STAR-Dundee

SpaceWire and SpaceFibre Expertise

STAR-System for LabVIEW

STAR-System for LabVIEW is an extension of STAR-System, the common API for all new and future STAR-Dundee SpaceWire devices. It provides support for the LabVIEW software development environment (a visual, dataflow programming language provided by National Instruments Corporation).

The features provided by STAR-System for LabVIEW include transmitting and receiving SpaceWire traffic, creating RMAP packets, and performing device configuration. All functions provided by the STAR-System C API can be accessed through this LabVIEW wrapper.

Key Features

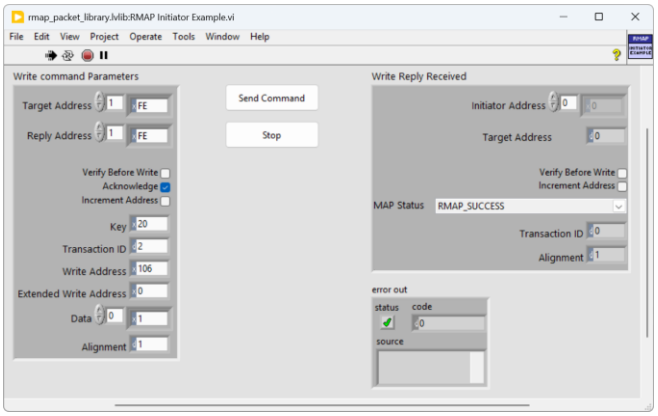
- Transmit and receive packets, including packets terminated with EEP or no EOP marker.
- Generate RMAP Packets.
- Perform device configuration operations, including remote device configuration over the SpaceWire network.
- Inject errors onto a SpaceWire Link.

STAR-System for LabVIEW provides example VIs demonstrating typical use cases for the STAR-System API. Examples provided include:

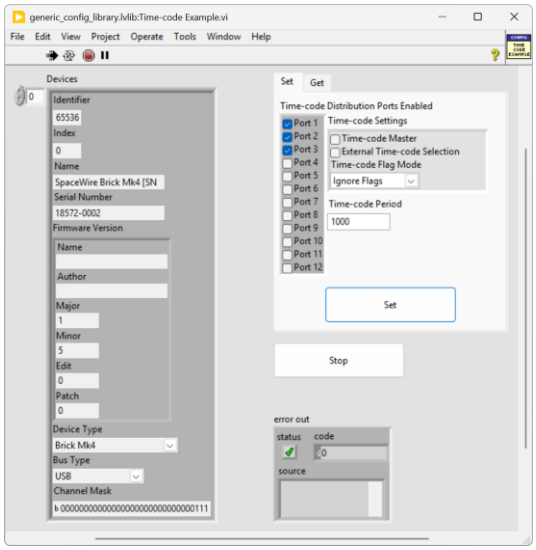
- Transmitting and receiving packets.
- Receiving time-codes and link events (speed change/state change).
- Building and decoding RMAP packets.
- Getting hardware information.
- Error injection.
- Building routing tables.
- Setting link speeds.
- RMAP Target and Initiator.
- Configuring Triggering API functions.

The API has been designed to be intuitive to LabVIEW users; with device access following the "Open, Perform Action, Close" architecture, and callback/notification functions implemented using LabVIEW user events.

Polymorphic VIs are used for stream item and transfer operation management, and for building and decoding RMAP packets, allowing for simpler block diagrams.



Example VI that performs the function of an RMAP Initiator.



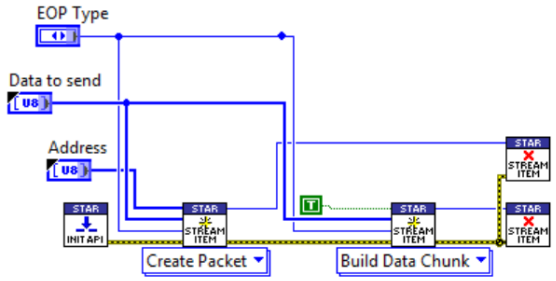
Example VI for getting/setting time-code parameters.

