



STAR-Dundee

SpaceWire Development Tools and Support Equipment

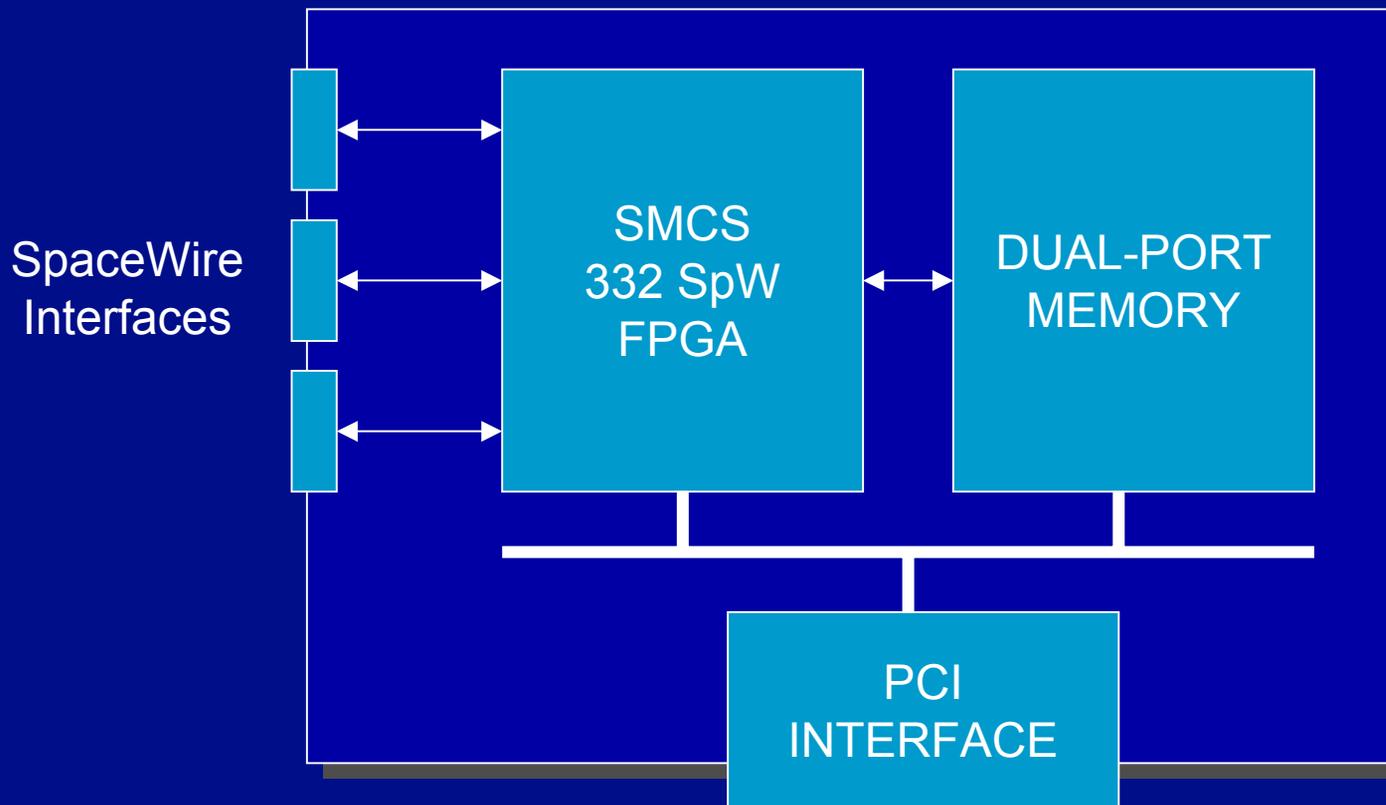
SpaceWire Working Group Meeting
Washington 2005

