



Description

The ShortStack 2.1 Developer's Kit provides the firmware, software, and tools that device manufacturers can use to quickly and inexpensively add control networking and Internet accessibility to any product that contains a microcontroller or microprocessor. The ShortStack 2.1 kit is ideally suited for developing low-end to mid-range controllers and multi-purpose input/output devices that may require up to 254 network variables and hundreds of configuration properties.

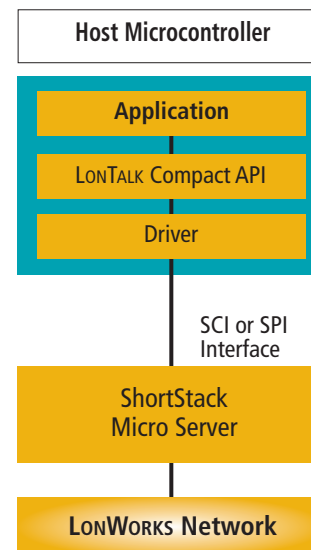
The ShortStack 2.1 Developer's Kit enables devices to be developed with the LonTalk® Platform—which is a set of development tools, an application programming interface (API), and firmware for developing LONWORKS® devices. The LonTalk Platform makes it easy to add networking to a control application. Developers can focus on defining the network inputs and outputs for an application. The LonTalk Platform takes care of generating all the code required to implement the developer's network interface design. The LonTalk Platform and API is also used by the FTXL 3190 Free Topology Transceiver, providing an easy migration path from low-end and mid-range controllers based on ShortStack 2.1 to high-end controllers based on the FTXL transceiver.

Any smart device can be network-enabled by adding the tiny LonTalk Compact API to the device's existing application, adding the appropriate calls to the LonTalk Compact API, defining the network interface with the LonTalk Interface Developer, and then adding a ShortStack Micro Server to the device hardware. The result is a smart-communicating device that can communicate with other devices on a LONWORKS network, and can also interface with Internet-based services via LONWORKS Internet servers such as the *i.LON*® SmartServer.

The ShortStack Micro Server allows you to use any microcontroller or microprocessor for your device's application and I/O. The ShortStack Micro Server implements the LonTalk protocol and provides the physical interface with the LONWORKS network.

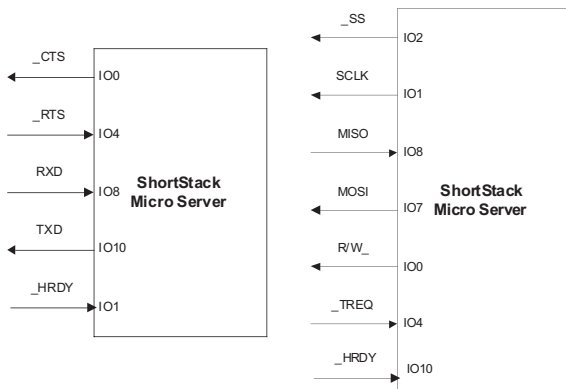
A ShortStack Micro Server consists of an Echelon Smart Transceiver running the ShortStack firmware. The ShortStack firmware is included with the ShortStack 2.1 Developer's Kit. Device manufacturers can easily build ShortStack Micro Server by loading the ShortStack firmware into an Echelon FT or PL Smart Transceiver. There is no additional royalty required for the ShortStack firmware or the LonTalk Compact API when used with an Echelon Smart Transceiver.

- ▼ Adds control network support to any application
- ▼ Supports mid-range controller applications with up to 254 network variables
- ▼ Simplifies development of products with hundreds of configuration properties
- ▼ Provides flexibility with a LonTalk Compact API that can be easily ported to any host
- ▼ Implements the ANSI/CEA-709.1 (EN14908) control networking protocol in the ShortStack Micro Server, further simplifying porting
- ▼ Requires only 4K to 6Kbytes of program memory and less than 1Kbyte of RAM on the host
- ▼ Reduces development time with the LonTalk Interface Developer
- ▼ Supports the PL and FT Smart Transceivers
- ▼ Uses a simple SCI or SPI interface between the Micro Server and host
- ▼ Shares the LonTalk Platform with FTXL transceivers providing scalability across a wide range of hosts
- ▼ Includes the Interoperable Self-Installation (ISI) API and engine, supporting development of devices that install themselves without the use of an installation tool
- ▼ Extends the useful life of product designs
- ▼ Preserves your investment in software code
- ▼ Allows devices to be used with new Internet services
- ▼ Available as a free download
- ▼ No royalties when used with Echelon's PL and FT Smart Transceivers



The ShortStack host processor can be an 8, 16, or 32-bit micro-controller or microprocessor. The LonTalk Compact API and driver typically require less than 4Kbytes to 6Kbytes of program memory on the host processor and less than 1Kbyte of RAM. The program memory can be ROM, PROM, or flash.

