

# STAR-Dundee

## Supporting SpaceWire Applications

### STAR Fire Mk3

The STAR Fire Mk3 is a test and development unit that can emulate, stimulate, debug and validate SpaceFibre enabled equipment. The STAR Fire Mk3 can transmit and receive both SpaceWire and SpaceFibre traffic; it can interconnect SpaceWire equipment to a SpaceFibre network; and it can operate as a SpaceFibre link analyser, capable of unobtrusively capturing and displaying SpaceFibre traffic.

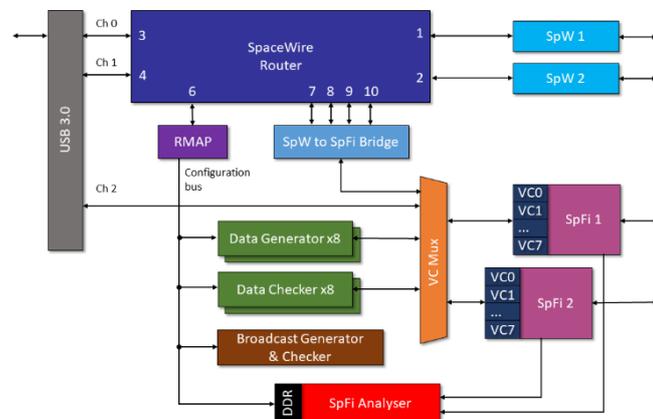
The STAR Fire Mk3 is controlled by a host PC, connected by a high-speed USB 3.0 interface, and is powered by a 5V power brick. It has two SpaceFibre EGSE ports, two SpaceWire ports, four external SMB triggers and two MICTOR logic analyser connectors.



STAR Fire Mk3

#### SpaceFibre Interface

The STAR Fire Mk3 can transmit and receive SpaceFibre packets in two different ways: from a host PC connected by a USB 3.0 interface or using built-in hardware data generators and checkers. Custom software running on the host PC can be used to simulate and stimulate SpaceFibre equipment, transmitting sophisticated packet sequences and reacting to received data. Additionally, accurate hardware emulation can be achieved using built-in hardware independent data generators and checkers, capable of real-time performance.



STAR Fire Mk3 Functional Block Diagram

#### SpaceFibre Link Analyser

The STAR Fire Mk3 can unobtrusively capture SpaceFibre traffic received, transmitted or inline on a SpaceFibre link. Over 44 million SpaceFibre words can be captured to hardware memory when a pre-defined capture trigger event is detected. Once capture has completed, the SpaceFibre traffic is uploaded to a host PC where it

is presented in different levels of detail in multiple displays: network, packet, frame and symbol views. These views can be used to validate and debug SpaceFibre equipment.

#### Key Features

**Two SpaceFibre interfaces:** Both fully compatible with the SpaceFibre standard and able to operate at a configurable data signalling rate between 1.88 and 3.2 Gbit/s. LEDs indicate SpaceFibre link state and data activity.

**Eight virtual channels per SpaceFibre interface:** Each with configurable quality of service (QoS) and transmit data throttling. Four of the virtual channels can be connected to a dedicated high-speed USB channel, or to specific ports of an embedded SpaceWire router. All eight virtual channels can be connected to high-speed hardware data generators and checkers.

**Two SpaceWire interfaces:** Both fully compatible with the SpaceWire standard and able to operate at up to 400 Mbit/s. LEDs indicate SpaceWire link state and data activity.

**High-speed interface to host PC:** A USB 3.0 interface connects the STAR Fire Mk3 to a host PC, allowing SpaceFibre packets to be transmitted and received from software at high-speed (in excess of 1.8 Gbit/s on a typical PC).

**Hardware data generators and checkers:** Built-in data generators and checkers provide a hardware independent solution for transmitting and receiving SpaceFibre packets with real-time performance. Data generators transmit user defined data patterns at specific data rates, whilst data checkers receive SpaceFibre packets and check the contents match a user defined pattern. These can test connected equipment with consistent packet timing under maximum lane utilisation conditions, and can check received packets for data errors.

**Hardware broadcast generators and checkers:** Periodically transmit low latency broadcasts using built-in hardware broadcast generators. Receive and check the value of broadcasts using broadcast checkers.

**SpaceWire to SpaceFibre interconnect:** SpaceWire equipment connected to the STAR Fire Mk3 can transmit and receive SpaceWire packets over a SpaceFibre interface virtual channel, and in doing so inherit the mass saving, QoS and fault detection isolation and recovery (FDIR) benefits SpaceFibre provides.

**Error injection:** Periodically inject a burst of errors or force a disconnect on either SpaceFibre interface.

**Configurable capture trigger:** Set the STAR Fire Mk3 to capture SpaceFibre traffic when specific symbols, words or errors are detected.

**Large capture memory:** Over 44 million SpaceFibre words can be unobtrusively captured to hardware memory when the capture trigger is detected. For efficient memory usage, the proportion of pre- and post-trigger memory reserved around the capture trigger is configurable. If appropriate, memory can be used more effectively still using filtering to disable idle frame capture.

**External triggers:** The STAR Fire Mk3 has four SMB triggers for integrating with external equipment. SpaceFibre link analyser traffic

capture can be triggered when an external input signal is detected on any of three external input triggers, or an output signal on the external output trigger can be generated when a pre-defined link analyser capture trigger is detected.

