## SpiNSAW – The SpaceWire Network System Administrator Workstation Session: Test & Verification

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# Introduction

 An important task in SpaceWire interconnections is network switches administration

 A user should have an opportunity to set any parameters of any switch in a network

• For this task the software tool with GUI SpaceWire Network System Administrator Workstation (SpiNSAW) was built

• This tool provides state monitoring and operating modes settings for SpaceWire switches in a SpaceWire network in a simple way

Simple mode is for users who would not like to know any details about switch internal structure

<u>Port View S</u> ettings Language (Язык) <u>H</u> elp
MiT COM1 Open Close Path to router Source path
Common Routing and ADG Status/Mode/Speed Simple RMAP
Receive and trans. speed [Mbit/s]       Connections block         1       1       2         3          4          5          6          7          8          9          11          12          13          14          15          14          15          14          15          Channel status refresh

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Simple mode is for users who would not like to know any details about switch internal structure

#### **Extended mode.** Routing and adaptive group routing registers

W7 SPINSAW																							
Po	rt <u>V</u> i	ew	5	etti	ngs	Ŀ	ang	gua	ge i	(Язі	ык)	F	lelp										
MiT COM1 Open									Clo	se			Pa	th to	route	r [		Source path					
Co	Common Routing and ADG Status/Mode/Speed Simple RMAP										ed	Si											
Routing table													Adaptive group routing registers										
LA	/Port	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Prior	HDel			ADG/Port 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
32	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			ADG_1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
33	}	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			ADG_2 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
34	ł	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	1			ADG_3 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
35	5	0	0	1	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	1			ADG_4 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
36	;	0	1	0	1	0	1	0	1	0	0	0	1	0	0	1	0	0	0	0			ADG_5 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
37	,	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0			ADG_6 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0
38	3	1	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	1			ADG_7 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0
39	)	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0			ADG_8 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
40	)	0	0	0	1	0	1	0	0	1	0	1	0	0	1	0	1	1	0	1			ADG_9 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
41		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			ADG_10 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
42	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			ADG_11 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0
43	}	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			ADG_12 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0
44	ł	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			ADG_13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0
45	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			ADG_14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
46	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			ADG_15 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0
47	,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			ADG_16 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
48	}	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
49	)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			Routing table control
50	)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			Enter strings number
51		1	1	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	1	1			34-40, 51 Get Set
52	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
53	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			Adaptive group routing registers control
54	ł	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			Check symmetry Get Set
55	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	•		

#### **Extended mode. General settings**

W7 SPINSAW	
<u>Port View Settings Language (Язык) H</u> elp	
MIT COM1 Open Close Path to router	Source path
Common Routing and ADG Status/Mode/Speed Simple RMAP	
Number of ports         State register [SWITCH_STATE]           dec         6         Set           bit         00000         0000         0000         0000         0 <th>Connections flags [CUR_CONNECTED] 0x 00 00 00 24 Get</th>	Connections flags [CUR_CONNECTED] 0x 00 00 00 24 Get
Register [ISR]         Get         Set           0x         00 E0 00 F0 00 1A C0 00         Get         Set	Errors flags [CUR_ERRORED] 0x 00 00 00 00 Get
Mask register [Poll-Codes]           0x         00 00 00 00 00 00 00 00 00 00 00 00 0000	Router identificator register [ID_SWITCH]       0x     00 00 00 00       Get     Set
Interrupts mask register [Int]         Get         Set           0x         000000000000000000000000000000000000	Protocol identificator register [ID_PROT]           0x         00 00 00 00         Get         Set
Current system time [CUR_TIME]     Router version register [ID_VER]       0x     06     Get     Set       0x     00 00 00 02     Get	Network links identificator [ID_NET]       0x     00 00 00 00       Get     Set
Out control code register [CONTROL_OUT]     Memory cells       0x     00 00     Get       Set     0x     00 00 00       0x     00 00 00     Get value by address       0x     00 00 00 00     Set value by address	Ox         00         00         00         Get         Set           bit         000000         00000         00000         <