Specifications

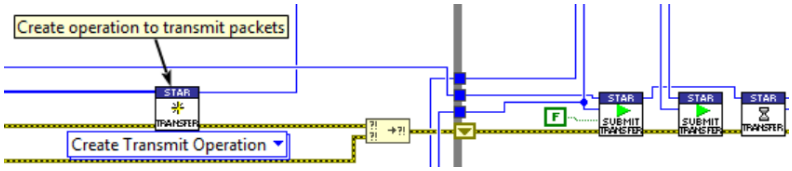
Part Number	136
Requirements	• Windows (11 and 10). • Requires STAR-System v3.7 or later. • Designed for LabVIEW 2014 and later.
Supported Devices Including	• SpaceWire PCI Mk2, cPCI Mk2 • SpaceWire PCIe, PCIe Mk2 • SpaceWire-USB Brick Mk2 • SpaceWire-USB Brick Mk3 • SpaceWire-USB Brick Mk4 • SpaceWire Router Mk2S • SpaceWire Physical Layer Tester • SpaceWire PXI, PXI Mk2

Provided LabVIEW Libraries	• STAR-API
	• RMAP Packet Library
	• RMAP Target Library
	• Device Configuration Library:
	  ○ Remote Device Configuration API
	  ○ Router Configuration API
	  ○ Mk2 Interface and Router Configuration API
	  ○ Configuration APIs for individual devices
	• Triggering Library

Selected Example Code



Creating a packet and a data chunk.



Transmitting packets.

Key VIs

General
- Initialise.vi
- Get API Version Information.vi
- Get All Versions.vi
- Get Application Info.vi
- Set Application Name.vi

Device and Driver Management
- Register Device Listener.vi
- Unregister Device Listener.vi
- Register Driver Listener.vi
- Unregister Driver Listener.vi
- Get Device Info.vi
- Get Devices.vi
- Get Devices for Type.vi
- Get Devices for Types.vi
- Get Device Config Capabilities.vi
- Get Device Tx Rx Capabilities.vi
- Get Drivers.vi
- Reset Device.vi
- Set Device Name.vi

Channel Management
- Get Device Channels.vi
- Open Channel.vi
- Get Channel Information.vi
- Register Channel Listener.vi
- Unregister Channel Listener.vi
- Close Channel.vi

Stream Items
- Create Stream Item.vi
- Destroy Stream Item.vi
- Get Stream Item Type.vi
- Get Stream Item Value.vi
- Destroy Transfer Item List.vi

Transfer Operations
- Create Transfer Operation.vi
- Submit Transfer Operation.vi
- Wait on Transfer Completion.vi
- Cancel Transfer Operation Waits.vi
- Cancel Transfer Operation.vi
- Dispose Transfer Operation.vi
- Get Transfer Status.vi
- Get Received Items.vi
- Register for Transfer Operation Completion Event.vi
- Unregister for Transfer Operation Completion Event.vi

RMAP
- Create RMAP Packet.vi
- Decode RMAP Packet.vi
- Check CRC.vi
- Calculate CRC.vi

Device Configuration

General
- Get/Set General Purpose.vi
- Get/Set Network Identity.vi
- Get/Set Router Global Settings.vi
- Update Device Info.vi

Hardware
- Get FPGA Info.vi
- FPGA Info to String.vi
- Identify.vi

Error Injection
- Inject Error.vi

Links
- Get/Set Transmit Signalling Rate.vi

Port Status and Control
- Clear Port Errors.vi
- Start/Stop Link.vi
- Get Config Port Errors.vi
- Get SpaceWire Link Errors.vi
- Get/Set SpaceWire Link Status.vi
- Get Port Status Control.vi
- Get Port Type.vi
- Get External Port Errors.vi
- Get External Port Status.vi
- Get Port Connection.vi

Device Identifier
- Get Network Discovery Info.vi
- Get Device Identification Info.vi
- Get Device Manufacturer as String.vi
- Get Device Type as String.vi

Group Adaptive Routing
- Output Ports Bitmask To Cluster.vi
- Output Ports Cluster to Bitmask.vi
- Get/Set Routing Table Entry.vi

Interface Mode
- Get/Set Port Routing Address.vi
- Get Identify Source Enabled.vi
- Enable/Disable Identify Source.vi
- Get Identify Source on Port Enabled.vi
- Enable/Disable Identify Source on Port.vi
- Get Interface Mode Enabled.vi
- Enable/Disable Interface Mode.vi
- Get Interface Mode on Port Enabled.vi
- Enable/Disable Interface Mode on Port.vi

Also includes VIs for the RMAP Target, Triggering and Timestamping APIs provided with STAR-System.

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