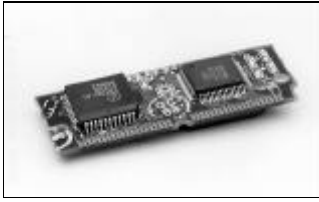


LTS-10 SERIAL ADAPTER CORE MODULE

MODEL 65200-100



FEATURES

- Compact Single In-Line module (SIM) form factor
- Host-independent design opens the LonTalk[®] protocol to any host with a standard EIA-232C serial interface
- Transceiver-independent design connects to any LONWORKS channel with a transceiver interface rate from 9.8kbps to 1.25Mbps
- Application-independent design can be used with any host application
- 1200 to 115,200bps serial bit rate to the host with optional autobaud detection sends and receives up to 77 packets per second
- Connection to remote hosts using modems conforming to the Hayes AT-command set
- Optional password protection prevents unauthorized access from remote hosts
- 4Kbyte RAM with 3Kbytes available for buffers
- 10MHz input clock
- ANSI C source code for a network interface library and sample host application
- Network driver for DOS and source code for sample network drivers for DOS and UNIX available

DESCRIPTION

The LTS-10 Serial Adapter Core Module is a compact module used by OEMs to build serial LonTalk[®] adapters (SLTAs). A serial adapter is a device that enables any host processor with an EIA-232C (formerly RS-232C) serial interface to implement LONWORKS[®] applications and to communicate with other devices using the LonTalk protocol. The host processor may be directly connected to the serial adapter or may be connected over a telephone line using a pair of modems.

A serial adapter allows any host to implement the upper layers of the LonTalk protocol, so applications on the host can send and receive network variable updates and explicit messages, as well as poll network variables. This capability extends the reach of LONWORKS technology to a variety of hosts including desktop, laptop, and palmtop PCs, workstations, embedded microprocessors, and microcontrollers.

Typical applications for the LTS-10 module include monitoring and control nodes based on microcontrollers or computers such as IBM PC compatibles, Sun workstations, or VME-based computers.

The LTS-10 consists of the core electronics and firmware in a compact single in-line module (SIM) form factor. Vertical SIM sockets are available to minimize footprint; right-angle SIM sockets are also available to minimize component height.

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

The LTS-10 module has a fixed input clock rate of 10MHz. The module can be used with transceivers running at interface rates from 9.8kbps to 1.25Mbps.

When used with a modem, a serial adapter can be used to implement applications with a host computer that is located remotely from the LONWORKS network. Any node can initiate a call to the remote host. Therefore, a node detecting an alarm condition can dial out to a remote host to inform the host of the condition. The modem can also be set up for automatic answer mode so that a remote host can dial into a LONWORKS network for remote network monitoring and control.

The LTS-10 module includes a Neuron[®] 3150[®] Chip, high-speed UART, PROM with high-performance firmware, and a 3KByte buffer RAM using a 2KByte external RAM and 1KByte of the Neuron Chip RAM.

PROTOCOL PROCESSING

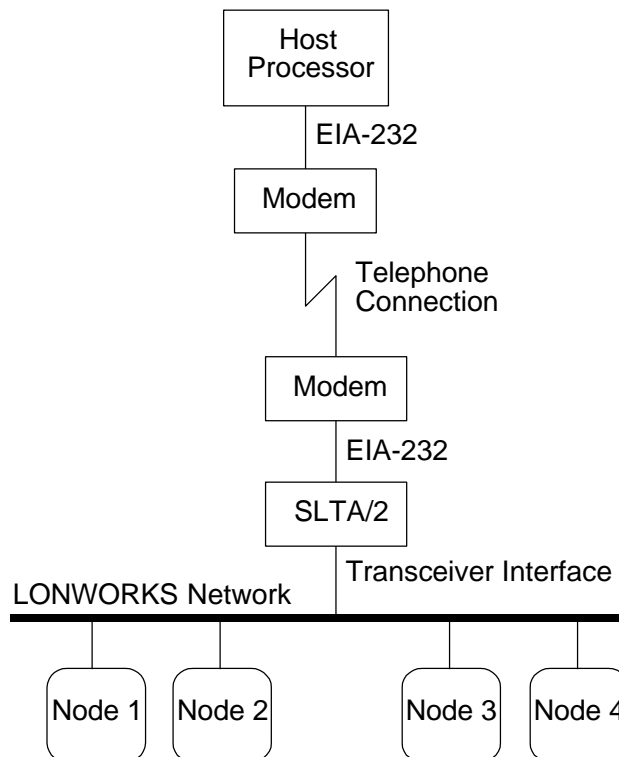
Nodes using an LTS-10 separate LonTalk protocol processing between the host processor and the serial adapter. The serial adapter handles layers 1 through 5 of the LonTalk protocol. This significantly reduces overhead in the host processor since it does not have to deal with lower layer network services such as media access control, collision avoidance, acknowledgments, retries, duplicate message detection, message validation, authentication, and priority processing. The host processor is left to run the application program and handle the layer 6 and 7 protocol services, i.e. network variable processing and explicit message processing. The host can easily send and receive network variable updates and explicit messages through these services.