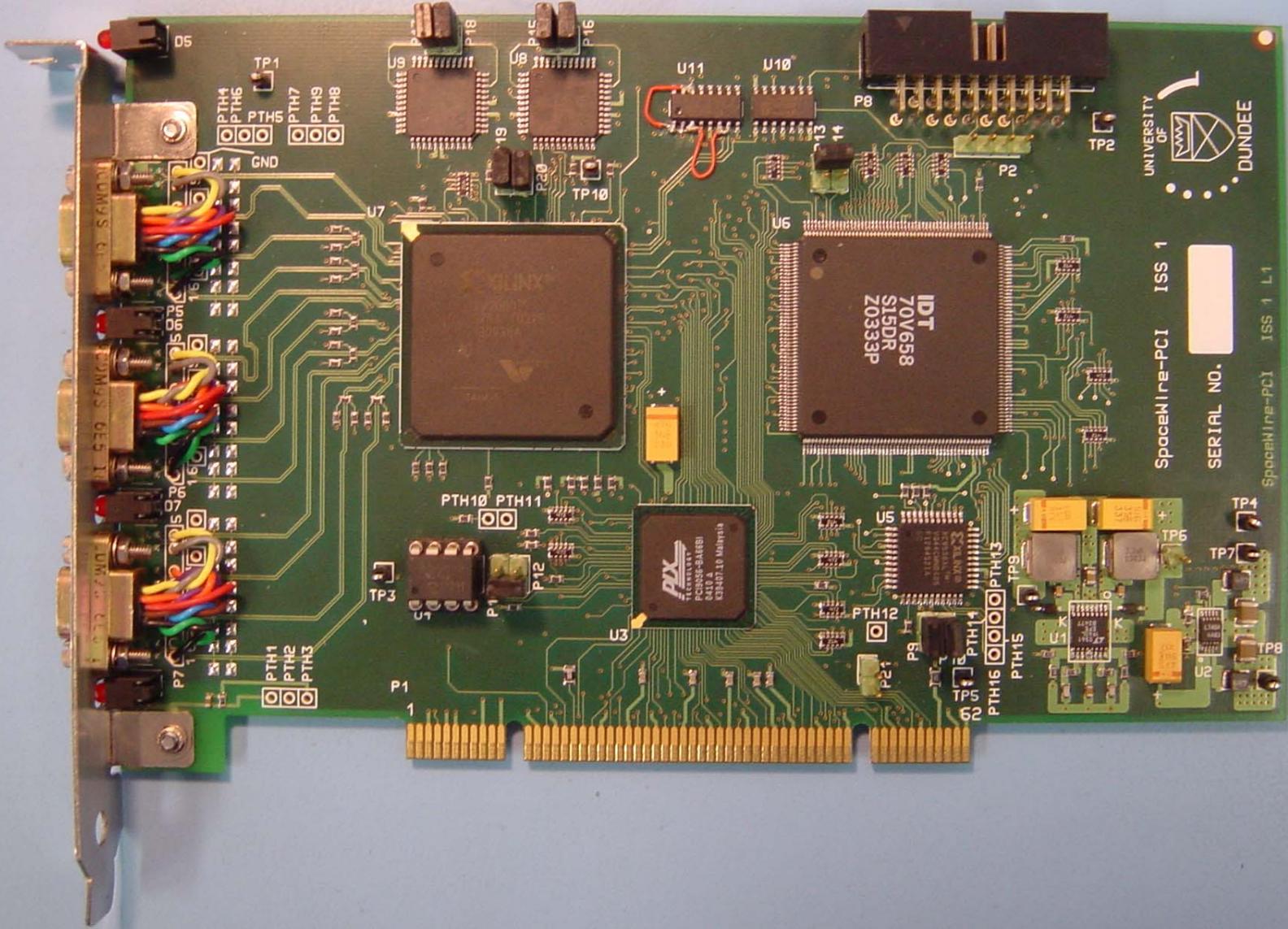
Steve Parkes
STAR-Dundee Ltd



STAR-Dundee

SpaceWire-PCI-2

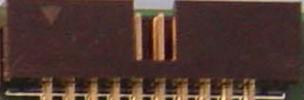




SpaceWire-PCI ISS 1

SERIAL NO.

SpaceWire-PCI ISS 1 L1



PTH4 PTH6
PTH5 PTH7
PTH9 PTH8

PTH1
PTH2
PTH3

PTH10 PTH11

PTH12
PTH13
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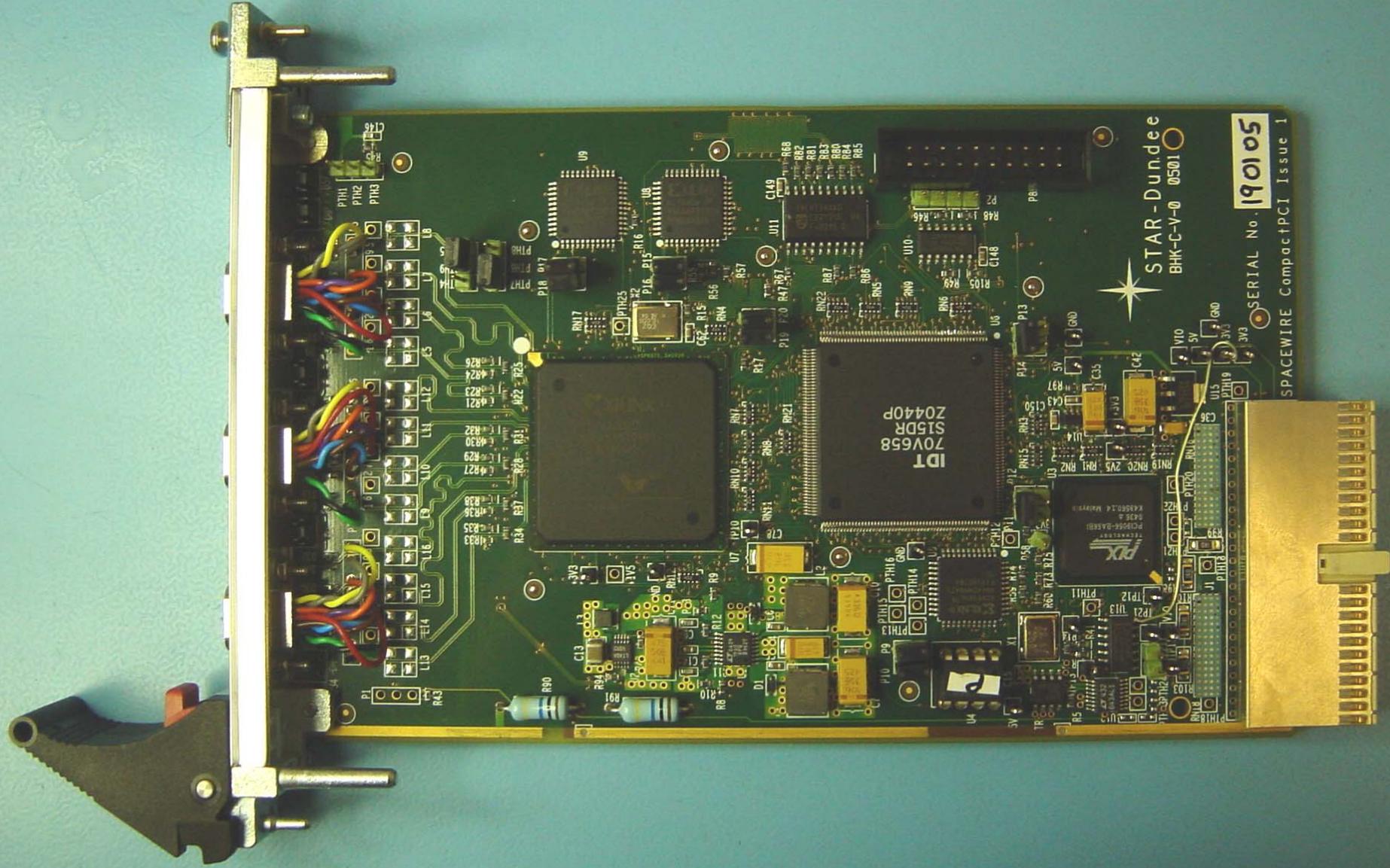
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STAR-Dundee
BHK-C-V-0 05010

