which it is receiving data and allows switching between two parallel radio links to protect the user data against link failures.

Please refer to Appendix I, or the Protection Kit user manual, doc. no. 862-02236 for detail on the functioning of this system.

2.3.3 Indoor Unit Status LEDs

The Indoor Unit LED functionality is described as follows:

SYSTEM

Green OK, Orange (OU/IU Comms Error), Red (OU/IU Comms Down)

PAYLOAD

Green OK, Orange (AIS Detected), Red (LOS Detected)

RF LINK

Green OK, Orange (FEC Correcting Errors), Red (FEC unable to correct errors)

In ALL cases flashing red and orange LEDs imply historic alarm conditions (The alarm can be cleared using the front panel button ‘position 1’ : see next section).

Flashing LED’s and yellow indicators (Orion NMS) may also be cleared by clicking on the “Clear Alarms” button in the Orion NMS Main Radio Window.

2.3.4 Reset / Configuration Button

The functionality of the Reset Button is described below. These functions are used to set up the radio. A paper clip or similar “probe” can be used to push the “reset / configuration button”. The count value / LED count at which the button is released, will be the "new" configuration / state of the IU.

The count value is determined by the different LEDs lighting up. ‘Position 1’ being RF Link LED (Green), 2 being Payload LED (Green), 3 being System LED (Green), 4 being RF Link LED (Orange), 5 being Payload LED (Orange) and 6 being System LED (Orange) etc.

Reset button functions (according to "LED reset" number)

1. Clear Front Panel LEDs (and associated alarms in IU)
2. Clear Event Log in the Indoor Unit
3. Reset the Indoor Unit (**does not** reset the non-volatile memory storing the IU’s configuration parameters)
4. Routed Configuration: Reset the IU configuration parameters that are stored in non-volatile memory (BATTERY-BACKED STATIC RAM) and configure as a ‘Far Side IU’ : i.e. for a ROUTED IP configuration, set the Ethernet IP address as 10.11.1.2, Element Manager IP address to 10.12.1.2
5. Routed Configuration: Reset the IU configuration parameters that are stored in non-volatile memory and configure as a ‘Near Side IU’ : i.e. for a ROUTED IP configuration set the Ethernet IP address as 10.2.1.2, Element Manager IP address to 10.13.1.2
6. Routed Configuration: If you are not sure how the IU is configured (NEAR or FAR side IU), reset it AS IS i.e. reset the ‘Near Side IU’ or ‘Far Side IU’ configuration parameters depending on how the IU is currently configured.
7. Bridged Configuration: Reset the IU configuration parameters that are stored in non-volatile memory (BATTERY-BACKED STATIC RAM) and configure as a ‘Far Side IU’ For a BRIDGED IP configuration, see Appendix C of this document for a description of the default IP addresses.
8. Bridged Configuration: Reset the IU configuration parameters that are stored in non-volatile memory and configure as a ‘Near Side IU’. For a BRIDGED IP configuration, see Appendix C of this document for a description of the default IP addresses.

9, 10, 11 RESERVED

12. Set up Indoor Unit with E1 tributaries.
13. Set up Indoor Unit with T1 tributaries.
14. Deactivate buttons 4 onwards.
15. Toggle SNMP and FTP Servers ON/OFF (V3.00+ firmware)
16. DHCP ON (V3.00+ firmware)
17. DHCP OFF (V3.00+ firmware)
18. Ethernet MAC learning enabled via front panel
19. Transparent ethernet mode enabled via front panel

20. EEprom erased via front panel (MDR Only)
21. OU back-to-back enable / disabled toggle via front panel

NOTE All buttons can be REACTIVATED (i.e. undoing a 14 'reset') by doing a power-on reset while holding the front-panel Reset Button in for 1 LED count.

NOTE

POSITIONS 4, 5, 6, 7 and 8 RESET THE INDOOR UNIT TO FACTORY DEFAULTS – THESE RESETS ARE TYPICALLY ONLY USED ONCE (THESE CHOICES RESET CERTAIN ADJUSTABLE PARAMETERS IN NON-VOLATILE MEMORY IN THE INDOOR UNITS). IF CHANGES ARE MADE TO THE CONFIGURATION PARAMETERS AND THE USER DOES NOT WANT THESE TO CHANGE WHEN A UNIT IS RESET, THE INDOOR UNIT CAN BE POWER-CYCLED OR POSITION '3' MUST BE USED E.G. THIS TECHNIQUE IS USED IF THE IP ADDRESSES ASSOCIATED WITH THE NETWORK INTERFACES ARE ADJUSTED – THE PROCESSOR NEEDS TO BE RESET TO ALLOW THE CHANGE/S TO BE IMPLEMENTED.

IF YOU OVER-RUN THE SELECTION YOU REQUIRE, CONTINUE UNTIL THE LEDs GO BLANK – THEN, START AGAIN (OPTION AVAILABLE WITH RELEASE 2+ OF IU FIRMWARE).

2.3.5 Service (Wayside) Serial Data Channel

This port supports asynchronous full duplex, serial data transfer at a speed of 115200 bps.

The interface type is RS-232 configured as DCE (Data Communications Equipment).

Handshaking can be None, Hardware.

2.3.6 Element Manager Port

This port is used for communication with the NMS software or with an SNMP manager to control the MDR system. The port must be connected to a serial port (configured for a speed of 115200 bps) on a personal computer to use the NMS software.

The interface type is RS-232 configured as DTE (Data Terminal Equipment).

Hardware handshaking is used.

2.3.7 10BaseT Ethernet RJ45 Port

This port is used for communications with the NMS / GUI software from a laptop / PC or with an SNMP manger to control the system. It can also be connected to a hub for 10BaseT wayside Ethernet throughput.

The interface type is DTE (Data Terminal Equipment) and can support Full and Half Duplex Ethernet connections. Select the Ethernet Duplex mode from the following MIB element: 1.3.6.1.4.1.1316.1.1.1.4.16 mdrmteEthernetFullDuplex.

Take note that connecting the radio to an Ethernet hub requires the Ethernet interface to operate in Half Duplex mode.

2.3.8 IU/OU Link LED

This LED indicates if there is a suitable electrical connection between the Indoor and Outdoor Units[1].

2.3.9 IU/OU Data Interconnect RJ45

This receptacle accepts an RJ45 plug that connects to UV-protected STP (Screened twisted pair) cable used between the IU and the OU.

2.3.10 IU/OU Power Interconnect

This connector (socket) is used for power interconnection between the IU and the OU. The connection is made using UV-protected 2-core cable. The cable is connected to a GREEN, two-pin connector, a plug.

CAUTION

The polarity sense (labelled) must be maintained between the IU and the OU.

2.3.11 Auxiliary In/Out Port

The auxiliary in/out port is used for remote monitoring and control. The following are provided

j. Two inputs (for sensing contact closure or opening) are provided to sense site alarm inputs. The states of these alarm inputs can be monitored with NMS, as well as from an SNMP Management Station.

k. Two relay contact outputs, normally-open and normally-closed contacts, are provided as alarm / auxiliary outputs. Output states are software customised and controlled. The outputs are used to indicate alarm or other states selected by the operator via the NMS or a SNMP Management Station.

[1] NOTE that on V1 hardware only the Ethernet Physical interface is checked with this LED, not the RS232/485 interface. The integrity of the RS232/485 interface is checked using the front panel “System LED”. On later versions the RS232/485 interface is no longer used.

2.3.12 IU DC Power Input

This connector (socket) is used for power input to the IU. The connection is made using 2 or 3-core cable. The cable is connected to a two pin GREY connector on the MDR radio and a THREE pin GREEN connector on the Orion unit - both are plugs. The polarity-sense (labelled) must be observed and implemented. A ground connection is available on the three-pin connector. This ground connection is not required if the ground terminal is connected (2.3.15).

2.3.13 Fuse Holder

This holder is used to hold a fuse (2A, slow blow fuse).

2.3.14 ON/OFF Switch

This switch is used to control power input to the Indoor Unit (and indirectly the Outdoor Unit). No switch is fitted to the Orion IU. The unit will start up as soon as the required DC voltage is applied.

2.3.15 Ground Terminal

This is used to accept connection to an earth strap, terminated with a crimped earth lug. Refer to the installation chapter for details on wire/earth lug requirements. A ground connection is also available on the three-pin IU DC power connector.

3 Planning

This chapter is aimed at management and planning staff to enable them to assess the requirements for installing an MDR / Orion digital radio link.

3.1 System Type Selection

The system uses an Outdoor Unit with a type-N RF output for connection to a range of antennas.

The MDR / Orion is aimed at FCC regulated markets.

Antenna polarization can used to co-locate multiple systems.

Antenna polarization can be used to overcome interference.

3.1.1 Antenna selection

The antenna type must be selected before the system is to be installed. The chosen antenna must enable the system to operate with sufficient link fade margin without excessive cost and allow the user's 'link availability requirements' to be met.

The main consideration when selecting an antenna is antenna gain measured in dBi. A path loss analysis is highly recommended to determine the antenna gain needed for adequate fade margin. The table below shows antenna selection guidelines for some configurations. The distances are calculated for a 20 dB link fade margin.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.

Table 8 MDR5800 Antenna Selection

Antenna Type	Gain (dBi)	MDR OU Typical Distance (Km)	Power level (dBm)
0.15 m Flat panel	18	9	24
0.3 m Flat panel	24	30	24
0.6 m Flat panel	28	80	24

Table 9 Orion 5850 Antenna Selection

Antenna Type	Gain (dBi)	MDR OU Typical Distance (Km)	Power level (dBm)
0.6 m Flat panel (MT-20004)	28	80	24

Table 10 MDR2400 Antenna Selection

Antenna Type	Gain (dBi)	Distance (Km)	Power level (dBm)
1.2 m Parabolic Antenna	27	80	18

3.2 Site Evaluation

When planning a site for a digital radio link, it is of the utmost importance that you take the operational environment of the proposed site into account.

The combined effect of atmospheric environmental factors such as rain and lightning, atmospheric attenuation, signal path obstruction, propagation fading, air temperature gradients, ice build-up, wind and solar radiation can contribute towards reducing the level of performance of the system. The 2.4 GHz and 5.8 GHz bands are not adversely affected by rain, ice or snow. Severely cold and excessively warm climatic conditions outside the scope of the operating temperature range can affect the function of the system, especially the outdoor equipment (see *Environmental Characteristics* on page 52 of this manual).

Also, if masts are not sufficiently rigid, very strong winds can affect the antenna beam alignment and Outdoor equipment reliability due to wind force build-up and/or vibration of the mast-mounted equipment.

3.3 Multipath Effects

The effects of multipath propagation can influence the radio. Understanding these effects will help when installing a radio link and maximise the reliability of the link.

Multipath fading occurs when the receiving antenna receives not only the direct signal from the transmitting antenna but also a signal from the transmitting antenna that has reflected off the ground or nearby obstacles. The reflected signal takes a longer path to reach the receiver and acts as interference since it is not in-phase with the direct path signal. The amplitude of the interference can be almost equal to that of the direct path signal, thus degrading the performance of the link.

Multipath propagation is dependent on transmit frequency and the specific geometry of the link such as antenna heights, distance between the antennas and the local terrain. To counteract multipath propagation, the installer can change the frequency at which the link operates or adjust the height of one or both of the antennas.

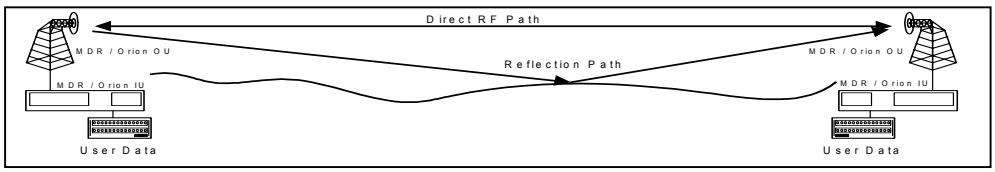


Figure 6. Multipath Effects.

3.4 Interference Considerations

The ISM frequency bands are used by other devices that can cause interference to the MDR / Orion radio systems. Interference can be avoided by careful planning of the system installation. The available methods for providing isolation from interfering radiators are the following:

l. Frequency diversity

m. Antenna polarization

It is recommended to scan the proposed installation areas with a spectrum analyzer prior to installation to establish the presence of interference. The spectrum analyzer feature available on the NMS / GUI may also be used. If interference is detected on the path, the GUI, via laptop connection, can be used to select a new channel plan (A, B, or C) to “steer around the interferer, or to create a new custom channel plan (Plan D) to avoid the interference. SNMP network architecture, if employed, may also be used to make the frequency plan changes. The frequency spectrum should be scanned over a sufficient time period to ensure that periodic transmissions are recorded.

Interferers will cause problems if their amplitudes are not more than 20 dB below the intended receive power level. A link path loss calculation should be performed to determine the expected receive power level.

The procedure for selecting the optimum antenna polarization and system frequency plan is the following:

n. Perform a spectral analysis at each site in the link direction using a high gain antenna.

o. Repeat the spectral analysis for vertical and horizontal polarization.

p. Select the polarization with the lowest interfering levels as the system antenna polarization.

q. Consult the MDR / Orion frequency channel plans as shown in section 2.2.1 and select the frequency plan that would operate in an interference-free band.

r. Install the ‘High Band’ and ‘Low Band’ Outdoor Units at the sites where they would experience the lowest interference in their respective *receive* bands.

3.5 Microcell Backhaul Applications of MDR / Orion Digital Radios

In applications where more than one independent and separate links, need to radiate from a central site, a number of parameters can be taken advantage of, to provide isolation and minimise interference between these links:

- Frequency multiplexing
- Antenna polarization
- Choice of High Antenna Gain

It is important to note that these methods only provide isolation between two radio Systems, and that power levels in the separate systems should be balanced to ensure correct operation.

3.5.1 Setting the Transmitted Power Levels

To minimise interference, received power levels should be balanced between separate radio links. This means that transmit power levels should be set to provide similar levels of received power, as indicated by the RSSI values of the adjacent receivers at the central site. Power levels are easily adjusted via point and click selection utilizing the provided NMS / GUI, installed on your laptop or via SNMP network architecture.

3.5.2 Frequency Multiplexing

The MDR2400 offers three frequency channel plans, the MDR5800 four and the Orion 5850 also four. Refer to paragraph 2.2.1 for more detail on the frequency channel plans. A radio link requires two channels (one for transmit and one to receive) to provide full duplex operation. Each radio has a high and a low sub-band, one that it uses for transmission and another for reception. Terminology definition: the 'High-band Outdoor Unit' of a system transmits on the higher of the two sub-bands. The 'Low-band Outdoor Unit' of a system transmits on the lower of the two sub-bands. A system (link) always has one High Band and one Low Band Outdoor Unit. It is important to note that unwanted transmitted signals in adjacent frequency bands can affect other receivers operating in an adjacent band if insufficient antenna isolation is provided. A solution is to group high-band or low-band Outdoor Units at the central site, rather than group high and low-band Outdoor Units together.

3.5.3 Antenna Isolation

Separate links at a central site will have sufficient isolation when radio systems operate outside the radiation beamwidth or side lobes of the system antenna. The achievable isolation can be established by examining the measured radiation patterns of the system antennas. Directional isolation can be used if the antenna radiation is 15 dB or lower relative to the adjacent main beam. Antennas with high directionality will allow reduced angular separation of adjacent systems. Antenna cross-polarization isolation can be used for adjacent radio links, radiating in the same direction. Typical isolation of 30 dB can be achieved using high quality antennas.

4 Installation

This chapter describes a recommended installation procedure for the MDR2400, the MDR5800 and the Orion 5850.

Before installation / departure to site

1. Carefully open all shipping boxes and look for any obvious damage that might have resulted during shipment.
2. Do an operational bench test to verify the functionality of the system. Confirm that both radios have the correct IP configuration (refer to page 108, paragraph 0) for "local" and "remote" sites. Use the provided NMS / GUI installed on a laptop / PC to configure / analyze the radio via a serial / ethernet connection to the IU element manager port. Local and remote IP addresses labels may be fitted to the IU's and can be verified with those listed in the GUI.
   Both radios should be on the same channel plan (paragraph 2.2.1) and power should be set to an appropriate test level (not muted).
   NOTE Use at least 60dB attenuation when directly connecting two OU RF ports.
   After initial power up and a minute or so of "settle time", clear any flashing LEDs via the front panel reset button (paragraph 2.3.4) or the GUI. The IU status LEDs should be green with no errors indicated and remain green for an appropriate time span (at least 1-2 minutes).
3. After satisfactory results, disconnect the units and transfer to the installation site for permanent installation.

NOTE It is recommended that the installer have previous experience in installing radio communication equipment or has attended a training course from the supplier for the purpose of understanding how to set-up and configure an MDR / Orion radio.

Recommended installation procedure

1. Install the Indoor Unit.
2. Prepare and connect the cables to the Indoor Unit.
3. Install the Outdoor Unit and antenna.
4. Install the Indoor-to-Outdoor Unit interconnection cables (the power and data cables).
5. Turn the Indoor Unit power on.
6. Perform the initial software setup using the supplied NMS application
7. Repeat item 1-5 for the remote site.
8. Align the antennas (use the RSSI voltage on the OU or the RSSI value from the MIB or the NMS Graphic User Interface to assist with the setup).
9. Perform a functional test and commission the link.
10. Connect to user data.
11. Start the system.

Installation of the MDR / Orion elements are described in the following sections:

s. Installing the Indoor Unit (paragraph 4.2, page 32)
t. Installing the Outdoor Unit and Antenna (paragraph 4.3, page 38)
u. Installing the interconnection cables (paragraph 4.4, page 38)

4.1 Customer Furnished Tools and Equipment

The following table lists tools and equipment required to install the MDR2400-SR, the MDR5800-SR and the Orion 5825-SR system.

General, IU-to-OU Interconnect

- Cable cutting and stripping tools.
- Ground lug crimp tools.
- 3 mm flat screwdriver - IU to OU power cable.
- RJ45 crimp tool - IU to OU data cable.
- Soldering iron.

v. Ground cable or strap rated at 45A with 5 mm ground lug for grounding the Indoor and Outdoor Units.
w. Cable ties, used to secure the cables to the mast at regular intervals.

IU

- Pozi #2 screwdriver - IU mounting in a 19" rack and the ground lug.
- 7mm Spanner – Attaching the earth cable to the IU.
- 2.5mm Allen key - To change the position of the IU mounting brackets.

x. DC power supply cable: minimum 2.5 mm square conductor, rated for 10 A. For connection between the power supply and the Indoor Unit DC connector on the rear panel. (The DC connector is on the front panel of the Orion IU.)

- IU ground lug: 10-4 (10 square mm for wire and hole big enough for M4 thread)

OU

- 13 mm wrench / spanner – used for attachment of OU to mounting bracket and mounting bracket to pole. Also used to close OU with hinge type connection box.
- 2.5 mm Allen key - used to tighten OU connection box cover fasteners.

- OU ground lug: 10-8 (10 square mm for wire and hole big enough for M8 thread)
- Multimeter (recommended) to measure RSSI at OU during antenna panning. The RSSI level may also be read from the NMS / GUI via laptop connection to the IU, indoors

Please refer to paragraphs 4.3.1 and 8.5.10 for details on the RF and data cables, which are also customer furnished equipment.

4.2 Indoor Unit

4.2.1 Introduction

This section describes the recommended installation procedure for the Indoor Unit. The Indoor Unit is designed for mounting in the DIN 41494 (19") racking standard and occupies a 1U high slot. Desktop mounting is also possible.

The Indoor Unit's payload (nT1, nE1 and 10BaseT Ethernet) and Service Channel ('Wayside serial') data interfaces and Element Management interface are located on the front panel. Input Power, Auxiliary alarm and 'IU/OU Interconnect' interfaces are located on the rear panel for the MDR IU, suitable for rack installations and on the front panel for the Orion IU, simplifying accessibility.

Refer to paragraph 2.3, page 20 for a view of the IU ports.

The recommended installation procedure for the Indoor Unit is the following:

y. Install the Indoor Unit in the rack.

z. Ground the Indoor Unit. This is required for safety and to minimise radiated emissions.

aa. Connect the DC power supply. There is no ON/OFF switch on the Orion IU, thus connecting the DC power supply will start up the radio.

bb. Connect Payload data ports (front panel).

cc. Connect Auxiliary In/Out port (optional).

dd. Connect Service Channel (Wayside) serial port (optional).

ee. Connect the Element Manager port using the supplied cable (front panel).

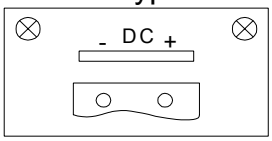
4.2.2 Installing the Indoor Unit in a Rack

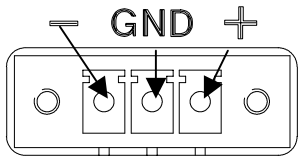
1. Slide the Indoor Unit into the 19" rack and secure to the rack using four (4) APPROPRIATELY sized bolts for size and rack threads provided. M6 x 18 mm screws are recommended.
2. Ground the Indoor Unit by connecting the ground cable or strap between the station ground and the ground terminal on the Indoor Unit rear / front (Orion) panel.

4.2.3 Connecting a DC Power Supply

WARNING – See section 0 for specification of the power supply.

1. Observing the polarity of the supply, wire up the supplied power connector cable plug and connect it to the DC supply (Voltage range as indicated on the Indoor Unit) through a minimum 2 A slow blow circuit breaker.
2. Check the supply voltage using a multimeter.
3. Secure the connector screws to the unit.

DC Power Connector Pinouts (MDR IU)		
Indoor unit connector: GREY	**Pin No**	**Signal**
2-pin Wieland Type 8213 Socket 	+	DC POWER
	-	DC POWER RETURN

DC Power Connector Pinouts (Orion IU)		
Indoor unit connector: GREEN	**Pin No**	**Signal**
3-pin Phoenix Type 18.27.87.1 Socket 	+	DC POWER
	GND	GROUND PIN
	-	DC POWER RETURN

4.2.4 Balanced Payload Data : DB25

1. Assemble the (nE1) / (nT1) payload data input and output cable. See the table below for Indoor Unit connector pin assignments.
2. Connect the payload data cable to the DB25 connector on the front panel of the Indoor Unit.

Standard termination of this port is 120 Ohms. On the Orion 25, 75 Ohms termination is available on request (please contact the factory).

NOTE Rx implies IN (signal expected to go INTO the interface), Tx implies OUT (signal coming out of the interface)

Tribs 1-4 are connected on D1 on the Orion 25 and MDR IU. In a similar fashion tribs 5-8 are connected on D2 for the Orion 25 radio, that is pin 2 = RTIP6, pin 10 = RTIP5 and so on.

D-Type Payload Data Connector Pin #	Pin Name	Tributary	Direction
1	GND / Earth		N/A
2	RTIP2	2	RX +
3	RRING2	2	RX -
4	GND / Earth		N/A
5	TTIP2	2	TX -
6	TRING2	2	TX +
7	GND / Earth		N/A
8	GND / Earth		N/A
9	RRING1	1	RX +
10	RTIP1	1	RX -
11	GND / Earth		N/A
12	TRING1	1	TX -
13	TTIP1	1	TX +
14	TRING3	3	TX -
15	TTIP3	3	TX +
16	GND / Earth		N/A
17	RRING3	3	RX+
18	RTIP3	3	RX-
19	GND / Earth		N/A
20	TTIP4	4	TX-
21	TRING4	4	TX+
22	GND / Earth		N/A
23	RTIP4	4	RX+
24	RRING4	4	RX-
25	GND / Earth		N/A

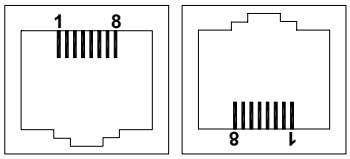
4.2.5 Balanced Payload Data : RJ48

1. Assemble the T1 / E1 payload data input and output cable. See the table below for Indoor Unit connector pin assignments.
2. Connect the payload data cables to the RJ48 connectors (numbered 1-8 for tribs 1-8) on the front panel of the Indoor Unit.

Standard termination of this port is 110 Ohms. On the Orion 25, 75 Ohms termination is available on request (please contact the factory).

It is recommended to use a cable that connects to pin 1,2,4, and 5 only since the other pins on the RJ48 are not used to transfer data.

NOTE Rx implies IN (signal expected to go INTO the interface), Tx implies OUT (signal coming out of the interface)

RJ48C Socket	Pin	Description	Direction
	1	R (Ring 1)	TX
	2	T (Tip 1)	TX
	3,6	50 Ohm terminated	N/A
	4	R1 (Ring)	RX
	5	T1 (Tip)	RX
	7,8	No Connection	N/A

NOTE Use Twisted Pair Cable conductors for pins: 1 & 2, 3 & 6 and 4 & 5.

4.2.6 Unbalanced Payload Data : BNC

One of the variants of the MDR Indoor Unit has a set of 75 Ohm BNC's on the front panel as well as the DB25 connector.

- Rx implies IN (signal expected to go INTO the interface)
- Tx implies OUT (signal coming OUT of the interface)

NOTE Tribs are numbered 0-3 on the front panel, but are called 1-4/1-8 in the NMS / GUI.

4.2.7 Connecting Auxiliary In/Out (Optional)

The auxiliary in/out port is used to:

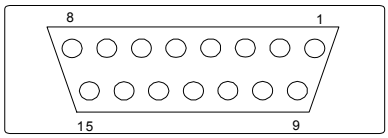
ff. Monitor switch-closure events using two isolated inputs.

gg. Control line connections using normally-open and normally-closed relay outputs.

Connect the port:

1. Assemble an auxiliary in/out cable using a 15 way D-type male connector according to connector pin assignments shown in Table 11.
2. Connect to the cable Indoor Unit auxiliary in/out connector.
3. Secure the connector using locking screws.

NOTE The Orion and MDR Indoor Units are equipped with only two relays. The Normally-Open and Normally-Closed output for each of the two relays are however provided on the Auxiliary Connector for convenience.

Table 11. Auxiliary In/Out Connector Pin Outs		
Indoor unit connector	**Pin No**	**Signal**
15-pin D-type female 	1	OUTPUT 1 COMMON
	2	OUTPUT 1 NORMALLY-OPEN
	3	OUTPUT 1 NORMALLY-OPEN
	4	OUTPUT 1 NORMALLY-CLOSED
	5	OUTPUT 1 NORMALLY-CLOSED
	6	OUTPUT 1 COMMON
	7	OUTPUT 2 COMMON
	8	OUTPUT 2 COMMON
	9	OUTPUT 2 NORMALLY-OPEN
	10	OUTPUT 2 NORMALLY-OPEN
	11	OUTPUT 2 NORMALLY-CLOSED
	12	INPUT 1
	13	INPUT 1 RETURN
	14	INPUT 2
	15	INPUT 2 RETURN

4.2.8 Connecting the Service (Wayside) Serial Channel (Optional)

This 'clear' serial channel can transport up to 115,200 bps across the radio link. This channel does not interfere with the payload data channels. The port is configured as DCE.

1. Connect the serial data interface cable to the Service channel connector on the Indoor Unit rear panel. The supplied serial data cable can be used to connect to this port after the software setup is completed.
2. See the table below for Indoor Unit connector pin assignments when a custom cable needs to be assembled.
3. Secure the connector using locking screws.

Service Channel Connector Pinouts		
Indoor Unit connector	**Pin No**	**Signal**
9-pin D-type Female Connector	2	TD
	3	RD
	4	DTR
	5	GROUND
	6	DSR
	7	RTS
	8	CTS

4.2.9 Connecting the Element Manager Port

The Element Manager port is used to connect the Indoor Unit to a PC/Laptop serial port. This enables the Indoor Unit to be configured using the supplied NMS / GUI

software or controlled via a PPP-dialup connection. The port can be connected to using the supplied serial data cable. The port is configured as DTE.

NOTE The Ethernet 10BaseT port can also be used to control the IU via the GUI / SNMP software.

4.3 Outdoor Unit

Before installing the MDR Outdoor Unit, ensure that a suitable mast is used for the antenna and that the Outdoor Unit installation is firmly in position. The pole diameter must be between 50 and 102 mm or between 2" and 4½".

The Outdoor Unit may also be mounted indoors, utilizing an optional rack mount adapter (not included as a standard item) at the base of a tower for convenient access. However, this as not recommended as a long and expensive RF cable would then be required, compromising system sensitivity and increasing link costs.

CAUTION – ENSURE THAT THE POLE IS EARTHED FOR LIGHTNING PROTECTION.

Follow these steps to install the Outdoor Unit:

1. Install the system antenna.
2. Adjust the mounting bracket to be slightly bigger than the pole diameter.
3. Secure the mounting bracket to the pole.
4. Secure the Outdoor Unit to the bracket using the screws on each bracket.
5. Connect the Outdoor Unit to the pole electrically by connecting the earth cable or strap between the pole earth and the Outdoor Unit earth point.
6. Connect the type-N RF output connector to the system antenna through an in-line lightning protection unit in areas with lightning activity.
7. Cover the connectors using an ultra violet protective, self-vulcanising tape.

