SpaceWire RMAP Responder, (SRR)

Simulator/Emulator of Target devices to the SpaceWire RMAP Protocol

Product Brief

The 4Links SpaceWire RMAP Responder (SRR) simulates (or emulates) one or more SpaceWire nodes that respond to the SpaceWire "Remote Memory Access Protocol" (RMAP), while passing other SpaceWire protocols transparently to and from a computer via Gbit Ethernet, and also serving as a general purpose SpaceWire interface.

SpaceWire RMAP Responder

- Up to six RMAP response targets are available with 32kBytes of RMAP memory per port, or up to four targets with 64KBytes per port.
- The SRR's, low latency, of the order of 1 microsecond, models the latency of hardware devices without the delays of software response.
- The memory is accessible from SpaceWire to respond to RMAP commands, and from a computer that reads and writes the memory to simulate the instrument. An interlock ensures that all transactions use valid data.
- Summaries of RMAP requests from SpaceWire may be reported to the computer. Any non-RMAP packets received can be discarded, reported to the PC, or sent to the PC in full so that the PC can respond to protocols other than RMAP.
- If not all the ports of the SRR are being used for RMAP response, the RMAP can be disabled on the unused port(s). When disabled, these ports behave as general purpose SpaceWire interface ports.

Simulating RMAP devices

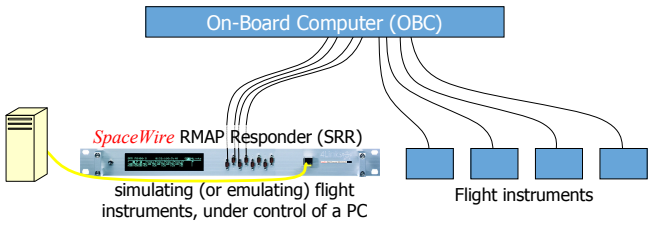
The SpaceWire RMAP Responder (SRR) can be used to simulate or emulate instruments, so that software for an on-board computer can be developed before the flight instruments are available. When the flight models become available, they can be tested by the SRR operating as a SpaceWire interface. During integration, the unit can be reverted to SRR functionality, so that differences between simulations and flight models can be compared.

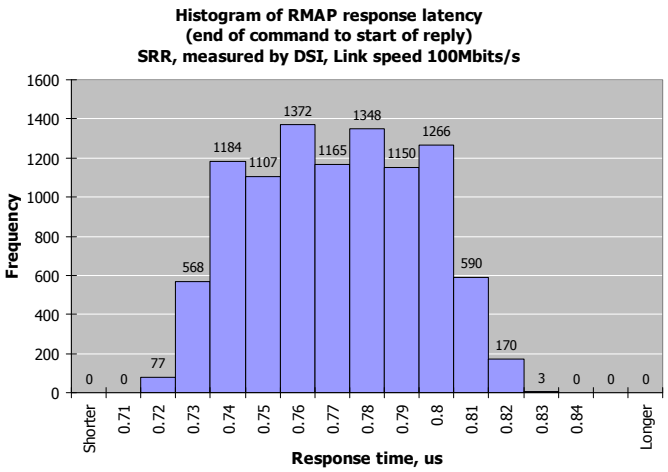
Low RMAP latency

The SRR's latency is of a similar order to other hardware implementations of RMAP. The chart summarizes 10 000 measurements of SRR latency made by a 4Links Diagnostic SpaceWire Interface (DSI), from the end of a command to the start of the response, at 100Mbits/s link speed. The longest latency measured was less than 850ns.

4Links SpaceWire test equipment

- The SRR is a member of 4Links' EtherSpaceLink family of SpaceWire test equipment, acclaimed by customers worldwide as, for example 'the gold standard', 'good value, very reliable, very accurate'.
- EtherSpaceLink family products are supplied as a hardware platform with firmware on a memory card. This makes them reconfigurable, so that an additional memory card could, for example, turn the SRR into a MSR or MSA recorder/analyzer or a FSR routing switch. Customers possessing another product from the family can buy a SRR memory card to use in place of the old one.
- This 4Links family of products and software has been successfully used with Windows™, Linux™, Real-Time Linux™, VxWorks™, Solaris™ and MacOS™ (all trademarks are acknowledged).
- Interfacing via Gbit Ethernet and TCP/IP means that the SRR, as the other products in the family, can be used remotely: from outside the clean room, from another company, or from another continent.





