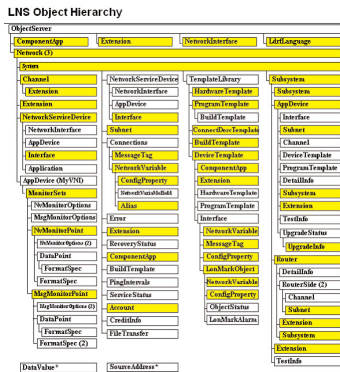


LNS® Application Developer's Kit for Windows®/Release 3 Model 34309



Description

The LNS Application Developer's Kit for Windows is a software development tool for designing and deploying high performance, highly scalable LNS network tools for LONWORKS control networks.

LNS Network Operating System

The LNS network operating system is the only network operating system that provides essential management, monitoring, and control services for single and multi-channel control networks. Release 3 includes technology for building architecturally-flat LONWORKS networks over an IP infrastructure, and seamlessly integrates with the *i.LON 10 Ethernet Adapter*, the *i.LON 100 Internet Server*, and the *i.LON 1000 Internet Server*. LNS provides these services for any Windows and non-Windows application that interacts with a LONWORKS network, and uses a distributed database technology to ensure that these applications remain synchronized with the network and with each other. This unique capability allows software components to interoperate, whether those components run on the same PC or on different PCs, and whether the PCs are located anywhere on the Internet or anywhere within a LONWORKS network. For example, a network may be installed locally using LNS tools from one vendor and the same network may be operated remotely using LNS operator interface drivers and visualization tools from another vendor.

LNS applications are able to engineer network databases as is typically required in larger systems, with device and router commissioning occurring later when the engineered database is loaded onto an LNS Server located on-site or remotely over an IP network using an *i.LON 10 Ethernet Adapter*, *i.LON 100 Internet Server*, or *i.LON 1000 Internet Server*. The LNS Server may be detached from the network after the commissioning phase. In this scenario, the LNS application and LNS Server are typically running on a notebook PC, and the installer takes the notebook PC away from the site after commissioning. This feature is especially desirable for smaller

- ▼ Tools for building interoperable LNS applications that can install, maintain, connect, monitor, control, diagnose and recover LONWORKS® networks
- ▼ Integrated support for the *i.LON® 10 Ethernet Adapter*, *i.LON 100 Internet Server*, and the *i.LON 1000 Internet Server*
- ▼ ANSI/EIA 709.1-B-2002 LonTalk® protocol stack executing within LNS provides a more than a 10x monitoring performance improvement over any tool using a traditional implementation of the LonTalk protocol
- ▼ Distributed, cached monitor sets provide fault-tolerant, instant-on monitoring
- ▼ Language-independent dual interface COM component for high programmer productivity and high operating performance
- ▼ Client/server LNS network operating system runs natively on IP and LONWORKS channels
- ▼ Support for Windows XP, Windows 2000, and Windows 98
- ▼ Remote data and service access via LONWORKS networks, modem dial-up or IP networks
- ▼ LONMARK® Version 3.3 support
- ▼ Example Microsoft Visual C++™ and Microsoft Visual Basic™ application source code
- ▼ Enhanced LNS Plug-in Wizard speeds plug-in creation by automatically creating ready-to-use monitoring and control pages

networks where an on-site PC management server is not required. In such a scenario, there are several remote connectivity options. If no persistent IP connection is available at the remote site, but a telephone line is available, the best solution is to use an *i.LON 100 Internet Server* with an available internal modem. If a persistent IP connection is available, one could use the *i.LON 10 Ethernet Adapter*, *i.LON 100 Internet Server*, or the *i.LON 1000 Internet Server*.

LONWORKS and Internet Clients

The LNS Server supports embedded, microcontroller-based, Java™, and Windows-based clients. Embedded, microcontroller-based clients run remotely to the LNS Server via the LONWORKS network, while Java-based clients run remotely to the LNS Server via an IP network. Windows-based clients can run locally to the LNS Server, remotely via the LONWORKS network, remotely via a modem, or remotely via IP. On the Windows platform, the same LNS application can be run in all four of these modes without modification.

Windows-based LNS clients access the LNS network operating system's services through a dual interface COM component. This COM component provides an easy-to-use, high-performance, programming language independent interface to the LNS Object Hierarchy managed by the LNS Server. The LNS Object Hierarchy presents the LONWORKS network components such as application devices, network variables, LONMARK objects, configuration properties, routers and channels as standard Windows objects. Each object has methods that clients can call to invoke operations on the object, properties that clients can get or set to read or modify the configuration of the object, and events to which clients can subscribe in order to stay current with changes to that object. Windows-based LNS client applications can extend the LNS Object Hierarchy by adding user-defined object extensions.