4.3.1 RF Connection

1. The RF port is an N-type female connector.
2. The N-Type connector is used to connect to the antenna, typically using coaxial transmission line.
3. 1/2" or 5/8” coaxial cables are recommended. Coaxial cable that is 7/8” or larger can exhibit moding at 5.8 GHz and is not recommended for 5.8 GHz radios.
4. Do not use right angle N-type connectors with the radios: they may present high loss.
5. Do not use low quality cables. Some cable types, such as RG-8, may have too high a loss at 5.8 GHz.

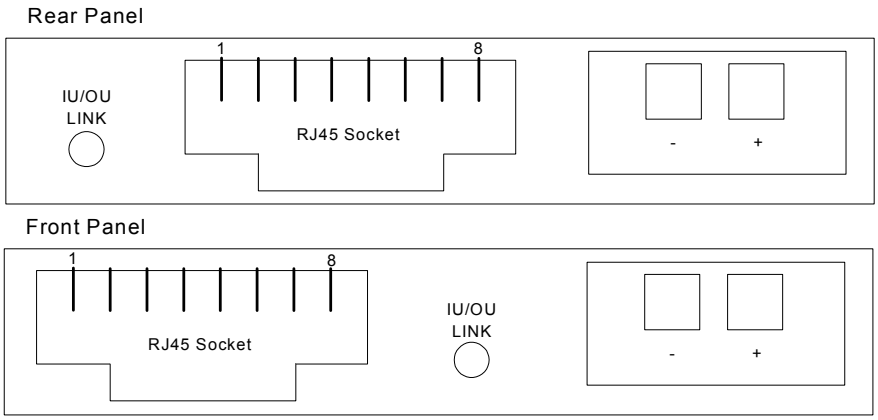
4.4 Interconnection Cable Installation

Follow these steps to install the Indoor Unit to Outdoor Unit interconnection cables.

CAUTION

- **DO NOT OVER TIGHTEN THE CABLE STRAPS ON THE CABLES AND DO NOT FASTEN THE STRAP LOCKING MECHANISM OF THE CABLE STRAP ONTO THE CABLES.**

1. On the OU side, connect an RJ45 plug to the data cable. Place the RJ45 plug into the RJ45 socket in the Outdoor Unit connection box.
2. On the OU side, connect the DC power leads within the Outdoor Unit Connection Box. Use the + and - connections.



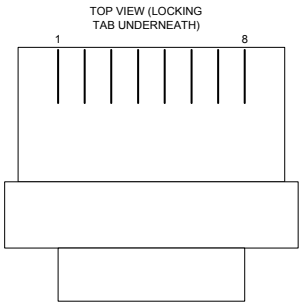
LOOKING AT THE "Outdoor Unit" CONNECTION BOX
(Located on the rear panel of the MDR IU, front panel of the Orion IU)

3. Close the Outdoor Unit Connection Box Cover using a 2.5mm Allen key. Make sure the rubber gaskets seal correctly over the power and data cables.
4. Using cable ties, secure the cable to the pole at regular intervals.
5. On the IU side, connect an RJ45 plug to the data cable. Place the RJ45 plug into the RJ45 socket in the "Outdoor Unit" connection box.
6. On the IU side, connect the DC power leads to the supplied GREEN Phoenix plug. Insert this plug into the green socket in the "Outdoor Unit" connection box.
7. The user can see that there is a suitable IU/OU data interconnection if the 'IU/OU Link' LED of the IU is lit up green.

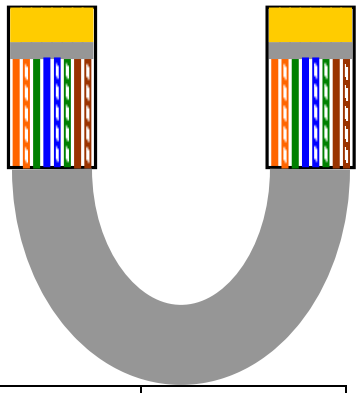
CAUTION

- **UNDO THE SCREWS OF THE "CONNECTION BOX" IN A UNIFORM MANNER. THIS ENSURES THAT THE "CONNECTION BOX" GASKET MATERIAL RELEASES STRESS UNIFORMLY AND DOES NOT LEAD TO THE SECURING SCREWS BEING BENT DUE TO THE PRESSURE PLACED ON THE CONNECTION BOX LID.**

4.4.1 INTERCONNECTION CABLE WIRING DESCRIPTION



RJ-45 PLUG



Pin	DTE (on INDOOR UNIT)	DCE (on OUTDOOR UNIT)	Wiring
1	TxD+	RxD-	Orange/White
2	TxD-	RxD+	White/Orange
3	RxD+	TxD+	Green/White
4†	TxC+	RxC+	Blue/White
5†	TxC-	RxC-	White/Blue
6	RxD-	TxD-	White/Green
7†	RxC+	TxC+	Brown/White
8†	RxC-	TxC-	White/Brown

NOTE

† VERSION 1 AND 2 RELEASES OF THE HARDWARE (INDOOR AND OUTDOOR UNITS) CANNOT BE USED INTERCHANGEABLY. FOR VERSION 2 IU & OU HARDWARE, USE OF TxC+, TxC-, RxC+, RxC- **FALLS AWAY** AND ONLY TWO (2) TWISTED PAIRS ARE REQUIRED.

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5 Antenna Alignment and Software Setup

This chapter describes the procedure for software setup and antenna alignment. The setup is done with a laptop / PC running the supplied NMS Graphical User Interface (GUI) software. See chapter 6 for details on using the NMS / GUI.

5.1 Installation Equipment Required

The following tools and instruments are required for software setup and aligning the antenna:

hh. RSSI test cable

ii. Voltmeter

jj. Wrench / spanner (see appropriate details in installation chapter depending on the antenna being used)

kk. PC with NMS software and supplied serial data cable.

ll. Binoculars (optional) used for locating the far end site. This will assist in the antenna alignment operation.

mm. GPS or Standard Compass (optional) used for locating the far end site. This will assist in the antenna alignment operation.

nn. Bit Error Rate Tester and connecting leads.

5.2 Information Required

You should know:

- the proposed frequency channel plan for each station.
- the expected receive level based on the chosen system configuration and a path loss analysis.

5.3 Antenna Alignment

5.3.1 Introduction

The OU should be installed on both sites before alignment starts. Perform the following steps at both stations:

1. Switch the Indoor Unit power ON.
2. Install and run the NMS Software application.
3. Configure the radio channel plan as required.
4. Set the transmitted power to maximum.
5. Perform a RF loopback test at each site before starting the alignment procedure.

5.3.2 Alignment Procedure

1. Locate the far site and point the antenna to the antenna at the far site, as accurately as possible using binoculars or a compass.
2. Connect the multimeter to the RSSI connector on the OU using the supplied RSSI test cable and set the multimeter to measure volts.
3. Check the RSSI level and refer to the figure below for received power level.
4. Align the antenna until the maximum RSSI is attained.
5. Secure the antenna.
6. Measure the RSSI level and record the value (see section 5.7).
7. Compare with the value with that calculated for the link i.e. using the path loss calculation done when planning the link.

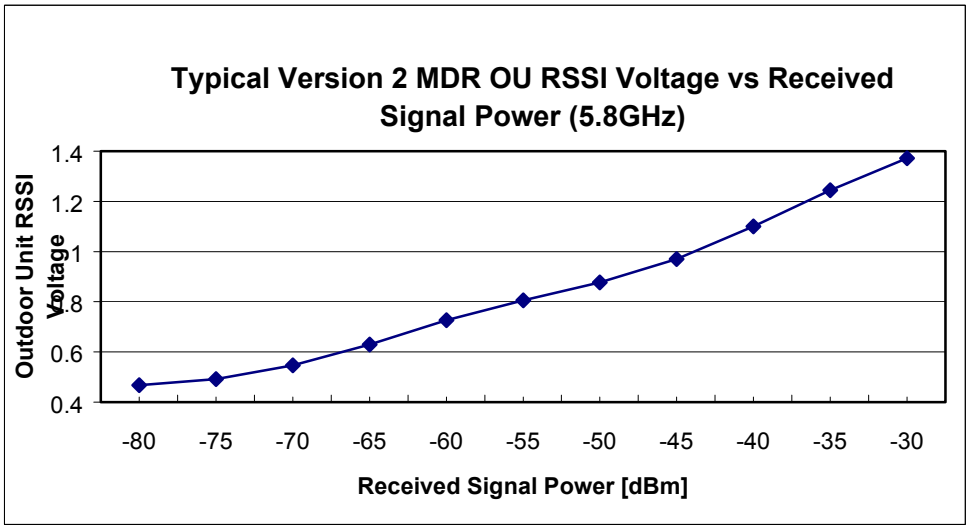


Figure 7. Typical Version 2 MDR5800 OU RSSI Voltage as a function of RF input power level

-80 dBm Average 0.436 ± 0.029 V : MIB RSSI 95 ± 1 dBm (see comment below)

-30 dBm Average 1.333 ± 0.047 V : MIB RSSI 54 ± 2 dBm (see comment below)

The front panel RF Link LED, the Received Signal Strength Indicators (RSSI : on NMS, via SNMP or as an Electrical signal on the Outdoor Unit), Carrier-detect (NMS, SNMP) and Frame Lock (NMS, SNMP) indicators are available to assist with link installation and alignment.

NOTE 1 The MIB lists a value representative of the received signal level in [-dBm].

This value corresponds to the signal power measured in a 200 kHz BW centred at the receive frequency of the radio.

When not in spectrum analyser mode, the Orion OU translates the measured signal power to a value corresponding to the wanted signal power in the receiver bandwidth.

NOTE 2 For the MDR OU, the RSSI values displayed in the MIB are representative of the signal level measured over a 200kHz BW. Add ~20dB to the MIB value for a wanted spread spectrum signal. The NMS / GUI will do this adjustment automatically and will therefore always display the correct RSSI value.

NOTE 3 Due to the technique used to calculate the RSSI level of a wanted signal, the measured RSSI level can differ from the actual value with up to ±3 dB.

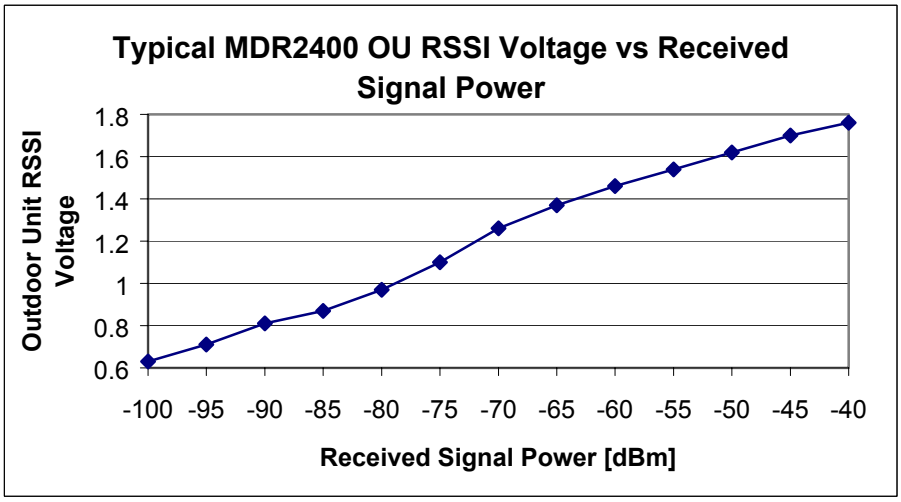


Figure 8. Typical MDR2400 OU RSSI Voltage as a function of RF input power level (See comment above.)

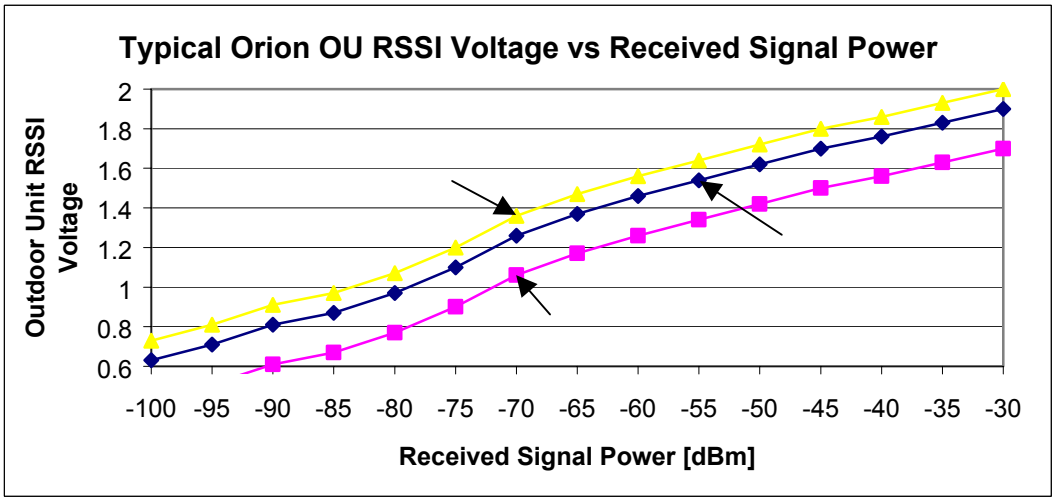


Figure 9. Typical Orion 5850 OU RSSI Voltage as a function of RF input power level (note the different bandwidths)

5.3.3 Set Transmitted Power Level

It is good practice to match received power levels by adjusting transmitted powers if co-located systems are being installed. This is important to avoid interference between co-located systems. An attenuator can be fitted between the Outdoor Unit and the antenna if the power level cannot be sufficiently reduced. The dBm output at the OU N-type connector (socket) levels are set via the NMS or using a SNMP Management application.

5.4 Software Setup

Refer to chapter 6, for setting up the following:

oo. Payload interface.
pp. Service Channel (Wayside) serial port.
qq. Auxiliary in/out port.
rr. General link parameters.

5.5 Functional Test

After completing the physical installation of the Indoor Units, antennas, Outdoor Units and the interconnection cables, you need to commission the system. This procedure describes how to set up the minimum requirements for successful MDR / Orion system operation.

5.5.1 Link Bit Error Rate Performance Test

To start : when the link is setup correctly, the RF Link LEDs on both IUs on both sides of the RF link should be GREEN.

When the link has been setup and is running error-free:

1. Clear the Indoor Unit Log using Reset Button Position ‘2’
2. Clear the Indoor Unit Errors using Reset Button Position ‘1’

Perform a link bit error rate performance test as follows:

ss. Connect a bit error rate tester to the payload interface of the link.
tt. Run data over the link for a period of 24 hours.
uu. Record the BER.
vv. Record the LED statuses.

Check the Indoor Unit Packet Error Results via the NMS or via SNMP access to the Indoor Unit MIB – for the NMS, right-click on the antennas in the NMS for either side of the link and select the “Diagnostic/Error Monitor” option. Record the results by saving the data to a file. For SNMP access, use a MIB Browser and check the mdrmteRFLinkPerf and mdrmteG826 Performance groups.

Record all results on a test record. See MDR / Orion Test Record, section 5.7 for an example.

5.6 MDR / Orion Installation Record

Parameter	Unit	Site A	Site B
Site Name			
Antenna Type			
RF cable length	Meters		
Lightening protection unit	Yes/No		
Interconnecting cable length	Meters		
Outdoor Unit serial number			
Indoor Unit serial number			
Outdoor Unit earthed	Yes/No		
Indoor Unit earthed	Yes/No		
Power Supply	Volts DC/AC		

	Date	Name	Signature
Performed by			
Approved by			

5.7 MDR / Orion Test Record

Parameter	Unit	Site A	Site B
Frequency channel plan: Transmit Receive **NOTE 1 :** C is NOT used for the MDR2400. **NOTE 2 :** FCC requirements (U.S. only), page 2.	 A/B/C/D A/B/C/D If D – List Transmit and Receive Frequencies [MHz]		
Transmitter output power (**NOTE 2**)	dBm		
Receiver input level (ON)	Volts		
Receiver input level (ON)	dBm		
Receiver input level (OFF)	Volts		
Receiver input level (OFF)	dBm		
Calculated input level	dBm		
Fade margin	dB		
Frame Lock indicator	Colour		
Fixed attenuator	DB		
BER-test	Hours BER		
Alarm Indicators	Clear (Yes/No)		

	Date	Name	Signature
Performed by			
Approved by			

6 NMS Software

6.1 Scope

This section provides minimal information required to install the Orion NMS. A detailed HTML-based help document can be found on the NMS installation CD supplied with new radios.

6.2 Introduction

The purpose of the Network Management System, hereafter called the NMS, is to allow you to configure, manage or interrogate the following primary functional elements of a Digital Radio Link:

- Indoor Unit
- Outdoor Unit

A Digital Radio Link consists of two Indoor-Outdoor Unit stations connected through a radio link.

The Orion NMS is designed to auto-detect the radio type it is connected to and can support the following radio types:

- Orion XX
- MDR XXXX

The NMS is a PC-based software package that provides you with a graphical interface that is used to perform on-site element management of a digital radio system. It allows you to configure, manage and interrogate the system by selecting various menus and options.

The hardware as well as the software constituting the NMS is collectively called the NMS Terminal.

The NMS Terminal is the principal system support equipment associated with the radio for system installation and commissioning.

The NMS connects to a designated NMS Terminal port (labelled Element Manager) on the front panel of the Indoor Unit, by means of a serial data interface (this cable is supplied in the IU box). It can also connect to any number of Indoor Units interconnected through an IP network.

The NMS communicates with SNMP agent software that is contained in each Indoor Unit. The NMS communicates with the agent's software: the software enables a unit to interpret MIB (Management Information Base) commands via SNMP (Simple Network Management Protocol).

NOTE The NMS application supplied with older MDR radios have been replaced with the Java-based Orion NMS. The older NMS does not support the Orion series radios and it is highly recommended to replace this NMS with the Orion NMS.

6.3 System requirements

The following PC system requirements apply for the Orion NMS:

- P III 450 MHz or higher CPU
- 128 MB RAM
- 20 MB Free Hard disk space
- CD-ROM Drive
- Win 98, 2000, NT or XP Operating System (Linux optional)

6.4 Installing the NMS

The NMS have been developed on the Java platform from Sun Micro Systems. This requires the installation of a Java Runtime Environment (JRE) on the PC from where the NMS will be used.

The installation files for the NMS and the JRE are provided on the installation CD that is shipped with each radio.

The supplied installation files allows the NMS to be set up on any WIN32 system (Windows 98, NT, 2000, XP). If required, a special installation can also be provided which would allow the NMS to be installed on a system using a Linux operating system.

6.4.1 JRE Installation

Complete the following steps to set up the required JRE on the required PC:

- Browse to the ***//OrionNMS/JRE*** folder in the root of the installation CD
- Execute the ***j2re-1_3_1_02-win.exe*** installation application
- Follow the user prompts in the JRE installation application to set up the JRE in the preferred folder on the PC

6.4.2 NMS Installation

After installing the JRE on the PC, complete the following steps to install the NMS on the PC:

- If a previous version of the Orion NMS have been installed on the target PC, first uninstall the older version
- Browse to the ***//OrionNMS/Setup*** folder in the root of the installation CD
- Execute the ***Plessey_OrionNMS_vXpXX.exe*** installation application
- Follow the user prompts in the NMS installation application to set up the NMS in the preferred folder on the PC

The NMS should now be installed on the target PC and should be available for selection through the Start Programs menu option.

6.4.3 NMS Un-Installation

Select the Uninstall menu item in the Orion NMS menu group from the Start Programs menu to uninstall the NMS form the PC. This action removes all installed files, menu items and register entries from the PC.

6.5 Help documentation

The HTML based help documents for the Orion NMS application is available on the installation CD at the following path: ***//OrionNMS/help/Orion NMS Help.htm***. The help document can be accessed by opening it with an Internet browser of your choice.

The help documents can also be opened from the Windows Start Menu folder created for the Orion NMS or through the ***Help|Contents*** menu in the Orion NMS application.

7 Maintenance Information

1. The user is advised to refer to the Technical Data section (paragraph 8.5.10) for details on IU/OU interconnection cables (customer-furnished).
2. The “Ordering Information” paragraph in the Technical Data section (paragraph 8.6) provides details on part numbers for items that can be ordered.
3. Paragraph 4 of this manual lists customer furnished equipment that should be used for installing the MDR / Orion product.
4. There are two options to control the MDR / Orion products via SNMP.
    a. One uses any open-standard-compliant SNMP Management package (HP OpenView, SNMPc etc): in this case, one has access to the full compliment of the product's MIB elements.
    b. The NMS application package supplied with the product accesses a subset of the MIB. It has a graphical user interface carefully designed to assist installation and maintenance staff.

8 Technical Data

8.1 Environmental Requirements

8.1.1 Outdoor Equipment

Operating temperature:	-30°C to +60°C
Relative humidity:	8-100%
Atmospheric pressure:	0.7 to 1.06 kPa
Lightning protection	ITU-T K.20

8.1.2 Indoor Equipment

Operating temperature:	0°C to +50°C
Relative humidity:	5-90%
Lightning protection:	ITU-T K.20

8.2 Mechanical Information for Outdoor Equipment

Dimensions (HxWxD):	335mm x 231mm x 124mm
Weight:	~ 5.9 Kg

8.3 Mechanical Information for Indoor Equipment

Dimensions (HxWxD):	45mm x 480 mm x 265mm
Mounting:	19” Rack, 1U high or Table top
Weight:	~ 2.9 Kg

8.4 Power Supply Requirements

DC power supply:	21 to 56 VDC (58 VDC when indicated as such)
DC power supply grounding:	Positively or negatively grounded
Power consumption (MDR2400/5800)	35 W typical, 45 W maximum.
Power consumption (Orion 5825):	35 W typical, 45 W maximum – standard power 42 W typical, 52 W maximum – high power

8.5 Electrical Performance

8.5.1 General Characteristics

MDR2400-SR

Frequency Range:	2400 to 2483.5 MHz
Payload Data Capacity:	T1 (1.544 Mbps/s) / E1 (2.048 Mbps) 2T1 / 2E1 4T1 / 4E1
RF Channel Bandwidth:	17 MHz
Go/Return spacing:	Can be adjusted as fixed go-return spacing. NOT mandatory in the ISM licence-free bands.
Modulation:	CCK
Processing Gain:	11 dB
Frequency Channel Plan A:	2410 and 2460 MHz
Frequency Channel Plan B:	2426 and 2476 MHz
Transmission Delay:	600 us maximum for radios only (one-way)

MDR5800-SR

Frequency Range:	5731 to 5844 MHz
Payload Data Capacity:	T1 (1.544 Mbps/s) / E1 (2.048 Mbps) 2T1 / 2E1 4T1 / 4E1
RF Channel Bandwidth:	17 MHz
Go/Return spacing:	Can be adjusted as fixed go-return spacing. NOT mandatory in the ISM licence-free bands.
Modulation:	CCK
Processing Gain:	11 dB
Frequency Channel Plan A:	5735 and 5804 MHz
Frequency Channel Plan B:	5753 and 5822 MHz
Frequency Channel Plan C:	5771 and 5840 MHz
Transmission Delay:	600 us maximum for radios only (one-way)

Orion 5825-SR

Frequency Range:	5731 to 5844 MHz

Payload Data Capacity:	• 1 - 4T1 (1.544 Mbps/s) / 1 - 4E1 (2.048 Mbps) (2.6MHz BW) • 1 - 8T1 (1.544 Mbps/s) / 1 - 8E1 (2.048 Mbps) (5.4MHz, 8.0MHz BW)
RF Channel Bandwidth:	2.6MHz
(Selectable)	5.4MHz
	8.0MHz
Go/Return spacing:	Can be adjusted as fixed go-return spacing. NOT mandatory in the ISM licence-free bands.
Modulation:	16-QAM
Frequency Channel Plan A:	5731 and 5801 MHz (2.6MHz BW)
	5732 and 5802 MHz (5.4MHz BW)
	5734 and 5804 MHz (8.0MHz BW)
Frequency Channel Plan B:	5752 and 5822 MHz (all bandwidths)
Frequency Channel Plan C:	5774 and 5844 MHz (2.6MHz BW)
	5773 and 5843 MHz (5.4MHz BW)
	5771 and 5841 MHz (8.0MHz BW)
Transmission Delay:	600 us maximum for radios only (one-way)

8.5.2 Transceiver Characteristics

8.5.2.1 Frequency Band: MDR2400 Lowband Outdoor Units

Transmit band:	2410 – 2426 MHz (Centre frequency)
Receive band:	2458 – 2474 MHz (Centre frequency)

8.5.2.2 Frequency Band: MDR2400 Highband Outdoor Units

Transmit band:	2458 – 2474 MHz (Centre frequency)
Receive band:	2410 – 2426 MHz (Centre frequency)

8.5.2.3 Frequency Band: MDR5800 Lowband Outdoor Units

Transmit band:	5725 – 5787 MHz (Band edge)
Receive band:	5787 – 5850 MHz (Band edge)

8.5.2.4 Frequency Band: MDR5800 Highband Outdoor Units

Transmit band:	5787 – 5850 MHz (Band edge)
Receive band:	5725 – 5787 MHz (Band edge)

8.5.2.5 Frequency Band: Orion 5850 Lowband Outdoor Units

Transmit band:	5731 – 5774 MHz (Center frequency)
Receive band:	5801 – 5844 MHz (Center frequency)

8.5.2.6 Frequency Band: Orion 5850 Highband Outdoor Units

Transmit band:	5801 – 5844 MHz (Center frequency)
Receive band:	5731 – 5774 MHz (Center frequency)

8.5.3 RF Interface

Transmitted Power	+2 to+24 dBm – MDR2400 and MDR5800, +2 to +18 dBm – Orion 5850 standard output power, +2 to +24 dBm – Orion 5850 high output power, software adjustable (incl. mute)
Receiver Sensitivity:	Up to 4T1/4E1 : -88dBm for BER = 10^{-6} (MDR2400) -86dBm for BER = 10^{-6} (MDR5800) Up to 8T1/E1 : Orion 5850, 16 QAM -85dBm for BER = 10^{-6} (2.6 MHz BW) -82dBm for BER = 10^{-6} (5.4 MHz BW) -80dBm for BER = 10^{-6} (8 MHz BW)
Maximum Receive Level:	-30dBm

8.5.4 Payload Data Interfaces

8.5.4.1 1, 2, 4 or 8 (i.e. nE1) Interface

Data Rate:	Full duplex E1 (2.048Mbit/s), 2E1, 4E1 or 8E1
Digital Interface:	ITU-T G.703
Connectors:	Balanced 110 ohm on DB25 Balanced 110 ohm on RJ45 (Orion IU only) Unbalanced 75 ohm on BNC's (Available on one of the MDR IU variants)
Line code:	HDB3 or AMI selectable
Jitter and Wander:	ITU-T G.823

8.5.4.2 1, 2, 4 or 8 (i.e. nT1) Interface

Data Rate:	Full duplex T1 (1.544Mbit/s), 2T1, 4T1 or 8T1
Digital Interface:	DSX-1, G.703 compliant
Connectors:	Balanced 110 ohm on DB25 Balanced 110 ohm on RJ45 (Orion IU only) Unbalanced 75 ohm on BNC's (Available on one of the MDR IU variants)
Line code:	AMI or B8ZS selectable
Jitter and Wander:	ITU-T G.823

8.5.5 Ethernet Traffic Interface

Data Rate:	< 8 Mbps Half / full duplex software selectable (Refer to Chapter 7, page 114)
Digital Interface:	10 BaseT, Half / full duplex, DTE
Connector:	RJ45

8.5.6 Auxiliary Input Interface (CONTACT CLOSURE)

Number of Inputs:	2
Maximum voltage:	12V
Logical zero:	Short from input to return pin
Logical one:	Open input to return pin

8.5.7 Auxiliary Output Interface

Number of outputs:	2
States:	Normally-open and normally-closed
Contact rating:	DC: 220 V, 1 A, 60 W
	AC: 250 V, 1 A, 125 VA

8.5.8 Wayside channel interface

Interface standard:	RS232, DCE
Handshaking:	None, Hardware
Port rate:	115,200 bps

8.5.9 Element Manager Port Interface

Interface standard:	RS232, DTE
Handshaking:	Hardware
Data rate:	115,200 bps

8.5.10 Indoor/Outdoor Unit Interface

The physical interface between the Indoor and Outdoor Unit is IEEE802.3 Ethernet. As such, the same considerations that apply between standard routers/switches/hubs and PC LAN cards should be adhered to when selecting lengths of cables between the OU and the IU. Cable lengths of up to 120 meters have been tested in a laboratory environment.

The following table lists information to assist the user to select cables to be used between the Indoor and Outdoor Units.