SERIAL No. 190105
SPACEWIRE CompactPCI Issue 1

IDT
70V658
S15DR
Z0440P

PXI
9095F-04K801.4
Memory

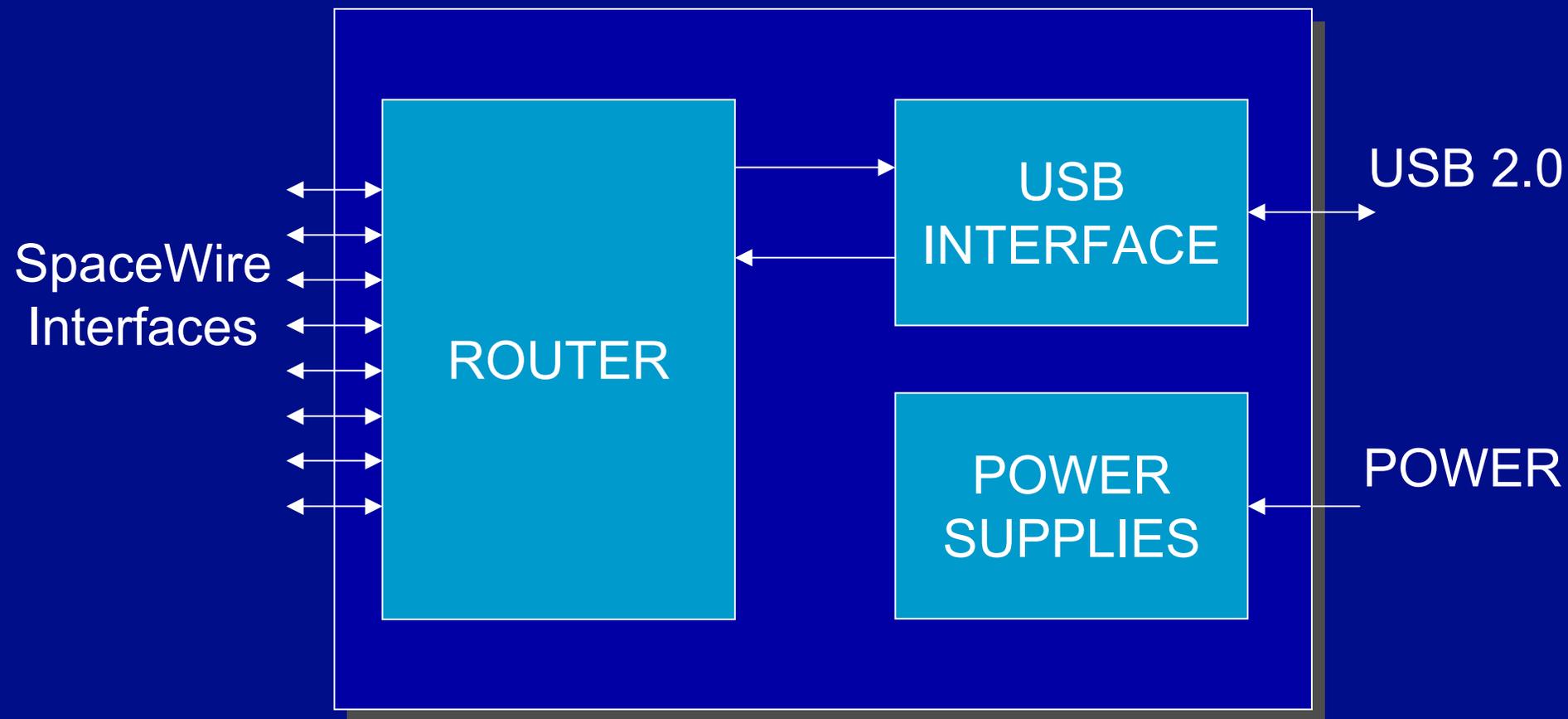
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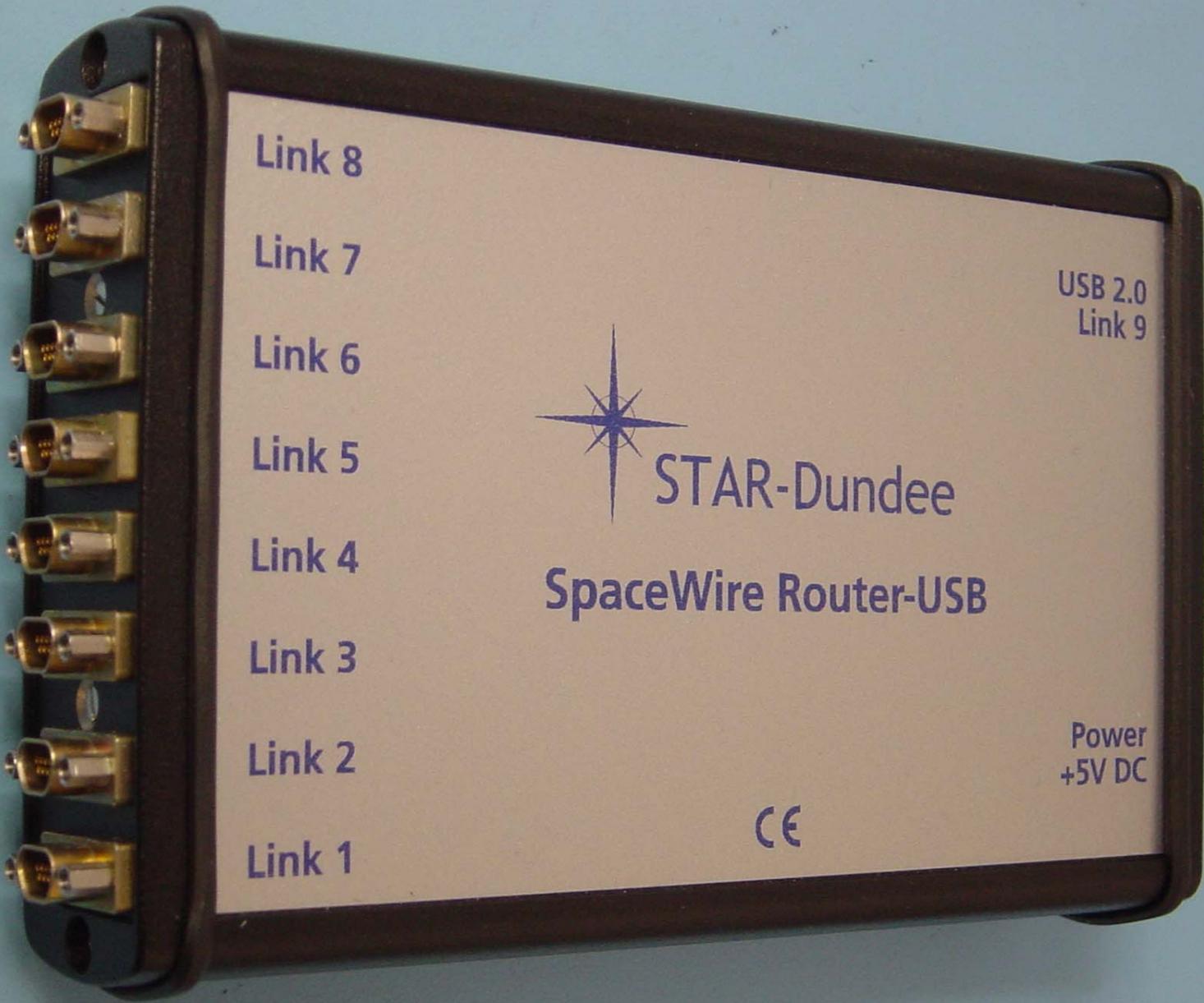
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SpaceWire Router-USB





