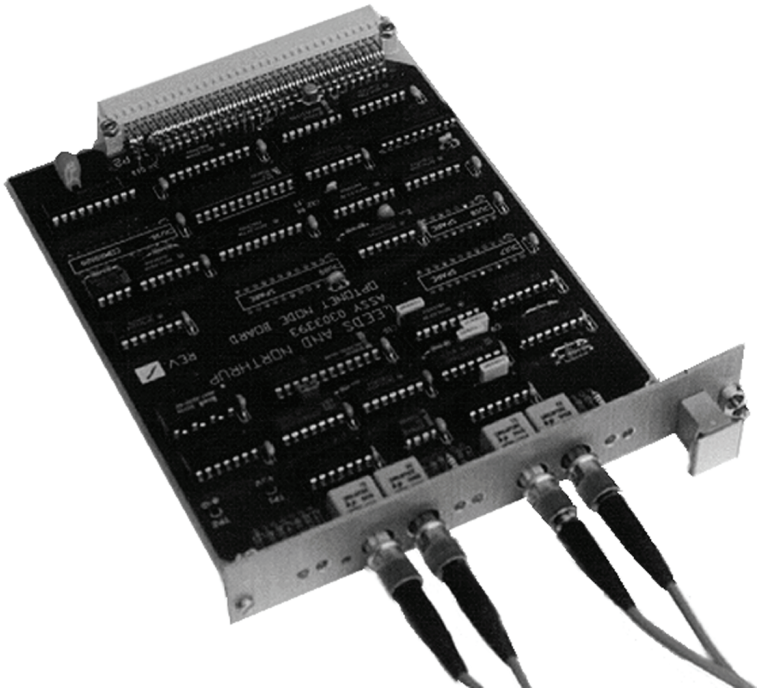
I/A Series® Remote Terminal Unit (RTU)
RTU 50 OPTOnet Module



FEATURES

- Ring network, with up to 63 nodes per network
- Optical fiber (glass) cables for reliable connection over large distances
- No single point of failure for RTU station activity
- High speed data transfer
- Ability of RTU to access information on the network for use in calculations or communications
- Total network length up to approximately 6.2 km
- Reduced cabling costs
- Deterministic, token-passing network protocol.

INTRODUCTION

Distributing Remote Terminal Units around your field site can produce considerable savings in cabling and installation costs. The I/A Series RTU 50 makes distributed configurations easy with OPTOnet modules.

The OPTOnet module provides the ability to support peer-to-peer communications between RTUs, by using a high speed optical ring network interface, with high isolation and noise immunity.

Each RTU constitutes a node on an OPTOnet network, and is able to communicate with all other RTU nodes on the network. The OPTOnet network distributes information between RTUs without interfering with the normal operation of the RTU.

Communications with a SCADA Master Station can occur from a single network node, or from many. Link redundancy is built into the network topology.

Implementing a distributed, networked RTU station eliminates the risk of a single point of failure of RTU station activity. If any one RTU fails, then all other units continue to communicate just as effectively, by accessing each other from the remaining healthy part of the network. Other advantages are reduced field cabling costs and the ability of any RTU on the network to access any information on the network for use in calculations.

Description of Operation

Each OPTOnet node card (see Figure 1) is essentially a three-port hub, with all three ports controlled from a single ARCNET network controller chip. The two external ports are logically and physically identical and can transmit and receive; resulting in two effective rings. The third port is logically identical to the others and is an internal port backing onto the Electrobus.

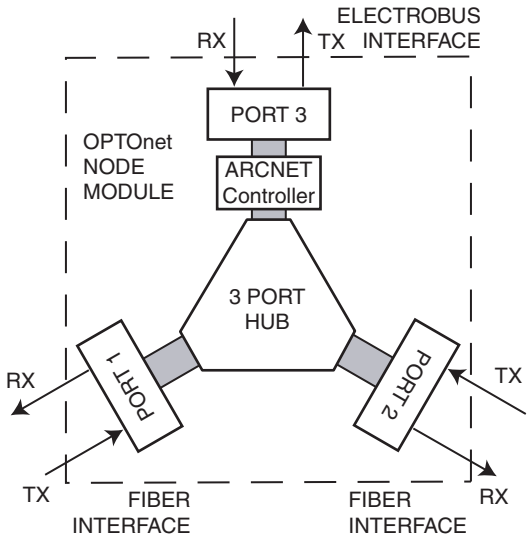


Figure 1. OPTOnet Node Card Operation

The OPTOnet node card (see Figure 2) only transmits from ports which do not receive. Therefore, an OPTOnet node that receives data from the RTU Master Processor module at Port 3, transmits the data from its two external ports 1 and 2, in both directions simultaneously (see Figure 1). The two neighboring RTUs, having received the message on one port, re-transmit the message on the other two ports. Each neighbor then re-transmits to the next successive RTU node in its respective direction.

A node which receives a message it has just transmitted recognizes the message and terminates its propagation at that point.

Using these network principles, if a message is prematurely halted in one direction due to a port or optical connection failure, the message continues to propagate in the opposite direction.