Interconnecting cable **Data**	
South Africa STP (FTP) 4 Pairs Solid Cat 5, PVC FR UV protected Polifin H2/J263/904 Outer Black. Outer diameter of cable : 7.3mm ± 0.5mm. (this is an "upjacketed" STP 4 Pair cable).	This is a standard FTP Cat 5 cable that is 'upjacketed' with suitable plastic for FR/UV (Flame retardant/Ultra Violet) protection.
Other cables: 1. Superior Essex BBDN CAT 5 cable P/N 04-0010-34 (7.8mm) 2. Superior Essex CAT 5 P/N 18-241-31 18-241-11 (5.1mm) 3. General Cable CAT 5 P/N 2137113 2137114 (5.6mm) 4. Belden CAT 5 P/N BC1002 (6.0mm) Option 1 is the preferred choice. For the cables that have diameters less the required OD, one can use one or two pieces of heatshrink on the cable where it passes through the gasket.	
Interconnecting cable **Power**	
South Africa Power 1.5mm sq stranded PVC Insulated, PVC FR UV protected Polifin H2/J263/904 Outer Black 300/500V Temp -20°C to +85°C. Cable outer diameter: between 7.4mm and 9mm i.e. 8.2mm ± 0.8mm.	
Other cables: Superior Essex type SJOOW flexible cable P/N 441821* (7.4mm) Carol Cable (General Cable) SJOW/SJO P/N 02001 18 gauge 2 conductor (7.8mm)	

8.6 Ordering Information

To confirm the correct order numbers, please visit www.plesseybbw.com/download.htm to download an "Order Number Generator" utility.

Part No	Model Number	Description
651-03994-01-H1 or **651-03994-01-L1**	**MDR2400-ET1**	MDR2400 Radio: Indoor Unit (DB25 balanced payload) and High or Low Band Outdoor Unit, Type-N RF output, high power output, Full T1/E1, 2Mbps or 1.5Mbps data interface
651-04106-01-H1 or **651-04106-01-L1**		As above with 75 Ohm, BNC unbalanced payload also available.
651-03994-01-H2 or **651-03994-01-L2**	**MDR2400-ET2**	MDR2400 Radio: Indoor Unit (DB25 balanced payload) and High or Low band Outdoor Unit, Type-N RF output, high power output, Full 2xT1/2xE1, 2x2Mbps or 2x1.5Mbps data interface
651-04106-01-H2 or **651-04106-01-L2**		As above with 75 Ohm, BNC unbalanced payload also available.
651-03994-01-H4 or **651-03994-01-L4**	**MDR2400-ET4**	MDR2400 Radio: Indoor Unit (DB25 balanced payload) and High or Low band Outdoor Unit, Type-N RF output, high power output, Full 4xT1/4xE1, 4x2Mbps or 4x1.5Mbps data interface
651-04106-01-H4 or **651-04106-01-L4**		As above with 75 Ohm, BNC unbalanced payload also available.

The MDR2400 operates from 21-56VDC (58VDC if indicated as such), optional 110-220VAC power supply available below.
A complete link requires two radios, one must be High Band (HB) and the other a Low Band (LB).

Part No	Model Number	Description
651-03853-02-H1 or **651-03853-02-L1**	**MDR5800-ET1**	MDR5800 Radio: Indoor Unit (DB25 balanced payload) and High or Low Band Outdoor Unit, Type-N RF output, high power output, Full T1/E1, 2Mbps or 1.5Mbps data interface
651-04055-02-H1 or **651-04055-02-L1**		As above with 75 Ohm, BNC unbalanced payload also available.
651-03853-02-H2 or **651-03853-02-L2**	**MDR5800-ET2**	MDR5800 Radio: Indoor Unit (DB25 balanced payload) and High or Low band Outdoor Unit, Type-N RF output, high power output, Full 2xT1/2xE1, 2x2Mbps or 2x1.5Mbps data interface
651-04055-02-H2 or **651-04055-02-L2**		As above with 75 Ohm, BNC unbalanced payload also available.
651-03853-02-H4 or **651-03853-02-L4**	**MDR5800-ET4**	MDR5800 Radio: Indoor Unit (DB25 balanced payload) and High or Low band Outdoor Unit, Type-N RF output, high power output, Full 4xT1/4xE1, 4x2Mbps or 4x1.5Mbps data interface

651-04055-02-H4 or **651-04055-02-L4**	As above with BNC unbalanced payload also available.

The MDR5800 operates from 21-56VDC (58VDC if indicated as such), optional 110-220VAC power supply available below.
A complete link requires two radios, one must be High Band (HB) and the other a Low Band (LB).

Part No	Model Number	Description
651-04230-01-H08 or **651-04230-01-L08**	**Orion5825-ET8**	Orion5825 Radio: Indoor Unit and High or Low Band Outdoor Unit, Type-N RF output, Full 8xT1/8xE1, 8x2Mbps or 8x1.5Mbps data interface
651-04253-01-H08 or **651-04253-01-L08**	**Orion5825-ET8**	Orion5825 Radio: Indoor Unit and High or Low Band Outdoor Unit, Type-N RF output, Full 8xT1/8xE1, 8x2Mbps or 8x1.5Mbps data interface

The Orion 5825 operates from 21-56VDC (58VDC if indicated as such), optional 110-220VAC power supply available below.

A complete link requires two radios, one must be High Band (HB) and the other a Low Band (LB).

Accessories & Upgrades

Part Number	Description
651-04226	MDR2400SR & MDR5800SR 1+1 hot standby combiner/splitter (4-tribs)
651-04227	ORION 5825 1+1 hot standby combiner/splitter (8-tribs)
651-03864	Bench Power Supply 110-220VAC to 24VDC
651-07865	19" Rack Mount for Outdoor Unit (4u high)
651-03865	MDR Indoor Unit Upgrade 1xT1/E1 to 2xT1/E1
651-03866	MDR Indoor Unit Upgrade 2xT1/E1 to 4xT1/E1
651-03867	MDR Indoor Unit Upgrade 1xT1/E1 to 4xT1/E1
651-04251	MDR / Orion NMS Software CD - Spare Part
651-03809	OU Pole Mounting Kit - Spare Part
862-01881	MDR / Orion Digital Radio System User Manual - Spare Part
660-03405	MDR / Orion Cable Assembly: RSSI Test Loom - Spare Part

The MDR and Orion systems use standard CAT5 Ethernet cable and RJ-45 connectors for connecting the Indoor Unit to the Outdoor Unit. A two-wire power cable is also required between the Indoor Unit and the Outdoor Unit.

NOTE Screened CAT-5 cable (for noise immunity) and UV resistant cables (for long-term outdoor use) are required to meet FCC EMC emission standards for this type of product.

Spare Parts for MDR2400, MDR5800 and Orion 5825 radios

Part Number	Description
651-04104-02-1	MDR MTE Indoor Unit 1xT1/E1 - Spare Part
651-04104-02-2	MDR MTE Indoor Unit 2xT1/E1 - Spare Part
651-04104-02-4	MDR MTE Indoor Unit 4xT1/E1 - Spare Part
651-04105-02-1	MDR MTE 75/120 OHM Indoor Unit (BNC) 1xT1/E1 - Spare Part
651-04105-02-2	MDR MTE 75/120 OHM Indoor Unit (BNC) 2xT1/E1 - Spare Part
651-04105-02-4	MDR MTE 75/120 OHM Indoor Unit (BNC) 4xT1/E1 - Spare Part
651-04231-01-08	Orion 25 Indoor Unit 8xT1/E1
651-03806-02L	MDR5800 Low Band Outdoor Unit - Spare Part
651-03806-02H	MDR5800 High Band Outdoor Unit - Spare Part
651-03905-01L	MDR2400 Low Band Outdoor Unit - Spare Part
651-03905-01H	MDR2400 High Band Outdoor Unit - Spare Part
651-04232-01L	Orion 5850 Low Band Outdoor Unit - Spare Part
651-04232-01H	Orion 5850 High Band Outdoor Unit - Spare Part

MDR2400 Ordering Information:

Part no's:
1T1/E1 Radio: 651-03994-01-H1 or 651-03994-01-L1
2T1/E1 Radio: 651-03994-01-H2 or 651-03994-01-L2
4T1/E1 Radio: 651-03994-01-H4 or 651-03994-01-L4

Each **MDR2400** radio includes the following:

Part No	Description	QTY
651-04104-02-1 or 651-04104-02-2 or 651-04104-02-4	MDR Indoor Unit: 1xT1/E1or 2xT1/E1 or 4xT1/E1, 120 Ohm	1
651-03905-01H or 651-03905-01L	MDR2400 ET4 Outdoor unit	1
651-03809	MDR 5800 OU Pole Mounting Kit	1
862-01881	MDR / Orion Digital Radio System User Manual	1
651-04252	NMS Software CD	1
660-03405	RSSI Cable	1

It is possible to purchase upgrades for T1/E1 Indoor Units (upgrades to 2T1/E1 or 4T1/E1). The user contacts the factory or distributor and provides the Indoor Unit Bar Code number details. The factory then supplies a "Tributary Code", unique to the Indoor Unit, which is entered using the MIB (MDR v.1 & 2+ and Orion products) or using the NMS (v. 2+ and Orion products).

MDR5800 Ordering Information:

Part no's:
1T1/E1 Radio: 651-03853-02-H1 or 651-03853-02-L1
2T1/E1 Radio: 651-03853-02-H2 or 651-03853-02-L2
4T1/E1 Radio: 651-03853-02-H4 or 651-03853-02-L4

Each **MDR5800** radio includes the following:

Part No	Description	QTY
651-04104-02-1 or 651-04104-02-2 or 651-04104-02-4	MDR Indoor Unit: 1xT1/E1or 2xT1/E1 or 4xT1/E1, 120 Ohm	1
651-03806-02H or 651-03806-02L	MDR5800 Outdoor Unit	1
651-03809	MDR 5800 OU Pole Mounting Kit	1
862-01881	MDR / Orion Digital Radio System User Manual	1
651-04252	NMS Software CD	1
660-03405	RSSI Cable	1

It is possible to purchase upgrades for T1/E1 Indoor Units (upgrades to 2T1/E1 or 4T1/E1). The user contacts the factory or distributor and provides the Indoor Unit Bar Code number details. The factory then supplies a "Tributary Code", unique to the Indoor Unit, which is entered using the MIB (MDR v.1 & 2+ and Orion products) or using the NMS (v. 2+ and Orion products).

Orion 5825-SR Ordering Information:

Part no's:
8T1/E1 Radio: 651-04230-01-H08 or 651-04230-01-L08

Each **Orion 5825** radio includes the following:

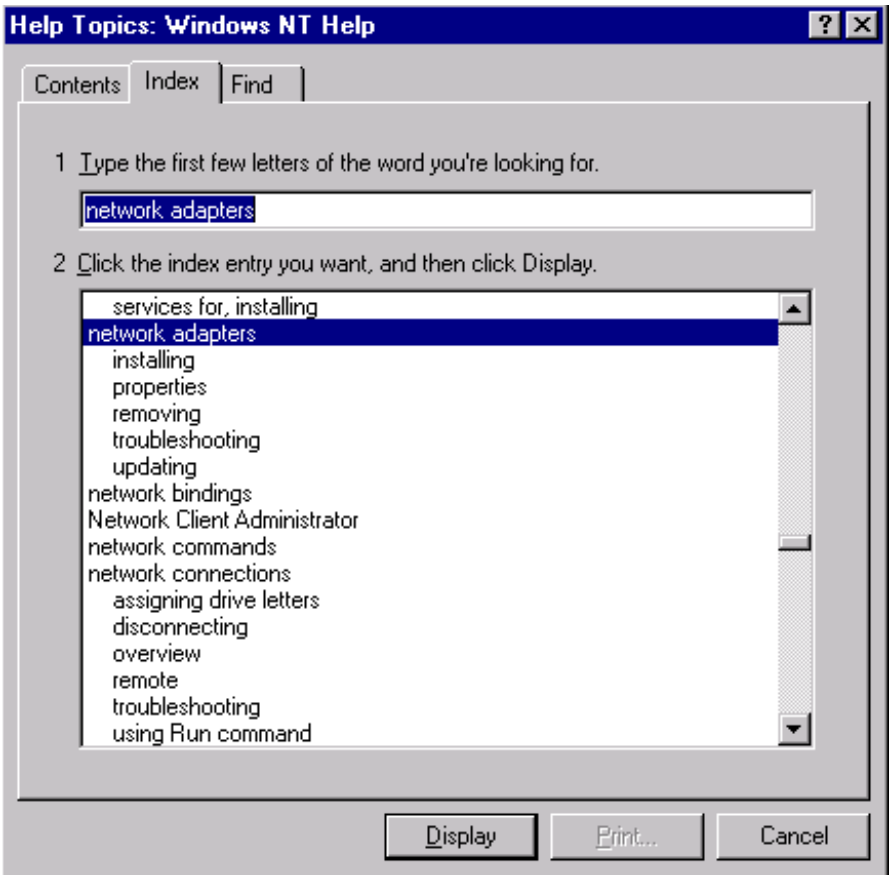
Part No	Description	QTY
651-04231-01-08	Orion 25 Indoor Unit: 8xT1/E1	1
651-04232-01H or 651-04232-01L	Orion 5850 Outdoor unit	1
651-03809	MDR / Orion OU Pole Mounting Kit	1
862-01881	MDR / Orion Digital Radio System User Manual	1
651-04252	NMS Software CD	1
660-03405	RSSI Cable	1

1 Appendix: Element Manager Port Point-to-Point Serial Communications Setup

This appendix summarises how to set up a network connection (using PPP) between a computer and the MDR / Orion IU's Element Manager port. It lists how the connection can be setup and configured to allow data transfer and SNMP-based control of the MDR / Orion IU.

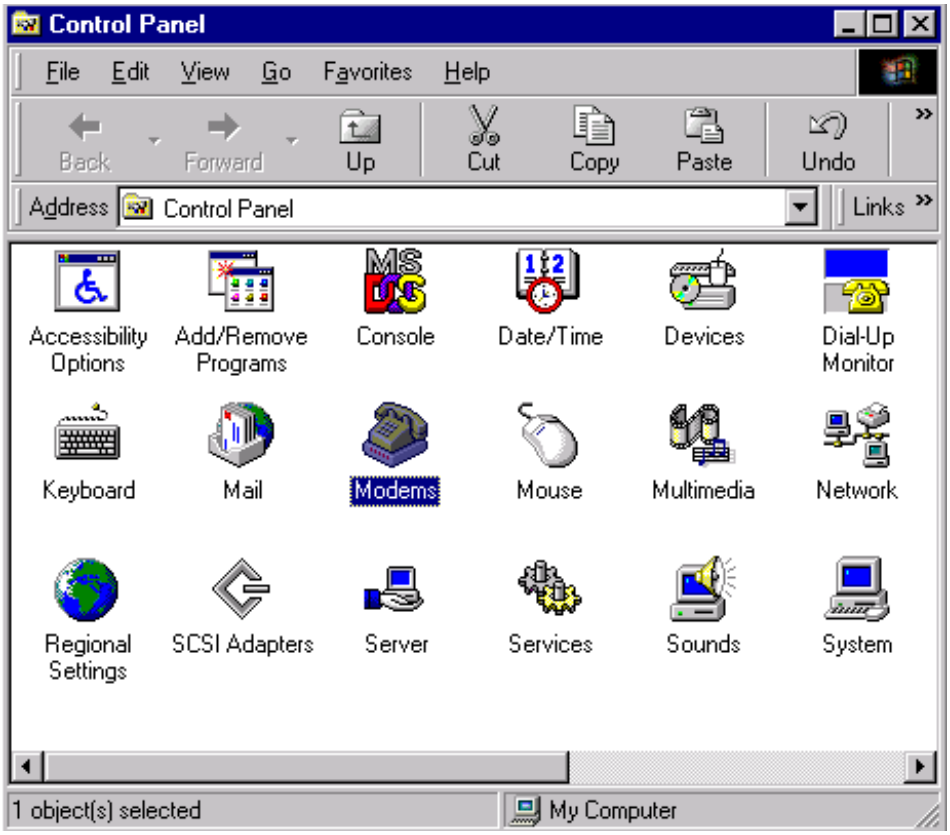
Note : For both NT and Win 95 or 98 machines, check that a Network Adapter is installed.

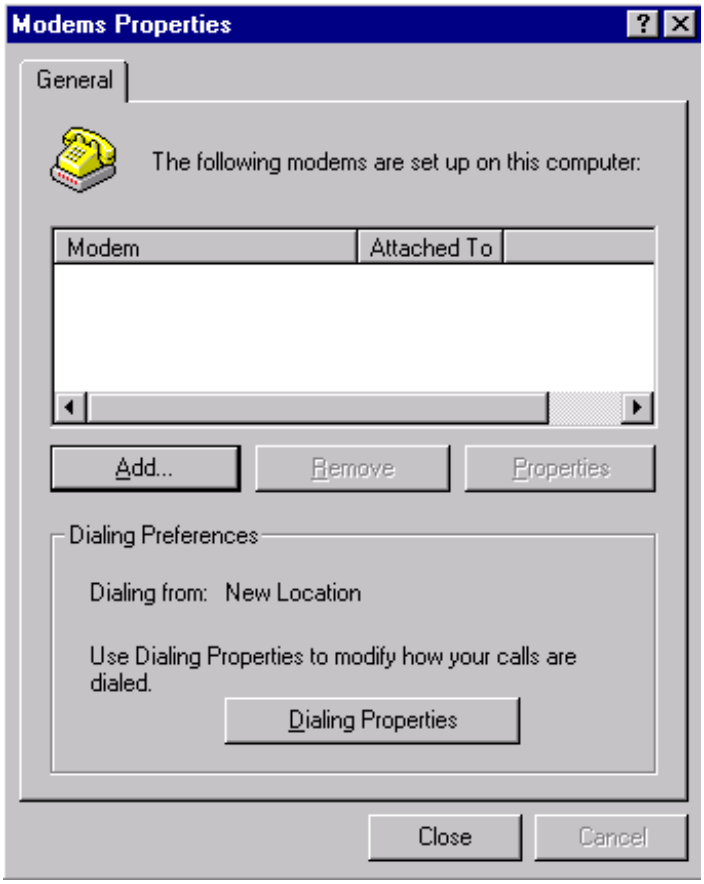
The following screen capture shows the Windows help available to assist setting up a serial comms network adapter.

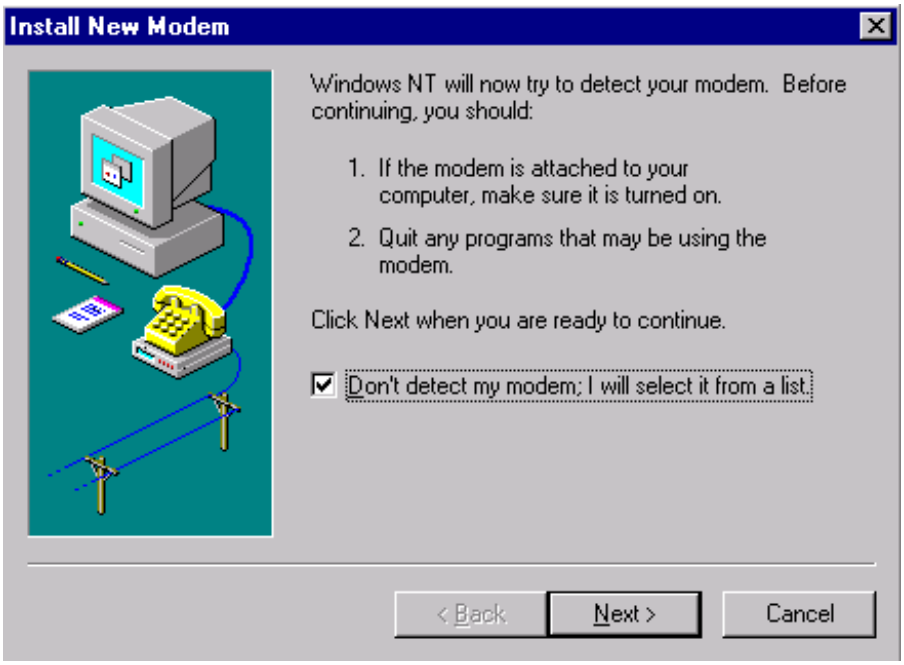


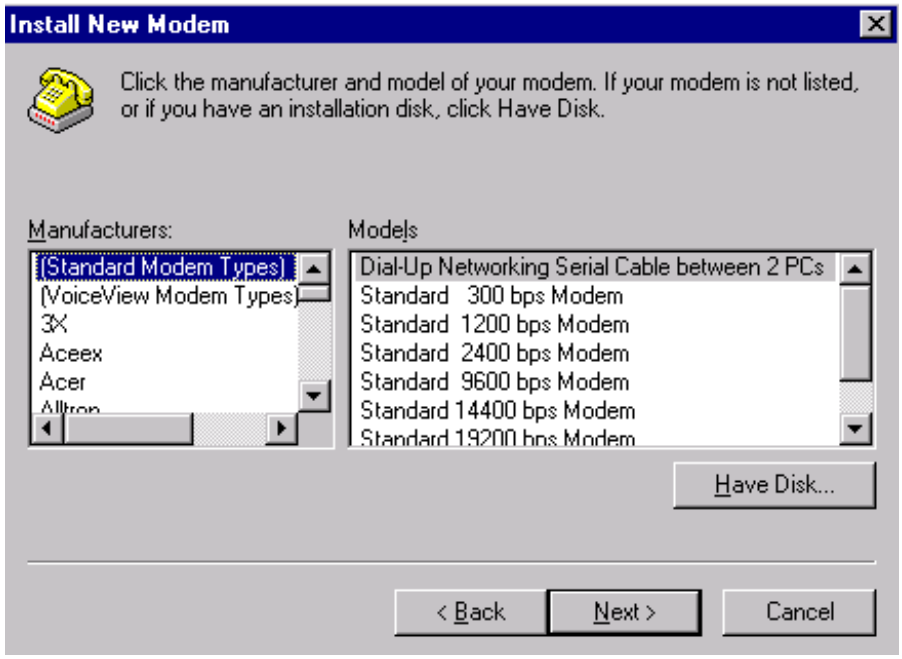
Adding a Modem : Windows NT

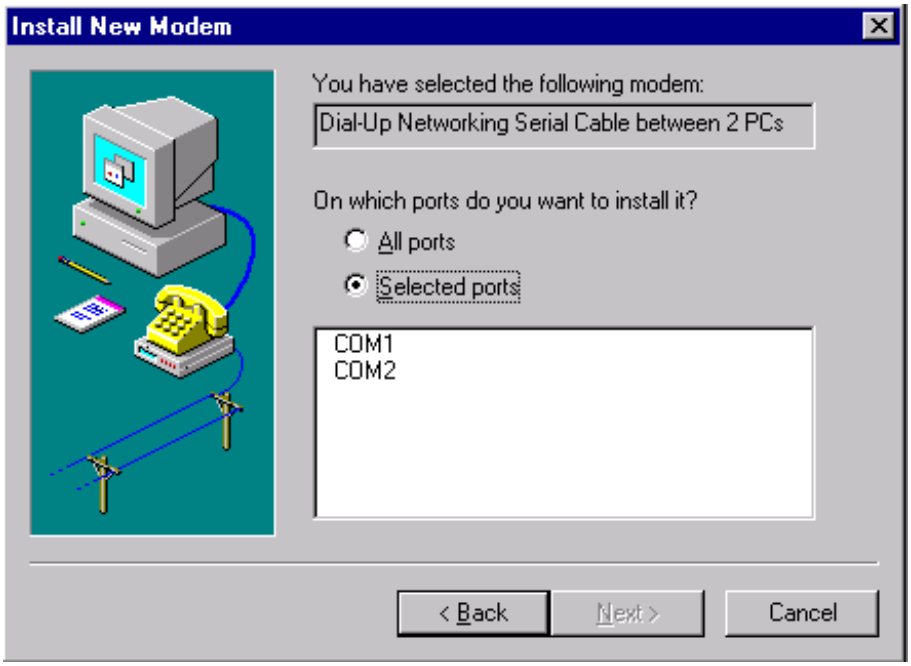
1. When working with a PC running a Windows NT, add a modem using the following screen as a guideline.


Control Panel
File Edit View Go Favorites Help
Back Forward Up Cut Copy Paste Undo
Address Control Panel
Links
Accessibility Options
Add/Remove Programs
Console
Date/Time
Devices
Dial-Up Monitor
Keyboard
Mail
Modems
Mouse
Multimedia
Network
Regional Settings
SCSI Adapters
Server
Services
Sounds
System
1 object(s) selected
My Computer

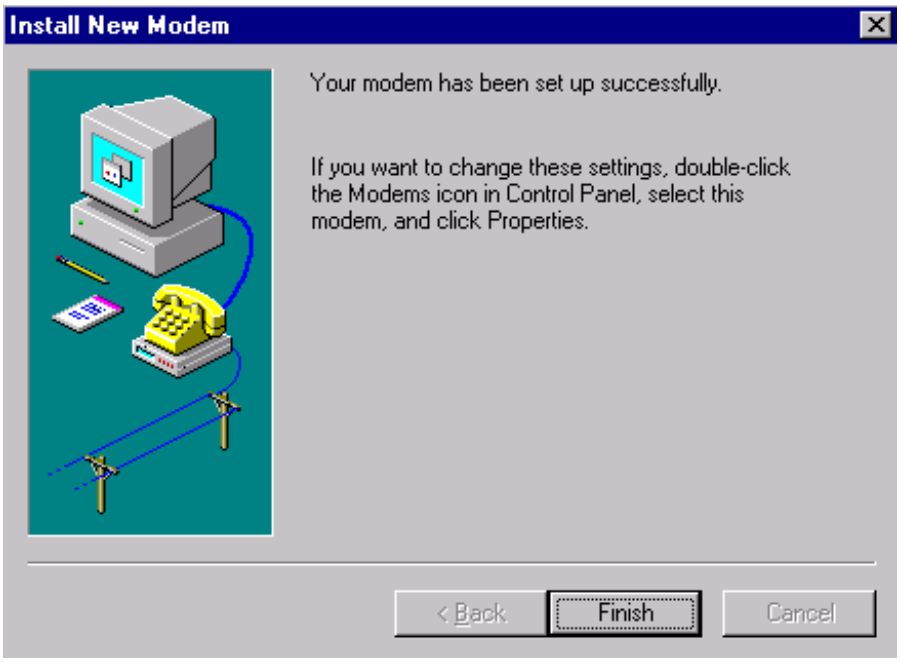

Modems Properties
General
The following modems are set up on this computer:
Modem
Attached To
Add...
Remove
Properties
Dialing Preferences
Dialing from: New Location
Use Dialing Properties to modify how your calls are dialed.
Dialing Properties
Close
Cancel


Install New Modem
Windows NT will now try to detect your modem. Before continuing, you should:
1. If the modem is attached to your computer, make sure it is turned on.
2. Quit any programs that may be using the modem.
Click Next when you are ready to continue.
Don't detect my modem; I will select it from a list.
< Back
Next >
Cancel





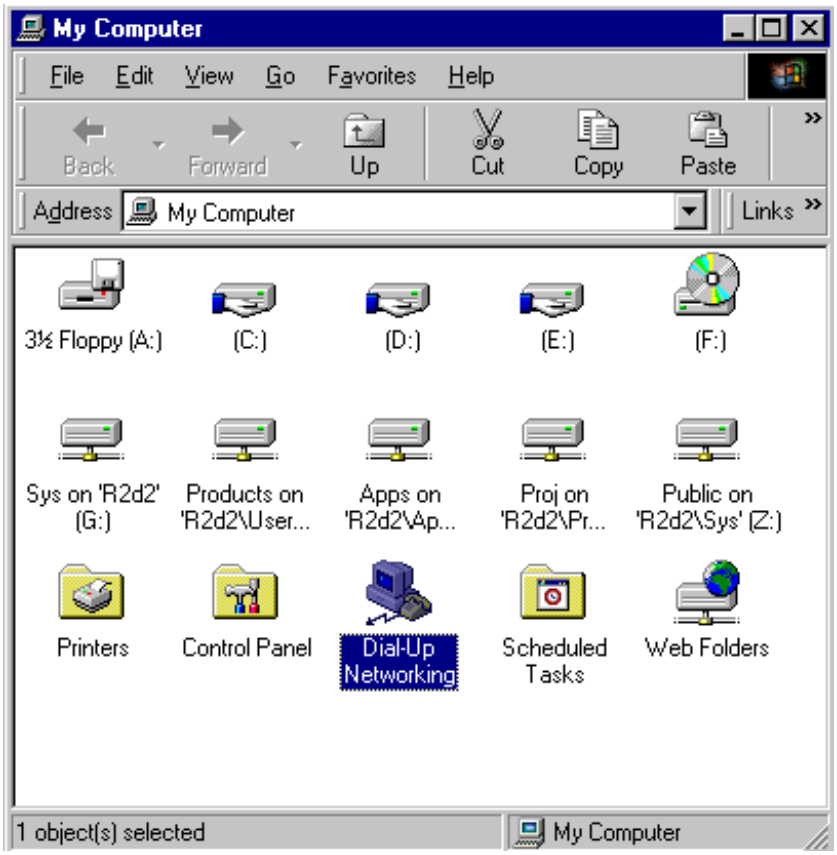
2. Select the COM port to use – push the Next when the COM port has been selected.


