

TRANSPARENT TECHNOLOGIES



**NRD Utility
Net Relay Device
*Operations & Installation Manual***

Transparent Technologies, Inc
5665 Airport Blvd
Boulder, CO 80301
720-406-1294

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Transparent Technologies reserves the names T2, NRD1, M2 and UDA. References are made to Sony®, Clie™ and Palm©.

Version

NRD1 Version 00.90

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NRD1

Utility
Network
Relay
Device

*Operations
&
Installation
Manual*

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OVERVIEW

NRD1

*Utility
Network
Relay
Device*



Description

The NRD1 is a network relay device to be used within a T2 mobile or network AMR system.

The NRD1 is an environmentally-hardened transceiver intended for “elevation” mounting in sites such as utility or light poles, towers or building roofs.

The NRD is a simple managed network device. When commanded by the G2 Mobile system or the G2 Central Host, the NRD1 re-broadcasts any M2 signals in proximity.

Basic Specifications

Transmission:	One-Way
Config/Datalogging:	Two-Way (unregulated)
Regulatory:	FCC 15.247
Temperature:	-40°F to 158°F (-40°C to +70°C)
Humidity:	100%
Submersion:	IP-67 Rating Watertight
PCBs:	Conformal Coated
Housing:	Powder-Coated Aluminum
Power:	120 Vac 12 Vdc Solar Options Dual D-cell lithium



INSTALLATION & WIRING

Installation

The NRD1 is intended for elevation sites such as utility poles, light poles, towers and building roofs. In most cases, T2 will provide assistance on

Mounting Location

When determining a mounting location for the desired RF coverage, the following parameters must be considered:

- Topography
- Elevation
- Seasonal Changes

Topography: The 900 MHz signals of the M2 endpoint radios and NRD1 relay do not require direct line of sight for successful communication. However, the signals cannot penetrate significant structures such as hills, mountains, large concrete buildings or clusters of large foliage. The local topography will dictate the RF coverage of the area.

Elevation: The height of the NRD1 is also very important to ensure the desired coverage. In general, the highest elevation possible will optimize RF coverage.

Seasonal Changes: Installers should be aware of tree foliage

absent in winter and present in other seasons. The water content of leaves can potentially cause seasonal variance in RF coverage.

Physical Mounting

The physical mounting of the NRD1 relay should observe the following guidelines:

- The antenna should always be mounted vertically upright.
- The antenna should be physically isolated from obstructions, especially any metal surfaces such as tank walls, pipes and poles.
- The antenna should be physically isolated from the power cable.
- Tie wraps should be used to securely strap the power cables to the mounting structure.

Three separate brackets are available for mounting purposes

- Wallmount
- Polemount Horizontal
- Polemount Vertical



Antenna

The antenna supplied with the NRD1 is a specific model and is the only antenna which can be used.

The antenna is model PAW-MA9-7.

The antenna is intended to be mounted directly to the NRD1 enclosure

Remote mount kits for antennas are also available from T2.

Parameter	Min	Typ	Max	Units
<i>Frequency Range</i>	900		928	MHz
<i>Input Return Loss (S₁₁)</i>		-14		dB
<i>VSWR</i>		1.5:1		
<i>Impedance</i>		50		OHM
<i>Input Power</i>			100	W
<i>Operating Temperature</i>	-45		+70	Deg C

Lightning Protection

The NRD1 utilizes a coaxial gas discharge suppressor. This provides protection per National Electric Code instructions.

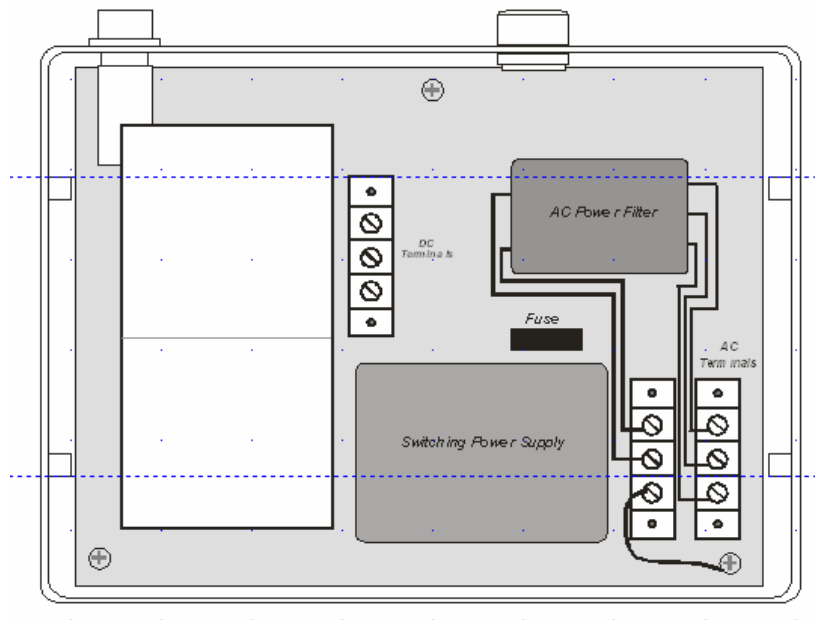




Wiring

Power

The only wiring required for the NRD1 is the power connection. All termination of power wires are made to the terminal blocks on the backplane of the unit as shown.