Separating the upper two layers of the LonTalk protocol from the lower five layers has the added benefit of making a serial adapter independent of its host application. The host application and its network variable can be changed at any time without modifying the adapter. This lowers development and maintenance costs since a serial adapter does not have to be tailored to an application.

Nodes based on an LTS-10 can have up to 4096 network variables, each potentially connecting to 32,000 network variables on other nodes. This limit is higher than the Neuron Chip-hosted node limit of 62 bound network variables because the network variable configuration is managed by the host instead of the Neuron Chip inside the serial adapter. The use of bound network variables reduces network loading and increases system capacity by allowing values to be updated over the network only when necessary without the need for constant polling.

MODEM SUPPORT

A serial adapter implemented with an LTS-10 module can be used with a pair of modems to provide remote access to a LONWORKS network. As illustrated in the following figure, the local SLTA is connected to the LONWORKS network and a local modem while the remote host is connected to a remote modem.



An adapter implemented with the LTS-10 module supports the LonTalk network management messages for controlling an attached modem. Any node can initiate an outgoing call to a remote host by sending network management dialing messages to the adapter. Network management messages can be used to define a dialing directory stored in the adapter, enabling application nodes to dial out to remote hosts without requiring host phone numbers to be maintained in every node.

Any node, including the host, can use network management messages to configure the adapter to automatically answer incoming calls to permit remote hosts to monitor or control the network at any time. Any node can use network management messages to install a password in the adapter so that a remote host must enter the password before accessing any nodes on the network.

The LTS-10 can be used with any modem recognizing the Hayes AT-command set. Compatible modems are readily available worldwide, making the LTS-10 a universal solution for remote access to LONWORKS networks.