**SpaceFibre signal decoder:** Two 40 pin MICTOR connectors can be used to view the decoded SpaceFibre signals of each SpaceFibre port on an external logic analyser.

**SpaceWire interface and routing capabilities:** The STAR Fire Mk3 is also a SpaceWire interface, capable of transmitting and receiving SpaceWire packets and time-codes from a host PC. An embedded SpaceWire router can be used to route packets between the USB 3.0 interface, SpaceWire ports and SpaceFibre virtual channels.

**Field upgradability:** The STAR Fire Mk3 supports field upgradeability of the unit functionality. Any upgrades or requested customisations can be downloaded from the STAR-Dundee website and installed quickly and efficiently.

**User friendly software:** Multiple graphical applications for STAR Fire Mk3 control and display purposes are included. Help menus/buttons provide descriptions of application components and SpaceFibre properties to aid software use.

**19" rack mountable:** Compatible with our 19" rack mounting kit, the STAR Fire Mk3 can be mounted on a 1U shelf alongside a combination of other STAR-Dundee products.

**First class support:** As with all of STAR-Dundee's products, a year's support and maintenance is included with the STAR Fire Mk3. This support is provided directly from the team that developed each product so that we can respond quickly with detailed answers to questions, give assistance with application development, and resolve any problems quickly.

### STAR Fire Mk3 Software

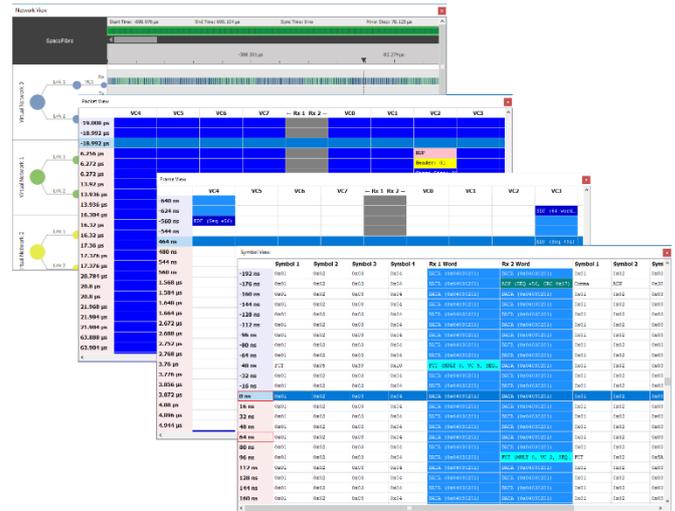
Three graphical user interface (GUI) software applications are provided specifically to support the STAR Fire Mk3's SpaceFibre capabilities.

**STAR Fire Mk3 Controller:** View and modify SpaceFibre interface properties including lane status and settings, virtual channel QoS, hardware data generators and checkers, broadcast generators and checkers, and error injection.

**STAR Fire Mk3 Statistics:** Displays live virtual channel and broadcast statistics including transmit and receive data rates, data and broadcast checker errors, and EEP count. To help visualise the effects of virtual channel QoS and data rate changes, transmit and receive percentage lane utilisation are graphed over time.

**STAR Fire Mk3 Link Analyser:** Enables the STAR Fire Mk3 to be used as a SpaceFibre link analyser, capable of capturing and displaying SpaceFibre link traffic. Memory, capture trigger and filter settings are configurable prior to traffic capture. Once captured, SpaceFibre traffic is displayed in multiple time synchronised views:

- **Network View:** Network level display that provides a high-level overview of all captured SpaceFibre traffic in varying quantities and detail depending on the zoom level.
- **Packet View:** Displays packet timing, size and contents for each virtual channel. **RMAP protocol analysis** displays the fields of packets conforming to the RMAP standard.
- **Frame View:** Displays interleaving data and broadcast frames.
- **Symbol View:** Shows captured SpaceFibre symbols and corresponding words.



**STAR Fire Mk3 Link Analyser Views**

The packet and symbol views have **built-in search capabilities** to help navigate and validate captured traffic. If required, the data can be exported to a CSV file for custom software to interpret.

### STAR-System

As with all the latest STAR-Dundee router and interface devices, the STAR Fire Mk3 is supported by our common software stack named STAR-System. This includes device drivers, C and C++ APIs with example code, command line and GUI applications, and comprehensive documentation. All STAR Fire Mk3 SpaceWire specific functionality is configured and controlled using STAR-System. The APIs and GUI applications included with STAR-System can also be used to transmit and receive SpaceFibre packets from the host PC.

### Specifications

Size: 110 x 30 x 112 mm (excluding feet)

Power: +5V DC, power brick supplied

Software:

- Application software included

Supported Platforms:

- Windows (10, 8, 7, Vista, XP)
- Linux (4.x, 3.x and 2.6 kernels)

SpaceFibre Ports:

- Compliant to ECSS-E-ST-50-11C
- Number of SpaceFibre Ports: 2
- Data Signalling Rate: 1.88 - 3.2 Gbit/s
- Connectors: Type-C EGSE electrical connectors

SpaceWire Ports:

- Compliant to ECSS-E50-12A, ECSS-E-ST-50-12C and ECSS-E-ST-50-12C Rev.1
- Number of SpaceWire Ports: 2
- Maximum Speed: 400 Mbit/s
- Connectors: 9-pin micro-miniature D-type

USB Port:

- USB 3.0.
- Backwards compatible with USB 2.0 and 1.1

EMC:

- CE/FCC certified

Part Number: 310