"I got it - Thanks so much! I really appreciate the support your group has been providing"

SpaceWire Brick user

"Can't thank you enough, it's all working with no errors, full frame rate as expected"
SpaceWire IP Core and Brick user

"Thank you very much. SpaceWire Conformance Tester is one of the most frequently used test equipments, so this upgrade is very helpful for us"

SpaceWire Conformance Tester user

"We received the analysers, hooked them up and are getting nice results. Looks like a pretty neat gizmo you have there."

SpaceWire Link Analyser user

"The support we have received has been excellent."
SpaceWire Brick user

"Many thanks for all your help on this"

RMAP IP Core customer

"The conformance tester is a big help"

SpaceWire Conformance Tester user

"We have two of your Router-USB and have been enjoying using them"
SpaceWire Router-USB user

"We're big fans of SpaceWire here"
Major space agency official

"A path to flight was one reason we selected them"
SpaceWire Router-USB user

"...thank you for the help we have received in our first implementation of SpaceWire links."
SpaceWire PCI-2 user

"It's saved us lots of time"
SpaceWire Link Analyser user

STAR-Dundee

SpaceWire
Engineering
Excellence

High-quality SpaceWire products

Widely used, proven flight chip technology

First-class technical support

Two awards for technology innovation

Unrivalled SpaceWire expertise

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SpaceWire

SpaceWire has emerged as one of the main data-handling networks for use on board spacecraft since the SpaceWire standard was published in 2003. It is now being used on many ESA, NASA and JAXA spacecraft and by research organisations and space industry across the world.

What is SpaceWire?

SpaceWire is a data-handling network designed to connect together instruments, processors, memory and telemetry/telecommand units.

Key features:
- Simple, small and low power interfaces readily implemented in ASICs and FPGAs
- Bi-directional, full duplex point-to-point links supporting data rates up to 200 Mbits/s
- Extensive network capabilities provided by routers
- Comprehensively documented international standard
- Many radiation-tolerant components available

A typical example of a SpaceWire network
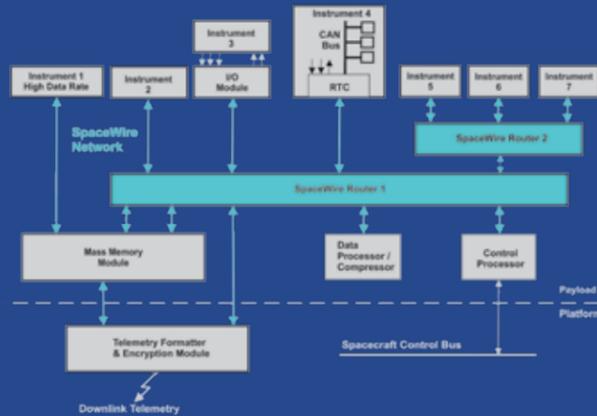
Purpose of SpaceWire

The purpose of the SpaceWire standard is:
- to facilitate the construction of high performance on-board data-handling systems
- to help reduce system integration costs
- to promote compatibility between data-handling equipment and subsystems
- to support the re-use of data-handling equipment across several different missions

Use of the SpaceWire standard ensures that equipment is compatible at both the component and subsystem levels. Processing units, mass-memory units and down-link telemetry systems using SpaceWire interfaces developed for one mission can readily be used on another mission. This reduces the cost of development, improves reliability and, most importantly, increases the level of science that can be achieved within a limited budget.

SpaceWire is being used on over 40 major space missions including Swift, James Webb Space Telescope, Lunar Reconnaissance Orbiter, ExoMars, and BepiColombo.

The SpaceWire Standard

The SpaceWire standard was authored by Steve Parkes, Managing Director of STAR-Dundee Ltd, with input from engineers from across Europe. SpaceWire is published by the European Cooperation for Space Standardization as ECSS-E-ST-50-12C July 2008 (formerly ECSS-E-50-12A January 2003). The standard can be downloaded from http://www.spacewire.esa.int.

STAR-Dundee Ltd

STAR-Dundee is an engineering company that specialises in spacecraft onboard data-handling network technology. Formed in 2002 we now provide SpaceWire evaluation, test and development equipment to most of the world's space agencies and leading aerospace companies. Our SpaceWire interface boards and units are used in Electronic Ground Support Equipment for integrating and testing spacecraft across the word. Our IP cores are used in flight systems destined for missions monitoring the Earth and exploring the solar system. High technology requires a highly skilled team: over half of the people working at STAR-Dundee have a PhD and many others have a lifetime of practical engineering skills and knowledge.

