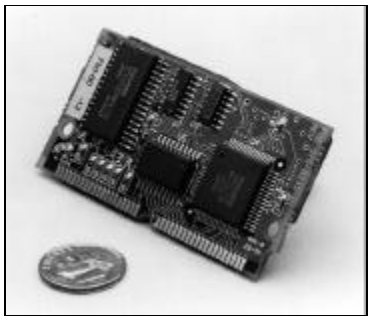
LONMANAGER NSS-10
MODEL 34000-100



FEATURES

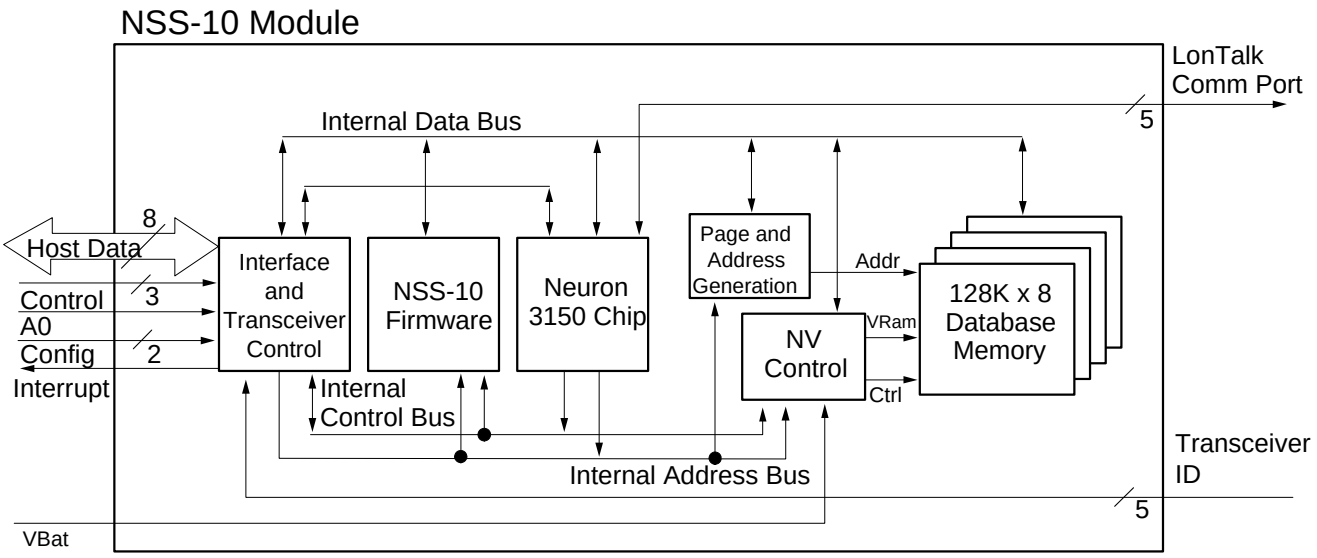
- Host processor and operating system independent design
- Register-based host interface provides high packet throughput for system-level monitoring and control applications
- Support for installation using service pin, find device with wink, and manual entry of Neuron® IDs
- All network configuration information definable off-site to reduce installation time
- Full-featured network variable and message tag binder replaces physical connections between nodes with logical connections
- Neuron Chip application loading supports field upgrades of application images
- System-level monitoring and control lets the host read or write any network variable on any node and lets the host send an explicit message to any node without needing to be bound
- On-board non-volatile network database ensures reliable replacement of failed nodes by preserving system configuration across power outages
- Database transaction management allows canceled or failed operations to be reliably reversed
- Optional status interrupts minimize latency and host processor overhead
- Configurable as Motorola or Intel-style I/O device
- Transceiver-independent design supports all LONWORKS media types and bit rates
- Upgrade path from NSS-10 to a remote NSI client, to an NSS for Windows network services server

DESCRIPTION

The LonManager® NSS-10 Network Services Server module provides a simple and cost effective method of adding LONWORKS® network installation, maintenance, configuration, monitoring, and control functions to any microcontroller, microprocessor, or computer host. The host treats the NSS-10 module as a smart peripheral device that provides both the hardware and software resources needed to enable these network services for a single channel network with up to 62 application nodes.

Typically the NSS-10 module is an integral part of the network it manages, either as a “black box” that automates installation tasks or as part of a control panel. When used as an automated network installer, the NSS-10 module makes it possible to develop networks that install themselves with little or no end-user action. When included in a control panel, the NSS-10 module makes it possible to deliver a single device that the end-user can use as an application operator interface as well as a network installation tool.

The LonManager NSS-10 module is a miniature single inline module (SIM) that is embedded within an OEM’s product along with an attached microcontroller, microprocessor, or computer host to provide network installation, maintenance, monitoring, and control functions. The NSS-10 module provides the heart of a network management, monitoring, and control tool. The NSS-10 module includes a Neuron 3150® Chip, a PROM with the NSS-10 firmware, support circuitry for the NSS-10 interface registers and memory control, and 128Kbytes of non-volatile RAM (using an external battery) for the network database.