Install New Modem
Your modem has been set up successfully.
If you want to change these settings, double-click the Modems icon in Control Panel, select this modem, and click Properties.
< Back
Finish
Cancel

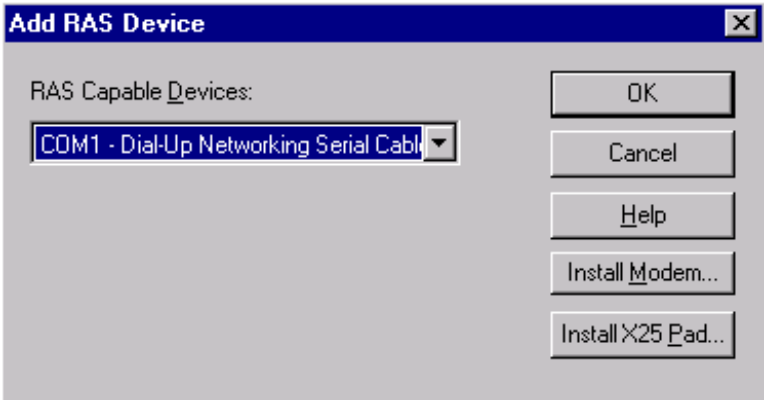
Adding Dial-up Networking : Windows NT

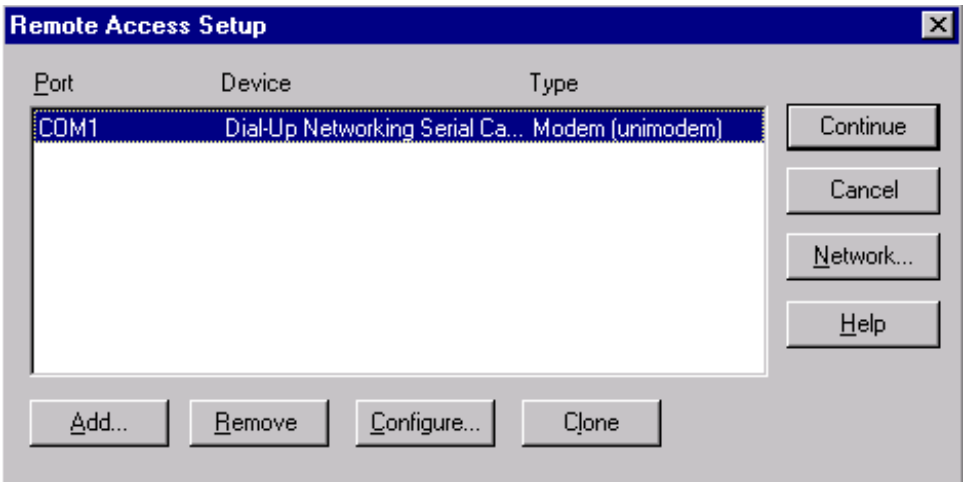
To add dial-up networking

1. From the desktop, open the My Computer icon and double-click the **Dial-up Networking** icon.

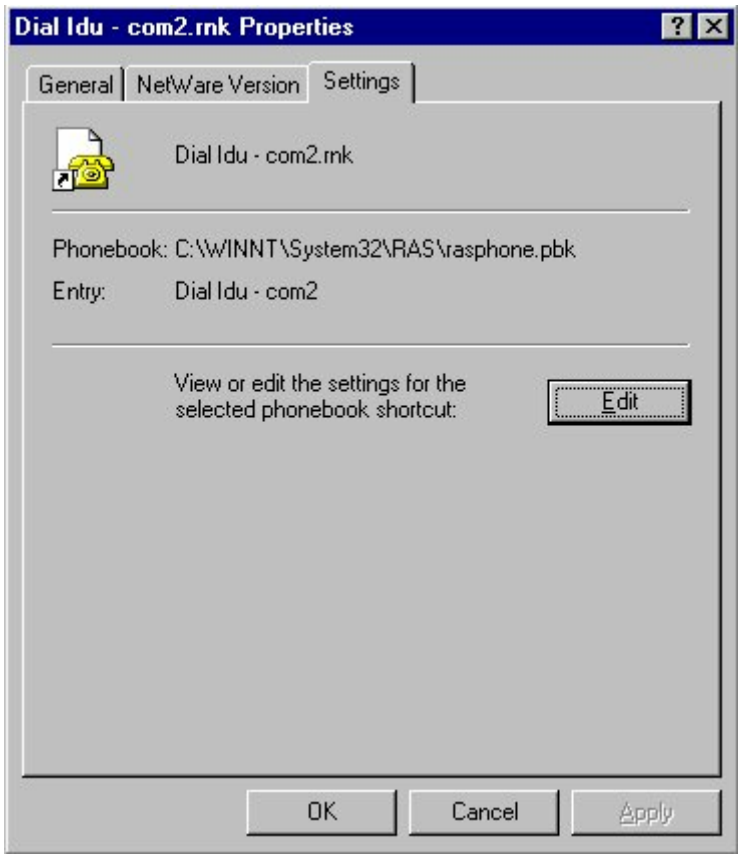


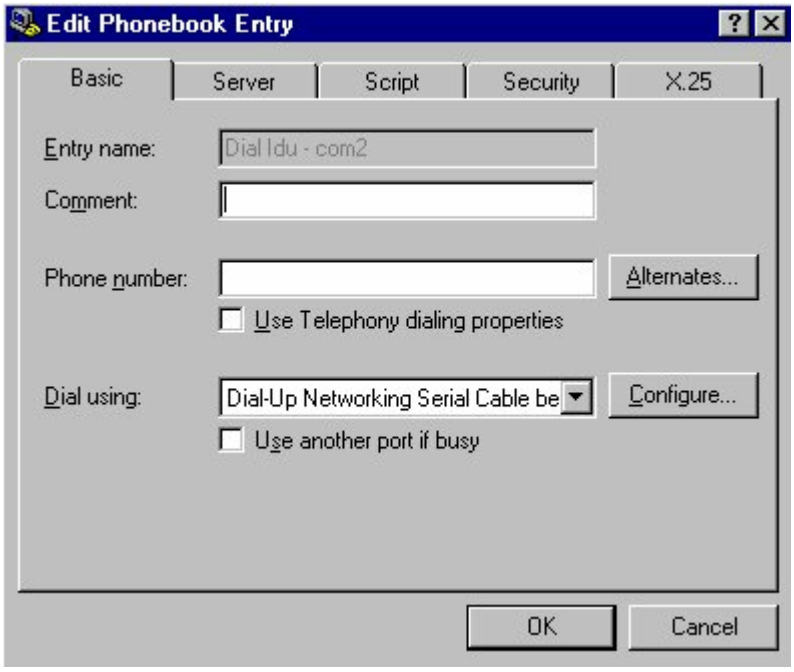
2. The following windows are displayed:

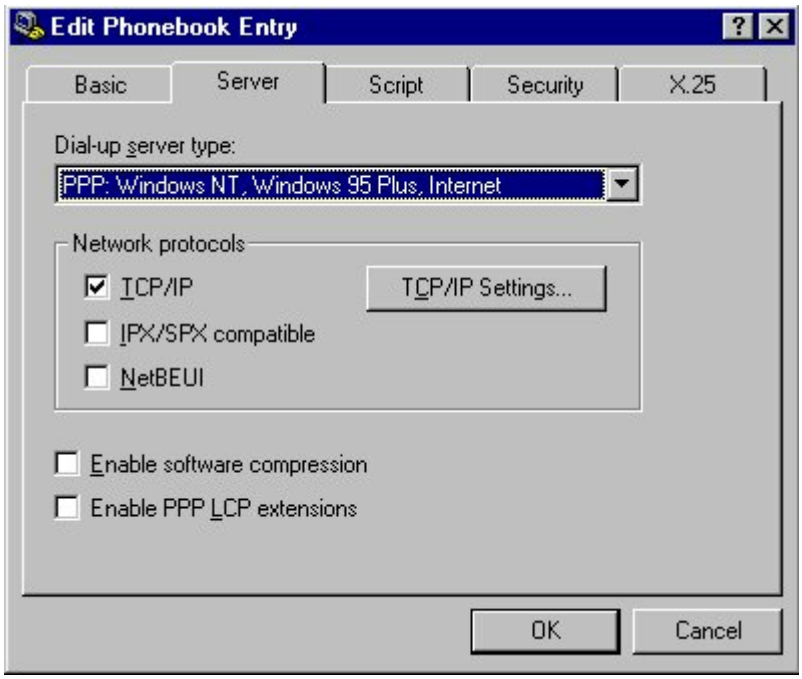


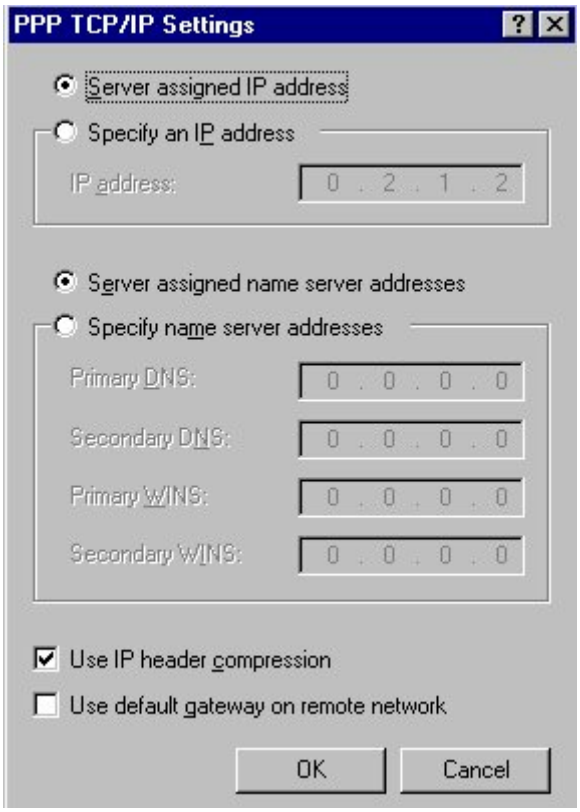


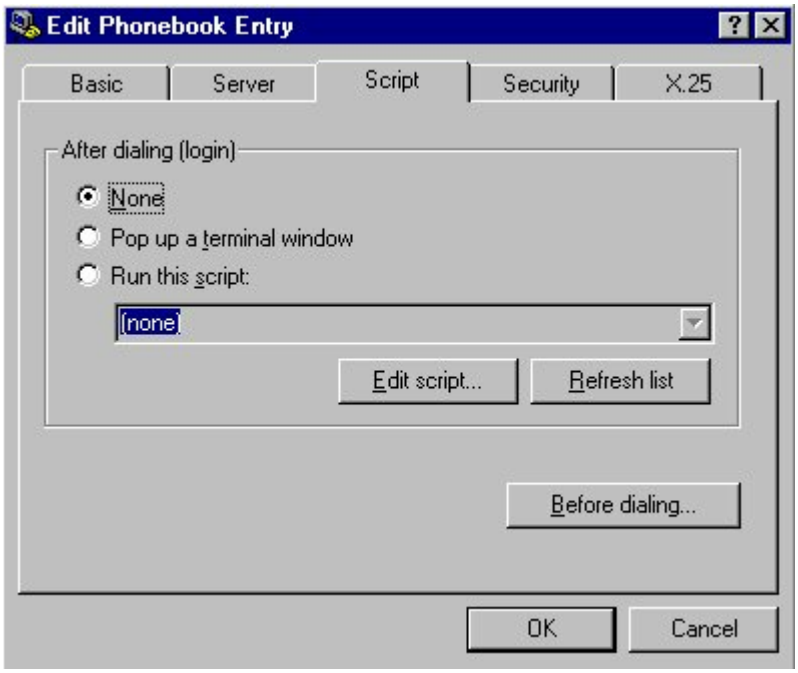
3. Whether COM1 or COM2 is selected, setup the connection using the following screens as a guideline. This allows establishment of a PPP connection between the computer and the IU's Element Manager port.

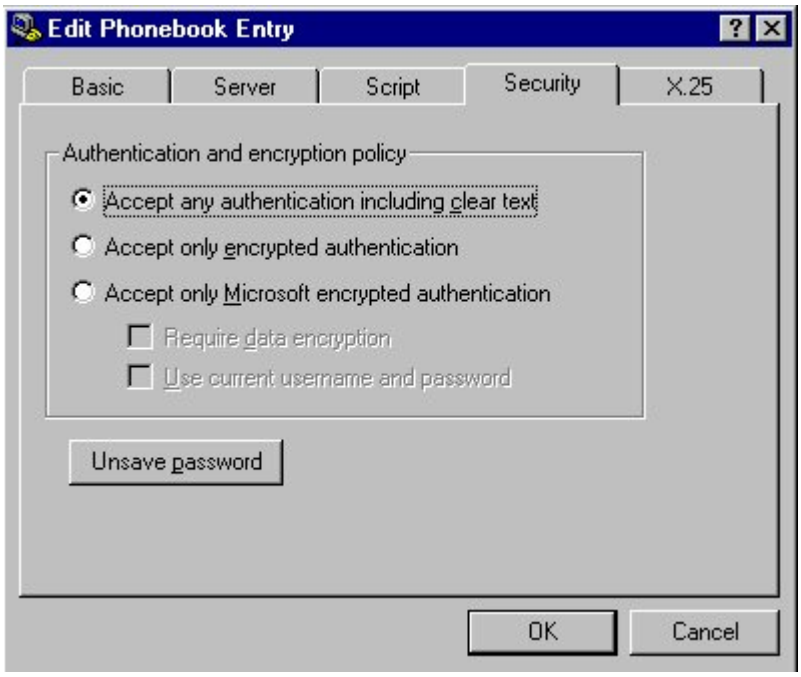



Edit Phonebook Entry
Basic
Server
Script
Security
X.25
Entry name:
Dial Idu - com2
Comment:
Phone number:
Alternates...
Use Telephony dialing properties
Dial using:
Dial-Up Networking Serial Cable be
Configure...
Use another port if busy
OK
Cancel


Edit Phonebook Entry
Basic
Server
Script
Security
X.25
Dial-up server type:
PPP: Windows NT, Windows 95 Plus, Internet
Network protocols
TCP/IP
TCP/IP Settings...
IPX/SPX compatible
NetBEUI
Enable software compression
Enable PPP LCP extensions
OK
Cancel

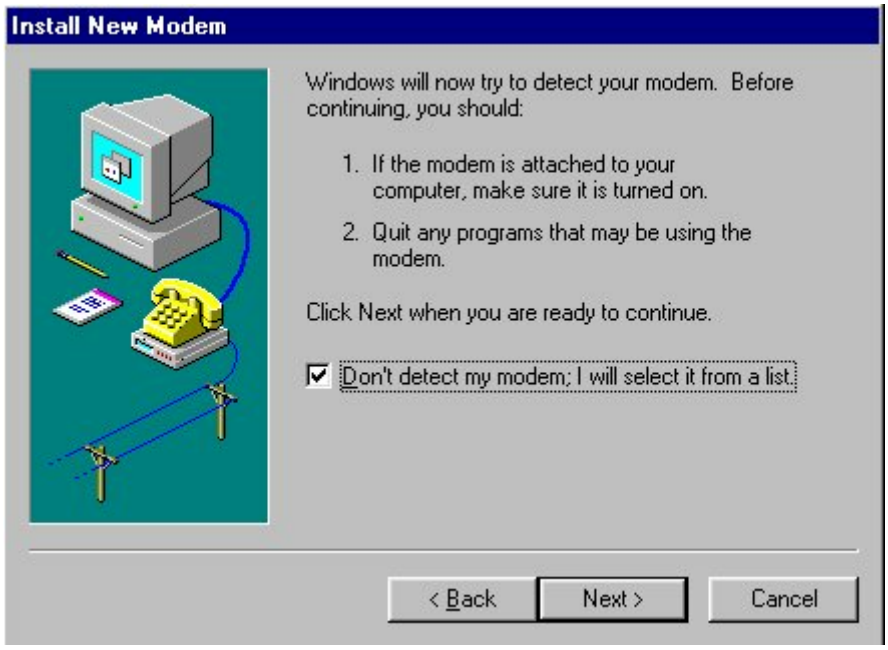

PPP TCP/IP Settings
Server assigned IP address
Specify an IP address
IP address:
0 . 2 . 1 . 2
Server assigned name server addresses
Specify name server addresses
Primary DNS:
0 . 0 . 0 . 0
Secondary DNS:
0 . 0 . 0 . 0
Primary WINS:
0 . 0 . 0 . 0
Secondary WINS:
0 . 0 . 0 . 0
Use IP header compression
Use default gateway on remote network
OK
Cancel


Edit Phonebook Entry
Basic
Server
Script
Security
X.25
After dialing (login)
None
Pop up a terminal window
Run this script:
(none)
Edit script...
Refresh list
Before dialing...
OK
Cancel

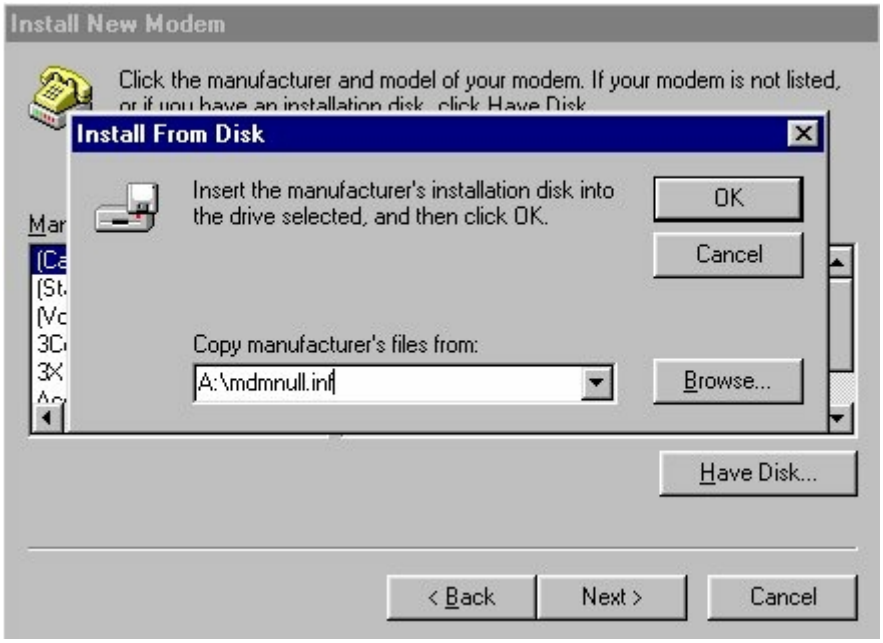

Edit Phonebook Entry
Basic
Server
Script
Security
X.25
Authentication and encryption policy
Accept any authentication including clear text
Accept only encrypted authentication
Accept only Microsoft encrypted authentication
Require data encryption
Use current username and password
Unsave password
OK
Cancel

Adding a Modem : Windows 95/98

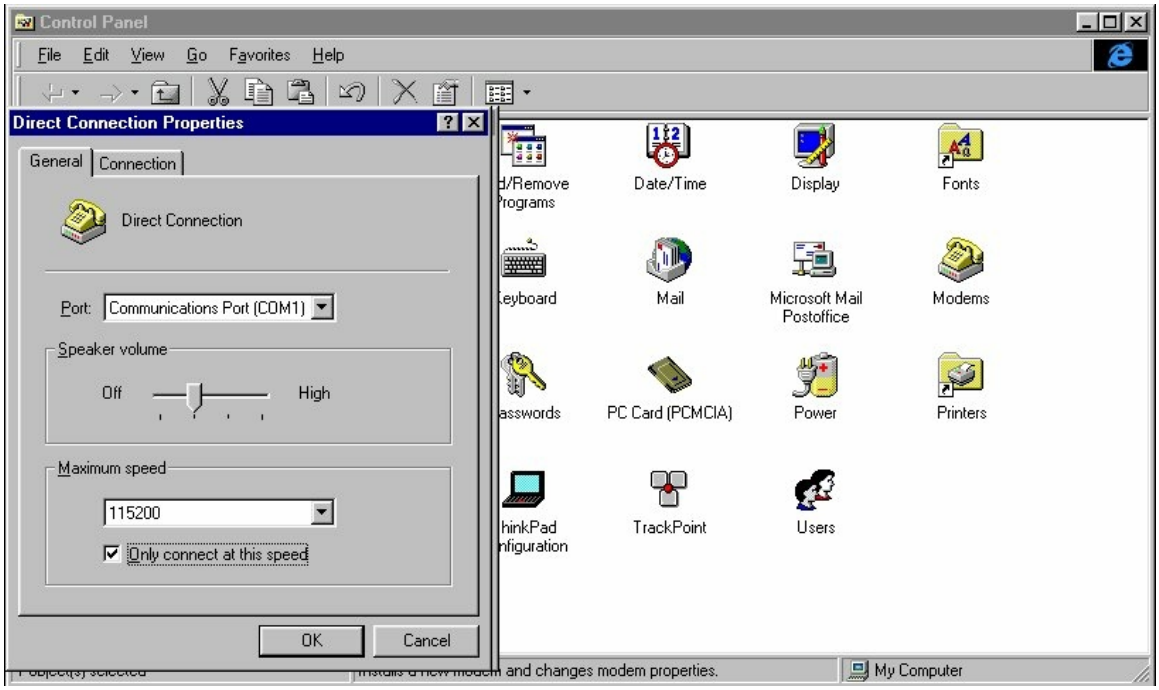
1. When working with a PC running a Windows 95/98, add a modem using the following screen as a guideline.

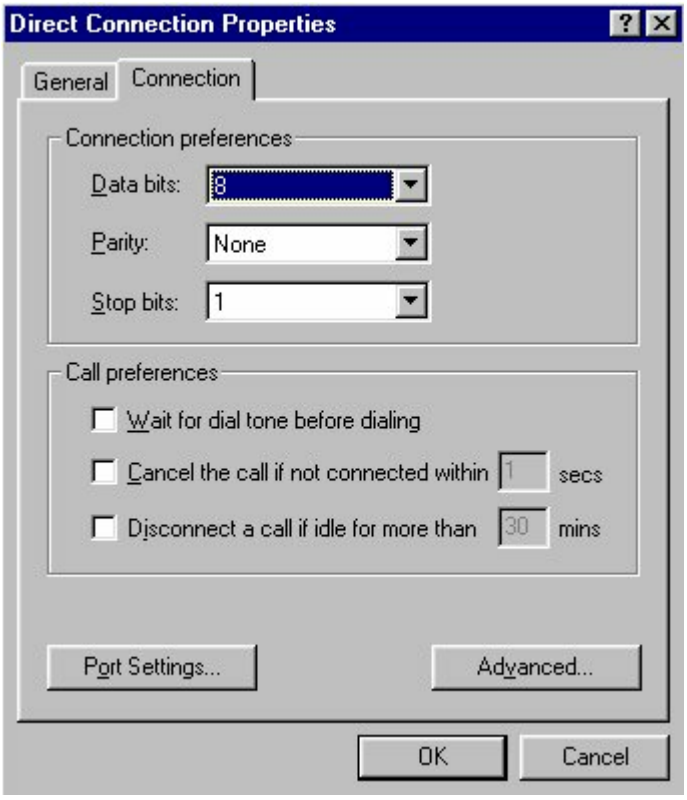


3. Use the mdrnull.inf to add a serial cable modem connection capability to the PC or laptop.



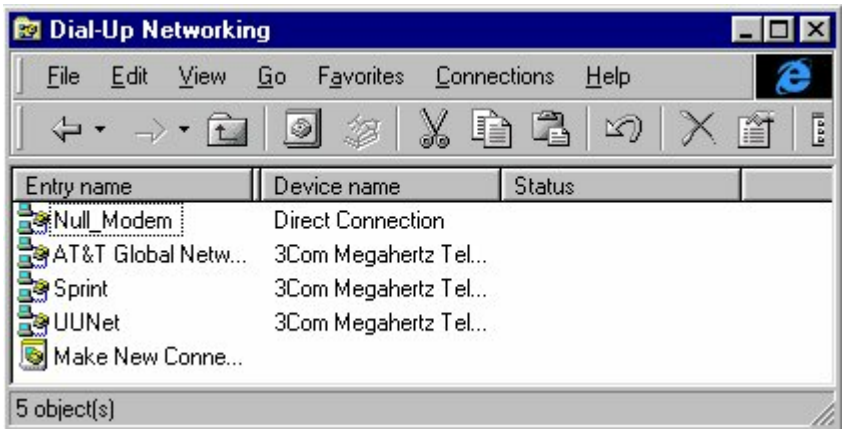
4. Once setup, use the following screens to set up the COM port's parameters.

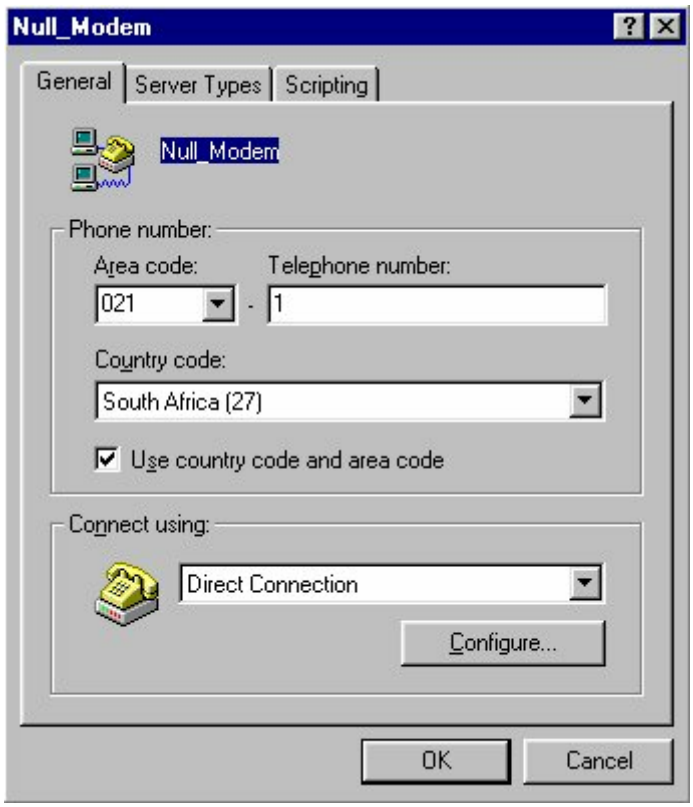


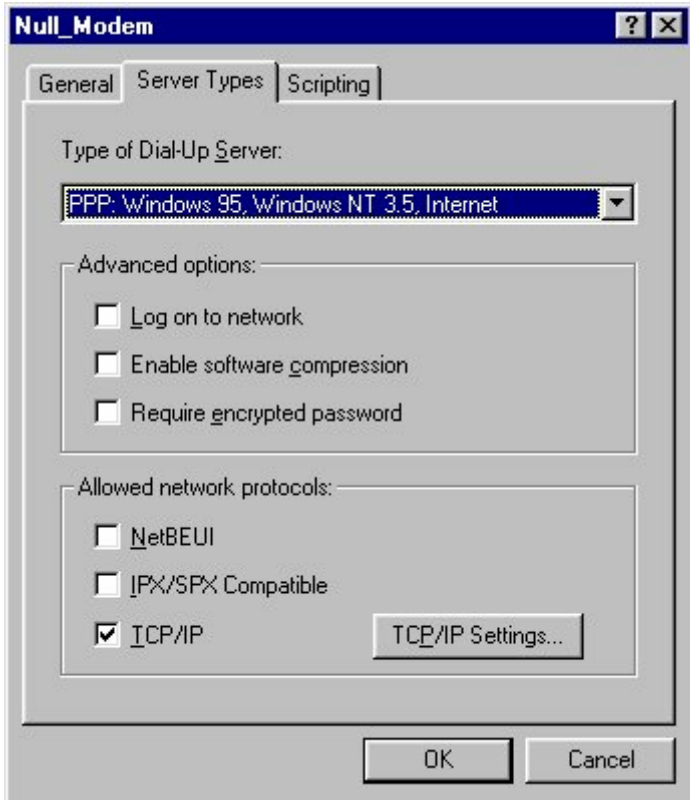


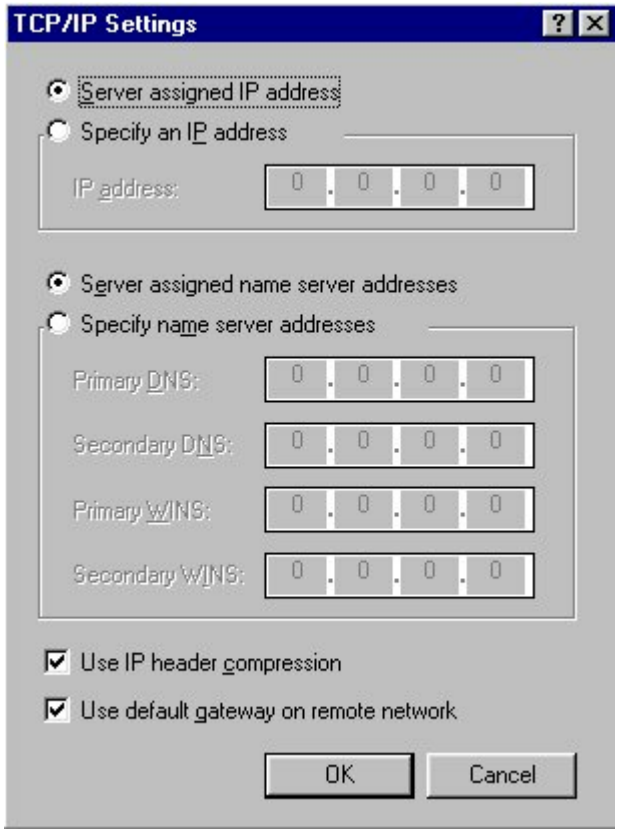
Adding Dial-up Networking : Windows 95/98

1. After adding the modem, set up the connection properties using the following screens as a guideline. This will allow establishment of a PPP connection between the computer and the IU's Element Manager port. A Null_Modem connection option as shown below will be created. If one doesn't exist, double click on the "Make New Connection" icon.