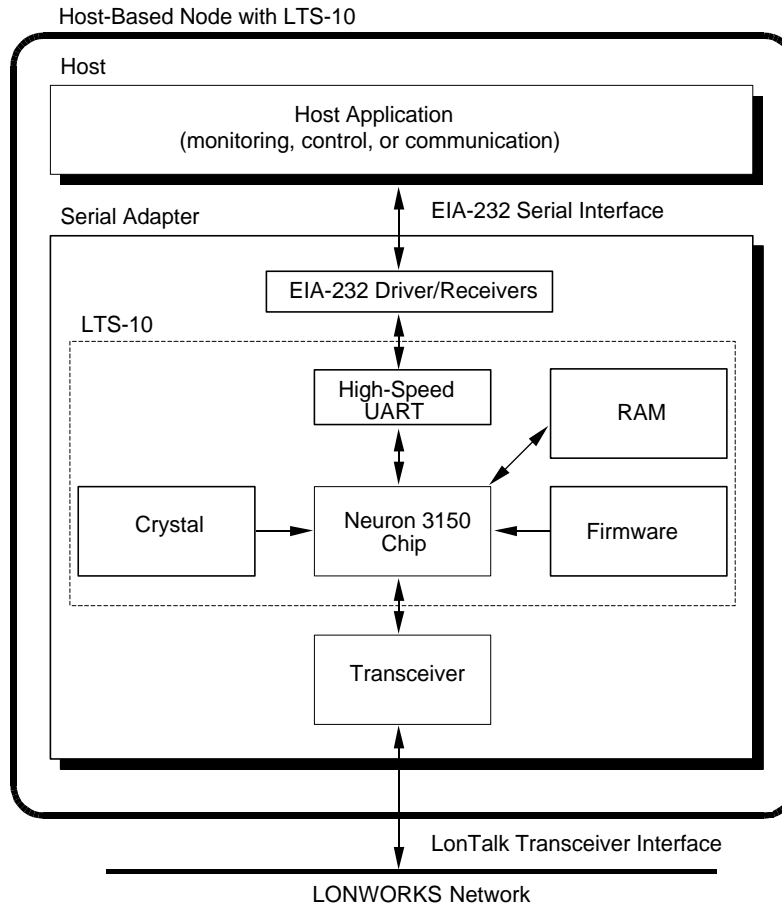
USAGE

The LTS-10 module does not have the network services interface (NSI) functionality required for use with the NSS for Windows network services server, preventing LNS-based network management applications from using the LTS-10 module. Thus, the primary use of a LTS-10 module in a network installed with a tool based on the LNS Developer's Kit for Windows is to create a microprocessor-hosted node with up to 4096 network variables, instead of the 64 network variables allowed a Neuron Chip-hosted node. The microprocessor may be any processor with an EIA-232C (formerly RS-232C) serial interface, such as Sun workstations or VME-based computers.

The LTS-10 can be used with legacy applications such as the LonManager LonMaker installation tool, the LonManager DDE Server, and applications based on the LonManager API for DOS or the LonManager API for Windows.

A complete serial adapter requires an LTS-10 SLTA Core Module, LonTalk transceiver, EIA-232 driver/receiver, and a motherboard with power supply. The LTS-10 module is compatible with all LONWORKS transceivers with interface rates of 9.8kbps or higher including standard transceivers for twisted pair, link power, and power line.

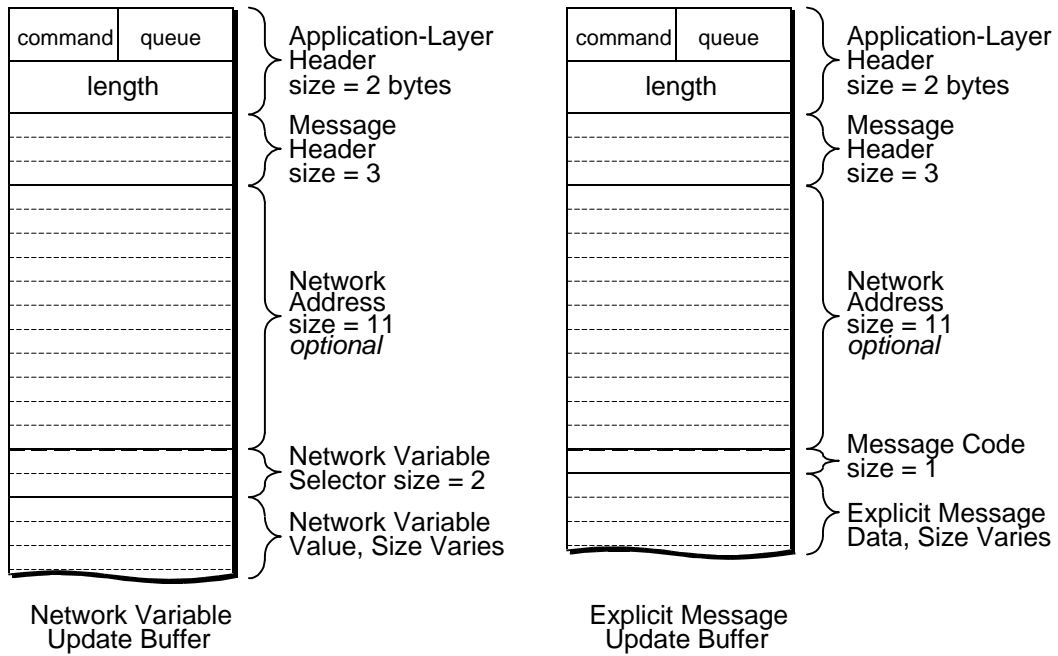
The following figure is a block diagram of a node based on the LTS-10 module.



A simple network driver is implemented on the host processor to manage the interface with the serial adapter. This allows the same host application to be used with multiple network interfaces, preserving any investment in host application development. Complete specifications for the network driver are included in the *Serial LonTalk Adapter and Serial Gateway User's Guide*. Complete source code for DOS and UNIX network drivers that can be used as the basis for a network driver for any host is provided with the Connectivity Starter Kit.

