STAR-SYSTEM FOR LABVIEW

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

The features provided by the STAR-System LabVIEW wrapper 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.
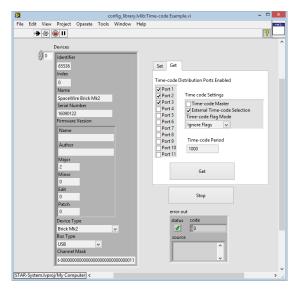
Key Features

- 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.

The STAR-System LabVIEW wrapper 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.

The library 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 for getting/setting time-code parameters.
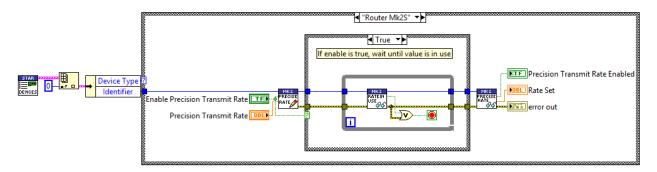
Specifications

Software:
- Operates under Windows (10, 8, 7, Vista, XP SP3).
- Requires STAR-System v3.7 or later.
- Designed for LabVIEW 2015 and later. Contact STAR-Dundee regarding support for earlier LabVIEW versions.

Supported Devices:
- SpaceWire PCI Mk2, cPCI Mk2.
- SpaceWire PCIe.
- SpaceWire-USB Brick Mk2.
- SpaceWire-USB Brick Mk3.
- SpaceWire Router Mk2S.
- SpaceWire Physical Layer Tester.
- SpaceWire PXI devices.

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.

Source code for setting precision transmit rate of a Router Mk2S device.

List of provided STAR-System VIs

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

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

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

Stream Items
Build Data Chunk.vi
Build Error In Data.vi
Build Packet.vi
Build Time-code.vi
Create Stream Item.vi
Destroy Stream Item.vi
Destroy Transfer Item List.vi
Get Data Chunk Value.vi
Get Link Speed Event Value.vi
Get Link State Event Value.vi
Get Packet Value.vi
Get Stream Item Type.vi
Get Stream Item Value.vi
Get Time-code Value.vi

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

RMAP
Calculate CRC.vi
Check CRC.vi
Create RMAP Packet.vi
Create RMAP Read Command.vi
Create RMAP Read Modify Write Command.vi
Create RMAP Read Modify Write Reply.vi
Create RMAP Read Reply.vi
Create RMAP Write Command.vi
Create RMAP Write Reply.vi
Decode RMAP Packet.vi

Device Configuration
Brick Calculate Divider for Desired Link Speed.vi
Brick Calculate Parameters for Desired Link Speed.vi
Brick Mk3 Calculate Parameters for Desired Link Speed v2.vi
Brick Mk3 Calculate Parameters for Desired Link Speed.vi
Clear Port Errors.vi
Create Remote Device Identifier.vi
Destroy Remote Device Identifier.vi
Distribution Ports Bitmask to Cluster.vi
Distribution Ports Cluster to Bitmask.vi
Get Base Transmit Clock.vi
Get Brick Interface Mode Port Settings.vi
Get Brick Link Clock Frequency.vi
Get Brick Mk3 Base Transmit Clock.vi
Get Brick Mk3 Transmit Clock.vi
Get Brick Port Routing Address.vi
Get Config Port Errors.vi
Get Current Time-code Value.vi
Get Device Clock Rate.vi
Get Device Identification Info.vi
Get Device Manufacturer as String.vi
Get Device Type as String.vi
Get External Port Status.vi
Get General Purpose Register.vi
Get Hardware Info.vi
Get Interface Mode Global Settings.vi
Get Interface Mode Port Settings.vi
Get Link Clock Divider.vi
Get Link Event Settings.vi
Get Measured Link Speed.vi
Get Mk2 Link Event Settings.vi
Get Network Discovery Info.vi
Get Network Identity Register.vi
Get PCI Link Clock Frequency.vi
Get Port Routing Address.vi
Get Port Status.vi
Get Precision Transmit Rate In Use.vi
Get Precision Transmit Rate Settings.vi
Get PXI Base Transmit Clock.vi
Get PXI Link Clock Divider.vi
Get PXI Transmit Clock.vi
Get Remote Device Description.vi
Get Remote Device List.vi
Get Router Global Settings.vi
Get Routing Table Entry.vi
Get SpaceWire Link Status.vi
Get Time-code Counter Bypass Settings.vi
Get Time-code Period.vi
Get Time-code Settings.vi
Get Transmit Clock.vi
Identify.vi
Inject Error Brick.vi
Inject Error PXI.vi
Inject Error.vi
Output Ports Bitmask To Cluster.vi
Output Ports Cluster to Bitmask.vi
PCI Calculate Divider for Desired Link Speed.vi
PCI Calculate Parameters for Desired Link Speed.vi
PCIe Calculate Parameters for Desired Link Speed v2.vi
PCIe Calculate Parameters for Desired Link Speed.vi
PCIe Calculate Parameters for Desired Link Speed.vi
PXI Calculate Parameters for Desired Link Speed v2.vi
PXI Calculate Parameters for Desired Link Speed.vi
Set Base Transmit Clock.vi
Set Brick Interface Mode Port Settings.vi
Set Brick Link Clock Frequency.vi
Set Brick Mk3 Base Transmit Clock.vi
Set Brick Mk3 Transmit Clock.vi
Set Brick Port Routing Address.vi
Set General Purpose Register.vi
Set Interface Mode Global Settings.vi
Set Interface Mode Port Settings.vi
Set Link Clock Divider.vi
Set Link Event Settings.vi
Set Mk2 Link Event Settings.vi
Set Network Identity Register.vi
Set PCI Link Clock Frequency.vi
Set Port Routing Address.vi
Set Precision Transmit Rate Settings.vi
Set PXI Base Transmit Clock.vi
Set PXI Link Clock Divider.vi
Set PXI Transmit Clock.vi
Set Router Global Settings.vi
Set Routing Table Entry.vi
Set SpaceWire Link Status.vi
Set Time-code Counter Bypass Settings.vi
Set Time-code Period.vi
Set Time-code Settings.vi
Set Transmit Clock.vi
Start Link.vi
Start Periodic Action.vi
Stop Link.vi
Stop Periodic Action.vi

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

Examples
Command Packet Example.vi
CRC Example.vi
Create Packet Example.vi
Device Listener Example.vi
Get Hardware Information Example.vi
Identify Device.vi
Inject Error Example.vi
Link Speed Example.vi
Manual Authorisation Example.vi
Multiple Channel Example.vi
Open Channel to Device Example.vi
Read Link Events.vi
Read Time-codes Example.vi
Reset.vi
RMAP Initiator Example.vi
RMAP Notification Example.vi
RMAP Target Example.vi
Routing Table Example.vi
Set Device Names.vi
Set Precision Transmit Rate Example.vi
Show Device Channels.vi
Stop Receiving on Timer.vi
Time-code Example.vi
Timestamping Example.vi
Transfer Completion Event.vi
Transmit Multiple Packets on External Trigger.vi
Transmit Multiple Packets on Time-code.vi
Transmit Packet on External Trigger.vi
Transmit Packet on Time-code.vi
Transmit Packet on Timer.vi
Transmit Packets at Intervals with Time-code.vi
Transmit Time-code on External Trigger.vi
Transmit Time-code on Timer.vi
Transmit.vi
Tri-state Example.vi