Null_Modem
General
Server Types
Scripting
Null_Modem
Phone number:
Area code:
Telephone number:
021
1
Country code:
South Africa (27)
Use country code and area code
Connect using:
Direct Connection
Configure...
OK
Cancel


Null_Modem
General
Server Types
Scripting
Type of Dial-Up Server:
PPP: Windows 95, Windows NT 3.5, Internet
Advanced options:
Log on to network
Enable software compression
Require encrypted password
Allowed network protocols:
NetBEUI
IPX/SPX Compatible
TCP/IP
TCP/IP Settings...
OK
Cancel



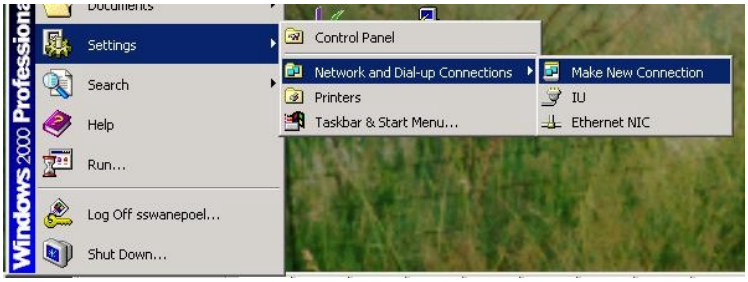
Adding Dial-up Networking : Windows 2000 / Windows XP

To add dial-up networking

The installation procedure documented here is based on the procedure that should be followed for Windows 2000. Some of the configuration windows for Windows XP may look slightly different, and may appear in a different order, but the basic procedure are the same as for Windows 2000 and are therefore not repeated in an attempt to reduce the size of this user manual.

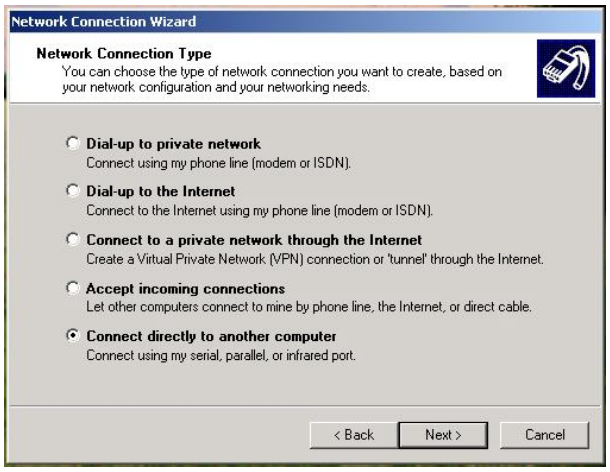
1. Select the ***Make New Connection*** menu item.

Win2000 & Win-XP

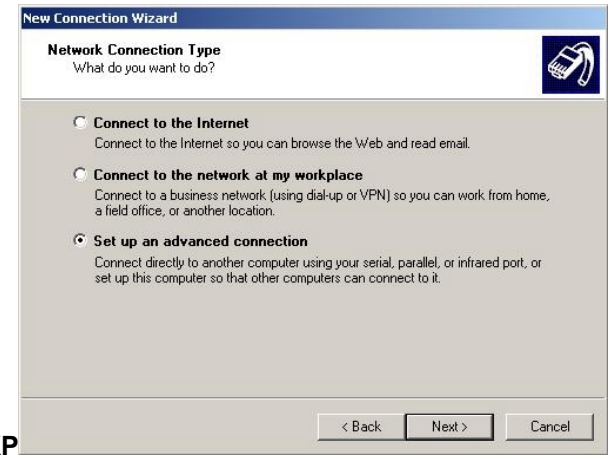


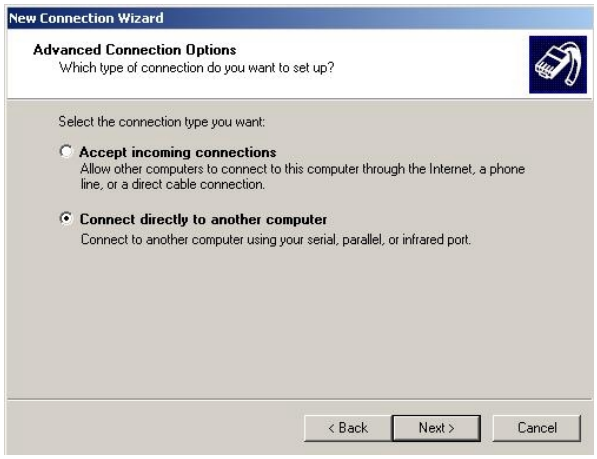
2. Select the ***Connect directly to another computer*** and press the ***Next*** button.

Win2000



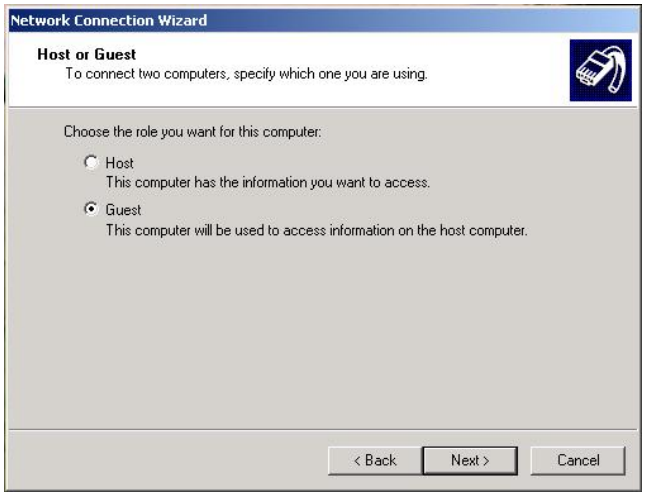
Win-XP





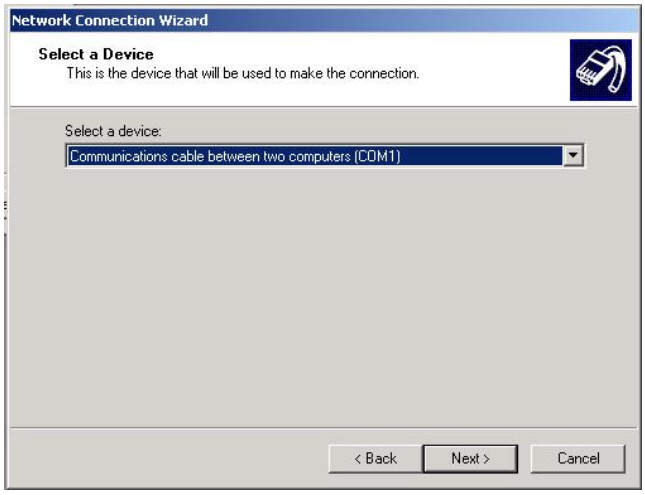
3. Set the dialup connection to connect as ***Guest*** and press the ***Next*** button.

Win2000 & Win-XP



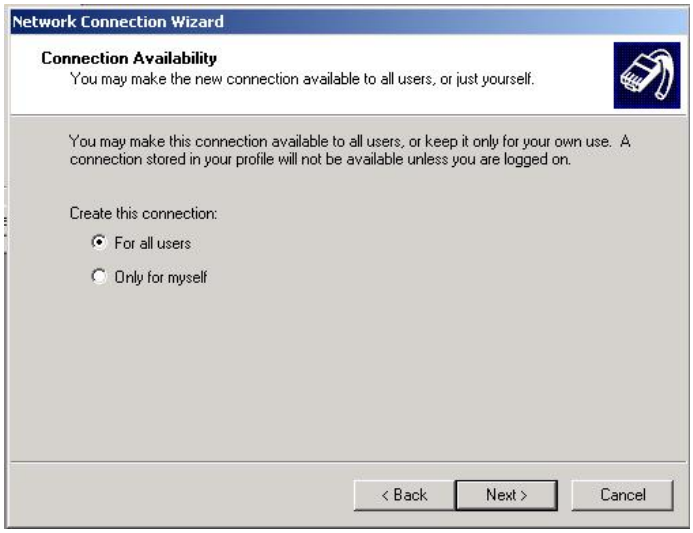
4. Select the COM port you intend to use to connect to the radio from the ***Select Device*** dropdown box and press the ***Next*** button. In Windows XP, this window is preceded by **Step 6** below.

Win2000 & Win-XP



5. Select the users that must be able to use this dialup connection and press the ***Next*** button.

Win2000 & Win-XP



6. Enter the name of this dialup connection and press the ***Finish*** button. This name may be any name of your choice. The connection is now installed, but its properties must still be configured. This window is displayed earlier in Windows XP.

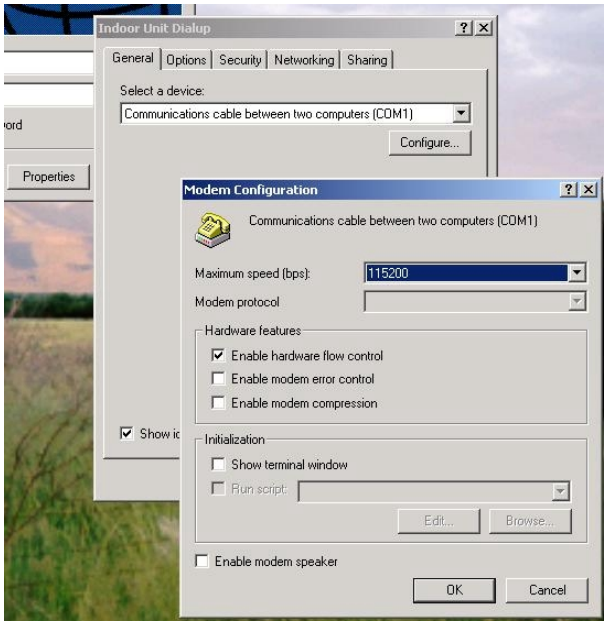
Win2000 & Win-XP

7. Finish installing the connection (Windows XP only)

Win-XP

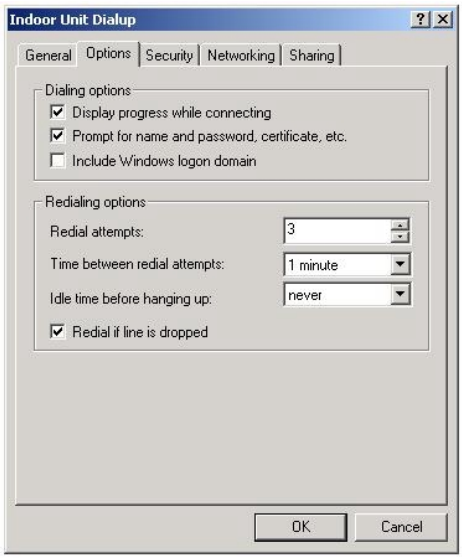
8. Browse to the newly added connection under the ***Network and Dial-Up connections*** menu item of Windows, and right-click on the connection with your mouse. Select the ***Properties*** item from the pop-up menu to bring up the properties window below. Now click on the ***Configure*** button below the ***Select a Device*** combo box in the ***General*** properties tab window to bring up the ***Modem Configuration*** box below. Make sure that all the settings on your PC are the same is in this window (Maximum speed: 115200 bps & hardware flow control enabled). Now press the **OK** button.

Win2000 & Win-XP



9. In the ***Options*** properties box below, select ***Redial if line is dropped*** and press the **OK** button.

Win2000 & Win-XP



10. Browse to the newly added connection under the ***Network and Dial-Up connections*** menu item of Windows, and left-click on the connection with your mouse. This will bring up the connection window below. The values of the ***Username*** and ***Password*** fields does not matter, press ***Connect*** to dial into the radio once the dialup cable has been plugged into the Indoor Unit and the PC.

Win2000 & Win-XP

2 Appendix: MANAGEMENT OF THE MDR2400-SR MDR5800-SR and the Orion 5825-sr

All management of the MDR and Orion products are implemented using SNMP (Simple Network Management Protocol), an open standard. The products can be managed by:

1. Standard SNMP managers such as HP OpenView or SNMPc i.e. there is Open Network Management compatibility.
2. For rapid product installation, the NMS GUI Application (hereafter referred to as the NMS-GA) provides extensive management functions on site and, via the microwave radio link, can be used to access the MDR / Orion station on the opposite side of the link. The NMS-GA is a software application that runs on a PC workstation such as a laptop or notebook computer that is connected to an MDR / Orion Indoor Unit serial port (DB9 DTE) or an Ethernet connection (10BaseT DTE), both accessed via the IU front-panel.

SNMP and the MDR / Orion

Use of SNMP within the product allows remote: configuration, monitoring of performance, notification of alarms and firmware upgrades via an IP-network. Within an IP network supporting routing of IP data, the radios can be supported from any remote location. The product can be accessed via the Internet if the necessary gateways are provided. A GSM/PCS modem dial-up capability provides another remote management option.

The Indoor Units have built-in SNMP agents and an extensive MIB (Management Information Base). The MDR /Orion product uses SNMP V1 (RFC1155, 1157). The user has access to an Enterprise MIB (obtainable though customer services) and MIB II (RFC 1213).

Access to the MIB via the IU SNMP agent is via Ethernet (10BaseT interface on the product's front panel) or PPP (RFC 1661) via the product's serial channel Element Manager port. The use of SNMP provides flexibility for operators with central equipment monitoring. It provides management access to radio configuration (all data interfaces), interface status and statistics, fault and maintenance information.

SNMP security (if enabled) is ensured by using a login and password to give the user "administrator" or "standard user" rights. The "standard user rights" option limits the ability to SET MIB variables.

NOTE Secure SNMP is not longer supported.

The product has threshold-based alarm generation (there is an extensive SNMP trap list with a trap filter that is adjustable via SNMP). Network access (wired or wireless i.e. GSM/PCS Modem) allows over-the-air remote firmware uploading (FTP) with a load verification (and reversion) capability.

There are three principle requirements to use SNMP with the MDR / Orion Radio Stations.

1. A Management Station that runs a SNMP Management Software package that is installed on a networked or stand-alone PC that can be connected to an Indoor Unit either using a serial connection or an Ethernet connection. From the Management station, the agents within the Indoor Units can be configured or polled for information.
2. Agent: The agent accepts SNMP GET, SET or GET-NEXT commands from the Management Application software and collects or adjusts information from the Indoor Unit's MIB.
3. Management Information Base (MIB): the MIB is a database that is accessed based on the OID (object ID) the SNMP Manager has chosen. The Indoor Unit uses an Enterprise MIB and a standard MIB (MIB II) to store or allow access to information relevant to the MDR / Orion link.

The MIB Elements – OID (Object ID) DESCRIPTIONS

Object ID	Object name	Object Type	Access Rights	Description
.1316	plessey			
.1316.1	products			
.1316.1.1	digitalradio			
.1316.1.1.1	mdrmte			
.1316.1.1.1.1	mdrmtePerformance			
.1316.1.1.1.2	mdrmteConfiguration			
.1316.1.1.1.3	mdrmteFault			
.1316.1.1.1.4	mdrmteAccess			
.1316.1.1.1.5	mdrmteRelayOutputs			
.1316.1.1.1.6	mdrmteOptoInputs			
.1316.1.1.1.1.1	mdrmtePayloadPerf			
.1316.1.1.1.1.1.1	mdrmtePpTable	SEQUENCE	not-accessible	
.1316.1.1.1.1.1.1.1	mdrmtePpEntry	MdrmtePpEntry	not-accessible	
.1316.1.1.1.1.1.1.1.1	mdrmtePpIndex	INTEGER	read-only	
.1316.1.1.1.1.1.1.1.2	mdrmtePpLOS	INTEGER	read-only	A Loss of Signal has been detected on the input to a tributary - there is one for each tributary (0, 1, 2, 3, ...)
.1316.1.1.1.1.1.1.1.3	mdrmtePpAIS	INTEGER	read-only	An Alarm Indication Signal has been detected on the input to a tributary - there is one for each tributary (0, 1, 2, 3, ...)
.1316.1.1.1.1.1.2	mdrmteCrcErrors	INTEGER	read-only	The number of CRC4 or CRC6 errors seen on the selected tributary since the last time errors were cleared.
.1316.1.1.1.1.1.3	mdrmteCrcTribSelect	INTEGER	read-write	The tributary selected for CRC checking.
.1316.1.1.1.1.1.4	mdrmteCrcLock	INTEGER	read-only	Indication of whether the CRC checking algorithm has locked onto a CRC frame signature in the payload data.
.1316.1.1.1.1.1.5	mdrmteCrcEbitCnt	INTEGER	read-only	Reflects the number of assertions of the 'E' bits in selected tributary.
.1316.1.1.1.1.2	mdrmteRFLinkPerf			
.1316.1.1.1.1.2.1	mdrmteCarrierDetect	INTEGER	read-only	Indicates if a RF Carrier has been detected by the Outdoor Unit - if so, the header in the RF Packet has been identified as a potential valid packet - note however, that it could be received from another transmitter that uses the same header format
.1316.1.1.1.1.2.2	mdrmteRSSI	Gauge	read-only	A dBm value representative of the received signal level. The value detected is representative of the level that would be measured should a spread spectrum signal be input at the Outdoor Unit's Diplexer RF Port - a CW (Continuous Wave) signal will appear to be 20 dB higher

Object ID	Object name	Object Type	Access Rights	Description
.1316.1.1.1.1.2.3	mdrmteCurrentPER	DisplayString	read-only	This is the current Packet Error Rate and is based on the number of uncorrectable packets/blocks being detected by the FEC (Forward Error Correction) circuitry within the Indoor Unit (based of the number of errored packets divided by the total number of packets transmitted in a measurement period of 250msec)
.1316.1.1.1.1.2.4	mdrmteMaximizedPER	DisplayString	read-only	This is the maximum Packet Error Rate detected during the last measurement period, based number of maximum number
.1316.1.1.1.1.2.5	mdrmteLinkUnavailable	INTEGER	read-only	Based on G.826 criteria, this MIB element indicates RF Link Availability/Non-availability
.1316.1.1.1.1.2.6	mdrmteFrameUnlock	INTEGER	read-only	The data that is transmitted across the RF Link is conveyed in a frame, compiled within
.1316.1.1.1.1.2.7	mdrmteRemoteFrameUnlock	INTEGER	read-only	Frame-lock (mdrmteFrameUnlock) as seen by the other end of the link is fed back here.
.1316.1.1.1.1.2.8	mdrmteErrSecRatioExceeded	INTEGER	read-only	The ESR is a ratio of the number of Errored seconds (one second periods within
.1316.1.1.1.1.2.9	mdrmteSevErrSecRatioExceeded	INTEGER	read-only	The SESR is a ratio of the number of Severely Errored seconds (one second periods within
.1316.1.1.1.1.2.10	mdrmteBkgrndBlkErrRatioExceeded	INTEGER	read-only	The BBER is a ratio of the number of uncorrectable blocks/packets received
.1316.1.1.1.1.2.11	mdrmteMinorPERExceeded	INTEGER	read-only	This parameter indicates if the minor packet (uncorrectable by FEC) error rate has been exceeded based on the defined
.1316.1.1.1.1.2.12	mdrmteMajorPERExceeded	INTEGER	read-only	This parameter indicates if the major packet (uncorrectable by FEC) error rate has been exceeded based on the defined
.1316.1.1.1.1.2.13	mdrmteCriticalPERExceeded	INTEGER	read-only	This parameter indicates if the critical packet (uncorrectable by FEC) error rate has been exceeded based on the defined
.1316.1.1.1.1.2.14	mdrmtePrevParamsRestored	INTEGER	read-only	Indicates if autorecovery for the Outdoor Unit settings had to be invoked
.1316.1.1.1.1.2.15	mdrmteAveragePER	DisplayString	read-only	This is the current Average Packet Error Rate and is based on the number of
.1316.1.1.1.1.2.16	mdrmteStartSweep	INTEGER	read-write	This is used to start the spectral RSSI sweep.
.1316.1.1.1.1.2.17	mdrmteRssiSpectrum	DisplayString	read-only	This contains the results of the sweep through the spectum of
.1316.1.1.1.1.3	mdrmteG826			

Object ID	Object name	Object Type	Access Rights	Description
.1316.1.1.1.1.3.1	mdrmteStatus	INTEGER	read-only	Indicates if 'G.826-like' errored, severely errored and unavailable
.1316.1.1.1.1.3.2	mdrmteTotalSeconds	Counter	read-only	Indicates the total number of seconds, both available and unavailable
.1316.1.1.1.1.3.3	mdrmteAvailableSeconds	Counter	read-only	A period of unavailable time begins at the onset of ten consecutive SES events.
.1316.1.1.1.1.3.4	mdrmteUnavailableSeconds	Counter	read-only	A period of unavailable time begins at the onset of ten consecutive SES events.
.1316.1.1.1.1.3.5	mdrmteErroredSeconds	Counter	read-only	A one second period with one or more errored packets(uncorrectable packets) or at least one defect
.1316.1.1.1.1.3.6	mdrmteSeverelyErroredSeconds	Counter	read-only	A one-second period which contains > 30% errored blocks or at least one defect. SES is a subset of ES.
.1316.1.1.1.1.3.7	mdrmteErroredBlocks	Counter	read-only	A packet which has been identified as containing uncorrectable bits by the FEC circuitry
.1316.1.1.1.1.3.8	mdrmteBackgroundBlockErrors	Counter	read-only	An errored block not occurring as part of a SES.
.1316.1.1.1.1.3.9	mdrmteErroredSecondsRatio	DisplayString	read-only	The ratio of ES to total seconds in available time during a fixed measurement interval.
.1316.1.1.1.1.3.10	mdrmteSeverelyErroredSecondsRatio	DisplayString	read-only	The ratio of SES to total seconds in available time during a fixed measurement interval.
.1316.1.1.1.1.3.11	mdrmteBackgroundBlockErrorRatio	DisplayString	read-only	The ratio of Background Block Errors (BBE) to total blocks in available time
.1316.1.1.1.1.3.12	mdrmteDeprecated2	INTEGER	write-only	Deprecated
.1316.1.1.1.1.3.13	mdrmteCorrectedSymbols	INTEGER	read-only	This parameter lists the number of corrected symbols i.e. those corrected by the FEC
.1316.1.1.1.1.4	mdrmteCounters			
.1316.1.1.1.1.4.1	mdrmteLostEthRxPkts	Counter	read-only	Indicates the total number of times an ethernet packet could not be buffered
.1316.1.1.1.1.4.2	mdrmteLostLinkRxPkts	Counter	read-only	Indicates the total number of times a link packet could not be buffered
.1316.1.1.1.1.4.3	mdrmteLostWaySideTxPkts	Counter	read-only	Indicates the total number of times a wayside packet could not be buffered
.1316.1.1.1.1.4.4	mdrmteScc1FullCnt	Counter	read-only	Indicates the total number of times SCC1 was full to capacity
.1316.1.1.1.1.4.5	mdrmteScc2FullCnt	Counter	read-only	Indicates the total number of times SCC2 was full to capacity
.1316.1.1.1.1.4.6	mdrmteScc1UnderrunCnt	Counter	read-only	Indicates the total number of times SCC1 ran out of BDs
.1316.1.1.1.1.4.7	mdrmteScc2UnderrunCnt	Counter	read-only	Indicates the total number of times SCC2 ran out of BDs
.1316.1.1.1.1.4.8	mdrmteScc2RxBdAbortCnt	Counter	read-only	Indicates the total number of times SCC2 received an aborted frame

Object ID	Object name	Object Type	Access Rights	Description
.1316.1.1.1.1.4.9	mdrmteScc2RxBdNonOctCnt	Counter	read-only	Indicates the total number of times SCC2 received a Non octet aligned frame
.1316.1.1.1.1.4.10	mdrmteScc2RxBdCrcCnt	Counter	read-only	Indicates the total number of times SCC2 received a frame with a CRC error
.1316.1.1.1.1.4.11	mdrmteEtherTxRetries	Counter	read-only	Indicates the total number of (collisions) packets that were retransmitted on ethernet
.1316.1.1.1.1.4.12	mdrmteEtherTxDeferCnt	Counter	read-only	Indicates the total number of frames deferred due to early collisions on ethernet
.1316.1.1.1.1.4.13	mdrmteEtherTxHeartBeatCnt	Counter	read-only	Indicates the total number of times the collision inup was not asserted on ethernet
.1316.1.1.1.1.4.14	mdrmteEtherTxLateCollisions	Counter	read-only	Indicates the total number of late collisions on ethernet
.1316.1.1.1.1.4.15	mdrmteEtherReTxLimit	Counter	read-only	Indicates the total number of times the retransmission limit was reached on ethernet
.1316.1.1.1.1.4.16	mdrmteEtherTxUnderrun	Counter	read-only	Indicates the total number of buffer underruns on ethernet
.1316.1.1.1.1.4.17	mdrmteEtherTxCarrierLost	Counter	read-only	Indicates the total number of times carrier was lost on ethernet
.1316.1.1.1.1.4.18	mdrmteEtherRxLenErr	Counter	read-only	Indicates the total number of frame length violations received on ethernet
.1316.1.1.1.1.4.19	mdrmteEtherRxNonOctet	Counter	read-only	Indicates the total number of non-octet aligned frames received on ethernet
.1316.1.1.1.1.4.20	mdrmteEtherRxShort	Counter	read-only	Indicates the total number of (too) short frames received on ethernet
.1316.1.1.1.1.4.21	mdrmteEtherRxCRCerr	Counter	read-only	Indicates the total number of CRC errored frames received on ethernet
.1316.1.1.1.1.4.22	mdrmteEtherRxOverrun	Counter	read-only	Indicates the total number of receiver overruns received on ethernet
.1316.1.1.1.1.4.23	mdrmteEtherRxCollision	Counter	read-only	Indicates the total number of collisioned frames received on ethernet
.1316.1.1.1.1.4.24	mdrmteEtherJunkFrames	Counter	read-only	Indicates the total number of invalid frames received on ethernet
.1316.1.1.1.1.4.25	mdrmteEtherShortFrames	Counter	read-only	Indicates the total number of times the Ethernet frame received was too short.
.1316.1.1.1.1.4.26	mdrmteEtherTxBdsFull	Counter	read-only	Indicates the total number of times the ethernet Tx BD queue was too full to insert data
.1316.1.1.1.1.4.27	mdrmteEtherRxPauseCnt	Counter	read-only	Indicates the total number of times the ethernet receiver was disabled due to lack of buffers.
.1316.1.1.1.1.4.28	mdrmteIdma1InUse	Counter	read-only	Indicates the total number of times IDMA controller 1 was already in use. memcpy() was used instead.