A sample host application is also provided with the Connectivity Starter Kit. This application illustrates how a host application can send and receive network variables and explicit messages using the network driver. The sample application demonstrates how a host application can implement network variables and respond correctly to network management messages for binding those network variables.

The sample host application also includes source code for a network interface library that simplifies the use of any LONWORKS network interface, including an adapter based on the LTS-10 module. The library includes function calls to initialize and reset the network interface; send, receive, and respond to LonTalk messages; and handle errors. LonTalk messages may include network variable updates and polls, as well as explicit messages. For example, to send a network variable the host application initializes a buffer that contains the network variable selector and the new value for the network variable and then calls the `ni_send_msg_wait()` function in the network interface library. The following figure illustrates the application buffer format for network variable updates and explicit messages.



MODULE SOCKET SUPPLIERS

Connector	Supplier	Part Number
SIMM Socket: 40-position vertical 50mil pitch 40-position right angle 50mil pitch	Molex Molex	15-82-1175 or 15-82-0793 15-82-1376

MODULE SPECIFICATIONS

Throughput		
Unacknowledged	1-byte data	71 packets/sec (571bps)
	8-byte data	71 packets/sec (4,571bps)
	32-byte data	56 packets/sec (14,222bps)
	228-byte data	22 packets/sec (39,652bps)
Acknowledged	1-byte data	77 packets/sec (615bps)
	8-byte data	71 packets/sec (4,571bps)
	32-byte data	59 packets/sec (15,059bps)
	228-byte data	22 packets/sec (40,533bps)
with Modem	5 - 10 packets/sec depending on type of service	
Note: PC/386 host, 25MHz; TP/XF-1250 transceiver, 115,200bps EIA-232 interface; protocol overhead of 9 bytes per message.		

Network Interface Commands	Buffer Request Send Message Local Network Management Command Reset Flush and Flush Cancel Online and Offline Source Quench and Resume
Network Interface Responses	Buffer Grant Incoming Message Incoming Response Completion Event Reset Flush Complete
Network Management Commands	Send Modem String Modem Status Readback Modem Response Query Connection Status Query Install Directory Entry Dial From Directory Hang Up Install Password Install Start-Up Configuration String Install Dial Prefix Install Hang-Up String Install Hang-Up Timer
Network Driver Commands	Open Network Interface Read and Write Buffer I/O Control Register Callback Function Close Network Interface
Network Interface Library Functions	Initialize Network Interface Reset Network Interface Send LonTalk Message and Wait for Completion Get Next Response Receive LonTalk Message Send LonTalk Response Local Network Management Command Handle Error
Processor	Neuron 3150 Chip
Processor Input Clock	10 MHz
Serial Communications Type	EIA-232, TTL signal levels
Serial Bit Rate	1200, 2400, 9600, 14.4k, 19.2k, 38.4k, 57.6k, or 115.2kbps
Serial Modem Control	Optional RTS, CTS, DSR, DCD, DTR, and RI
SIM Connector	40-position SIMM or SIMM II 0.050" centerline single row connector, vertical or right angle
Operating Input Voltage	+5VDC \pm 10%
Operating Input Current	150mA max
Temperature	
Operating	-40 to +85°C (revision G or higher)
Non-operating (12 hour)	-45 to +85°C
Humidity (non-condensing)	
Operating	10 to 95%RH @85°C (revision G or higher)
Non-operating (12 hour)	95%RH max @85°C
Dimensions	67mm x 27mm x 7mm (2.65" x 1.06" x 0.3")
EMI Compliance	
FCC	Designed to comply with Part 15 Level B
VDE	Designed to comply with 0871 Level B

DOCUMENTATION

The following documentation is included with the Connectivity Starter Kit. The documentation describes how to build a serial adapter using the LTS-10 module, how to install the adapter, and how create a host application that uses the adapter as a network interface.

Document & Echelon Model Number

LONWORKS Host Application Programmer's Guide	078-0016-01B
Serial LonTalk Adapter and Serial Gateway User's Guide	078-0108-01E

ORDERING INFORMATION

The Connectivity Starter Kit should be ordered with the initial LTS-10 module. This kit includes the LTS-10 module documentation and software, in addition to a SIM socket for prototyping.

Product & Echelon Model Number

LTS-10 Serial Adapter Core Module	65200-100
Connectivity Starter Kit	58030-01

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