Link 8

Link 7

Link 6

Link 5

Link 4

Link 3

Link 2

Link 1



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SpaceWire Router-USB

USB 2.0
Link 9

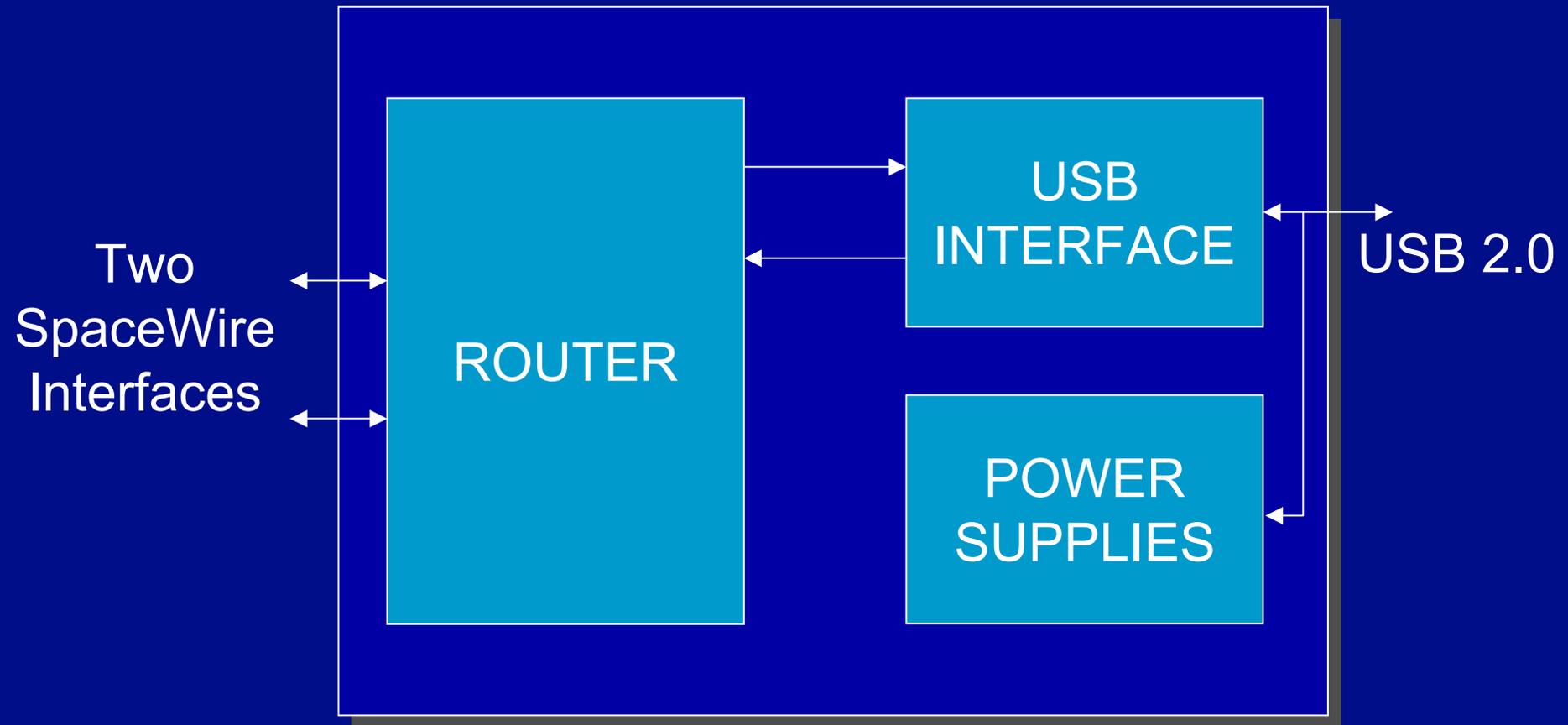
Power
+5V DC





STAR-Dundee

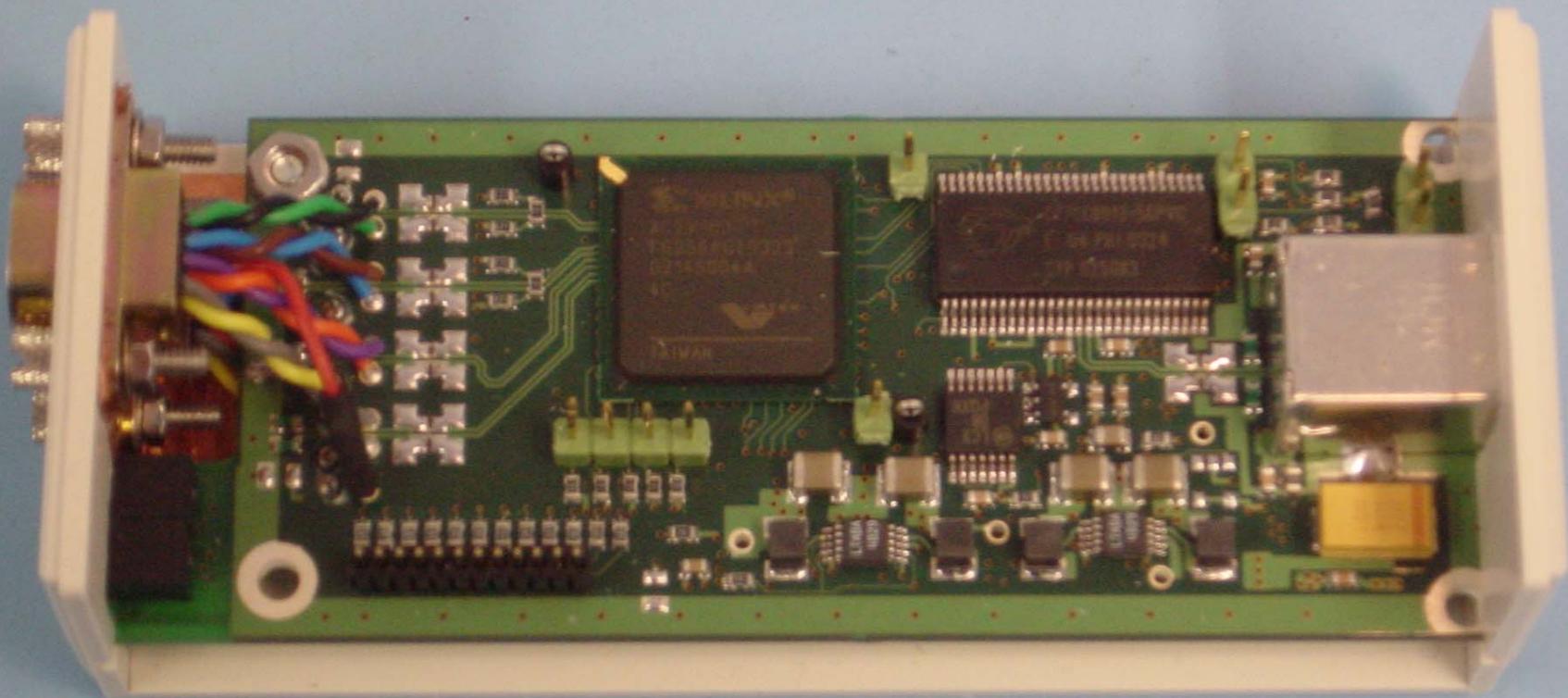
SpaceWire Brick





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SpaceWire-USB Brick







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SpaceWire Drivers

- SpaceWire Router-USB and Brick
 - Linux
 - Windows (2000, XP)
- SpaceWire PCI-2 and cPCI
 - Windows (98, 2000, XP)