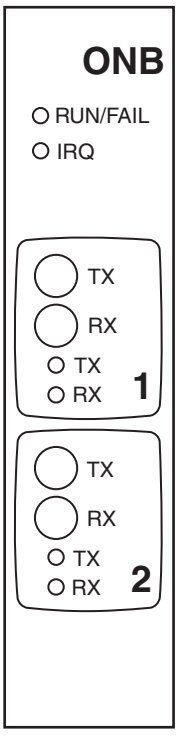


Figure 2. Front Panel

Network Configuration

Configuration of the network at startup is automatic, with each RTU being assigned a unique network node number. The ARCNET controller chip in the OPTOnet node module handles all network tasks, such as token passing, message acknowledgment, error checking, and so forth. Since each RTU contains a Master Processor module, it is capable of separately monitoring network activity.

In the event that a token is lost, the next would-be recipient of the token times out because it did not receive an invitation to transmit within a given period. In this circumstance, the RTU sends out a re-configuration burst, signalling all RTUs to re-initialize OPTOnet.

Similarly, in a situation where two network failures occur on either side of the network ring, two island networks are established. In both cases, the two networks re-configure themselves and continue to operate in isolation from each other. The situation does not affect the operation of the individual RTUs. The only effect is the loss of communication of shared data between the two islands. Should one (or both) of the failed network elements re-establish itself, then having sensed that there are two tokens, the network self-heals and resumes normal operation.

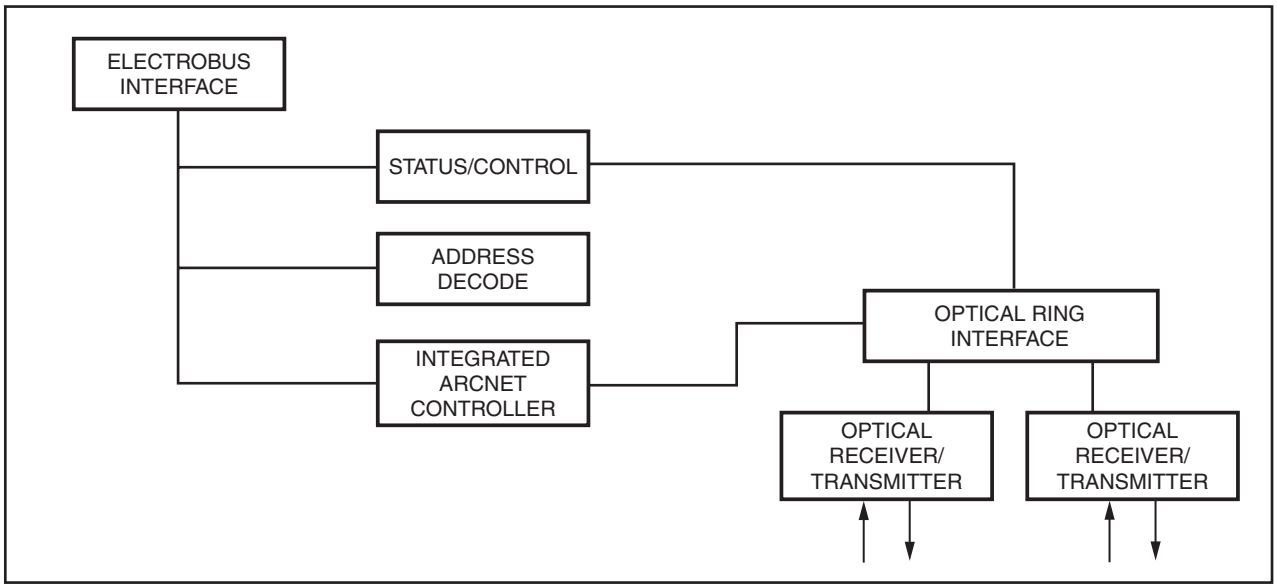


Figure 3. I/A Series RTU 50 OPTOnet Module Functional Block Diagram

FUNCTIONAL SPECIFICATIONS

Configuration

ARCNET optical ring arrangement

Maximum Length of OPTOnet Ring (use the following formula)

6200 - [40 x (Number of nodes -2)] meters

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature

STANDARD
0°C to 60°C (32°F to 140°F)

EXTENDED(1)
-20°C to +70°C (-4°F to 158°F)

Humidity
10 to 95% (noncondensing)

PHYSICAL SPECIFICATIONS

Physical Size
160 x 127 mm board
182 x 145 x 25 mm assembly

Module Location
Must reside in a main file

Maximum Length Between Nodes
500 meters

Optical Cable
Glass fiber, multimode 62.5/125 µm

ORDERING INFORMATION

Part Number	Description
SY-0303393	OPTOnet Node Module

(1) Extended temperature range modules are available on request.

Invensys Operations Management
5601 Granite Parkway Suite 1000
Plano, TX 75024
United States of America
http://iom.invensys.com

Global Customer Support
Inside U.S.: 1-866-746-6477
Outside U.S.: 1-508-549-2424 or contact your local Invensys representative.
Email: support@invensys.com
Website: http://support.ips.invensys.com