Object ID	Object name	Object Type	Access Rights	Description
.1316.1.1.1.1.4.29	mdrmteIdma2InUse	Counter	read-only	Indicates the total number of times IDMA controller 2 was already in use. memcpy() was used instead.
.1316.1.1.1.1.4.30	mdrmteLinkKnQueueFull	Counter	read-only	Indicates the total number of times a Kwiknet frame was deferred due to a lack of space in the AMX link queue.
.1316.1.1.1.1.4.31	mdrmteLinkTxBdsFull	Counter	read-only	Indicates the total number of times the Rf Link Tx BD queue was too full to insert data
.1316.1.1.1.1.4.32	mdrmteKnEtherFramesLost	Counter	read-only	Indicates the total number of times the Kwiknet queue was too full to insert Ethernet data
.1316.1.1.1.1.4.33	mdrmteKnCraftFramesLost	Counter	read-only	Indicates the total number of times the Kwiknet queue was too full to insert SCC4 data
.1316.1.1.1.1.4.34	mdrmteKnLinkFramesLost	Counter	read-only	Indicates the total number of times the Kwiknet queue was too full to insert SCC2 data
.1316.1.1.1.1.4.35	mdrmteKnFramesTooShort	Counter	read-only	Indicates the total number of times the Kwiknet buffer allocated was too short.
.1316.1.1.1.1.4.36	mdrmteLinkVoidFrames	Counter	read-only	Indicates the total number of overwritten frames received on the wireless PPP link
.1316.1.1.1.1.4.37	mdrmteLinkRxPauseCnt	Counter	read-only	Indicates the total number of times the link receiver was disabled due to lack of buffers.
.1316.1.1.1.1.4.38	mdrmteRelayServerRestarts	Counter	read-only	Indicates the total number of times the Relay scripting server restarted.
.1316.1.1.1.1.4.39	mdrmteRelayClientRestarts	Counter	read-only	Indicates the total number of times the Relay scripting client restarted.
.1316.1.1.1.1.4.40	mdrmteMuxEtherErrors	Counter	read-only	The number of Ethernet errors reported by the FPGA
.1316.1.1.1.1.4.41	mdrmteMuxBlockErrors	Counter	read-only	The number of Block errors reported by the FPGA
.1316.1.1.1.1.4.42	mdrmteOuRxEtherCRCerrors	Counter	read-only	The number of Ethernet errors reported by the FPGA on the OU
.1316.1.1.1.1.5	mdrmteResetAllPerfData	INTEGER	write-only	Reset all parameters associated with Packet Error and G.826 measurements for the RF Link
.1316.1.1.1.2.1	mdrmtePayloadConf			
.1316.1.1.1.2.1.1	mdrmteDataRate	INTEGER	read-write	Configure the tributary data interface rate - either E1 or T1
.1316.1.1.1.2.1.2	mdrmteLineCodeType	INTEGER	read-only	Deprecated
.1316.1.1.1.2.1.3	mdrmtePcTable	SEQUENCE	not-accessible	
.1316.1.1.1.2.1.3.1	mdrmtePcEntry	MdrmtePcEntry	not-accessible	
.1316.1.1.1.2.1.3.1.1	mdrmtePcIndex	INTEGER	read-only	
.1316.1.1.1.2.1.3.1.2	mdrmtePcLabel	DisplayString	read-write	E1/T1 Payload configuration tributary label
.1316.1.1.1.2.1.3.1.3	mdrmtePcActive	INTEGER	read-write	Defines whether tributaries are active or inactive
.1316.1.1.1.2.1.4	mdrmteLineEncodingTable	SEQUENCE	not-accessible	

Object ID	Object name	Object Type	Access Rights	Description
.1316.1.1.1.2.1.4.1	mdrmteLineEncodingEntry	MdrmteLineEncoding Entry	not-accessible	
.1316.1.1.1.2.1.4.1.1	mdrmteLineEncodingIndex	INTEGER	read-only	
.1316.1.1.1.2.1.4.1.2	mdrmteLineEncodingTribSelect	INTEGER	read-only	Selects the trib, or group of tributaries to which encoding applies
.1316.1.1.1.2.1.4.1.3	mdrmteLineEncoding	INTEGER	read-write	Defines the line code types for the tributaries, either HDB3 or AMI for E1
.1316.1.1.1.2.2	mdrmteRFLinkConf			
.1316.1.1.1.2.2.1	mdrmteTxPower	INTEGER	read-write	Allows setup of the output power available at the diplexer port of the Outdoor Unit
.1316.1.1.1.2.2.2	mdrmteBandPlan	INTEGER	read-write	The MDR5800 Outdoor Units operate in the 5.725 GHz to 5.850 GHz ISM frequency band.
.1316.1.1.1.2.2.3	mdrmteTxFrequencyPlanD	INTEGER	read-write	Frequency plan D allows independent control of transmit and receive frequencies.
.1316.1.1.1.2.2.4	mdrmteRxFrequencyPlanD	INTEGER	read-write	Refer to the mdrmteTxFrequencyPlanD description
.1316.1.1.1.2.2.5	mdrmteTransmitBand	INTEGER	read-only	This value is read from the Outdoor Unit via the Indoor Unit and defines whether it transmits in the
.1316.1.1.1.2.2.6	mdrmteReserved2	INTEGER	read-write	
.1316.1.1.1.2.2.7	mdrmteRegulations	INTEGER	read-only	This parameter is read from the Outdoor Unit via the Indoor Unit and defines regulatory compliance of the Outdoor Unit
.1316.1.1.1.2.2.8	mdrmteAutoRecovery	INTEGER	read-write	This feature is used if the user is installing a link from one side and there is no assistance on the opposite side of the link. It mitigates against the link failing and not being able to be
.1316.1.1.1.2.2.9	mdrmteOURateOverride	INTEGER	read-write	Depracated
.1316.1.1.1.2.2.10	mdrmteOUDataRate	INTEGER	read-write	A setable rate that allows a reduced transfer data rate over the RF Link
.1316.1.1.1.2.2.11	mdrmteTxFrequencyCurrent	INTEGER	read-only	This value [MHz] is read back from the Outdoor Unit and defines the transmit frequency of the Outdoor Unit
.1316.1.1.1.2.2.12	mdrmteRxFrequencyCurrent	INTEGER	read-only	This value [MHz] is read back from the Outdoor Unit and defines the receive frequency of the Outdoor Unit
.1316.1.1.1.2.2.13	mdrmteNonAutoBandPlan	INTEGER	read-write	Same as mdrMTEBandPlan setting in this MIB group except Autorecovery is not enabled - this allows control of the Outdoor
.1316.1.1.1.2.2.14	mdrmteNonAutoTxFreqPlanD	INTEGER	read-write	Same as mdrTxFrequencyPlanD setting in this MIB group except autorecovery is not enabled - this allows control of the Outdoor

Object ID	Object name	Object Type	Access Rights	Description
.1316.1.1.1.2.2.15	mdrmteNonAutoRxFreqPlanD	INTEGER	read-write	Same as mdrRxFrequencyPlanD setting in this MIB group except autorecovery is not enabled - this allows control of the Outdoor
.1316.1.1.1.2.2.16	mdrmteNonAutoTxPower	INTEGER	read-write	Same as mdrTxPower setting in this MIB group except autorecovery is not enabled - this allows control of the Outdoor
.1316.1.1.1.2.2.17	mdrmteRadioType	INTEGER	read-only	This value is read from the Outdoor Unit via the Indoor Unit and defines
.1316.1.1.1.2.2.18	mdrmteSevereErrorMargin	INTEGER	read-write	Defines the percentage threshold (1-99) used when calculating in a one second period
.1316.1.1.1.2.2.19	mdrmteTimedMute	INTEGER	write-only	Initiates muting of transmitted signal for a short period to facilitate spectral analysis.
.1316.1.1.1.2.3	mdrmteServiceChannel			
.1316.1.1.1.2.3.1	mdrmteScDataRate	INTEGER	read-write	Bit rate used across the wayside service channel link
.1316.1.1.1.2.3.2	mdrmteScDataBits	INTEGER	read-write	The data width - can be 7 or 8 bits
.1316.1.1.1.2.3.3	mdrmteScParity	INTEGER	read-write	Serial channel - set to none, odd or even
.1316.1.1.1.2.3.4	mdrmteScStopBits	INTEGER	read-write	The nuber of stop bits can be set to 1 or 2
.1316.1.1.1.2.3.5	mdrmteScFlowControl	INTEGER	read-write	Either hardware or no flow control is used
.1316.1.1.1.2.3.6	mdrmteScStatusDump	INTEGER	read-write	Allows the wayside service (serial) channel to be used as a diagnostics port
.1316.1.1.1.2.4	mdrmteGeneral			
.1316.1.1.1.2.4.1	mdrmteStationName	DisplayString	read-write	The station name is stored in the Indoor Unit in nonvolatile memory
.1316.1.1.1.2.4.2	mdrmteIUSerialNumber	DisplayString	read-only	An electronic serial number is read from the Indoor Unit - this number is unique
.1316.1.1.1.2.4.3	mdrmteIUFirmwareVersion	DisplayString	read-only	The Indoor Unit firmware number is the version of application firmware that is loaded into
.1316.1.1.1.2.4.4	mdrmteIUBootkernelVersion	DisplayString	read-only	The Indoor Unit bootkernel version is the version of boot firmware that is loaded into
.1316.1.1.1.2.4.5	mdrmteOUBarCode	INTEGER	read-only	The Outdoor Unit bar-code number is programmed into the OU at time of manufacture and is read via the
.1316.1.1.1.2.4.6	mdrmteOUPICFirmwareVersion	DisplayString	read-only	The Outdoor Unit PIC firmware number is programmed into the OU at time of manufactute and is read via the
.1316.1.1.1.2.4.7	mdrmteOUPayloadSupport	INTEGER	read-only	Deprecated
.1316.1.1.1.2.4.8	mdrmteDate	DisplayString	read-write	This is a date record that is recovered from the Indoor Unit's Real Time Clock

Object ID	Object name	Object Type	Access Rights	Description
.1316.1.1.1.2.4.9	mdrmteTime	DisplayString	read-write	This is a time record that is recovered from the Indoor Unit's Real Time Clock
.1316.1.1.1.2.4.10	mdrmteNOVRAMInit	INTEGER	read-write	If activated, the Nonvolatile memory is initialised to a set of default parameters
.1316.1.1.1.2.4.11	mdrmteFECBypass	INTEGER	read-write	This is primarily a laboratory test entry used to control whether the FEC circuitry within the
.1316.1.1.1.2.4.12	mdrmteFECCorrectableSymbols	INTEGER	read-write	This is primarily a laboratory test entry used to control the FEC correction power - 20 parity symbols
.1316.1.1.1.2.4.13	mdrmteTribCode	DisplayString	read-write	This is a text entry code (80 characters ie 40 bytes) used to allow activation of tributaries on the Indoor Units.
.1316.1.1.1.2.4.14	mdrmteIndoorUnitBarCodeNumber	DisplayString	read-write	This is a text entry code used to allow storage of the Indoor Unit's bar code serial number (as seen on the outside of the
.1316.1.1.1.2.4.15	mdrmteIndoorUnitPCBrevision	INTEGER	read-write	This is a numeric entry code used to reflect the PCB revision number and modification status.
.1316.1.1.1.2.4.16	mdrmteLocation	DisplayString	read-write	The station location is stored in the Indoor Unit in nonvolatile memory
.1316.1.1.1.2.4.17	mdrmteOnePlusOne	INTEGER	read-write	Enables 'one-plus-one' dual-redundant (non-hitless) operation
.1316.1.1.1.2.4.18	mdrmteMaxTribs	INTEGER	read-only	How many tribs can be used with the current trib code.
.1316.1.1.1.2.4.19	mdrmteDefaultConfig	INTEGER	write-only	Allows one to set one of four default-configurations.
.1316.1.1.1.2.4.20	mdrmteTotalTribs	INTEGER	read-only	How many tribs in total on this version of IDU motherboard.
.1316.1.1.1.2.4.21	mdrmteCustomConfigSet	INTEGER	read-write	Changes the way in which the default configurations work by pre-loading
.1316.1.1.1.2.4.22	mdrmteFpgaVersion	INTEGER	read-only	Firmware version of the FPGA.
.1316.1.1.1.2.4.23	mdrmteOuCommsRate	INTEGER	read-write	Data-rate of the ethernet link between the IU and the OU.
.1316.1.1.1.2.4.24	mdrmteHdlcRateCap	INTEGER	read-write	Maximum Data-rate of the HDLC link between the IU's (Mbit/sec + 1)
.1316.1.1.1.2.4.25	mdrmteOUSerialNo	DisplayString	read-only	The Outdoor Unit serial number is programmed into the OU at time of manufacture and is read via the
.1316.1.1.1.2.4.26	mdrmteApVersion	DisplayString	read-only	The Firmware version number of the Atmel processor
.1316.1.1.1.2.5	mdrmteFirmware			
.1316.1.1.1.2.5.1	mdrmteFTPServerStatus	INTEGER	read-write	This allows activation/deactivation of the FTP server that runs in the Indoor Unit and is
.1316.1.1.1.2.5.2	mdrmteFlashNewFirmware	INTEGER	read-write	This entry determines the time when the new version of firmware will be activated

Object ID	Object name	Object Type	Access Rights	Description
.1316.1.1.1.2.5.3	mdrmtePlatformSupport	DisplayString	read-only	This indicates the hardware types supported by the firmware:
.1316.1.1.1.2.6	mdrmteOutdoorUnit			
.1316.1.1.1.2.6.1	mdrmteOuPersonalityTable	SEQUENCE	not-accessible	
.1316.1.1.1.2.6.1.1	mdrmteOuPersonalityEntry	MdrmteOuPersonality Entry	not-accessible	
.1316.1.1.1.2.6.1.1.1	mdrmteOuPersonalityIndex	INTEGER	read-only	
.1316.1.1.1.2.6.1.1.2	mdrmteOuPersonalityActive	INTEGER	read-write	Indicates whether this particular OU personality is selected.
.1316.1.1.1.2.6.1.1.3	mdrmteOuPersonalityDataRate	INTEGER	read-only	Maximum raw data rate of the personality.
.1316.1.1.1.2.6.1.1.4	mdrmteOuPersonalityModulation	INTEGER	read-only	Modulation type.
.1316.1.1.1.2.6.1.1.5	mdrmteOuPersonalityFpgaVersion	INTEGER	read-only	FPGA version.
.1316.1.1.1.2.6.1.1.6	mdrmteOuPersonalityRssiComp	INTEGER	read-only	RSSI compensation factor used by the OU
.1316.1.1.1.2.6.1.1.7	mdrmteOuPersonalityMinTxFreq	INTEGER	read-only	Lowest allowed Tx frequency
.1316.1.1.1.2.6.1.1.8	mdrmteOuPersonalityMaxTxFreq	INTEGER	read-only	Highest allowed Tx frequency
.1316.1.1.1.2.6.1.1.9	mdrmteOuPersonalityMinRxFreq	INTEGER	read-only	Lowest allowed Rx frequency
.1316.1.1.1.2.6.1.1.10	mdrmteOuPersonalityMaxRxFreq	INTEGER	read-only	Highest allowed Rx frequency
.1316.1.1.1.2.6.1.1.11	mdrmteOuPersonalityPlanATxFreq	INTEGER	read-only	Band plan A Tx frequency
.1316.1.1.1.2.6.1.1.12	mdrmteOuPersonalityPlanARxFreq	INTEGER	read-only	Band plan A Tx frequency
.1316.1.1.1.2.6.1.1.13	mdrmteOuPersonalityPlanBTxFreq	INTEGER	read-only	Band plan B Tx frequency
.1316.1.1.1.2.6.1.1.14	mdrmteOuPersonalityPlanBRxFreq	INTEGER	read-only	Band plan B Rx frequency
.1316.1.1.1.2.6.1.1.15	mdrmteOuPersonalityPlanCTxFreq	INTEGER	read-only	Band plan C Rx frequency
.1316.1.1.1.2.6.1.1.16	mdrmteOuPersonalityPlanCRxFreq	INTEGER	read-only	Band plan C Rx frequency
.1316.1.1.1.2.6.1.1.17	mdrmteOuPersonalityMaxTxPower	INTEGER	read-only	Maximum allowed Transmit Power
.1316.1.1.1.2.6.1.1.18	mdrmteOuPersonalityMinTxPower	INTEGER	read-only	Minimum allowed Transmit Power
.1316.1.1.1.2.6.1.1.19	mdrmteOuPersonalityDefTxPower	INTEGER	read-only	Default Transmit Power
.1316.1.1.1.2.6.1.1.20	mdrmteOuPersonalityDescription	DisplayString	read-only	Verbal description of this personality
.1316.1.1.1.2.6.2	mdrmteOuPersonalities	INTEGER	read-only	The number of FPGA personalities that the OU has programmed
.1316.1.1.1.2.6.3	mdrmteOuActivePersonality	INTEGER	read-write	The currently active FPGA personality
.1316.1.1.1.3.1	mdrmteInfo			
.1316.1.1.1.3.1.1	mdrmteLEDTable	SEQUENCE	not-accessible	A group of LEDs on the front panel of the Indoor Unit.
.1316.1.1.1.3.1.1.1	mdrmteLEDEntry	MdrmteLEDEntry	not-accessible	A LED entry containing objects describing a particular LED.
.1316.1.1.1.3.1.1.1.1	mdrmteLEDIndex	INTEGER	read-only	A unique value for each LED in the Indoor Unit. Its value
.1316.1.1.1.3.1.1.1.2	mdrmteLEDLabel	DisplayString	read-only	SYSTEM Green OK, Orange (OU/IU Comms Error), Red (OU/IU Comms Down).
.1316.1.1.1.3.1.1.1.3	mdrmteLEDState	INTEGER	read-only	The current state of the LED - for a detailed description of functionality, see the mdrmteLEDLabel entry

Object ID	Object name	Object Type	Access Rights	Description
.1316.1.1.1.3.1.1.1.4	mdrmteLEDColour	INTEGER	read-only	The current colour of the LED - for a detailed description of functionality, see the mdrmteLEDLabel entry
.1316.1.1.1.3.1.1.1.5	mdrmteLEDHistoricAmberWarning	INTEGER	read-only	The number of Amber 'blips' that the LED is flashing
.1316.1.1.1.3.1.1.1.6	mdrmteLEDHistoricRedError	INTEGER	read-only	The number of Red 'blips' that the LED is flashing
.1316.1.1.1.3.1.2	mdrmteOutdoorUnitComms	INTEGER	read-only	Describes the state of Indoor Unit communication with the Outdoor unit.
.1316.1.1.1.3.1.3	mdrmteOutdoorUnitResetType	INTEGER	read-only	This message is read from the Outdoor Unit and identifies the last reason for a reset within the
.1316.1.1.1.3.1.4	mdrmteOutdoorUnitLockDetect	INTEGER	read-only	The transmit RF synthesizer, receive RF synthesizer and IF phased locked loop lock detect signals
.1316.1.1.1.3.1.5	mdrmtePayloadDrive	INTEGER	read-only	In a One-Plus-One configuration, this tells you if this IU is driving the
.1316.1.1.1.3.1.6	mdrmteLock	INTEGER	read-only	In a One-Plus-One configuration, this tells you if this IU is driving the
.1316.1.1.1.3.1.7	mdrmtePeerPayloadDrive	INTEGER	read-only	In a One-Plus-One configuration, this tells you if the peer (standby) is driving the
.1316.1.1.1.3.1.8	mdrmtePeerLock	INTEGER	read-only	In a One-Plus-One configuration, this tells you if the peer (standby) is driving the
.1316.1.1.1.3.1.9	mdrmteOuEtherRate	INTEGER	read-only	The current (actual) Data-rate of the ethernet link between the IU and the OU.
.1316.1.1.1.3.2	mdrmteSelfTest			
.1316.1.1.1.3.2.1	mdrmteFlash	INTEGER	read-only	Identifies pass/fail status of the Indoor Unit's application flash
.1316.1.1.1.3.2.2	mdrmteDRAM	INTEGER	read-only	Identifies pass/fail status of the Indoor Unit's Dynamic RAM
.1316.1.1.1.3.2.3	mdrmteSRAM	INTEGER	read-only	Identifies pass/fail status of the Indoor Unit's Static RAM
.1316.1.1.1.3.2.4	mdrmteLineInterface	INTEGER	read-only	Identifies pass/fail status of the Indoor Unit's Line Interface IC
.1316.1.1.1.3.2.5	mdrmteFPGA	INTEGER	read-only	Identifies pass/fail status of the Indoor Unit's FPGA interface registers to the microprocessor
.1316.1.1.1.3.2.6	mdrmteFEC	INTEGER	read-only	Identifies pass/fail status of the Indoor Unit's FEC IC electrical interface
.1316.1.1.1.3.2.7	mdrmteRealTimeClock	INTEGER	read-only	Identifies pass/fail status of the Indoor Unit's Real Time Clock
.1316.1.1.1.3.2.8	mdrmteIndoorUnitResetType	INTEGER	read-only	This message is read from the Indoor Unit and identifies the last reason for a reset within the
.1316.1.1.1.3.2.9	mdrmteLoopbackMode	INTEGER	read-write	Entry defines the loopback mode of a radio station in terms of loopback at either
.1316.1.1.1.3.2.10	mdrmteLoopbackTimeOut	INTEGER	read-write	This is the number of seconds the loopback will run for until it times out

Object ID	Object name	Object Type	Access Rights	Description
.1316.1.1.1.3.2.11	mdrmteOuTemperature	DisplayString	read-only	This is the measured temperature in the Out-door unit (if supported) in degrees Celcius
.1316.1.1.1.3.2.12	mdrmteOuEtherPhy	INTEGER	read-only	Identifies pass/fail status of the ethernet phy to the OU
.1316.1.1.1.3.2.13	mdrmteEEprom	INTEGER	read-only	Identifies pass/fail status of the Indoor Unit's EEPROM
.1316.1.1.1.3.3	mdrmteTrapManagement			
.1316.1.1.1.3.3.1	mdrmteTrapFilter	INTEGER	read-write	Alarms within the MDR product are classfied as critical, major, minor or informational. The trap
.1316.1.1.1.3.3.2	mdrmteNumberTrapManagers	INTEGER	read-only	This entry shows the number of trap managers allowed
.1316.1.1.1.3.3.3	mdrmteTrapManagerTable	SEQUENCE	not-accessible	
.1316.1.1.1.3.3.3.1	mdrmteTrapManagerEntry	MdrmteTrapManager Entry	not-accessible	
.1316.1.1.1.3.3.3.1.1	mdrmteTrapManagerIndex	INTEGER	read-only	
.1316.1.1.1.3.3.3.1.2	mdrmteTrapManagerIP	IpAddress	read-write	This is the IP address of the management station that is set up to detect and act upon
.1316.1.1.1.3.3.3.1.3	mdrmteTrapManagerComm	DisplayString	read-write	This is the 'SNMP community name' used for dispatch of traps
.1316.1.1.1.3.3.3.1.4	mdrmteTrapManagerActive	INTEGER	read-write	Defines whether a particular Trap Manager is active or inactive
.1316.1.1.1.3.4	mdrmtePerfTrapThreshold			
.1316.1.1.1.3.4.1	mdrmteMinorPERThreshold	DisplayString	read-write	Defines the threshold used as a checking criterion for the Minor PER (Packet Error Rate)
.1316.1.1.1.3.4.2	mdrmteMajorPERThreshold	DisplayString	read-write	Defines the threshold used as a checking criterion for the Major PER (Packet Error Rate)
.1316.1.1.1.3.4.3	mdrmteCriticalPERThreshold	DisplayString	read-write	Defines the threshold used as a checking criterion for the Critical PER (Packet Error Rate)
.1316.1.1.1.3.4.4	mdrmteErrSecRatioThreshold	DisplayString	read-write	Defines the threshold used as a checking criterion for the Errored Second Ratio
.1316.1.1.1.3.4.5	mdrmteSevErrSecRatioThreshold	DisplayString	read-write	Defines the threshold used as a checking criterion for the Severely Errored Second Ratio
.1316.1.1.1.3.4.6	mdrmteBkgrndBlkErrRatioThreshold	DisplayString	read-write	Defines the threshold used as a checking criterion for the Background Block Error Ratio
.1316.1.1.1.3.5	mdrmteEventLogTable	SEQUENCE	not-accessible	
.1316.1.1.1.3.5.1	mdrmteEventLogEntry	MdrmteEventLogEntry	not-accessible	
.1316.1.1.1.3.5.1.1	mdrmteEventIndex	INTEGER	read-only	
.1316.1.1.1.3.5.1.2	mdrmteEventDate	DisplayString	read-only	Lists the date on which the event occurred
.1316.1.1.1.3.5.1.3	mdrmteEventTime	DisplayString	read-only	Lists the time when the event occurred
.1316.1.1.1.3.5.1.4	mdrmteEventType	INTEGER	read-only	Lists the type of event - informational, minor, major or critical
.1316.1.1.1.3.5.1.5	mdrmteEventDescription	DisplayString	read-only	Textual description of the logged event

Object ID	Object name	Object Type	Access Rights	Description
.1316.1.1.1.3.6	mdrmteClearEventLog	INTEGER	write-only	This entry is used to clear the Event Log
.1316.1.1.1.3.7	mdrmteResetAllFaults	INTEGER	write-only	This entry is used to
.1316.1.1.1.3.8	mdrmteEnableDebug	INTEGER	read-write	This entry is used to enable test and debugging features
.1316.1.1.1.3.9	mdrmteErrorWindow	INTEGER	read-write	This entry is used to set the time period in minutes during
.1316.1.1.1.3.10	mdrmteTrapData	DisplayString	read-only	Textual description or data relating to a trap
.1316.1.1.1.3.11	mdrmteLogCorrectedSymbols	INTEGER	read-write	Enable or disable periodic logging of corrected sybmols
.1316.1.1.1.3.13	mdrmteHideHistoricLeds	INTEGER	read-write	Enable or disable the 'historic' flashing on the LEDs
.1316.1.1.1.3.12	mdrmteEngineering			
.1316.1.1.1.3.12.1	mdrmteDataStreamStatus	INTEGER	read-only	Status bits for the outdoor unit and tribs during during production tests.
.1316.1.1.1.3.12.2	mdrmteFramingSchedule	INTEGER	read-only	The current framing schedule selected on the FPGA
.1316.1.1.1.3.12.3	mdrmteFrameTribCnt	INTEGER	read-only	The number of tribs supported by the framing structure in use
.1316.1.1.1.3.12.4	mdrmteIuBackToBack	INTEGER	read-write	Loop one Indoor unit to another without Outdoor units for production tests
.1316.1.1.1.3.12.5	mdrmteWaysideFeedsOu	INTEGER	read-write	Feed the Wayside channel to the Outdoor Unit for production tests
.1316.1.1.1.4.1	mdrmteEthernetIPAddress	IpAddress	read-write	The IP address associated with product's Ethernet port.
.1316.1.1.1.4.2	mdrmteEthernetNetMask	IpAddress	read-write	The netmask associated with the Ethernet port
.1316.1.1.1.4.3	mdrmteMaxNumUsers	INTEGER	read-only	If the firmware is compiled with the security feature
.1316.1.1.1.4.4	mdrmteMaxNumActiveUsers	INTEGER	read-only	If the firmware is built with the security feature switched on, users
.1316.1.1.1.4.5	mdrmteNumActiveUsers	Gauge	read-only	If the firmware is built with the security feature switched on, users
.1316.1.1.1.4.6	mdrmteUserTable	SEQUENCE	not-accessible	Deprecated
.1316.1.1.1.4.6.1	mdrmteUserEntry	MdrmteUserEntry	not-accessible	Deprecated
.1316.1.1.1.4.6.1.1	mdrmteUserIndex	INTEGER	read-only	Deprecated
.1316.1.1.1.4.6.1.2	mdrmteUserName	DisplayString	read-write	If the firmware is built with the security feature switched on, users
.1316.1.1.1.4.6.1.3	mdrmteUserPassword	DisplayString	write-only	If the firmware is built with the security feature switched on, users
.1316.1.1.1.4.6.1.4	mdrmteUserAccessLevel	INTEGER	read-write	If the firmware is built with the security feature switched on, users
.1316.1.1.1.4.6.1.5	mdrmteUserActive	INTEGER	read-write	Indicates if a user is active or not based on password entry
.1316.1.1.1.4.6.1.6	mdrmteUserAdd	INTEGER	write-only	In security-enabled mode, allows an administrator to add users
.1316.1.1.1.4.6.1.7	mdrmteUserDelete	INTEGER	write-only	In security-enabled mode, allows an administrator to delete users

Object ID	Object name	Object Type	Access Rights	Description
.1316.1.1.1.4.7	mdrmteRFLinkIPAddress	IpAddress	read-write	PPP IP address for the RF Link. The user need not adjust this parameter
.1316.1.1.1.4.8	mdrmteRFLinkNetMask	IpAddress	read-write	PPP IP netmask for the RF Link. The user need not adjust this parameter
.1316.1.1.1.4.9	mdrmteRemoteIPAddress	IpAddress	read-write	Default PPP IP address for the other end of the link. The user need not adjust this parameter
.1316.1.1.1.4.10	mdrmteElementManagerIPAddress	IpAddress	read-write	Default PPP IP address for the the element manager port - 10.13.1.1
.1316.1.1.1.4.11	mdrmteElementManagerNetMask	IpAddress	read-write	IP netmask for the Element Manager PPP port
.1316.1.1.1.4.12	mdrmteIPNegotiable	INTEGER	read-write	Determines if the local PPP IP address is negotiable or not - does not need to be adjusted by
.1316.1.1.1.4.13	mdrmtePPPisDefaultRoute	INTEGER	read-write	Determines if PPP interface is the default route - does not need to be adjusted by
.1316.1.1.1.4.14	mdrmteStaticRouteTable	SEQUENCE	not-accessible	Manually added static routes. (Only activated after system reset)
.1316.1.1.1.4.14.1	mdrmteStaticRouteEntry	MdrmteStaticRouteEntry	not-accessible	
.1316.1.1.1.4.14.1.1	mdrmteStaticRouteIndex	INTEGER	read-only	
.1316.1.1.1.4.14.1.2	mdrmteStaticRouteIPAddressDestination	IpAddress	read-write	Ultimate destination
.1316.1.1.1.4.14.1.3	mdrmteStaticRouteIPAddressMask	IpAddress	read-write	net mask, 255.255.255.255 if destination is host address
.1316.1.1.1.4.14.1.4	mdrmteStaticRouteIPAddressNextHop	IpAddress	read-write	Where to forward to
.1316.1.1.1.4.14.1.5	mdrmteStaticRouteInterfaceForNextHop	INTEGER	read-write	Interface (net) for nexthop
.1316.1.1.1.4.15	mdrmteBridgeEnable	INTEGER	read-write	Determines if the system is to act as a transparent bridge for all ethernet packets received.
.1316.1.1.1.4.16	mdrmteEthernetFullDuplex	INTEGER	read-write	Determines if the ethernet interface is full- or half-duplex.
.1316.1.1.1.4.17	mdrmteDefaultGateway	IpAddress	read-write	Default Gateway (Only activated after system reset)
.1316.1.1.1.4.18	mdrmteDefaultGWInterface	INTEGER	read-write	Default Gateway interface
.1316.1.1.1.4.19	mdrmteElementManagerPeerIP	IpAddress	read-write	Default PPP IP address for the the PC connected to the element manager serial port.
.1316.1.1.1.4.20	mdrmteMacLearning	INTEGER	read-write	Enable or disable the ability to learn what MAC addresses are present locally.
.1316.1.1.1.4.21	mdrmteEnableDHCP	INTEGER	read-write	Enable or disable the DHCP client on ethernet. If enabled, the locally stored IP
.1316.1.1.1.4.22	mdrmteClearArpCache	INTEGER	read-write	Delete all cached MAC addresses in the ARP table
.1316.1.1.1.4.23	mdrmteMacAddress	DisplayString	read-write	3-octet substring of the ethernet MAC address excluding the Plessey OUI.
.1316.1.1.1.4.24	mdrmteSnmpSetCommunity	DisplayString	write-only	Up to 31 octets defining the SNMP Write community string for READ/WRITE access.