#### **Extended mode. Status / Mode / Speed registers**

MT SPINSAW																							
Port Vie	Port View Settings Language (Язык) Help																						
MiT	C	OM1		-	Oj	pen		Close		Pat	h to	rou	ıter	Γ					Source	path			
Common Routing and ADG Status/Mode/Speed Simple									le	RMA	AP												
Status Register									Mo	de re	aist	er-							n rRee	tieve	and trans.	speed	
Status register bits											Mo	de C	RЬ	its							Speed val	ues [Mbit/s]	
	0 1	12	2	5 7	0	111	12	Value		V	NO	0	1	2	5	11	12	12	Value		NO	Deceive	Trans
IVE	0 0	- 0	0	000	0	1	0				1	0	0	1	1	0	0	0	value 0×00000024		1	n Neceive	8
2	0 0	0	0	100	0	1	0	0x00000820			2	0	0	1	1	0	0	0	0x00000024		2	0	8
✓ 3	0 0	0	0	101	0	1	1	0x000018A0		•	3	0	0	1	1	0	0	0	0×00000024		3	7	50
✓ 4	0 0	0	0	100	0	1	0	0×00000820		•	4	0	0	1	1	0	0	0	0×00000024		4	0	8
☑ 5	0 0	0	0	110	0	1	0	0×00000860		✓	5	0	0	1	1	0	0	0	0x00000024		5	0	8
✓ 6	0 0	0	0	101	0	1	1	0×000018A0		•	6	0	0	1	1	0	0	0	0x00000024		6	7	8
7	0 0	0	0	0	0	0	0	0			7	0	0	0	0	0	0	0	0		7		
	0 0	0	0	0	0	0	0	0			8	0	0	0	0	0	0	0	0		8		
9	0 0	0	0	0	0	0	0	0			9	0	0	0	0	0	0	0	0		9		
10	0 0	0	0	0	0	0	0	0			10	0	0	0	0	0	0	0	0		10		
11	0 0	0	0	0	0	0	0	0			11	0	0	0	0	0	0	0	0		11	-	
12	0 0	0	0	0	0	0	0	0			12	0	0	0	0	0	0	0	0		12	2	
13	0 0	0	0	0	0	0	0	0			13	0	0	0	0	0	0	0	0		13		
14	0 0	0	0	0	0	0	0	0			14	0	0	0	0	0	0	0	0		14		
15	0 0	0	0	0	0	0	0	0			15	0	0	0	0	0	0	0	0		15		
16	0 0	0	0	2	0	0	0	0			16	0	0	0	0	0	0	0	0		16		
Port number	DC_ERR	P_ERK	CREDIT ERK	DC_STATE	FUEF FULL	BUFF EMPTY	CONNECTED	Gat Set		nui	Port	LinkDieshled	AutoStart	LinkStart	DS_RESET	LVDS_LOOPBACK	CODEC_LOOPBACK	BUF_MODE	Get Set	n	Porl	r Get	Get Set

# Local switch administration

The SpiNSAW can be used for configuration of one switch MCK, which is connected to the PC by a COM-port.

In this case SpiNSAW forms instructions according to user's operations in a certain format and sends them to the switch through the COM-port.

Switch MCK01 processes such instructions, form answers on them and sent them back to the SpiNSAW.

# **Remote switch administration**

To provide SpiNSAW access to the remote switch in the network the RMAP is used.

We can form RMAP packets automatically in case of known address space distribution or by hand.

W7 SPINSAW	_ 🗆 🗙									
<u>P</u> ort <u>V</u> iew <u>S</u> ettings Language (Язык) <u>H</u> elp										
MIT COM1 Open Close Path to router Source path										
Common Routing and ADG Status/Mode/Speed Simple RMAP										
Connections block           0         1         2         3         4         5         6         7         8         9         10         11         12         13         14         15         16         All										
✓     2     0     8										
✓         3         7         8         Set logical address           ✓         4         0         8         0         1         2         3         4         5         6         7         8         0         10         11         12         13         14         15         16         All         For routing										
✓     6     7     8       7     7     C     Normal priority     Delete header indecation?										
■ 8										
Adaptive group routing register. Create group.										
□ 12 Number of ports 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 All										
16 Create group										
Port Get Get Refresh list										
Set Delete group										
Channel status refresh										
22										

# RMAP

#### Form for an RMAP packet generation

W7 SPINSAW	
<u>Port View S</u> ettings Language (Язык) <u>H</u> elp	
MiT COM1 Open Close Path to router S	ource path
Common   Routing and ADG   Status/Mode/Speed   Simple RMAP	
Destenation node address	
Path address	•
C Logical addre	<b>_</b>
Source address	
Path address	<b>•</b>
C Logical address	<b>_</b>
Memory Address, Data, Flags	
Memory address	Flags
Extended memory address	Ack
Data	Length
	CRC Data 0 CRC Header 0
	Select action:
	© Read
	Write / Read
🗖 Destination key 🔲 Transaction identifier	

#### **SpiNSAW** with third party SpW units

- Without a switch connected to the PC through the COM-port the SpiNSAW also can be used
- It is possible to use such off-the shelf devices as PCI-SpaceWire Bridge, USB brick, etc.
- In this case SpiNSAW forms RMAP-packet and transmits it to the software of the device that is used.
- The device software transmits it to the network through the SpaceWire channel. When reply an RMAP-packet is received, the device's software should send it to the SpiNSAW for the further processing



# Conclusion

- SpiNSAW is a convenient tool for SpaceWire switches network administration.
- It makes possible to set switches' operating modes in the network and to control and monitor their state in a simple way.
- The SpiNSAW allows to send time-codes, distributed interrupts, RMAP-packets and data packets that can be convenient for distributed system work testing.
- SpiNSAW can be used for the network administration with different types of devices.
- SpiNSAW can be used without GUI, as a library of network routers administration functions, in other operating systems (e.g. Linux, etc.) also, for building specific network administration software