 - VxWorks



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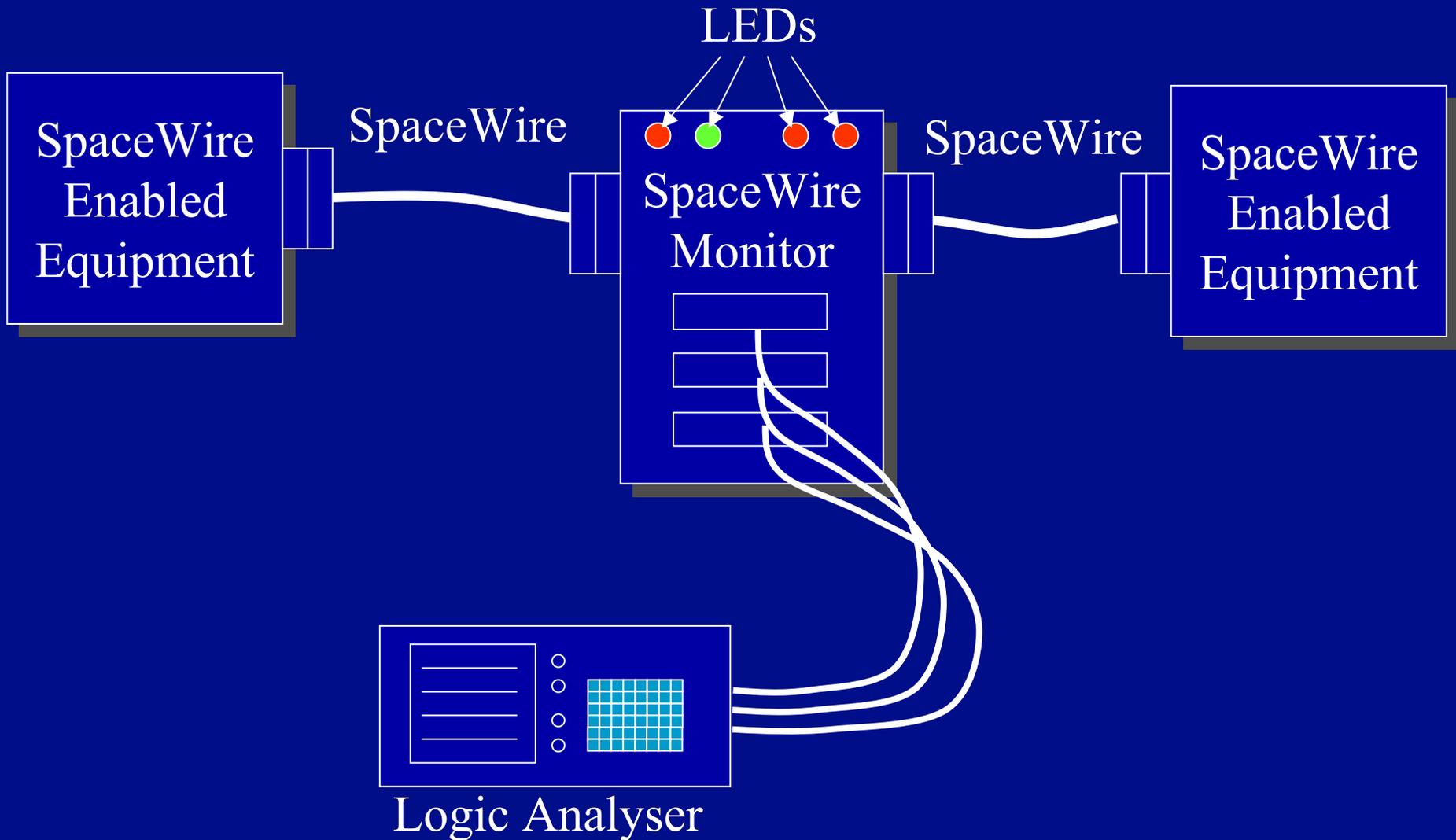
SpaceWire Test Software

- Validation software
 - Simple packet transmit and receive
 - Configuration of routers
 - Sending and receiving of test packets
 - Time-code transmit and receive
- PETRI software
 - Aimed at testing user equipment
 - Send commands, receive response
 - Commands defined in text file
 - When to receive defined in the text file
 - Run from command line
 - Responses put in text file
- Example application source code