Scalable Monitoring and Control

To optimize performance and minimize network traffic, remote Windows-based client applications cache directory information received from the LNS Server. These applications can then perform monitoring and control functions directly, without interaction with the LNS Server. Client applications can read network variables using polled or event-driven updates, and can optionally filter redundant updates to minimize application overhead. Client applications can request that the LNS Server notify them of changes to the cached information, ensuring consistency between the database and the caches. In addition, monitoring and control applications can start-up or continue to function if the LNS Server is not available. New in Release 3 is the monitor set feature, whereby the LNS application can specify a set of points that can be instantly started and stopped, thus making any application and especially HMI driver applications as fast and robust as possible.

Network variable and configuration property values on devices by default are automatically converted to and from formatted strings to simplify user interaction. This default formatting can be overridden, and formatting can be based on standard resource files for standard network variable types and standard configuration property types, or manufacturer-specific resource files for user-defined network variable and configuration property types.

Comprehensive LONMARK Support

LNS includes comprehensive support for the latest version of the LONMARK Interoperability Guidelines. LNS is able to manage certified and prototype LONMARK devices as well as other LONWORKS devices.

The LONMARK function blocks on LONMARK devices can be easily controlled, allowing LNS applications to override, enable, test, or disable individual function blocks on a device. Network variables can be accessed either by their device name or by their member name within a function blocks. LONMARK

configuration properties are accessed as easily as network variables, even if the configuration properties are stored in the device's memory and accessed using client memory read/write or the LONMARK file transfer protocol.

In addition, LNS provides simplified access to other LONMARK features such as standard functional profiles, resource files, and network variable aliases.

Plug-in Component Standard

To provide interoperability between LNS applications from different vendors, LNS defines and supports a standard plug-in architecture where an LNS application can invoke the services of any other LNS application on the same PC.

The LNS Plug-in standard allows a single user interface or installation tool application to navigate or manage all the devices in a network, and then invoke a device type specific LNS plug-ins) for a particular device type on the network. Device type specific LNS plug-ins are developed by device manufacturers to simplify the installation, configuration, or operation of their devices.

The LNS Plug-in standard enables a component application to be invoked on any type of object in the LNS Object Hierarchy, allowing such plug-ins to be, for instance, system plug-ins, subsystem plug-ins, or channel plug-ins. Plug-in applications can also be developed for general purpose applications such as device drivers for HMI or SCADA applications.

A listing of currently available LNS plug-ins is available at www.echelon.com/plugins.

Example Applications

Example applications are included which demonstrate how to use the LNS Object Server dual interface COM component. The examples demonstrate a range of complexity, starting with simple tutorial examples written in Microsoft Visual C++ and Microsoft Visual Basic. The most complex examples can provide a starting point for a general purpose installation tool. The examples can operate remotely through the Internet or a LONWORKS network. In addition, an example of how to invoke LNS Plug-ins is provided.

Licensing

The LNS Application Developer's Kit for Windows is licensed to LNS application developers via a shrink-wrap license agreement. Applications developed with this product require an LNS Server or LNS Remote Client distribution of the LNS network operating system in order to run. The LonMaker™ Integration Tool, LNS DDE Server, and numerous third-party products include an LNS redistribution and may be used by the LNS application developer to supply the LNS redistribution for the end-user. Additional LNS Device Credits for LNS applications deployed on end-user PCs may be ordered by using a software utility included with the LNS Server redistribution package.

Upgrades

Current users of any release of the Model 34305 LNS Developer's Kit for Windows, Device Plug-in Edition, Model 34306 LNS Device Plug-in Developer's Kit for Windows and Model 34309 LNS Application Developer's Kit for Windows should purchase the Model 34319 LNS Application Developer's Kit for Windows Upgrade. Current users of any

release of the Model 34303 LNS Developer's Kit for Windows or Model 34304 LNS FASTART should purchase Model 34313 LNS Developer's Kit for Windows Upgrade. This upgrade product includes a Model 34319 LNS Application Developer's Kit for Windows Upgrade and requires a signed license agreement. Contact your Echelon sales representative or distributor for details.