Block diagram of the hardware components of the NSS-10 Module

The NSS-10 module communicates with the attached host through an 8-bit bi-directional data register and an 8-bit status/control register; a single address bit selects the appropriate register. If desired, the host can enable interrupts on the NSS-10 module for a variety of status conditions. Interrupts can be configured as active high or active low by the host software.

The NSS-10 module provides the majority of the software components required to perform network installation, maintenance, configuration, monitoring, and control functions, freeing the host processor to focus on automating and simplifying application-related tasks.

During installation, the host uses the NSS-10 module to tell each node the system to which it belongs and with which nodes it shares data. This information is stored in each node's internal tables and defines each node's unique network personality. During configuration, the host uses the NSS-10 module to customize each node to the particular installation. This includes setting configuration parameter values and allocating LonTalk® priority message slots. For maintenance, the host uses the NSS-10 module to add new nodes, replace failed nodes, and re-specify which nodes share data with one another.

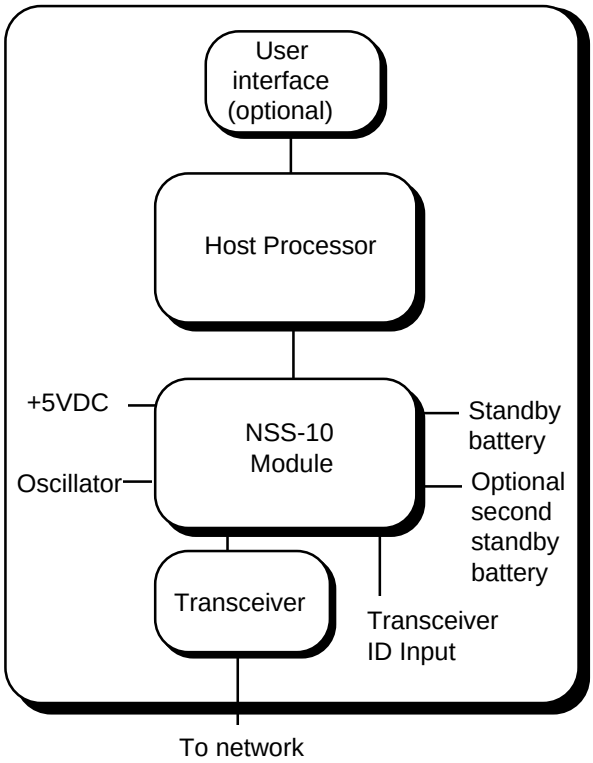
To perform installation, configuration, and maintenance tasks, the host sends a buffer to the NSS-10 module requesting an action. When the NSS-10 module receives the request, for example to connect a set of network variables, the NSS-10 module expands the request into the required network actions — allocating network resources; building, sending, and processing network messages; keeping a database journal of all changes; performing error checking and recovery — and returns the final result of the request to the host. The NSS-10 module manages the details, allowing the host to easily accomplish tasks with a minimum of overhead.

Using the network configuration information in the NSS-10 module's on-board database, the host can also perform system-level monitoring and control. The host can read or write any network variable on any node, and exchange explicit messages with any node, without the need for a network variable or message tag connection between the host and the node.

The NSS-10 network services server module and an NSI that operates as a remote client to an NSS for Windows network services server share the same programming interface, called the LNS Host API. This commonality allows for a straightforward migration path from small networks with 62 nodes or fewer using the NSS-10 network services server to larger networks with up to 32,385 nodes using the NSS for Windows network services server as long as the application is written with this path in mind. First, the NSS-10 module is removed from its socket and replaced with an NSI-10 module, keeping the node hardware and software the same. Then an NSS for Windows network services server is attached to the network, and the NSS database is recovered from the network. The original NSS-10 node has become a remote NSI client node to the NSS for Windows server. To the end-user, there has been no change in the installation tool interface, either hardware or software.

USAGE

A complete node based on the NSS-10 module consists of the NSS-10 module, an oscillator, a LONWORKS transceiver, a host processor and its related circuitry, and a power supply. Optionally, one or two backup batteries can be added to power the on-board NVRAM during power outages. When two batteries are used, one can be changed without interrupting power to the NVRAM. The following block diagram shows a node based on an NSS-10 module.



A node based on the NSS-10 module

The NSS-10 module is compatible with all LONWORKS transceivers and comes preconfigured with many common LONWORKS transceiver parameters. Five transceiver identification (XID) pins on the NSS-10 module select the appropriate transceiver type. The transceiver ID inputs simplify the host software by automatically configuring the NSS-10 module for most transceivers. A special transceiver ID is reserved for programming any custom type.

SUPPLIERS

Connector	Supplier	Part Number
SIM Socket:		
40-position vertical	Molex	15-82-1175 or 15-82-0793
40-position right angle	Molex	15-82-1376

TECHNICAL SPECIFICATIONS

Throughput per channel		
Unacknowledged	1-byte data	228 packets/sec (1823bps)
	8-byte data	218 packets/sec (13,938bps)
	32-byte data	218 packets/sec (55,808bps)
	228-byte data	159 packets/sec (290,151bps)
Acknowledged	1-byte data	109 packets/sec (873bps)
	8-byte data	106 packets/sec (6790bps)
	32-byte data	97 packets/sec (24,745bps)
	228-byte data	56 packets/sec (102,351bps)

Note: PCNSS with 486DX2-66 host; TPM/XF-1250 transceiver, protocol overhead of 9 bytes per message.