The interface between the host processor and the ShortStack Micro Server may be a Serial Communications Interface (SCI) or a Serial Peripheral Interface (SPI). With the SPI interface, the Micro Server is the master and the host is the slave. The speed of the interface depends on whether SCI or SPI is used, and the clock speed of the ShortStack Micro Server. The highest bit rate for an SCI interface with a 40MHz ShortStack Micro Server is 307,200bps. This interface rate scales with the ShortStack Micro Server clock. The following figures illustrate the two interface options.



ShortStack SCI Interface

ShortStack SPI Interface

The ShortStack 2.1 Developer's Kit can be used to create any type of LONWORKS device. The LonTalk Compact API provides functions to send and receive network variables or explicit messages. A ShortStack device can be installed in a managed network by any ANSI/CEA-709.1 (EN14908) compliant network management tool.

The ShortStack 2.1 Developer's Kit can be used to create a device that can be installed in a managed network using a network management tool, and can also be used to create a device that installs itself without requiring the use of any tools. The ShortStack kit includes support for Echelon's Interoperable Self-Installation (ISI) protocol. This support enables ShortStack devices to install themselves using a standard open protocol that enables self-installed devices to discover and interoperate with each other. The ISI protocol is ideally suited for devices sold for the home market, where ease-of-installation without the need for skilled installers or installation tools is critical. ShortStack support for the ISI protocol requires the use of an FT or PL 3150 Smart Transceiver.

Contents

The ShortStack Developer's Kit includes the following components:

- ▼ The LonTalk Interface Developer for generating the LONWORKS interfaces for a ShortStack device
- ▼ ShortStack Micro Server firmware images for creating a PL-20 or TP/FT-10 ShortStack Micro Server using a PL or FT Smart Transceiver
- ▼ A ShortStack library for creating custom ShortStack Micro Server firmware images for a PL or FT Smart Transceiver.

An example ShortStack 2.1 port for an Atmel ARM7 host is available. The ARM7 port was developed with the IAR Embedded Workbench, runs on an Echelon Model 11200R Pyxos™ FT EV-Pilot Evaluation Board, and includes the following components:

- ▼ Example ANSI C SCI driver source code for the ARM7 host processor
- ▼ Portable ANSI C LonTalk Compact API source code
- ▼ Example ANSI C host application and IAR project files

The API and examples can be easily ported to other processors, typically taking a couple weeks of development for the port.

Requirements

A third-party development tool for the target processor is required. The IAR Embedded Workbench was used to create the ARM7 Example Port. If you are using a different target processor or development tool, you will have to port the driver and LonTalk Compact API to the new processor using the third-party development tool.

If you are using one of the standard ShortStack Micro Server firmware images included with the ShortStack 2.1 Developer's Kit, you do not need a NodeBuilder Development Tool or Mini EVK Evaluation Kit to use the ShortStack kit. To create a custom ShortStack Micro Server firmware image, you must have either a NodeBuilder Development Tool or a Mini EVK Evaluation Kit. You can accelerate your development with the NodeBuilder Code Wizard included with the NodeBuilder 3.1 Development Tool. The code wizard can save you many weeks of development for a typical ShortStack application.

Specifications

Function	Description
SCI Interface Bit Rates	307,200bps to 38,400bps with a 40MHz ShortStack Micro Server; rate selected by Micro Server clock and configuration pins
SPI Interface Bit Rates	Clocked by Micro Server; approximately 230kbps to 40kbps uplink and 171kbps to 23kbps downlink with a 40MHz ShortStack Micro Server; rate selected by host, Micro Server clock, and configuration pins
Commonly Used API Functions	Broadcast a service pin message
	Initialize the LonTalk API and Micro Server
	Poll a network variable value
	Process network events
	Send a network variable update
Commonly Used API Callback Functions	Go offline request received from network
	Go online request received from network
	Micro Server reset occurred
	Micro Server service pin pressed
	Micro Server service pin pressed and held
	Network variable received from network
	Network variable update or poll completed
	Wink request received from network

Documentation

The following documentation is included with the ShortStack Developer's Kit and is also available as a free download from www.echelon.com/shortstack. The documentation provides an overview of the development of LONWORKS applications using a ShortStack Micro Server.

Document	Echelon Part Number
ShortStack User's Guide Release 2.1	078-0365-01

Ordering Information

The ShortStack 2.1 Developer's Kit and the ShortStack 2.1 ARM7 Example Port are available for free download from www.echelon.com/shortstack. Support and training options are available. Contact your local Echelon representative or distributor for details.

Product	Echelon Model Number
ShortStack Developer's Kit	23400-21
ShorStack 2.1 ARM7 Example Port	23450-21-010

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