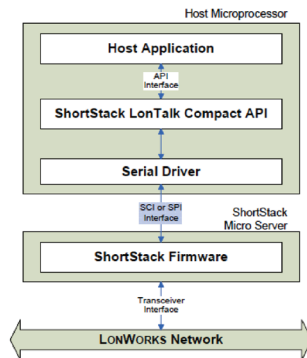


## ShortStack FX Developer's Kit

Easily Network New or Existing Smart Devices— While Preserving Your Code Investment

The ShortStack FX Developer's Kit offers device manufacturers free firmware, software, and tools for quickly adding control networking and Internet accessibility to any device with a microcontroller or microprocessor.



The kit is ideal for creating low- to mid-range controllers and multipurpose I/O devices that may require up to 254 network variables and hundreds of configuration properties.

## FEATURES

### Developer's Kit

The free developer's kit includes the following:

- Development tools.
- Application programming interface (API) source code.
- Firmware images for Echelon Smart Transceivers and Neuron® Chips.
- Library for creating custom firmware images.
- Example application source code.

### Development Tool Features

- Wizard automatically generates network-specific source code.
- Resource editor lets you view and create data types and profiles.

### ShortStack API Features

- Compact implementation for easy porting and integration.
- Porting to a new processor typically requires less than a few weeks.
- Compatible with FTXL API for easy upward migration.
- Typically requires 4KB to 6KB of program memory on the host processor and less than 1KB of RAM.
- Program memory can be ROM, PROM, or flash.
- No royalty required.

### Commonly Used ShortStack API Functions

- Broadcast a service pin message.
- Initialize the LonTalk API and Micro Server.
- Poll a network variable value.
- Get a network variable value.
- Process network events.
- Send a network variable update.
- Send an explicit message.
- Send a service pin message.
- Get the ShortStack Micro Server Neuron ID.

### Commonly Used ShortStack 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.

### Extended API Functions

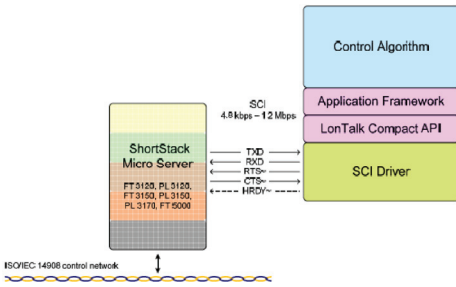
- Query/update domain configuration.
- Query/update network variable and alias configuration.
- Query/update address table configuration.
- Query/update local configuration.
- Query device status, transceiver status, and communication statistics.
- Determine if an NV or message tag is bound.
- Query ShortStack Micro Server version information.

### Firmware Features

- Runs in the FT 5000 Smart Transceiver, the Neuron 5000 Processor, and many Series 3100 chips, creating a ShortStack Micro Server.
- Communicates with any 8-, 16-, or 32-bit host microcontroller or microprocessor.
- Combined with the Neuron firmware, implements layers 2 through 6 of the ISO/IEC 14908-1 protocol stack.
- Supports up to 254 network variables and hundreds of configuration properties.
- Provides full compatibility with LNS network management tools and with any other ISO/IEC 14908-1-compliant network management tools.
- No royalty required.

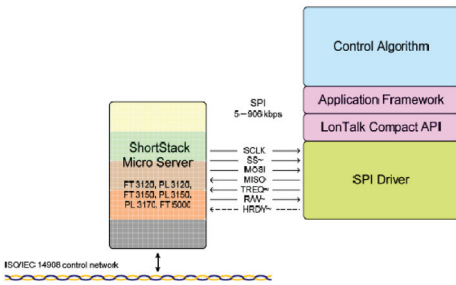
## Host Interface Options

- Interface between the host processor and the ShortStack Micro Server can be a Serial Communications Interface (SCI) or a Serial Peripheral Interface (SPI).



### SCI Architecture for a ShortStack Device

- Simple SCI interface using RTS/CTS plus optional host-ready signal.
- SCI bit rates up to 1.2 Mbps with an 80MHz FT 5000 or Neuron 5000 system clock.



### SPI Architecture for a ShortStack Device

- Standard 6-wire SPI interface with optional host-ready signal.
- SPI bit rates up to 906.2 kbps uplink/ 690.5 kbps downlink with an 80MHz FT 5000 or Neuron 5000 system clock.