The unit can accept the following power inputs through the switching power supply:

AC Option

Input Range: 90 – 260 VAC
47 – 440 Hz

DC Option

Input Range: 120 – 370 VDC

Direct DC (Solar charger)

Input Range: 5 - 12 VDC

Terminal Blocks

The backplane board in the NRD has two different terminal blocks: One for AC power and one for DC power. Each terminal block clearly shows the proper termination.

Grounding

The NRD1 should always be wired with a ground wire. This ground is connected securely to the chassis.

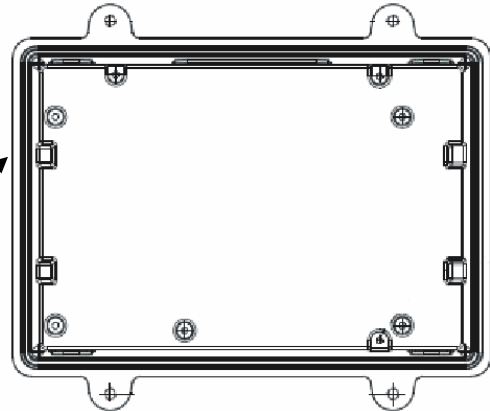


Environmental Seals

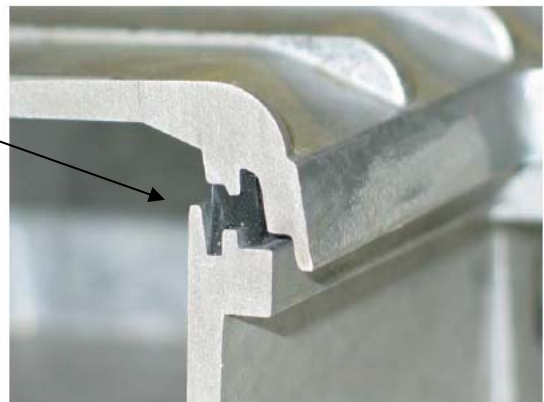
The NRD1 enclosure is rated IP-67. To maintain this rating, the installer must pay special attention to the environmental seals:

Front Plate Gasket

This is the primary seal of the enclosure. It fits around the entire face of the housing.



The front plate sits on the silicon gasket as shown to the left. The front plate must be properly aligned with the H-shape gasket prior to clamping with the front plate screws. The gasket should be wiped clean with water prior to installation. No alcohol or solvents should be used on the gasket as it will degrade the material.



Cable Gland

The cable gland is the seal for the entry of the power cable. The cable must be fed through the nut and the gland. Once the cable is in place, the nut can be tightened until a complete seal is present.





OPERATION

Operation

The NRD1 is a basic managed network relay. The device does not have any direct field inputs. Its function is to re-broadcast valid M2 or M1B RF packets.

The default mode of operation for the NRD1 is MONITOR.

In MONITOR mode, the NRD1 simply wakes up pseudo-randomly every 3-10 seconds and transmits its ID and internal diagnostic information. At the end of this transmission, the NRD1 will go into a receive mode to check for any host commands.

The host computer can initiate the following commands through the r2 Transceiver:

Broadcast: This command will direct the NRD1 to receive and re-transmit any local M2 or M1B messages for a specified duration (default of 60 seconds)

Change Freq: This commands directs the NRD1 to change either its receive or transmit frequency.



TROUBLESHOOTING

This section under development.



APPENDIX – FCC / IC INFORMATION

FCC Information

This equipment has been tested and found to comply with the limits for a **Class B** digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC / IC Declarations

The M2 Utility Radio Transceiver is an approved intentional radiator device under FCC 15.247 and Industry Canada under RSS-210.

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:

- (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND
- (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRE OPERATION.

The NRD1 Relay is a self-contained unit and access to its circuitry by an end user, other than for installation, wiring or replacement of the battery, is not intended. The supplied whip antenna is the only antenna authorized for use with the NRD1. Changes or modifications not expressly approved by Transparent Technologies or use of the radio other than the purposes described herein voids the user's authority to operate the equipment.

Industry Canada product labeling.

“IC” before the equipment certification number only signifies that the Industry Canada technical specifications were met.



Antenna Requirements

This device has been designed to operate with the antennas listed below, and having a maximum gain of 7 dB. Antennas not included in this list or having a gain greater than 7 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

Pacific Wireless PAW-MA9-7

The antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.