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SpaceWire Monitor





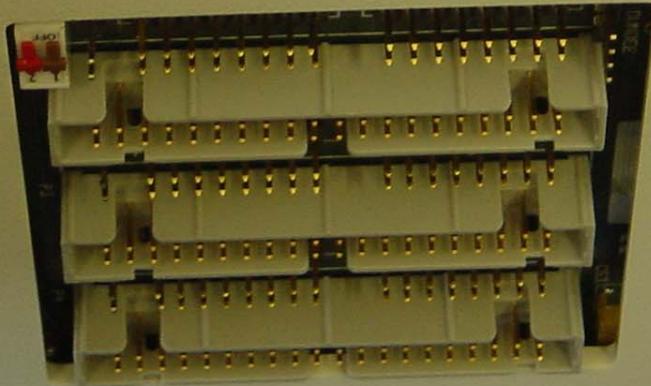
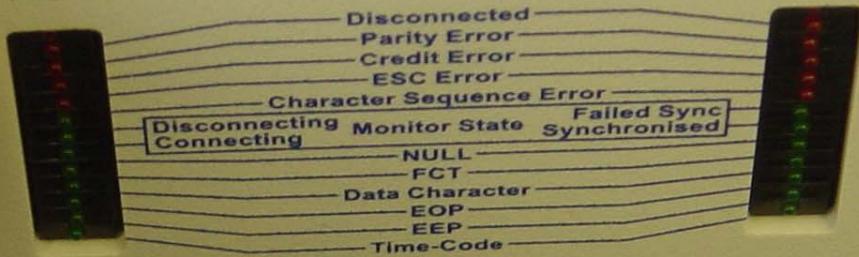
A B
UNBUFFERED

A B
BUFFERED

SpaceWire Monitor

A to B

B to A



 STAR-Dundee

Analyzer

Listing RECEIVER1

Cancel

Run

Markers
Off

Acquisition Time
07 Nov 2002 13:08:56


Label >
Base >

RXCHA1

RXCHA2

NCHAR1

NCHAR2

Time

Symbol

Symbol

Hex

Hex

Relative

30	NULL		000	015	24
31	ESCAPE	NCHAR	000	016	16
32	NULL		000	016	24
33	ESCAPE		000	017	16
34		NCHAR	000	017	8
35	NULL		000	017	16
36	ESCAPE		000	017	16
37	NULL	NCHAR	000	018	24
38	ESCAPE		000	018	16
39	NULL		000	019	24
40		NCHAR	000	019	8
41	ESCAPE		000	019	8
42	NULL	EOP	000	100	24
43		ESCAPE	000	100	8
44	ESCAPE		000	100	8
45		NULL	000	100	16



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SpaceWire Link Analyser

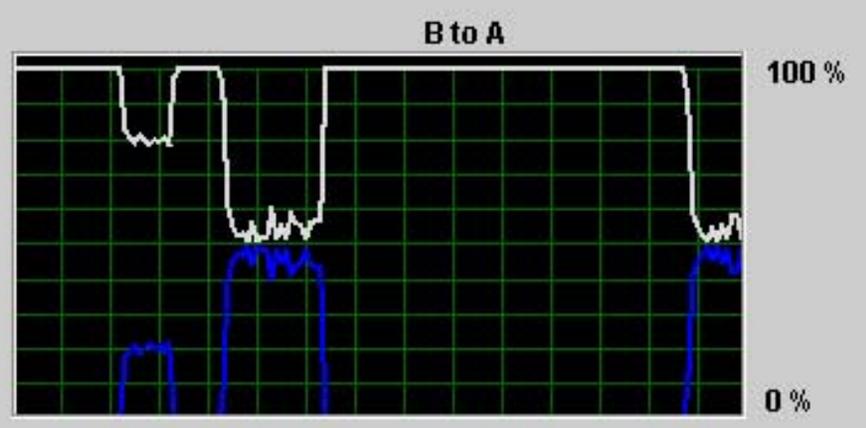
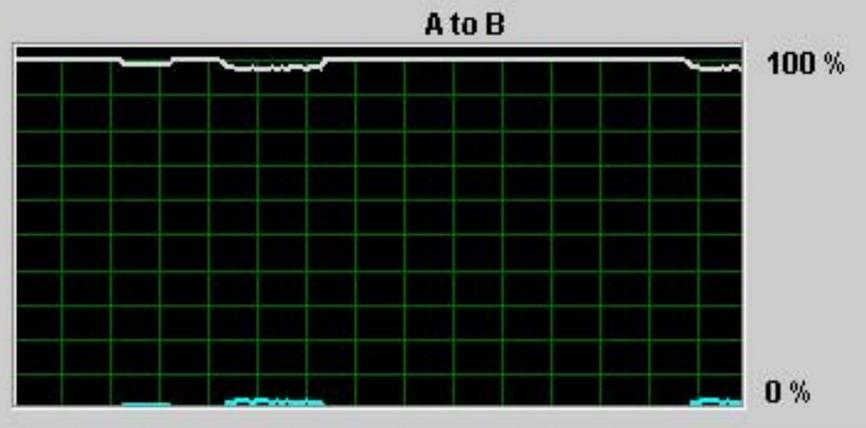
- GUI specifically for SpaceWire
- Monitors traffic on link
- Triggers on specific SpaceWire events
- Or sequence of events
- Captures and displays SpaceWire events
- Oscilloscope or Logic Analyser
- Fault injection

A hand is holding a small, white, rectangular electronic device. The device has a blue logo of a starburst with a central dot. To the right of the logo, the text 'STAR-Dundee' is printed in a blue, sans-serif font. Below this, 'SpaceWire Link Analyser' is printed in a smaller, blue, sans-serif font. On the left side of the device, there are two gold-plated connectors, likely SpaceWire ports, and several small circular holes. The background is a plain, light blue surface.

 STAR-Dundee
SpaceWire Link Analyser

Characters/Events Per Second ▾

	A --> B	B --> A
Signaling Rate	200.001 MHz	200.001 MHz
Disconnect Error	0	0
Parity Error	0	0
Credit Error	0	0
Escape Error	0	0
Char Sequence Error	0	0
Data Character	0	9,689,501
EOP Character	0	485
EEP Character	0	0
FCT Character	1,211,240	0
NULL Character	24,394,329	12,888,020
Time-code Character	0	0



Clear

Freeze



Comparator Select

A→B Short Comparator 1

Comparator Options for A→B Short Comparator 1

	Mask	Type	Hex Value
1	<input type="checkbox"/>	Header (Check Value) ▼	35
2	<input type="checkbox"/>	Data ▼	56
3	<input checked="" type="checkbox"/>	Data ▼	0
4	<input checked="" type="checkbox"/>	Data ▼	0
5	<input checked="" type="checkbox"/>	Data ▼	0
6	<input type="checkbox"/>	EOP ▼	0
7	<input checked="" type="checkbox"/>	Data ▼	0
8	<input checked="" type="checkbox"/>	Data ▼	0

