ROC800-Series Network Radio Module

The Network Radio Module (NRM) is an integral part of the Distributed RTU Network and allows ROC800-Series (ROC800) to communicate wirelessly. It has the ability to broadcast and detect information from other RTUs and flow computers for easier and faster interconnection and communication setup.

The NRM provides a wireless solution of transferring data from RTU to another RTU within the Distributed RTU Network (DRN). The data can be any type of information that the RTU has in its database, such as I/O, soft points, or other parameters.

Features

- Peer-to-peer wireless network
- The ability to move data on a 1 second time interval
- Ability to configure or issue diagnostic messages to all devices on the network from the gateway via a host computer with no interruption of critical data transfer
- Devices are automatically detected by the network
- The ability to replace any unit and allow the replacement unit to come up and join the network
- The ability to co-exist with adjacent RTU networks or other foreign radio networks

Distributed RTU Network

The Distributed RTU Network (DRN) is a network solution for RTUs in wide-area production pad or multiple well installations to communicate wirelessly. The DRN is an answer to challenges of wells spread over a wide geographical area wherein setting up wiring and connectivity is difficult.

The DRN is designed for RTUs to import, export, or process over-the-air messages and information. The DRN supports one central network access point (NAP) and up to 12 or 24 nodes.

DRN Model

The DRN employs two network models, Network Model 12 and 24. Network Model 12 is designed for a maximum of 12 nodes and one NAP. Network Model 24 is designed for a maximum of 24 nodes and one NAP. During each transmission, the node can send exports, pass through messages, or maintenance polls.

Network Access Point

You can configure a ROC800 with an NRM installed to act as a Network Access Point (NAP). The NAP is a central RTU connected to a host computer or ROCLOCK that configures and diagnoses the network. The NAP imports and exports data over-the-air from the nodes connected on the DRN. The NAP is also responsible for syncing all of the nodes on network.

Auto Discovery

Auto Discovery is the method wherein the NAP locates or discovers nodes in the DRN. When NRM is configured as a NAP, the NRM initiates Auto Discovery sequence and sends an Auto Discovery broadcast to all the nodes in the DRN. If the node has the correct network ID and the frequency hop key, the NAP adds the node to a list of available devices. You can then activate an available node by dragging and dropping the device to a commissioned list.

Node

You can configure a ROC800 with an NRM installed to act as a node. The node is responsible for over-the-air exporting of data which the NAP or other nodes in the network receive and process.
High Frequency Radio

The NRM includes a 2.4 GHz radio to handle the wireless data transmission. The radio utilizes TDMA technology, and allows for multiple networks (with unique Network IDs and Frequency hop Keys) to be located in close proximity to each other without experiencing signal degradation.

Data Export

The NRM shares data from one RTU to another RTU at a periodic interval. Exporting data is a process of one node sending data out over-the-air for other nodes or NAP to receive and use. Export data is sent over-the-air for not slower than once a second. The NRM delivers up to 30 Export Values to other receiving devices.

The NRM periodically requests the Export Values List from the RTU. This is requested every second. The NRM stores the Export Values List in its own local database. The export data is marked for transmission on the next available TDMA slot once a new data has been received from the RTU. The Export List consists of the following:

- Unique Map ID
- IEEE Float Value
- Data Integrity Status

Data Import

Importing is the process of receiving over-the-air-export messages. There is one or more consumers of every exported data. The NAP receives the export message and parses the message searching for an export value that it is configured to receive. The export data is saved in the local database of the NRM and is transmitted to the RTU every one second. The NRM can receive up to 128 Import Values to the ROC800 not slower than one per second.

Installation

The NRM is designed to be plug-and-play and requires no wiring. The NRM can be installed in slot 1, 2, or 3 in the ROC800-Series 2 RTU.

Note: This module cannot be hot-swapped.

Depending on the enclosure you choose to surround the node and protect it from the environment, you may need additional cabling between the antenna and the connection on the module itself.

Note: The NRM requires an antenna to function. The antenna will be provided by the installer.
Network Radio Module

**Processor**

Type: 32-bit ARM7TDMI core Atmel AT91SAM7X256 processor at 24MHz.

Reset Controller: The UCC2946 supervisor with watchdog timer IC monitors the onboard power supply voltage 3.3V and pin 46 of the microcontroller. The controller also generates the reset signal if the backplane reset line is asserted by the host processor.

Clock: The processor’s main clock oscillator is driven by an 18.432 MHz crystal.

**Memory**

<table>
<thead>
<tr>
<th>Type</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash</td>
<td>256 KB</td>
</tr>
<tr>
<td>SRAM</td>
<td>64 KB</td>
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</tbody>
</table>

**Communication**

<table>
<thead>
<tr>
<th>Radio</th>
<th>Quantity</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>RadioGXM TDMA Embedded Radio</td>
<td></td>
</tr>
<tr>
<td>Spectrum</td>
<td>2.4 GHz</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>20 km (12.4 miles) LOS</td>
<td></td>
</tr>
<tr>
<td>Max output power</td>
<td>500 mW</td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40°C to 85°C (-40°F to 185°F)</td>
<td></td>
</tr>
<tr>
<td>Input Voltage</td>
<td>3.3 V to 5 V</td>
<td></td>
</tr>
<tr>
<td>Power Adjustment</td>
<td>Linear</td>
<td></td>
</tr>
<tr>
<td>Interface</td>
<td>TTL (RS-232 optional)</td>
<td></td>
</tr>
<tr>
<td>Remote LED</td>
<td>Supported via 24-pin option</td>
<td></td>
</tr>
</tbody>
</table>

Data Security: AES 256-bit encryption (optional)

Protocol: TDMA

TDMA assigns each radio within a network a specific time slot to transmit a message, receive a message, or stay in a listen mode.

**Power**

Network Radio Module Controller: 9 – 30 Vdc PWR IN

Radio: 5V LTM8023

Consumption: 1.2 W (24 Vdc @ 50 mA or 12 Vdc @ 100 mA)

**Physical**

| Dimensions | 26 mm W by 75 mm H by 133 mm D (1.03 in. W by 2.96 in. H by 5.24 in. D) |
| Weight | 80 g (2.4 oz) |

Light Emitting Diode (LED)

| LED1 (Network joined status) | Node: On (non-blinking) – joined the network and commissioned Blinking – joined the network and not commissioned Off – not joined to the network NAP: Always on |
| LED2 (NAP or Node) | Node: Always off NAP: Always on |
| LED3 (Signal strength indicator) | Node: | On (non-blinking) – good signal-to-noise ratio  
Blinking – adequate signal-to-noise ratio  
Off – poor good signal-to-noise ratio  
NAP: | Always on |
|----------------------------------|-------------------------|---------------------------------------------------------------------|------------------|
| LED4 TX (Transmission) activity  | Node: | Blinking – indicates TX activity on the radio  
NAP: | Blinking – indicates TX activity on the radio |
| LED5 RX (Reception) activity     | Node: | Blinking – indicates RX activity on the radio  
NAP: | Blinking – indicates RX activity on the radio |

**Environmental**

Same as ROC800 in which it is installed.

**Approvals**

Same as ROC800 in which it is installed.