Network Services	Add a new node to the network Define a new node Get the next node Remove a node Load a node's network image Replace a node Copy configuration network variable values Send a command to a node Test a node Create a network variable connection Create a message tag connection Get the hub of the next connection Remove a connection Create a new connection description Get the definition of a connection description Change the settings for a connection description Remove a connection description definition Change a connection's description Get the next member in a connection Start a program loading session Load a portion of an application program End a program loading session Start a program definition session Load a portion of a program definition End a program definition session Remove a program definition Get the value of a property Set a property to a new value Subscribe to events Cancel event subscriptions Add the NSS-10 module to the system Remove the NSS-10 module from the system Deconfigure all nodes in a system Reset a client Start a transaction Commit a transaction Cancel a client's service and transaction Query the status of a service Cancel the current transaction
Network Events	Service pin message arrived Address table entry changed Message tag connection address changed Network variable connection address changed Network variable selector changed Node network address changed Missed an event notification
Managed Network Objects	Message tag Network variable Node NSS-10 module Program System
Modifiable Connection Attributes	Protocol service Layer 4 timing parameters Priority
Network Variable Properties	Address table entry Attributes Length Name Network variable selector Self-documentation Type

Node Properties	Channel ID Error log Error statistics Location Message tag count Network address Network variable count Neuron ID Non-group receive timers Priority slot Program ID Reset cause Self-documentation State
Program Properties	Program ID
System and NSS-10 Properties	Automatic update interval Background discovery interval Domain ID length Domain ID value Network attached Repeat time Retry count Transaction time
Capacity	
Application nodes	62
Connections	383
Domains	1
Network variables per node	255
Network variables per system	767
NSS-10 modules	1
Programs	31
Typical Host Processor Requirements	
Program space	35Kbytes
Stack and heap space	2Kbytes
Database requirements	None
Processor	Neuron 3150 Chip
Processor Input Clock	10MHz, 5MHz, 2.5MHz, 1.25MHz, or 625kHz ±200ppm
Operating Input Voltage	+5VDC ±5%
Non-volatile RAM	128Kbytes
Operating Input Current	
Typical	150mA
Worst case	300mA
Standby Input Voltage on V_{BATTP} or V_{BATTS}	
Minimum	2.5 VDC
Maximum	4 VDC
Standby Input Current on V_{BATTP} or V_{BATTS}	
Typical	4µA
Worst case	50µA
Registers	A0=0: Data A0=1: Status/Control
Interrupt Sources (software selectable)	Uplink message available Downlink priority buffer available Downlink non-priority buffer available Ready Reset
Temperature	
Operating	0 to +70°C
Non-operating	-40 to +85°C Contact factory for other temperature ranges

Humidity (non-condensing) Operating Non-operating	 5 to 95% @70°C 5 to 95% @85°C
Dimensions	67 mm x 33 mm x 9 mm (2.6" x 1.3" x 0.3")
EMI Compliance FCC VDE	 Designed to comply with Part 15 Level B Designed to comply with 0871 Level B
SIMM Connector	40-position SIMM or SIMM II 0.050" centerline single row connector, vertical or right angle

DOCUMENTATION

The following documentation is included with the Model 34001-00X LNS Developer's Kit for Microcontrollers and Model 34304-00X LNS FASTART Package.

Document & Echelon Model Number	
NSI-10 and NSS-10 User's Guide	078-0123-01B
LNS Host API Programmer's Guide	078-0163-01A
LNS Host API Reference Guide	078-0124-01B

ORDERING INFORMATION

The LNS Developer's Kit for Microcontrollers or LNS FASTART Package is required to create host applications using the NSS-10 Module. A LONWORKS SMX transceiver is required to use either developer's kit.

Product & Echelon Model Number	
LonManager NSS-10 Module	34000-100
LNS Developer's Kit for Microcontrollers[1] Select P from one of the following power supply options: 1: North America 2: Europe 3: U.K. 4: Japan	34001-00P
LNS FASTART Package[1] Select P from one of the following power supply options: 1: North America 2: Europe 3: U.K. 4: Japan	34304-00P
TPM/XF-78 Twisted Pair Modular Transceiver	77010
TPM/XF-1250 Twisted Pair Modular Transceiver	77030
FTM-10 Free Topology Modular Transceiver	77040
TPM/RS485 Twisted Pair Modular Transceiver	77050
PLM-10 Power Line Modular Transceiver	77090
PLM-21 Power Line Modular Transceiver	77160
PLM-30 A-Band Power Line Modular Transceiver	77180

1 The model 34001-00X LNS Developer's Kit for Microcontrollers and Model 34304-00X LNS FASTART Package each include one model 34000-100 NSS-10 module.