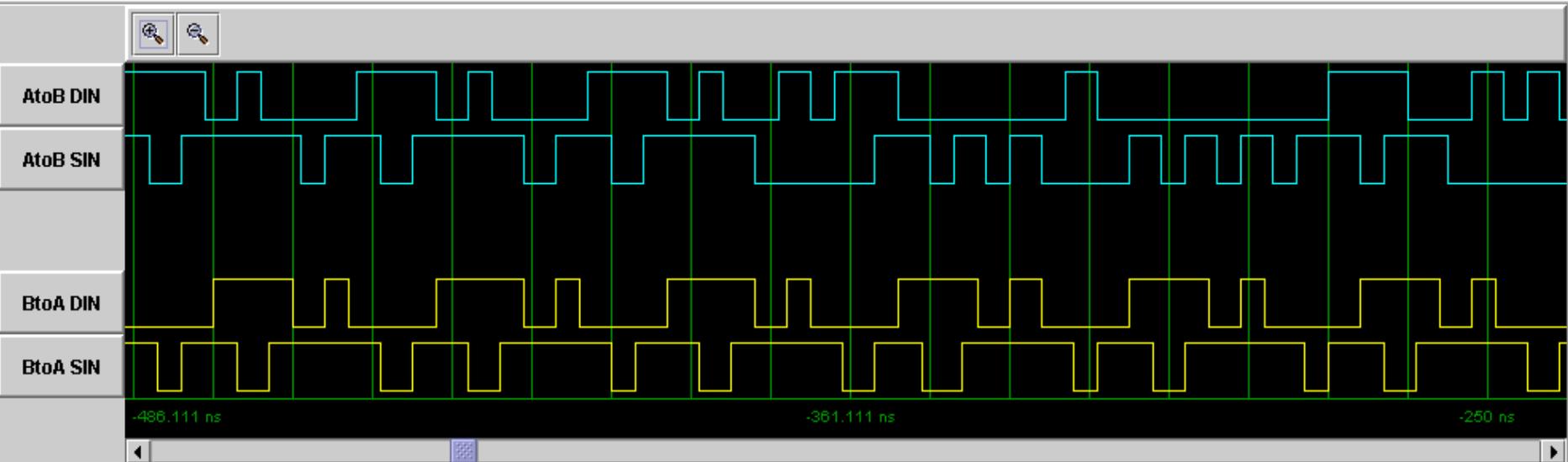


Set the trigger sequences

	Enabled	Source	Event	Number Of
1	<input checked="" type="checkbox"/>	A to B ▼	Packet Header Character ▼	4 ▲▼
2	<input type="checkbox"/>	A to B ▼	Timecode Comparator ▼	1 ▲▼
3	<input type="checkbox"/>	A to B ▼	Timecode Comparator ▼	1 ▲▼
4	<input type="checkbox"/>	A to B ▼	Timecode Comparator ▼	1 ▲▼
5	<input type="checkbox"/>	A to B ▼	Timecode Comparator ▼	1 ▲▼
6	<input type="checkbox"/>	A to B ▼	Timecode Comparator ▼	1 ▲▼
7	<input type="checkbox"/>	A to B ▼	Timecode Comparator ▼	1 ▲▼
8	<input type="checkbox"/>	A to B ▼	Timecode Comparator ▼	1 ▲▼

OK

Cancel



Marker A **-5.450 us** Marker B **-5.450 us** Diff **0 ns**



Time From Tri...	Time Delta	A→B	A→B Delta	B→A	B→A Delta
-700 ns				Header: 0x02 (Cargo Size = 6 bytes)	
				03 80 01 01 02 03	
-400 ns	300 ns			EOP (300 ns @ 23.333 Mbytes/s)	300 ns
-140 ns	260 ns	Header: 0x03 (Cargo Size = 5 bytes)			
		80 01 01 02 03			
140 ns	280 ns	EOP (280 ns @ 21.429 Mbytes/s)	280 ns		
414.860 us	414.720 us			Header: 0x02	415.260 us
				Cargo Size = 2012 bytes	
415.460 us	600 ns	Header: 0x03	415.320 us		
		Cargo Size = 2011 bytes			
578.040 us	162.580 us			EOP (163.180 us @ 12.336 Mbytes/s)	163.180 us
578.040 us	460 ns	EOP (163.040 us @ 12.341 Mbytes/s)	163.040 us		
914.760 us	336.260 us			Header: 0x02	336.720 us
				Cargo Size = 2012 bytes	
915.360 us	600 ns	Header: 0x03	336.860 us		
		Cargo Size = 2011 bytes			
1.07798 ms	162.620 us			EOP (163.220 us @ 12.333 Mbytes/s)	163.220 us
1.07798 ms	400 ns	EOP (163.020 us @ 12.342 Mbytes/s)	163.020 us		
1.33096 ms	252.580 us			Header: 0x02	252.980 us
				Cargo Size = 54 bytes	
1.33156 ms	600 ns	Header: 0x03	253.180 us		
		Cargo Size = 41 bytes			
1.33372 ms	2.160 us	UNKOWN END (2.160 us @ 19.444 Mbytes/s)	2.160 us		
1.33374 ms	20 ns			UNKOWN END (2.780 us @ 19.784 Mbytes/s)	2.780 us

Data View
 ASCII Integer
 Hex

Bit Width
 8 Bit (Byte) 16 Bit (Word)
 32 Bit (Double Word) 64 Bit (Quad Word)