Object ID	Object name	Object Type	Access Rights	Description
.1316.1.1.1.4.25	mdrmteSnmpGetCommunity	DisplayString	write-only	Up to 31 octets defining the SNMP Read community string for READ access.
.1316.1.1.1.5.1	mdrmteRelay1			
.1316.1.1.1.5.1.1	mdrmteRelay1Label	DisplayString	read-write	A short, descriptive name indicating the primary funtion of the relay,
.1316.1.1.1.5.1.2	mdrmteRelay1OpenStateLabel	DisplayString	read-write	A short, descriptive name indicating the primary funtion of the relay
.1316.1.1.1.5.1.3	mdrmteRelay1ClosedStateLabel	DisplayString	read-write	A short, descriptive name indicating the primary funtion of the relay
.1316.1.1.1.5.1.4	mdrmteRelay1Reserved	INTEGER	read-write	Reserved.
.1316.1.1.1.5.1.5	mdrmteRelay1CurrentState	INTEGER	read-write	The current state of the relay. Used to activate/deactivate a relay.
.1316.1.1.1.5.1.7	mdrmteRelay1Latching	INTEGER	read-write	Indicates whether the relay will be latched by Scripting events, or will follow the state.
.1316.1.1.1.5.1.6	mdrmteRelay1ScriptTable	SEQUENCE	not-accessible	
.1316.1.1.1.5.1.6.1	mdrmteRelay1ScriptEntry	MdrmteRelay1ScriptEntry	not-accessible	
.1316.1.1.1.5.1.6.1.1	mdrmteRelay1ScriptIndex	INTEGER	read-only	
.1316.1.1.1.5.1.6.1.2	mdrmteRelay1ScriptID	INTEGER	read-only	Defines which of the listed alarms can cause a relay to activate
.1316.1.1.1.5.1.6.1.3	mdrmteRelay1ScriptActiveLocal	INTEGER	read-write	Defines if the script is active or not for local relay activation
.1316.1.1.1.5.1.6.1.4	mdrmteRelay1ScriptActiveRemote	INTEGER	read-write	Defines if the script is active or not for remote relay activation
.1316.1.1.1.5.2	mdrmteRelay2			
.1316.1.1.1.5.2.1	mdrmteRelay2Label	DisplayString	read-write	A short, descriptive name indicating the primary funtion of the relay.
.1316.1.1.1.5.2.2	mdrmteRelay2OpenStateLabel	DisplayString	read-write	A short, descriptive name indicating the primary funtion of the relay
.1316.1.1.1.5.2.3	mdrmteRelay2ClosedStateLabel	DisplayString	read-write	A short, descriptive name indicating the primary funtion of the relay
.1316.1.1.1.5.2.4	mdrmteRelay2Reserved	INTEGER	read-write	Reserved.
.1316.1.1.1.5.2.5	mdrmteRelay2CurrentState	INTEGER	read-write	The current state of the relay. Used to activate/deactivate a relay.
.1316.1.1.1.5.2.7	mdrmteRelay2Latching	INTEGER	read-write	Indicates whether the relay will be latched by Scripting events, or will follow the state.
.1316.1.1.1.5.2.6	mdrmteRelay2ScriptTable	SEQUENCE	not-accessible	
.1316.1.1.1.5.2.6.1	mdrmteRelay2ScriptEntry	MdrmteRelay2ScriptEntry	not-accessible	
.1316.1.1.1.5.2.6.1.1	mdrmteRelay2ScriptIndex	INTEGER	read-only	
.1316.1.1.1.5.2.6.1.2	mdrmteRelay2ScriptID	INTEGER	read-only	Defines which of the listed alarms can cause a relay to activate
.1316.1.1.1.5.2.6.1.3	mdrmteRelay2ScriptActiveLocal	INTEGER	read-write	Defines if the script is active or not for local relay activation
.1316.1.1.1.5.2.6.1.4	mdrmteRelay2ScriptActiveRemote	INTEGER	read-write	Defines if the script is active or not for remote relay activation

Object ID	Object name	Object Type	Access Rights	Description
.1316.1.1.1.5.3	mdrmteRelayScriptServerPort	INTEGER	read-write	This specifies the IP port number to be used by the Relay scripting server
.1316.1.1.1.5.4	mdrmteRelayClientComms	INTEGER	read-only	This indicates the state of the Relay Scripting client-server socket.
.1316.1.1.1.5.5	mdrmteRelayScriptRemotePollTime	INTEGER	read-write	This specifies the poll interval for remote scripting updates in seconds.
.1316.1.1.1.5.6	mdrmteActiveEventsTable	SEQUENCE	not-accessible	Shows all the currently active events (even if scripting on the event is disabled.)
.1316.1.1.1.5.6.1	mdrmteActiveEventsEntry	MdrmteActiveEvents Entry	not-accessible	
.1316.1.1.1.5.6.1.1	mdrmteActiveEventsIndex	INTEGER	read-only	Index
.1316.1.1.1.5.6.1.2	mdrmteActiveEventsLabel	INTEGER	read-only	Name of the event
.1316.1.1.1.5.6.1.3	mdrmteActiveEvents	INTEGER	read-only	Defines whether events are active or inactive
.1316.1.1.1.5.6.1.4	mdrmteActiveRemoteEvents	INTEGER	read-only	Defines whether remote events are active or inactive
.1316.1.1.1.5.7	mdrmteRelayScriptingEnable	INTEGER	read-write	This enables or disables relay scripting. Both near and far units must have the same setting.
.1316.1.1.1.6.1	mdrmteOptoInput1			
.1316.1.1.1.6.1.1	mdrmteOptoInput1Label	DisplayString	read-write	A short, descriptive name indicating the primary funtion of the contact-closure input
.1316.1.1.1.6.1.2	mdrmteOptoInput1State	INTEGER	read-only	Indicates if the opto input contact-closure input is active (on) or not (off)
.1316.1.1.1.6.2	mdrmteOptoInput2			
.1316.1.1.1.6.2.1	mdrmteOptoInput2Label	DisplayString	read-write	A short, descriptive name indicating the primary funtion of the contact-closure input
.1316.1.1.1.6.2.2	mdrmteOptoInput2State	INTEGER	read-only	Indicates if the opto input contact-closure input is active (on) or not (off)

The MIB elements – TRAP DESCRIPTIONS

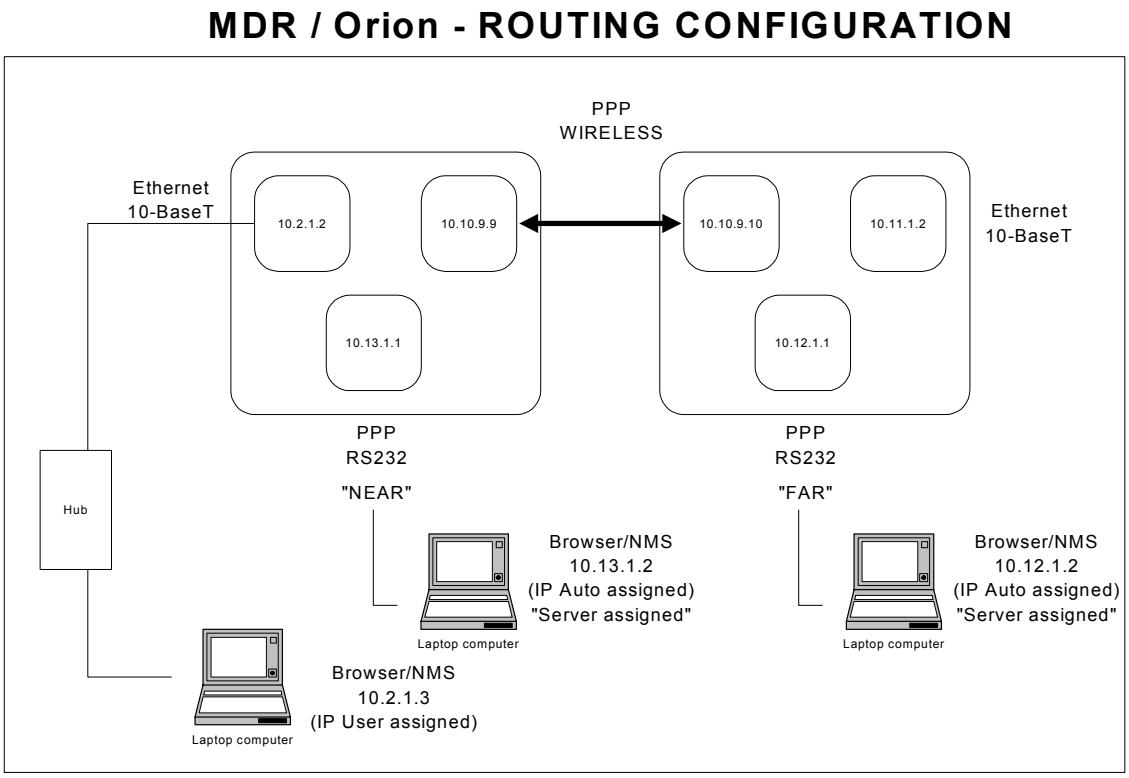
1	mdrmteTrapUndefined : Informational	
2	mdrmteTrapPayloadLOS : Critical	Indicates a Loss of Signal identified on the INPUT TO a tributary
3	mdrmteTrapPayloadAIS : Critical	Indicates an Alarm Indication Signal ' all 1's ' identified/sensed on the INPUT TO a tributary
4	mdrmteTrapLinkUnavailable : Critical	Indicates, based on G.826 criteria if the RF Link has become unavailable
5	MdrmteTrapLinkFrameUnlock : Critical	Indicates a Frame Unlock condition associated with the Indoor Unit
6	mdrmteTrapLinkOuSynthUnlock : Critical	Indicates if a synthesizer unlock condition was identified in the Outdoor Unit
7	mdrmteTrapLinkMinorPERExceeded : Minor	Indicates the minor packet error rate threshold was exceeded
8	mdrmteTrapLinkMajorPERExceeded : Major	Indicates the major packet error rate threshold was exceeded
9	mdrmteTrapLinkCriticalPERExceeded : Critical	Indicates the critical packet error rate threshold was exceeded
10	mdrmteTrapLinkESRExceeded : Minor	Indicates the Link Errored Second Ratio Threshold limit was exceeded
11	mdrmteTrapLinkSESRExceeded : Critical	Indicates the Link Severely Errored Second Ratio threshold limit was exceeded
12	mdrmteTrapLinkBBERExceeded : Minor	Indicates the Link Background Block Error Rate threshold limit was exceeded
13	mdrmteTrapFTPUploadDone : Informational	Indicates FTP Upload done
14	mdrmteTrapFlashEraseFail : Informational	Indicates failure to erase Application flash
15	mdrmteTrapFirmwareUpgradePass : Informational	Indicates that firmware was uploaded successfully
16	mdrmteTrapFirmwareUpgradeFail : Informational	Indicates that there was a firmware upload failure
17	mdrmteTrapInterstationCommsTimeOut : Major	Indicates an interstation communications timeout
18	mdrmteTrapInterstationCommsInvalidResponse : Minor	Indicates a communications error on the interstation overhead link
19	mdrmteTrapOUCommsTimeOut : Major	Indicates an Outdoor Unit communications timeout
20	mdrmteTrapOUCommsInvalidResponse : Minor	Indicates an Outdoor Unit communications error - an invalid response was received
21	MdrmteTrapOUCommsTxFail	Indicates Outdoor Unit communications transmit failure
22	mdrmteTrapSSPCRCError : Minor	Simple Serial Protocol CRC error identified
23	mdrmteTrapSSPLengthError : Minor	Simple Serial Protocol Length error identified
24	mdrmteTrapOptoInput1Off : Major	Contact closure input off state detected - Opto 1
25	mdrmteTrapOptoInput1On : Major	Contact closure input off state detected- Opto 1
26	mdrmteTrapOptoInput2Off : Major	Contact closure input off state detected - Opto 2
27	mdrmteTrapOptoInput2On : Major	Contact closure input on state detected - Opto 2
28	mdrmteTrapUserLoginFailed : Informational	With security MODE ON - indicates a user attempted to log on and the attempt failed
29	mdrmteTrapUserLogoutFailed : Informational	With security MODE ON - indicates a user attempted to log out and the attempt failed
30	MdrmteTrapUserAddFailed : Informational	With security MODE ON - indicates there was an attempt to add a user, but the attempt failed.
31	mdrmteTrapUserDeleteFailed : Informational	With security MODE ON - indicates there was an attempt to remove/delete a user, but the attempt failed.
32	mdrmteTrapUserLogIn : Informational	With security MODE ON - indicates a user logged in.
33	mdrmteTrapUserLogOut : Informational	With security MODE ON - indicates a user logged out.
34	mdrmteTrapUserAdd : Informational	With security MODE ON - indicates a user was added successfully.
35	mdrmteTrapUserDelete : Informational	With security MODE ON - indicates a user was deleted successfully.
36	mdrmteTrapOUSetBandPlan : Informational	Indicates the Outdoor Unit channel/band plan was changed.
37	mdrmteTrapOUSetTxChannel : Informational	Indicates the Outdoor Unit transmit frequency was changed.
38	mdrmteTrapOUSetRxChannel : Informational	Indicates the Outdoor Unit receive frequency was changed.
39	mdrmteTrapOUEepromWrite : Minor	Indicates there was an attempt to write to the Outdoor Unit EEPROM.

40	MdrmteTrapOUSetTxPower : Informational	Indicates there was an attempt to change the transmit power.
41	*MdrmteTrapOUSetPNCode*	*Deprecated*
42	MdrmteTrapOUSetAutoRecovery	Indicates there was an attempt to change the 'auto recovery' setting.
43	*MdrmteTrapOUProgramConfig*	*Deprecated*
44	mdrmteTrapOUChangeRFLoopback : Informational	Indicates a change the OU RF Loopback setting was implemented.
45	mdrmteTrapOUChangeBBPLoopback : Informational	Indicates a change the Baseband Processor Loopback setting was implemented.
46	mdrmteTrapOUWriteBBP : Minor	Indicates there was an attempt to write to the Baseband Processor.
47	mdrmteTrapSetDate : Informational	Indicates the Indoor Unit date was adjusted.
48	mdrmteTrapSetTime : Informational	Indicates the Indoor Unit time was adjusted.
49	mdrmteTrapSynchronizeSwRTC : Informational	Indicates the Indoor Unit's time was synchronized with its real-time clock.
50	MdrmteTrapSetRelayLabel	A relay label was changed.
51	MdrmteTrapSetRelayOpenStateLabel	A relay open-state label was changed.
52	MdrmteTrapSetRelayClosedStateLabel	A relay closed-state label was changed.
53	*mdrmteTrapSetRelayDefaultState : NA*	*Deprecated*
54	mdrmteTrapSetRelayCurrentState : Informational	Relay's current state has changed
55	MdrmteTrapRelayScriptEnable	Relay scripting is enabled.
56	MdrmteTrapRelayScriptDisable	Relay scripting is disabled.
57	mdrmteTrapGetEventLog : Informational	Indoor Unit's event log is being accessed.
58	mdrmteTrapClearEventLog : Informational	Indoor Unit's event log is being cleared.
59	mdrmteTrapSelfTestFailure : Major	Indoor Unit's self test failed.
60	mdrmteTrapProcessorReset : Critical	There was an Indoor Unit processor reset.
61	MdrmteTrapEtherRx	There was an Indoor Unit Receive Ethernet buffer error.
62	mdrmteTrapTest : Informational	Test trap
63	MdrmteTrapGenericText	Test trap
64	mdrmteTrapGenericText_Data	Test trap
65	mdrmteTrapGenericText_DecData	Test trap
66	mdrmteTrapSocket_Error	Test trap
67	mdrmteLog_Link_Status : Informational	The Event Log was cleared, so a summary of the status has been logged.
68	mdrmteLog_Link_Errors : Informational	One or more packet errors occurred in the last error window.
69	mdrmteLog_Link_Corrections : Informational	One or more corrected symbols occurred in the last error window.
70	mdrmteLocRelayScriptOpen : Minor	A relay opened as a result of a local relay scripting event.
71	mdrmteLocRelayScriptClose : Minor	A relay closed as a result of a local relay scripting event.
72	mdrmteRemRelayScriptOpen : Minor	A relay opened as a result of a remote relay scripting event.
73	MdrmteRemRelayScriptClose : Minor	A relay closed as a result of a remote relay scripting event.
74	mdrmteRemScriptEvent : Minor	A remote event occurred which will be processed by relay scripting.
75	MdrmteTrapLinkFrameUnlockAgain	Indicates a Frame Unlock condition associated with the Indoor Unit
76	MdrmteTrapOUSetFrequencies	Indicates the Outdoor Unit receive frequencies were changed.
77	MdrmteTrapOUSetPersonality	Indicates the Outdoor Unit FPGA personality was changed.

3 Appendix: SETUP OF A PC (WIN 95, 98, NT) TO ALLOW PINGING OF A 'REMOTE'-CONFIGURED INDOOR UNIT

The following diagram shows the default (factory) network IP addresses assigned to the various network ports on the MDR / Orion System: ROUTING CONFIGURATION

IP CONFIGURATION OF THE MDR / Orion – ROUTING CONFIGURATION



To allow pinging of an IU configured as a "remote unit" i.e. with an IP address of (10.11.1.2) when the PC has a 10.2.1.3 IP address, 10.2.1.2 default gateway and netmask 255.255.0.0, create batch files.

Batch file 1 - addroute.bat

route add 10.11.0.0 mask 255.255.0.0 10.2.1.3

Batch file 1 adds a route so that the IP stack on the PC "knows" where to send IP packets destined for the net 10.11.0.0

If you want to delete the route, use

Batch file 2 - delroute.bat

route delete 10.11.0.0

If you want a screen printout of the routes the PC is using, use the command line entry:

route print

NOTE

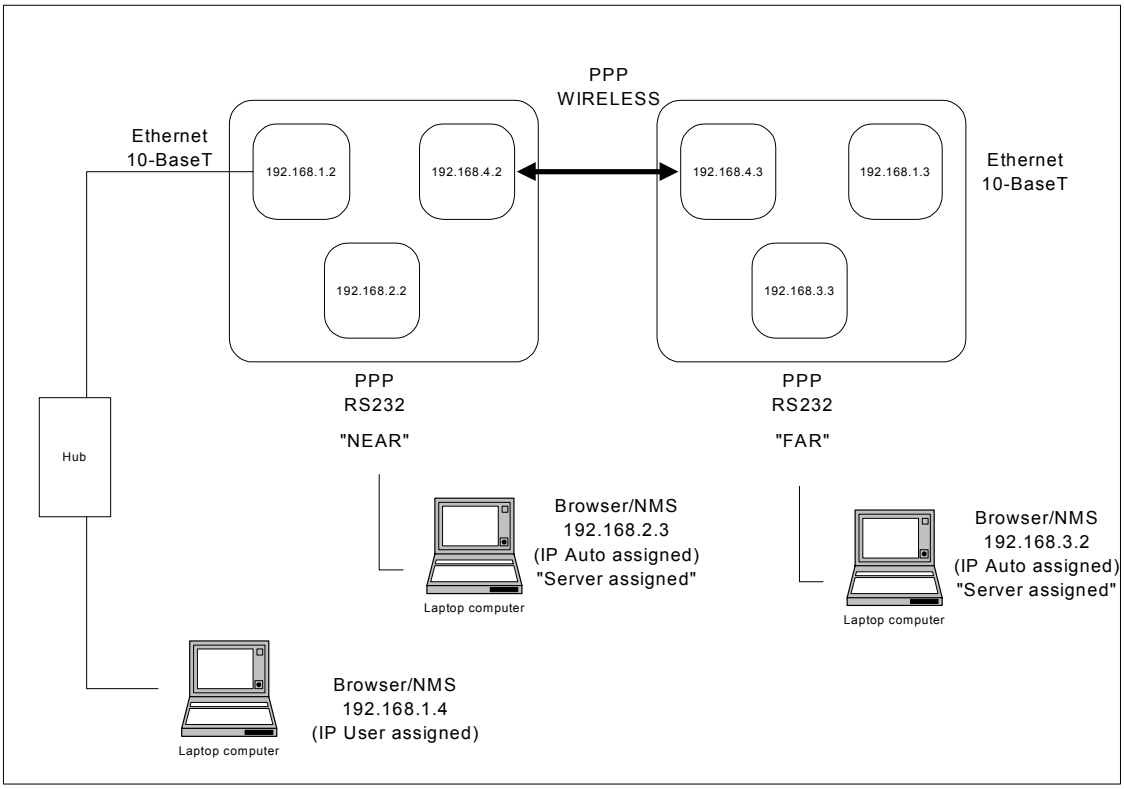
DO NOT ALLOW AN RF LINK TO ESTABLISH BEFORE DOING A PING on the remote IU (with 10.11.1.2 as an IP address) - if the RF link was established before, use the front panel button "position 3" to reset the IU before attempting to ping.

IP CONFIGURATION OF THE MDR / Orion – BRIDGING CONFIGURATION

The following diagram shows the default (factory) network IP addresses assigned to the various network ports on the MDR / Orion System: BRIDGING CONFIGURATION.

NOTE For most networks, bridging is the preferred IP configuration.

MDR / Orion - BRIDGING CONFIGURATION



NOTE The netmask for all the 192.168.x.x addresses is 255.255.255.0

4 Appendix: MDR5800 hardware VERSION 1, 2.x DIFFERENCES, COMPATIBILITY SUMMARY

Version 1 hardware (Indoor and Outdoor Units) is **incompatible** with Version 2.x hardware.

- The Indoor Unit /Outdoor Unit Twisted Pair Data Interconnection for Version 2 hardware uses 2 twisted pair cables to convey payload and Outdoor Unit control signals whereas Version 1 hardware uses 4 twisted pair cables.

Notes :
Version 2.x firmware (can be uploaded into the Indoor Unit using the NMS's Maintenance option) that can be used in Version 1.x hardware must be obtained from the product manufacturer. The file is **not** the same file that is used with Version 2.x hardware.
Updated RSSI and Power control functionality have been added to Version 2.x hardware and firmware.
Version 2.x firmware has

1. FTP upload functionality (needs to be activated via the MIB)
2. IP Bridging functionality (half and full duplex – selectable via the MIB). Appropriate IU hardware must be used.
3. Band Plan C
4. Refer to the MIB section of this manual and look for the † symbol to see what MIB-related functionality is in place/activated/planned for Version 2.x + firmware.
5. Functional RF Loopback built-in test feature.
6. Ethernet packet error monitoring and buffer monitoring added to MIB
7. E1 CRC4 payload monitoring added to MIB (only applicable for a single tributary)
8. Indoor Unit PCB hardware revision added to MIB
9. Periodic reporting of RF Link packet errors (adjustable in time, defaulted to 10 minutes) added to MIB.

Version 2.x NMS has

1. Ability to allow the user to connect to the Indoor Unit using PPP (via a serial cable interface to the IU's front panel Element Manager RS232 port) or via Ethernet (via the front panel RJ45 connector: 10BaseT).
2. Graphical Spectrum Analyzer display

By default, firmware provided for the Indoor Units does not provide a secure login feature (thereby limiting a user's ability to 'set' MIB variables). Suitably adapted firmware versions (dependent on hardware version) need to be requested from the product manufacturer to allow activation of this feature.

MDR / ORION INDOOR UNIT FIRMWARE UPGRADE NOTICE

MDR Version 2 hardware Indoor Units are identified as having 200+ serial numbers, Outdoor Units have 250+ serial numbers.
If upgrading Indoor Units to use V2.02+ IU firmware, upgrade the IU firmware on **BOTH** sides of the RF Link.
Note that firmware upgrades of Version 1 MDR Indoor Unit hardware do not require setting up of the PCB Issue in the MIB i.e. mdrmteIndoorUnitPCBrevision element. Upgrade to IU firmware Version 2+ of Version 1 hardware will NOT give improved RSSI functionality. This is only achieved with Version 2 hardware or modified version 1 hardware.
As a standard setting for mdrmteIndoorUnitPCBrevision, use MIB selection Issue_2. **HOWEVER,** if an appropriate Indoor PCB modification (made at the factory) has been made to allow Full Duplex Ethernet operation, the Issue_2_Mod_A selection option in the MIB **MUST** be used.

Table 12 indicates the compatibility between different indoor and outdoor unit types. The IU firmware types required to provide the compatibility between different hardware types are listed in.

NOTE Different indoor unit firmware versions may be required to provide compatibility between different indoor and outdoor unit types.

Table 12 Indoor - Outdoor Unit compatibility matrix.

Hardware Type	MDR IU	ORION 10 IU	ORION 25 IU
MDR2400 OU	X	X	X
MDR5800 OU	X	X	X
MDR5850 OU		X	X

Older versions (up to version 3.08) of the firmware are only suitable for MDR indoor units and are identified by the following filename:

idu_x_xx.cvf, where the x_xx is the numeric version number.

Newer firmware versions (version 4 upwards) are identified by the following filename:
abcddeeefghl_x_xx.cvf, where x_xx is the numeric version number of the firmware. The other fields in the name has the following meaning:
a: M or O = Indoor Unit PCB (MDR or Orion)
b: C=100 X=10 Ethernet to OU (or - if both are supported)
c: 2=v2 framing 3=v3 framing structure (3 is programmable, 2 is used on MDR)
dd: tt = 04=4 tribs 08=8 tribs E3, T3, etc
eee: 2.4 5.8 if it's specifically limited, not in name if not used
f: T or E for T1/E1 if it's specifically limited, not in name if not used
ghi: Reserved, not in number if not used

Examples:
oc308_4_04.cvf = Orion 100M v3 framing 8 tribs (Normal 8e1)
ox204_4_04.cvf = Orion 10M v2 framing 4 tribs (CCK-compatible 8e1)

5 Appendix: FIXED AntennaS

The table below identifies the distances where the 1mW/cm^2 exposure limits may be exceeded during continuous transmission using the proposed fixed antennas.

MDR5800

Manufacturer	Type	Model	Gain (dBi)	Numeric gain	Peak Power (mW)	Calculated Distance (m)	Minimum RF Exposure Separation Distance (m)
Gabriel	Dish	SSP2 52B	29.0	794.3	239.9	1.2	2
Gabriel	Flat panel	DFPD1-52	23.9	245.5	239.9	0.7	2
MTI	Flat panel	MT-20004	28.0	631.0	239.9	1.1	2

ORION5850

Manufacturer	Type	Model	Gain (dBi)	Numeric gain	Peak Power (mW)	Calculated Distance (m)	Minimum RF Exposure Separation Distance (m)
Gabriel	Dish	SSP2 52B	29.0	794.3	239.9	1.2	2
MTI	Flat panel	MT-20004	28.0	631.0	239.9	1.1	2

MDR2400

Manufacturer	Type	Model	Gain (dBi)	Numeric gain	Peak Power (mW)	Calculated Distance (m)	Minimum RF Exposure Separation Distance (m)
Gabriel	Parabolic	SSG4-23	26.7	467.7	63	0.5	2

WARNING: It is the responsibility of the professional installer to ensure that when using the outdoor antenna kits in the United States (or where FCC rules apply), only these antenna configurations shown in the table above are used. The use of any antenna other than those listed is expressly forbidden in accordance to FCC rules CFR47 part 15.204.

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment when installed as directed.
This equipment should be installed and operated with fix-mounted antennas that are installed with a minimum separation distance of 2 meters (6.6 ft) or more from all persons during normal operation to satisfy RF exposure requirements.

6 Appendix: Useful web links

The URL **http://www.plesseyinc.com/** provides information on current products as well as some FAQ.

For any other questions, the latest firmware or software, contact your local distributor, customer support on the above web site or customer support at mdrsupport@tellumat.com.

7 Appendix: MDR / Orion SCALABLE 1-to-4/8 E/T1 / 10 Base-T Ethernet functionality

Depending on the radio model and OU configuration, the MDR / Orion radio can simultaneously support 1 to 8 E1 or T1 tributary channels, with the balance of the available user BW made up by Ethernet packet data, up to a maximum aggregate Ethernet throughput no greater than 9.5 Mbps (Combined up- and downstream throughput). The unidirectional Ethernet throughput of the radios is limited to a maximum of 8 Mbps, which decreases as more tributary channels are activated.