Specifications

Development PC Requirements Windows XP, Windows 2000, or Windows 98 (Windows XP recommended) • Pentium 200MHz or faster (Pentium III 500 MHz or faster recommended) • 128 MB RAM (256 MB RAM or greater recommended) • 50 MB of free disk space. For highest performance during development the disk should be the fastest possible within budget, as the disk performance plays a large role in LNS database performance. • Microsoft TCP/IP Networking • Any 32-bit Windows application development tool that supports the use of COM components or ActiveX controls. Echelon has tested and offers technical assistance on the following development environments only: Microsoft Visual C++ 6.0, Service Pack 5 or higher, used with MFC or ATL and Microsoft Visual Basic 6.0, Service Pack 5 or higher • CD-ROM drive • Mouse or compatible pointing device • LNS Network Interface. See the "Compatible Network Interfaces" section below. An LNS Network Interface is not required if the development PC will be used in engineering mode only. In engineering mode the LNS application is not attached to a LONWORKS network, and can invoke any LNS function that does not require network connectivity. • *For PC requirements for LNS Server and LNS Remote Client redistributables, see Model 34312 LNS Redistribution Kit for Windows datasheet.*

Compatible LNS Network Interfaces Windows XP, Windows 2000, and Windows 98 drivers included for PCLTA-20 PCI card, PCLTA-10 ISA card, PCC-10 PC Card, SLTA-10 Serial LonTalk Adapter, and PL-SLTA Power line Serial LonTalk Adapter. PCLTA-20, PCLTA-10 and PCC-10 can operate as LNS High Performance Network Interfaces which provide faster monitoring/control throughput, 32,768 address table entries, and up to 1000 simultaneous outgoing transactions at a time. See the specifications below for more information. Additional drivers may be available from Echelon's web site at www.echelon.com. The Microsoft TCP/IP Networking protocol in conjunction with (typically) an Ethernet card can function as an LNS High Performance Network Interface if the *i.LON 1000* Internet Server is used to route between the LONWORKS/IP channel and the TP/FT-10 or TP/XF-1250 channel on the far side of the router. Microsoft TCP/IP Networking protocol and (typically) Ethernet card are required for LNS Servers and remote client PCs that communicate over IP.

The following general maximum limits apply:

Function	Description
Simultaneous active LNS clients per LNS Server	10 (any combination of local, LONWORKS remote, IP remote or dialup remote clients)
Simultaneous open networks per PC	50

The following maximum limits apply per device in a network

Network variables	4,096 per host-based device; each network variable is shared by applications and fan-in and fan-out connections up to ANSI/EIA 709.1-B-2002 protocol limits. On PCs, monitor set monitoring does not consume host network variables. 62 per Neuron® Chip-hosted device
Address table entries	32, 768 per LNS Network Service Device. These are shared for explicitly/implicitly bound network variables and for persistent monitor points. Typically one address table entry is used per monitored node, and per group in which the Network Service Device is a member. More may be used if different connection characteristics are used to force specific Layer 4 protocol timers to be used. 15 per non-PC host-based devices and Neuron Chip hosted devices.
Alias table entries	1024, shared among explicit and implicit bindings
Simultaneous outgoing transactions	1000 (LNS 3 PC with an LNS High Performance network interface) 1 (all other types of devices)

Function	Description (continued)
Simultaneous incoming transactions	1000 (LNS 3 PC with an LNS High Performance network interface) 16 (all other types of devices)
Protocol network input buffers	250
Protocol network output buffers	250
Protocol network priority output buffers	250

The following maximum limits apply per LNS network database:

Function	Description
Application devices	32,385 (2 addresses required per router and network service device)
Application device types	32,385
Channels	1,000
Domains per database	1
Network variable selectors	12,288 (The ANSI/EIA 709.1-B-2002 protocol limit) LNS 3 re-uses network variable selectors and therefore the number of network variable connections in a network is not restricted by this protocol limit)
Routers	1,000
Simultaneous traditionally-monitored points	8000 with intelligent point sharing if multiple applications are monitoring the same point. This limit does not pertain to monitor point monitoring or ad hoc monitoring of host (local) network variables.
Persistent monitor sets	8000; each monitor set may be used by any application
Persistent monitor points	65535; monitoring a host network variable does not consume a persistent monitor point.

Documentation

The following printed documentation is included with Model 34309 LNS Application Developer's Kit for Windows and Model 34319 LNS Application Developer's Kit for Windows Upgrade. Comprehensive on-line help is also included.

Document	Echelon Part Number
LNS for Windows Programmer's Guide	078-0177-01
LNS Plug-in Programmer's Guide	078-0178-01

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