STAR-Dundee is committed to excellence and providing the best possible products and services to our customers.

STAR-Dundee Offers a Complete SpaceWire Capability from Development to Flight

Spacecraft Instrument Simulation, Development and Test

SpaceWire provides a simple means of interfacing an instrument to an onboard data-handling system and has been used on many space missions for instrument interfacing. During the development of an instrument it is important to be able to simulate the instrument on a computer and to be able to configure, control and test the instrument during the various stages of development. STAR-Dundee provides a comprehensive range of SpaceWire interface devices for host PCs to facilitate instrument simulation and testing. With drivers for Windows and Linux supported as standard, and VxWorks and QNX amongst the supported real-time operating systems. With example source code, several useful applications and LabVIEW drivers, the development of test software or an instrument simulation is straightforward, reducing development risk, time and effort.

Spacecraft Data-Handling Networks

SpaceWire forms the core data-handling network on many scientific and Earth Observation spacecraft. To support the development of SpaceWire data-handling systems STAR-Dundee provides a complete range of SpaceWire equipment including routers, interfaces and low cost cables designed specifically for lab use. A complete SpaceWire system can be rapidly assembled and tested using STAR-Dundee units. The same equipment can then form part of the spacecraft EGSE, supporting integration and test. STAR-Dundee SpaceWire network technology includes advanced router features designed to support fault tolerance and reduce power consumption for flight systems.

A Path to Flight

Using STAR-Dundee equipment can provide projects with an easy path to flight. Our interface and router equipment use customisable, proven IP. SpaceWire interface, router, and RMAP cores are available as VHDL source code with license options optimised for space related applications. These IP Cores are extensively and independently tested, widely used, and provide a cost effective, low risk way of adding SpaceWire capability to instruments, processors, memory systems and other spacecraft on-board data-handling equipment. Our IP has been implemented in Xilinx and Actel FPGA and ASIC technologies. Users of the Atmel AT7910E SpaceWire Router and AT7913E SpaceWire Remote Terminal Controller chips can get a rapid start on their development using the STAR-Dundee SpW-10X Development Kit and the STAR-Dundee SpW-RTC Development Kit.

SpaceWire Analysis and Debugging

When working with SpaceWire equipment it is important to be able to see what is happening on a SpaceWire link. STAR-Dundee Link Analysers and Conformance Testers make the operation of the SpaceWire link visible at a number of different levels to support both the hardware engineer, trying to get a link operational, and the software engineer, writing software to send and receive packets of information over the SpaceWire link. The Link Analyser is able to rapidly pinpoint problems and help validate that hardware and software are working correctly. When the pressure is on, these tools help track down problems and ensure that development runs to schedule.

SpaceWire EGSE

SpaceWire Electronic Ground Support Equipment (EGSE) is essential for testing and integrating SpaceWire subsystems. STAR-Dundee's test and development equipment is ideal for use in spacecraft EGSE. Interface boards are provided in a variety of formats with drivers for various operating systems. The drivers have a common API which makes porting applications across different hardware or operating systems very easy, enabling ready reuse of software. For particularly demanding EGSE applications that cannot be met by our standard range of test and development equipment we offer bespoke customisation and design of hardware and software. Building on proven hardware components, extensive software libraries, and long experience of SpaceWire systems, this can be a very cost effective and fast way of procuring SpaceWire EGSE for your mission.

SpaceWire Engineering Excellence

STAR-Dundee specialises in SpaceWire and has over 85 person-years experience. Members of the STAR-Dundee team played leading roles in the specification of the SpaceWire and Remote Memory Access Protocol (RMAP) standards and in the design of widely used IP cores and radiation tolerant devices. Our acclaimed technical support comes directly from the engineers that developed the equipment giving our customers access to a wealth of SpaceWire knowledge and expertise. We also offer consultancy and design services, customisation of our SpaceWire equipment and IP cores to suit specific requirements, and SpaceWire training.

Full datasheets and further information available from
www.star-dundee.com or
enquiries@star-dundee.com

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