8 Appendix: MDR / orion FTP Firmware Upload

Firmware can be uploaded to MDR and Orion IUs using FTP uploads as well as by using the "CVF Loader" or NMS software, available on the software CD or from the distributor.

Note the following:

Username : anonymous
Password : guest

The relevant MIB info is in the "mdrmteConfiguration" GROUP

1.3.6.1.4.1.1316.1.1.1.2.5 mdrmteFirmware
1.3.6.1.4.1.1316.1.1.1.2.5.1 mdrmteFTPServerStatus
1.3.6.1.4.1.1316.1.1.1.2.5.2 mdrmteFlashNewFirmware

By Default for mdrmteFTPServerStatus : the Indoor Unit FTP server is active
By Default for mdrmteFlashNewFirmware : the upgrade is immediate (it can also be timed)

We recommend that the user ALWAYS verify that the new version has indeed been uploaded and is being used by the IU. In this case one checks the following element:

1.3.6.1.4.1.1316.1.1.1.2.4.3 mdrmteIUFirmwareVersion

This OID (object ID) is part of:

1.3.6.1.4.1.1316.1.1.1.2.4 mdrmteGeneral, part of the "mdrmteConfiguration" GROUP

When updating the Indoor Unit firmware by means of FTP, please note that the choice of IP address is very important. You must always choose the IP address of the interface "closest" to you. In other words if you are using Ethernet to connect, then use the IP address of the Ethernet Interface.

NOTE If you are updating the firmware on the remote unit, use the IP address of the "overhead" PPP link - NOT the Ethernet interface of the remote unit. For example use 192.168.4.3 when uploading to the far side and using the bridging configuration. If by mistake you use the wrong address, you will create a "half-established" FTP session, and NO FURTHER SESSIONS will be permitted until the session times out after some minutes.

Setup for Full Duplex mode on the MDR: Max Transfer Rate

Follow the steps outlined below to setup the MDR radio in Full Duplex mode:

- Upload the radio Firmware by following the aforementioned procedure. Full duplex Ethernet operation is supported from version 2 of the firmware.
- Setup default configuration of the radio to the required configuration. Refer to Section 2.3.4 for a description of the different default configurations.
- Ensure that the PCB revision of the IU is *issue_2_mod_a(3)* by reading the following MIB element: 1.3.6.1.4.1.1316.1.1.1.2.4.15 mdrmteIndoorUnitPCBrevision. If the PCB revision is *issue_2(2)* the radio hardware does not support Full Duplex Ethernet mode.
- Disable all tributary channels to make the maximum user bandwidth available for Ethernet traffic.
- Enable Full Duplex mode via the MIB using element: 1.3.6.1.4.1.1316.1.1.1.4.16 mdrmteEthernetFullDuplex.
- Set the data rate to T1 if required using MIB element: 1.3.6.1.4.1.1316.1.1.1.2.1.1 mdrmteDataRate.

9 Appendix: Getting started guide

Checklist for Bench Testing (without a PC)

You will need the following:		Check	Additional Information
1	1 MDR / Orion User Manual (Issue 10)		
2	2 Indoor Units		
3	2 Outdoor Units		1 low and 1 high band - see L/H stamp near serial number
4	1 or 2 Power supplies		User Manual par. 4.2.3 and 8.4
5	2 Indoor Unit power cables		User Manual par. 4.2.3
6	2 Indoor to Outdoor Unit power cables		Specifications - User Manual par. 8.5.10
7	2 Indoor to Outdoor RJ45 Data cables		Connections - User Manual par. 4.4.1
8	N-type male to N-type male (6 GHz) RF cable		Type and connection - User Manual par. 4.3.1
9	60 - 90 dB of N-type attenuators		Note Max input is -30 dBm, default output power is +24 dBm
10	2.5 mm Allen Key		Required to open the connector lid on the outdoor unit.
11	3 mm terminal screwdriver		Required to connect the power cables
Recommended items:			
12	T1 or E1 BER Tester		
13	T1/E1 Payload cable		User Manual par. 4.2.4, 4.2.5, 4.2.6
14	Payload Loopback Connector		User Manual par. 4.2.4, 4.2.5, 4.2.6

You will need to know:

15 **How to use the reset button:**

When you press and hold down the reset button on the front panel with a suitable tool,the 3 LEDs on the front panel will change state depending on the duration that the button is held down for:

Count the number of state changes and let go of the reset button when the desired count is reached: It starts off with one green LED in the right most position, "moving" to the left:

Number	Left (System)	Middle(Payload)	Right (RF Link)
1	off	off	Green
2	off	Green	off

3	Green	off	off

Then an Orange LED "moving" from right to left (for 4-6), then Red, then Green again etc.

NOTE If you accidentally overshoot, keep on holding the reset button until all the LEDs eventually go off. Then release the button and try again.
See User Manual - par. 2.3.4 for more detail.

16 How to interpret the status of the LEDs:

Interpreting Rear Panel LED (Front Panel on Orion IU)

IU/OU Link LED - OFF: No communication between Indoor and Outdoor Units
Check cables between Indoor Unit and Outdoor Unit

Interpreting Front Panel LEDs

Continually Lit LEDs

LED	COLOR	Interpretation	Action
System	RED	There is a problem with the communication to the Outdoor Unit	*Check cables between Indoor Unit and Outdoor Unit*
RF Link	RED	Continually running bit errors on tributaries	*If System LEDs are green then check Outdoor Units*
Payload	RED	The is no Payload signal present (LOS) on one or more tributaries	*Check connections to the BER Tester*
System	ORANGE	There is a problem with the communication to the Outdoor Unit	*Check cables between Indoor Unit and Outdoor Unit*
RF Link	ORANGE	FEC is correcting errors - no problem	*No problem unless the LED stays orange*
Payload	ORANGE	The incoming payload signal is AIS	*Check BER tester*

Flashing/Blinking LEDs

A blinking LED indicates that a particular error condition from the table above (same colour coding) occurred at some time in the past.
You can clear this memory of past errors by applying a "1 LED"-reset.

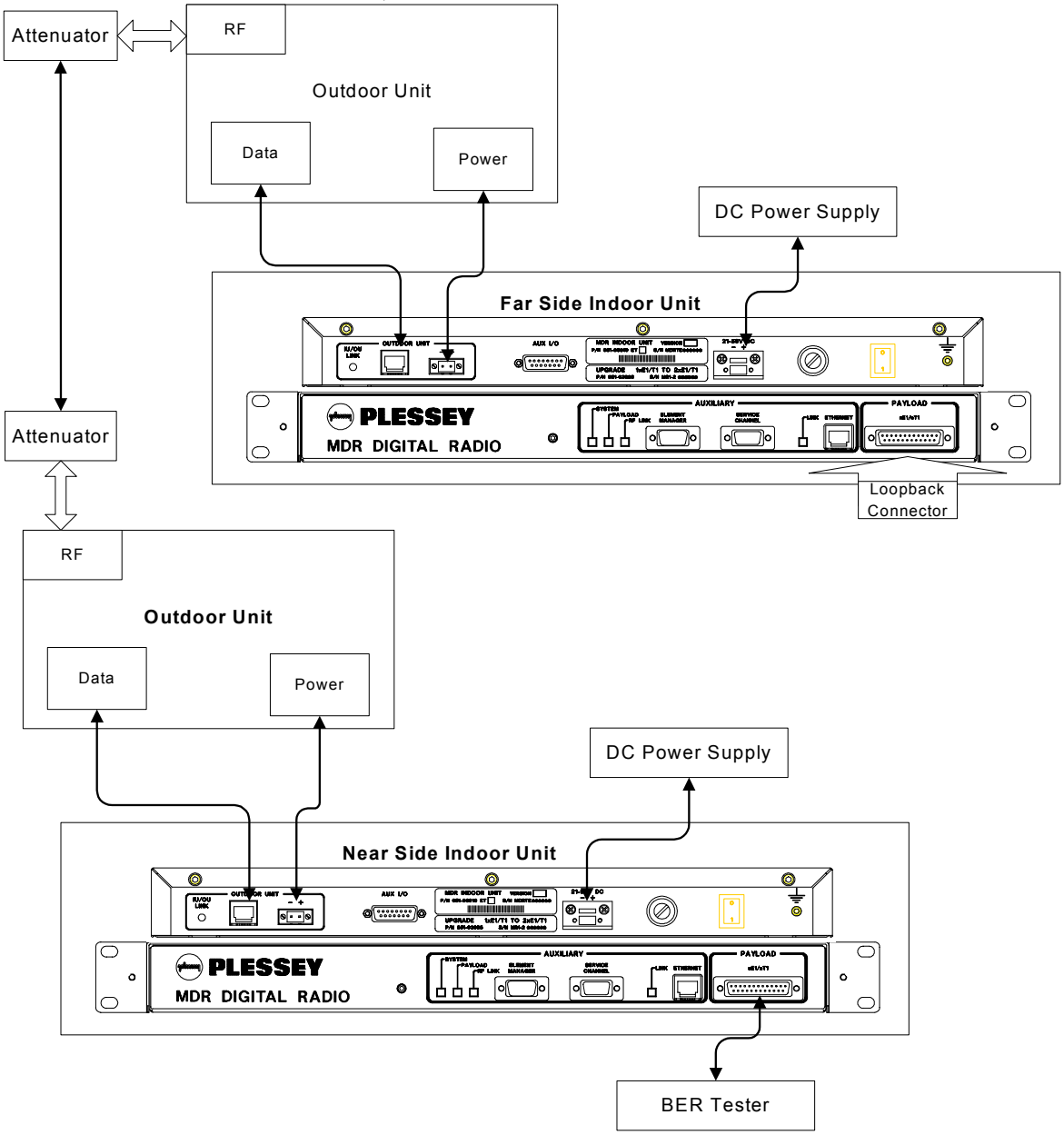
One Page Set-up for T1/E1 Bench Test (without a PC)

1. PREPARATION: Complete the attached check list

This section applies to the MDR and Orion radio series with the only difference being the location of the interface connectors on the MDR and Orion IUs.

Complete the attached checklist (above section) to ensure that you have the required equipment and information to continue.
Do not continue until you have read the checklist in the above section!

2. CONNECT AS SHOWN, THEN SWITCH POWER ON



3. CONFIGURE USING THE RESET BUTTON

Be sure that you know how to use the reset button before continuing!
See note "How to use the reset button" on the checklist, above section.

Configure your payload type to T1 or E1:
For E1: Do a 12-reset on both Indoor Units
For T1: Do a 13-reset on both Indoor Units

Configure Near and Far side Indoor Units:
For Near: **Do an 8-reset on the Indoor Unit you would like as the "Near" side unit**
Note that this clears all stored parameters to factory defaults
For Far: **Do a 7-reset on the Indoor Unit you would like as the "Far" side unit**
Note that this clears all stored parameters to factory defaults

4. CLEAR ERRORS

Apply a 1-reset to Clear the Historical errors on the Front Panel LEDs
See note "Interpreting LED Status" on the checklist

Apply a 2-reset to Clear the Event Log in the Indoor Unit
This is required if you wish to view the Event Log using a PC.

Reset your BER Tester.

5. MONITOR STATUS

Be sure that you know how to interpret the status of the LEDs before continuing!
See note "Interpreting LED Status" on the checklist

If all is well, then:
BER Tester should run with no errors
All 3 Front Panel LEDs should be green.
(The RF Link LED may flash orange without the need to worry.)

If you have not connected a BER Tester, then the Payload LED will be Red, indicating LOS i.e. no payload signal.

> **NOTE** Make sure to *deactivate* all *unused* tribs to ensure that the Payload LED stays GREEN for the tribs *used*. That is: if only two tribs are used, but all four are active, a RED Payload LED will be indicated as the two unused tribs have LOS. Deactivating the two unused tribs through the NMS / GUI, will result in the Payload LED only indicating information for two active tribs – i.e. are there a valid signals on the two tribs, regardless of the two other, unused tribs.

10 APPENDIX: 1+1 PROTECTION SYSTEM OPERATION

Introduction

System Description

When a single radio link is used to convey user data, any number of unexpected events may cause the link to fail resulting in user data being lost. This would require immediate corrective actions from the network operator responsible for maintaining the radio link. Since such a failure may occur at any time and possibly at a remote location, corrective actions may be very costly, both in terms of downtime and human resources. Common reasons for radio links to fail are:

- Signal fading on the radio link
- The presence of strong in-band interference
- Equipment failure

One possible solution to this problem is to install a second redundant radio link that can automatically take over the function of the primary radio link. This not only reduces the downtime of the link, but also provides the network operator with the opportunity to repair the faulty link at a convenient time.

This document describes the one-plus-one redundancy system that can be used with the radio products of Plessey BBW. Radio systems that are currently supported by the system are:

- MDR2400-SR
- MDR5800-SR
- Orion 5810-SR
- Orion 5825-SR

The remainder of this document is aimed at giving a detailed technical description of the redundancy system and the installation thereof.

Technical Description

System Overview

The functionality required to establish a protected radio link is already built into the MDR- and Orion-type Software Radios. This implies that the user can set up a protected radio link by interconnecting the equipment for two parallel radio links through a 1U protection panel and a dedicated communications cable.

Each Indoor Unit in a protected radio system continuously monitors the status of the radio link it uses, as well as the radio link provided through the redundant system running in parallel. Indoor Units forming part of a redundant link at each end of the radio link share status information through a cable connecting the two Auxiliary ports of the Indoor Units.

Only the tributary payload data channels are protected by the redundant link i.e. there is no protection for Ethernet data. Tributary payload data is split and combined between links through a 1U protection panel that connects to the user network equipment as well as the two Indoor Units used at each end of the redundant link. Although both radio links are functioning continuously, only one of the Indoor Units is actively driving the tributary channels of the user network at any given time.

Each Indoor Unit continuously monitors the level of the Packet Error Ratio (PER) for the radio link on which it is receiving user data. When the PER exceeds a predefined ratio of 10 consecutive seconds, the Indoor Unit driving the tributary channels of the user network will signal the redundant Indoor Unit to take over processing the data it receives over the radio link.

The value of the PER threshold is configurable and can be changed through the Orion NMS if required. The default value is set at 30%.

There is no notion of a primary and secondary link in this redundancy system. The first link to be configured successfully will start driving the tributary payload channels. Switch over will only take place when the aforementioned condition occurs. In the event where the link to which the data was switched over fails at a later stage, the system will attempt to switch the data back to the original link.

NOTE 1 A situation can arise where the up- and downstream user tributary data is carried by separate radio links, i.e. link A carries the upstream data, and link B carries the downstream data.

NOTE 2 Due to the architecture of the redundancy system, the process of switching over from one link to another is not hitless and user tributary data will be lost for a few seconds (< 10)

System Configuration

The block diagram in Figure 10 illustrates a typical redundancy system configuration. Note that this system is managed over an Ethernet LAN, where the two local Indoor Units are connected to the LAN using a hub. It is important to note that the IP addresses for each Indoor Unit should be unique. It is however possible to configure

each link in the redundant system separately through the Element-Manager port of each local Indoor Unit, in which case it is not necessary to assign unique IP addresses to the Indoor Units.

The block diagram in Figure 10 also clearly illustrates the following important interfaces:

- IU A to IU B connection through the respective Auxiliary ports of the four Indoor Units
- The Protection Panel interfaces on each side of the link that combines and splits the tributary payload channels between the two radio links
- The single user network interfaces provided by the Protection Panel
- The two radio links that provide the redundancy required for user data protection

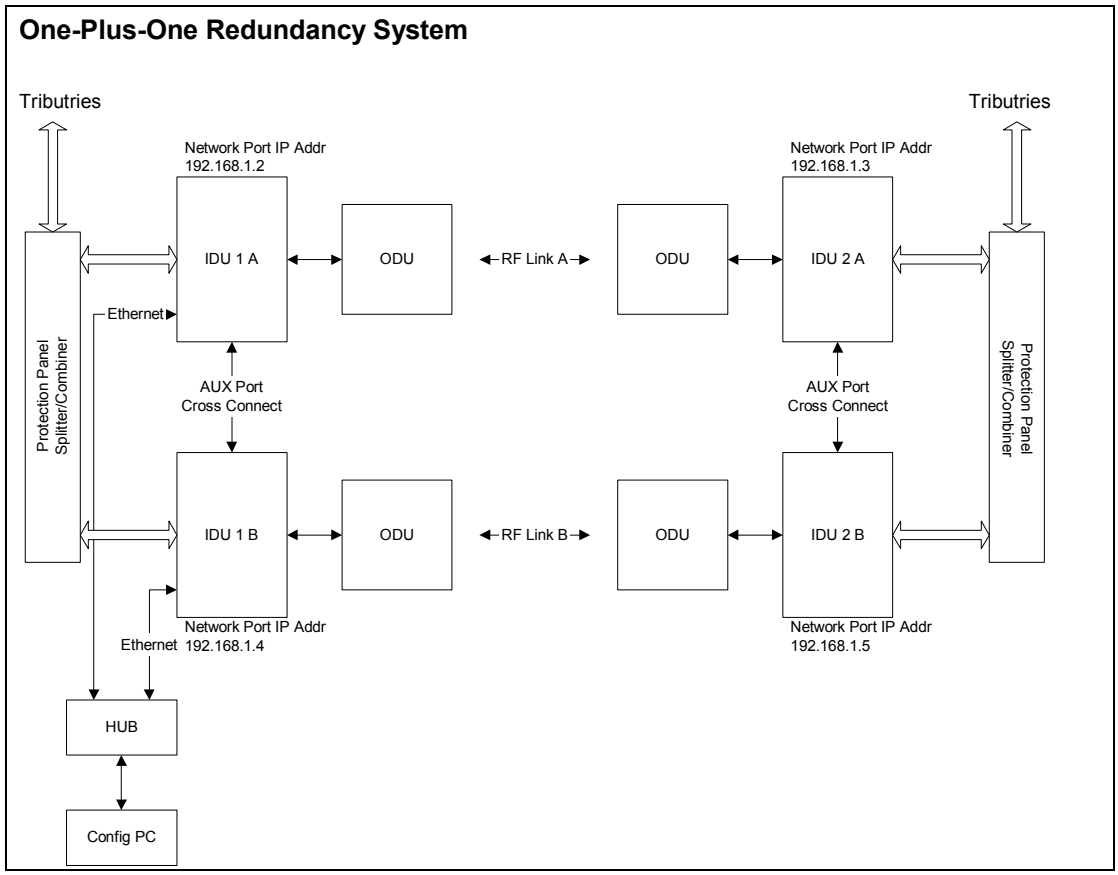


Figure 10: Block diagram of a typical redundancy protected system where the radio links are managed through an Ethernet network.

1U Protection Panel

There are two types of protection panels: a four and an eight tributary channel panel. They operate in the same way and perform the signal splitting and combination functions for the tributary channels taking part in the redundancy protected radio system. Note from Table 13: Protection Kit connector interfaces. that the Protection Kit is currently only provided in 110-ohm as a compromise to make provision for E1 and T1 mode.

Table 13: Protection Kit connector interfaces.

Description	Connector	Impedance
Orion Protection Panel		
Payload Network Interface	2xDB-25 or 8xRJ-48	110 ohm
Indoor Unit Interface	2x2xDB-25	110 ohm
Orion Protection Panel		
Payload Network Interface	DB-25 or 4xRJ-48	110 ohm
Indoor Unit Interface	2xDB-25	110 ohm

The cables required to connect the Patch Panel to the two Indoor Units are provided with the Patch Panel. The DB-25 pinouts used for each DB-25 connector on the patch panel are exactly the same as that of the MDR and Orion Indoor Units respectively.

Auxiliary port communication

The two Indoor Units on each side of the radio link share status information through the two relay outputs and OPTO inputs on the Auxiliary (AUX) port of each Indoor Unit. Information shared by each of these:

- Indication if the Indoor Unit is currently driving the tributary channels on the user network
- The current Frame Lock status detected by the Indoor Unit for the radio link it is using

System functional description

Each Indoor Unit taking part in a protected radio link continuously monitors the PER of the radio link it is receiving tributary data over. If the PER for the link increases above the Sever Error Margin for more than 10 consecutive seconds, the Indoor Unit will request the second Indoor Unit to take over the driving of the tributary channels if the second Indoor Unit sees a frame lock.

Once the second Indoor Unit has started driving the tributary channels, the first Indoor Unit becomes the redundant link.

The flow diagram for the algorithm that governs the protection switch-over process in each Indoor Unit is illustrated in Figure 11.

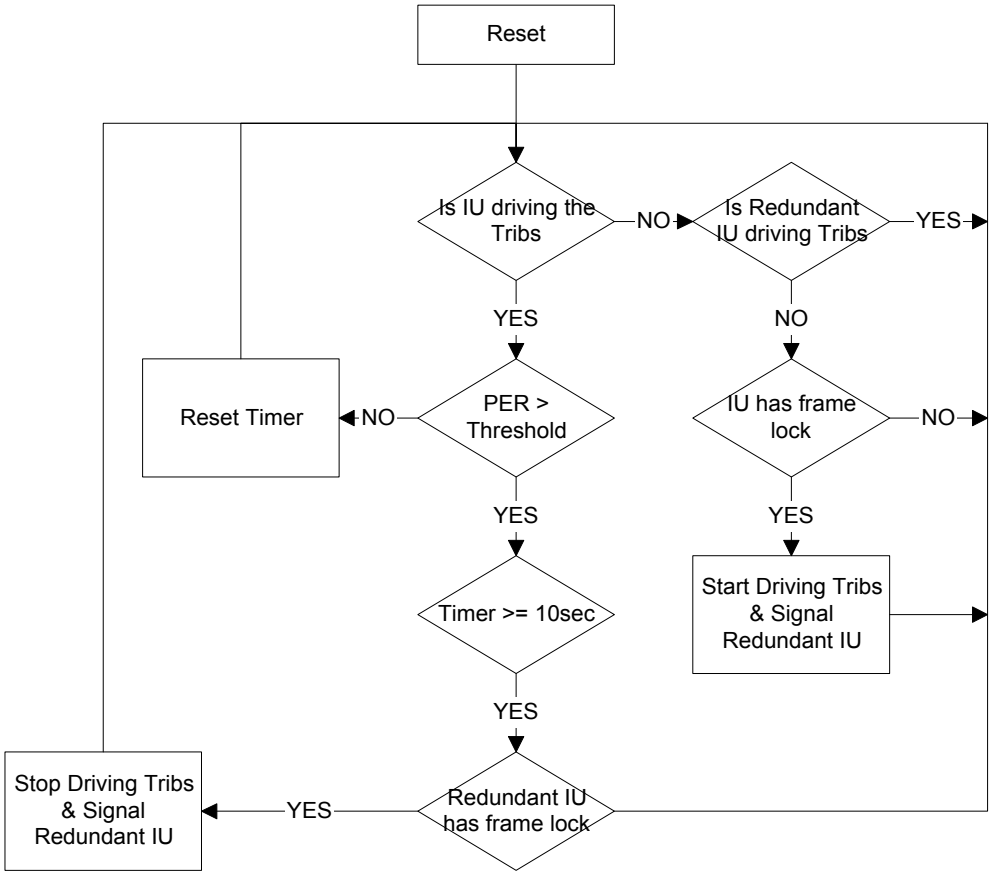


Figure 11: Redundant system switch-over algorithm.

Installation

Hardware Installation

The following list of equipment is required to set up a protected radio link:

- Four MDR / Orion Indoor Units
- Four MDR / Orion Outdoor Units
- Two MDR / Orion Protection Kit 1U panels (Supplied with protection kit)
- Four / Eight IU interface loom cables (Supplied with protection kit)
- Tributary channel interface cables to connect to the user network
- Two IU-IU auxiliary communications cables (Supplied with protection kit)
- Standard tools and cabling required to set up a MDR / Orion radio link

Illustrations of the Protection Kits can be seen in Figure 12and Figure 13. Note from the drawings that the Orion Protection Kit offers the ability to protect eight E1/T1 tributary channels. Thus, the latter could be used with either the MDR or Orion radios.

Follow the steps below at each site to interconnect and set up the protected radio systems:

- Install each IU-OU system as described in the MDR / Orion User Manual
- Install the four / eight tributary channel Protection Kit panel in the rack mount
- Connect tributary paths A and B on the Protection Kit panel to the two installed indoor units using the provided DB-25 interface cables
- Link the two Indoor Unit auxiliary ports of the Indoor Units through the IU-IU auxiliary communications cable
- Switch on the two units and configure the radios as explained in Section 0
- Connect the tributary interface of the Protection Kit panel to the user network through the preferred interface (DB-25 / RJ48)

NOTE Be sure to acquire the correction protection kit that matches the indoor unit type you intend to use.

Figure 12: MDR Protection Kit front panel.

Figure 13: Orion Protection Kit front panel.

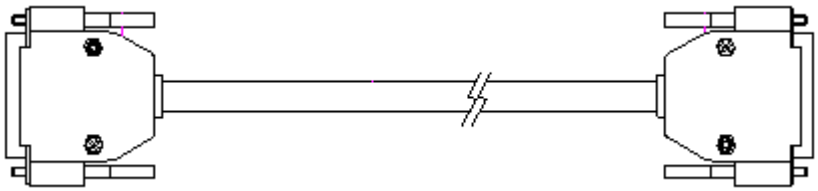


Figure 14: Tributary channel interface cable used to connect Protection Kit Paths A & B to the two Indoor Units.

IU-IU auxiliary communications cables are supplied with the Protection Kit and are used to connect the auxiliary ports of the two indoor units according to Table 14. The system diagram when using the two radio pairs in bridging mode is shown in Figure 10.

Table 14: Auxiliary Port cross connection.

Radio 1A Pin No	Radio 1B Pin No
1	12
2	13
8	14
9	15
12	1
13	2
14	8
15	9

Radio Software Configuration

Two MIB elements are used to configure the radios taking part in the protected radio link. These MIB elements can be set using any SNMP element manager application, or through the Orion NMS application. Please refer to the following user manuals for details on using the above applications:

- MDR / Orion – SR user manual
- Orion NMS HTML user manual
- 3rd party user manual (If a 3rd party SNMP element manager / MIB browser is used.

Set the following MIB element in all IDUs taking part in the protected radio link to 1 (Yes). **mdrmteOnePlusOne (OID: 1.3.6.1.4.1.1316.1.1.1.2.4.17, Parent: mdrmteGeneral)**

The MIB element controlling the switch-over threshold, **mdrmteSevereErrorMargin (OID: 1.3.6.1.4.1.1316.1.1.1.2.2.18, Parent: mdrmteRFLinkConf),** is set to 30% by default. This value is a percentage and represents the switch-over threshold for the Packet Error Ratio (PER). When the PER exceeds 30%, the switch-over will occur. The value of this MIB element can be adjusted to meet the exact user requirements. It is advisable to set the switch-over threshold on all Indoor Units to the same value.

System Verification

Since most of the functionality of the protected system is hidden from the user, it may be difficult to monitor the status at times. It can however be determined by monitoring the MIB elements listed below.

The status of the protected link can also be monitored through the Orion NMS. Please refer to the Orion NMS user manual for more information on this option.

- Name: mdrmteOnePlusOne – shows if the protected mode is active (OID: 1.3.6.1.4.1.1316.1.1.1.2.4.17, Parent: mdrmteGeneral)
- Name: mdrmtePayloadDrive – shows if the indoor unit is driving the tributary channels of the user network (OID: 1.3.6.1.4.1.1316.1.1.1.3.1.5, Parent: mdrmteInfo)
- Name: mdrmteLock – shows if frame lock is present (OID: 1.3.6.1.4.1.1316.1.1.1.3.1.6, Parent: mdrmteInfo)
- Name: mdrmtePeerPayloadDrive – shows if the Auxiliary port connected indoor unit (Peer) is driving the tributary channels. This element is the inverse (opposite) of mdrmtePayloadDrive (OID: 1.3.6.1.4.1.1316.1.1.1.3.1.7, Parent: mdrmteInfo)
- Name: mdrmtePeerLock - shows if the Auxiliary port connected indoor unit (Peer) has frame lock (OID: 1.3.6.1.4.1.1316.1.1.1.3.1.8, Parent: mdrmteInfo)
- Name: mdrmteSevereErrorMargin – the threshold percentage value for link unavailable to switch over (OID: 1.3.6.1.4.1.1316.1.1.1.2.2.18, Parent: mdrmteRFLinkConf)
- Name: mdrmteAveragePER – average Packet Error Ratio (OID: 1.3.6.1.4.1.1316.1.1.1.1.2.15, Parent: mdrmteRFLinkPerf)
- Name: mdrmteCurrentPER – real time Packet Error Ratio. For example a PER of 1e-1 (10%) corresponds to a SevereErrorMargin value of 10. The Current PER has to exceed the Severe Error Margin for 10 seconds continuously for the link to become unavailable and switch over to its peer indoor unit. (OID: 1.3.6.1.4.1.1316.1.1.1.1.2.3, Parent: mdrmteRFLinkPerf)

Index

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