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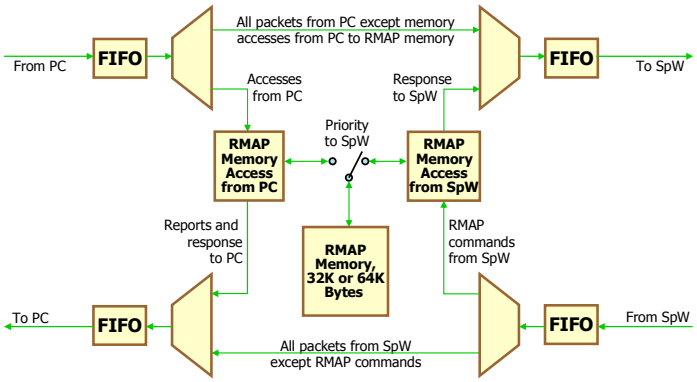
RMAP Memory on each port

Each SpaceWire port of the SRR contains memory, which can be accessed by an RMAP command from SpaceWire and also from the PC, which has access to the memory of all the ports. An interlock ensures that each port's memory is not accessed simultaneously from both RMAP and from the PC, with accesses from SpaceWire taking priority over PC accesses. When an RMAP command is received from SpaceWire, a status report can be sent to the PC. Non-RMAP packets received from SpaceWire bypass the RMAP memory, as do packets from the PC direct to SpaceWire, so that the RMAP commands can be mixed with other protocols such as CCSDS or RDDP.



Block diagram of the SRR's per-port functionality

NB: RMAP features not supported by the SRR are: reply address field, RMW. Verified write and FIFO access are supported, but with limitations.

Software to set up RMAP responses

Software provided with the SpaceWire RMAP Responder includes a comprehensive command line / script-driven interactive interface that includes plugins for accessing the RMAP memory. With Ethernet and TCP/IP, no device driver needs to be installed.

Platforms and memory cards in 4Links test equipment

The SRR is supplied as a hardware platform together with a firmware memory card, or as the memory card alone to plug into an existing platform. The platform is a 1U rack mounted unit (w: 483mm, h: 45mm; depth from front face to rear of power connector is 295mm). Platform options include SpaceWire connectors on either the front or the rear panel, resources for the number of active ports supported, and synchronization between units.

Product codes	SRR	-RG -MC	40	n/	8	(blank) R	L M	(blank) S	-32K -64K

RG: platform + memory card
MC: memory card only

Up to 400Mbits/s link speed

n is the number of active ports

Number of physical SpaceWire ports

R platforms have SpaceWire port connectors at rear

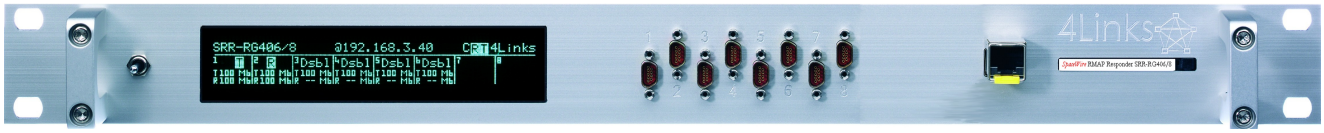
M platforms can support more active ports than L platforms

S platforms include SMA connectors for synchronization between platforms

RMAP memory per port
(see below for numbers of ports)

Not all combinations of platform, number of active ports, and memory size per port, are available. This table shows the number of active ports available in L and M platforms for each size of memory per port

	32KBytes/port	64KBytes/port
L platforms	up to 3 active ports	up to 2 active ports
M platforms	up to 6 active ports	up to 4 active ports



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