## ISI Support

- ISI is a standard open protocol that lets devices from different manufacturers discover and interoperate with each other.
- ISI support can be used to create devices that install themselves without the use of any tools.
- ISI is ideal for devices created for the home market, where simple user installation is critical.
- ISI is supported with the FT 5000 Smart Transceiver, Neuron 5000 Processor, FT 3150 Smart Transceiver, PL 3150 Smart Transceiver, and PL 3170 Smart Transceiver.

## Requirements

- A third-party development tool for the target processor.
- The IAR Embedded Workbench was used to create the ARM7 Example Port. If you're using a different target processor or development tool, you'll have to port the driver and LonTalk Compact API to the new processor using a third-party development tool.
- To create a custom ShortStack FX Micro Server, a NodeBuilder FX Development Tool or Mini FX Evaluation Kit is required. Neither is required to use a standard ShortStack FX Micro Server firmware image.
- The NodeBuilder FX Code Wizard simplifies development, but is not required.

## SPECIFICATIONS

### SCI Interface Bit Rates

Interface rate selected by Micro Server clock and configuration pins, with the following settings available:

Series 3100 External Clock	Series 5000 System Clock	SBR1 (I06)	SBR0 (I05)	SBR1 (I06)	SBR0 (I05)	SBR1 (I06)	SBR0 (I05)	SBR1 (I06)	SBR0 (I05)
		GND	GND	GND	V <sub>DD</sub>	V <sub>DD</sub>	GND	V <sub>DD</sub>	V <sub>DD</sub>
5MHZ	—	38400	19200	9600	4800				
10MHZ	5MHZ	76800	38400	19200	9600				
20MHZ	10MHZ	153600	76800	38400	19200				
40MHZ	20MHZ	307200	153600	76800	38400				
	40MHZ	604200	302100	153600	76800				
	80MHZ	1208400	604200	302100	153600				

### SPI Interface Bit Rates

Interface clocked by host with the interface rate selected by the Micro Server clock and configuration pins, with the following settings available for an uplink SPI interface:

Series 3100 External Clock	Series 5000 System Clock	SBR1 (I06)	SBR0 (I05)	SBR1 (I06)	SBR0 (I05)	SBR1 (I06)	SBR0 (I05)	SBR1 (I06)	SBR0 (I05)
		GND	GND	GND	V <sub>DD</sub>	V <sub>DD</sub>	GND	V <sub>DD</sub>	V <sub>DD</sub>
5MHZ	—	29200	16600	10200	5100				
10MHZ	5MHZ	58300	33200	20300	10300				
20MHZ	10MHZ	116700	66300	40600	20500				
40MHZ	20MHZ	226600	129500	76700	40900				
	40MHZ	453100	258900	153300	81900				
	80MHZ	906200	517900	306600	163700				

The following settings are available for a downlink SPI interface:

Series 3100 External Clock	Series 5000 System Clock	SBR1 (I06)	SBR0 (I05)	SBR1 (I06)	SBR0 (I05)	SBR1 (I06)	SBR0 (I05)	SBR1 (I06)	SBR0 (I05)
		GND	GND	GND	V <sub>DD</sub>	V <sub>DD</sub>	GND	V <sub>DD</sub>	V <sub>DD</sub>
5MHZ	—	21700	9200	4800	2900				
10MHZ	5MHZ	43400	18400	9700	5700				
20MHZ	10MHZ	86800	36800	19300	11500				
40MHZ	20MHZ	172600	73300	38600	22800				
	40MHZ	345200	146700	77100	45600				
	80MHZ	690500	293400	154300	91300				

## DOCUMENTATION

ShortStack FX Developer's Guide  
078-0365-01B

ShortStack API Function Reference  
078-0433-01D

Introduction to the LonWORKS® Platform  
078-0183-01B

ISI Programmer's Guide  
078-0299-01F

ISI Protocol Specification  
078-0300-01F

Neuron C Programmer's Guide  
078-0002-02H

Neuron C Reference Guide  
078-0140-02F

Neuron Tools Errors Guide  
078-0402-01B

ShortStack FX ARM7 Example Port  
User's Guide  
078-0366-01B

Series 5000 Chip Data Book  
005-0199-01A

PL 3120/PL 3150/PL 3170 Power Line  
Transceiver Data Book  
005-0193-01A

## ORDERING INFORMATION

The ShortStack FX Developer's Kit can be downloaded for free from [www.echelon.com/shortstack](http://www.echelon.com/shortstack). The free example port for the ARM7 is also available at this link.