Bytes per row

Cargo header bytes

Error Injection



A to B Error Injection

B to A Error Injection

Error Length **µs** ▼

Error Interval **seconds** ▼

Error Type **Burst Error** ▼

Inject Single Error

Enable Interval Error

Close

Apply

Cancel

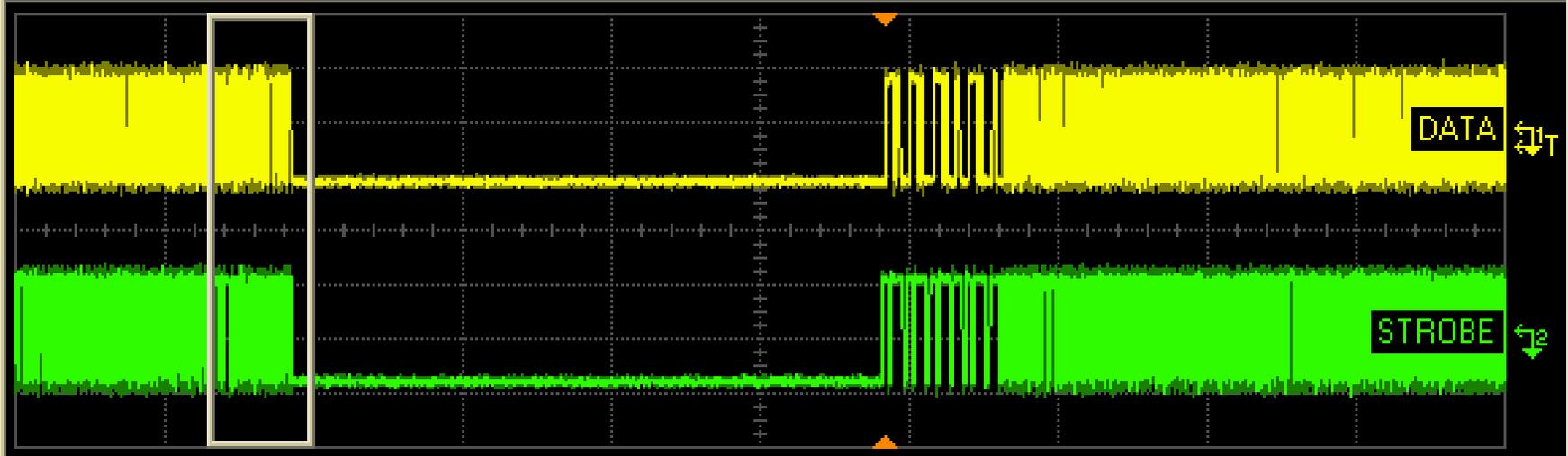
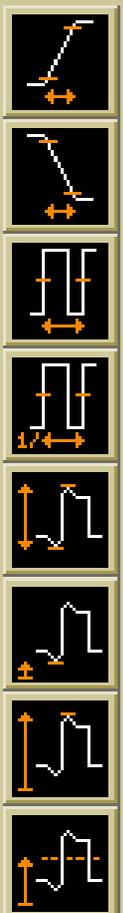
Close the dialog and save the settings

Acquisition is stopped.

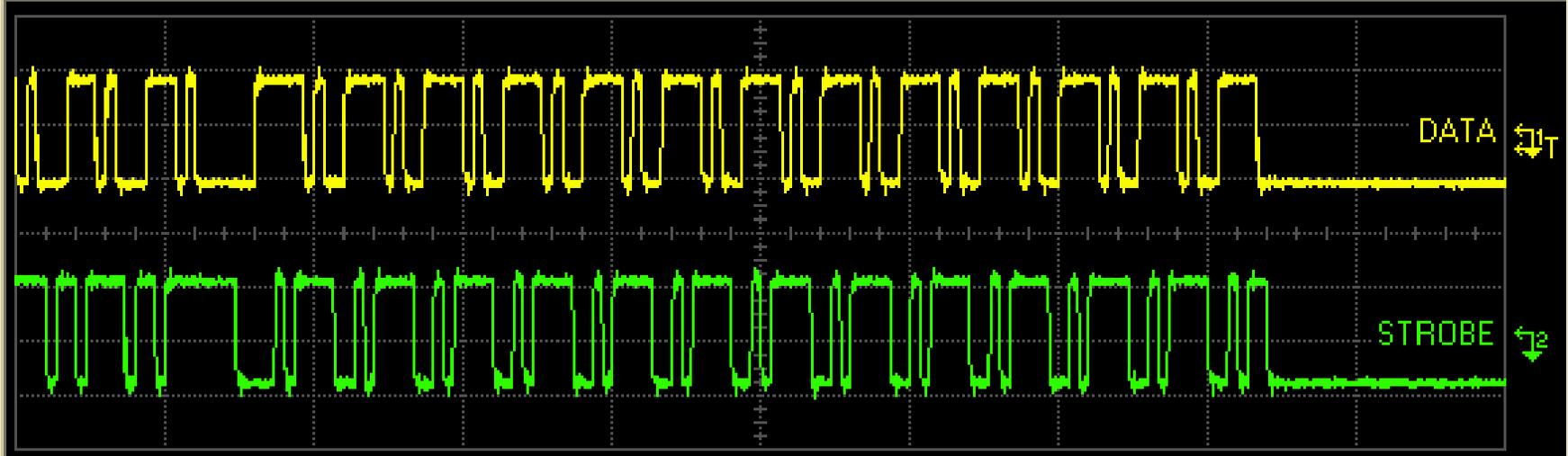
2.00 GSa/s 4.01 Mpts



1 On 400 mV/ 2 On 400 mV/ 3 On 4 On On

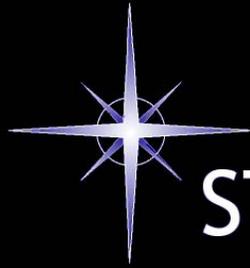


5.00 μs/ -4.1818185 μs



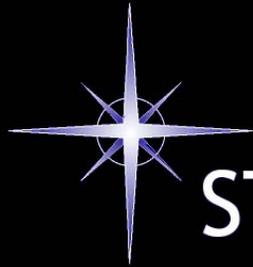
300 ns/ -20.9656500 μs -140.0 mV

More (1 of 2)
Delete All



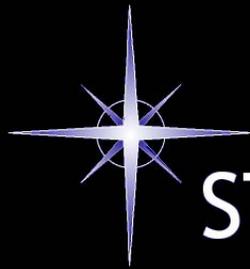
STAR-Dundee

- Products shipping now
 - SpaceWire Router-USB
 - SpaceWire USB Brick
 - SpaceWire Monitor
 - SpaceWire Link Analyser
 - SpaceWire PCI 2
 - SpaceWire cPCI
- CE/FCC certification



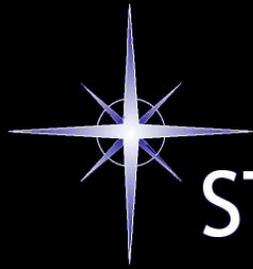
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- Products shipping with
 - Validation Software (USB & PCI)
 - PETRI Software (USB only)
 - Example Application in Source Code
- Applications Support



STAR-Dundee

- Coming soon
 - SpaceWire Conformance Tester
 - SpaceWire IP Tunnel
 - Remote Memory Access Protocol



STAR-Dundee

- Support for users of SpaceWire
 - Test equipment
 - Test software
 - Software drivers
 - Development support
 - IP support
 - ASIC support

SpaceWire IP

- **SpaceWire CODEC**
 - Configurable VHDL core
 - Suitable for ASIC and FPGA implementation
 - IP licence available from ESA or UoD
- **SpaceWire Router**
 - Configurable VHDL Router
 - Generics for
 - Number of SpaceWire Ports
 - Number of External Ports
 - IP licence from University of Dundee