



### SuperVisor - comprehensive first level web based craft tool

<b>4RF</b> SUPERVISOR			Aprisa 🛲
Protected Station OK MC	ODE AUX TX RX OK MODE AUX TX RX O O O O O O O O O O Primary Secondary	K Network	
Terminal Radio Seria	al Ethernet Networking Security	Maintenance Events Software	
Radio Summary Channel S	Summary Radio Setup Channel Setup	Advanced Setup	
TRAN SMITTERTX Frequency (MHz)TX Power (dBm)RECEIVERRX Frequency (MHz)GENERALChannel Size (kHz)Antenna Port ConfigurationSave Cancel	400       (400 to 470 MHz, in 6.25 kHz steps)         34       (10 to 37 dBm, in 1 dB steps)         400       (400 to 470 MHz, in 6.25 kHz steps)         12.5 ▼       Single Antenna Dual Port (Duplexer) ▼	MODEM Modem Mode Mode A (ETS), Modulation Type QPSK ACM Control Fast V ADAPTIVE CODING MODULATION Modulation Range QPSK (High Gain) Save Cancel	/ ACMA) ▼ ▼ To 64QAM (Low Gain) ▼
Ready	Radio: Protected Station	Active Unit: Primary	Logout ADMIN



### Network monitoring using web-based SuperVisor interface

### Enables monitoring of entire network from master

Operators can monitor and view network health and investigate issues

<b>;;</b> 4	<b>IRF</b> SUPERVISOR								Aprisa 🛲
Ba	Se Station OK MODE AUX	TX RX O O			Network				
Term	inal Radio Serial Ether	net Networkir	ng Security	Maintenance	Events So	ftware			
Alarn	n Summary Event History Eve	ents Setup Tr	aps Setup Alar	m I/O Setup	Event Action Setur	Defaults			
EVI	ENTS SETUP								
ID	Name	Severity	Suppress	Lower Limit	Upper Limit	Units	Duration	Units	
1	PA Current	critical 🗸	none 🗸						
61	PA Driver Current	critical 🗸	none 🗸						
62	PA Stability	warning 🗸	none 🗸						
2	TX AGC	critical 🗸	none 🗸						
60	TX Forward Power	warning 🗸	none 🗸						
3	TX Reverse Power	warning 🗸	none 🗸						
4	Temperature Threshold	warning 🗸	none 🗸	-30	75	Celsius			
5	TX Synthesizer Not Locked	critical 🗸	none 🗸						
Sav	e Cancel								Prev Next



### SuperVisor – example alarm summary and diagnostics



### **TERMINAL PARAMETERS**

8	Receiver	Power Supply	VLAN User	
Current Tempe	erature		35.9 Celsius	🔲 user tab
Last TX Packe	t PA Current		411 mA	user tab
Last TX Packe	t PA Driver Cu	rrent	84 mA	🔲 user tab
Last TX Packe	Forward Pow	er	20.0 dBm	user tab



### Management - monitoring the radio infrastructure

SCADA radio wide network operation, administration and maintenance is a necessity – not a nice to have

# We manage network switches, routers, why not radios?

- Industry converging on SNMP, moving away from proprietary applications
- SNMP is the simple network management protocol, a unified, open standard, supported by a wide range of vendors



Example: SNMPc from CastleRock





### Management – monitoring the radio infrastructure

We manage network switches, routers, why not SCADA radios? Industry converging on SNMP, moving away from proprietary applications

- SNMP is the simple network management protocol, a unified, open standard, supported by a very wide range of vendors
- The SNMP management application is a central application that monitors available information from devices attached to a network
- The advantage of SNMP is that it provides a standard means to manage devices, making sense of complex networks
- Vendor independence any device that supports SNMP can be part of the network
- SCADA radio devices monitored over a network from a central location
- Flags conditions that need administrative attention
- Allow remote control of devices



## SNMP integration with third party NMS



**4RF** 



## MegaSys<sup>™</sup> Telenium Manager Task Bar

🐓 Telenium Manager			
🎯 - EMS' MEG2 - TELENILMUSER	- 🚬 🗙 📔 Admin - Provisioning - Reporting - Surveilance	Server Tasks 🗾 🏭 [no filter]	- 🛃 🛞 -   🛃 - 🎤 - 🔞 -   09:14 AM 🗖
	🔔 Alarm	Chrono	
	🤼 Alarm	Count <del>a</del>	
	GSM 🧐 GSM		
	🕮 Reach	Thru	
	🔁 Recon	d Selector	

Telenium Manager task bar displays tasks to start Client Suite applications. It allows users to

- Launch Telenium applications (tasks). The basic task groups
  - Surveillance, Reporting, Admin, Provisioning, and Server Tasks. The Telenium database can include customized task triggers and others (per licensing)
- Start a new session or manage sessions
- Change password
- Minimize/close applications for current session or for all sessions
- Select a filter, disable muting and more...

### MegaSys<sup>™</sup> Telenium NMS integration examples

NE 4RF-TEST 10.75.1.2	ut Point 1-1 252				Gomm shores			
			Hi	storical L	ata Trend			
		24.24400	v	10:25:00	31-JUL-14	15-MIN Values		
24 28	24-1760 25-0530 ;	5-18.00 28-063	0 26-19:00	27-07:30	27-30-00 28-08-30	252100 34939 35200	30-10-30 30-22	24 24 24 23 24 24 24 23 24 24 24 23 24 24 24 23 24 24 24 23 24 24 24 23 24 23 24 24 24
oint Information	)				Alarms			
AID: PM-Monitoring Description:	Current VDC Power	Supply			Alarm	DI Reference	Limit	Status
Point Condition					ніні			
Current Value: Frend Limits:	24.24400				Hi			
Rate Of Change:	0.000000				LoLo			
Date:	10:25:00 31-JUL-1	4			BOC B/FI			

Analog Input Point • NE 4RF-TEST-1 10.75.1.252	Comm 4RFASR											
Historical Data Trend												
33.60000 Cels 10:20:	00 31-JUL-14 15-MIN Values											
35	35											
34.5	34.5											
34	34											
33.5												
33												
32.5	525											
32	36											
23-16:00 24-04:30 24-17:00 25-05:30 25-18:00 26-06:30 26-19:00 27-07:3	8 27-20.00 28-08.30 28-21.00 29-09.30 29-22.00 30-10.30 30-23.00											
Point Information	Alarms											
AID: PM-Monitoring	Alarm DI Reference Limit Status											
Description: Current Temperature												
Point Condition												
Current Value: 🕞 33.60000 Cels ( )												
Trend Limits:	Lo											
Rate Of Change: -0.00033	LoLo											
Date: 10:20:00 31-JUL-14	ROC R/F:											
/PM	TELENIUM											

August 28, 2014

Mr. Motti Dahan 4RF Limited

### RE: Support of your 4RF Aprisa Equipment

Dear Motti,

As you are aware, 4RF has provided us with Aprisa SR+ devices for integration and testing into our Telenium network management system. We have had great success with these products and appreciate your assistance and responsiveness with the loan of equipment.

MegaSys.

Based on the results of our testing, we have successful developed a Telenium model for the Aprisa SR+ that includes:

- The ability to synchronize alarms;
- Receive and process all autonomous traps;
- Poll for analog and PM information held in the equipment;
- Successfully issue all relevant provisioning commands available in the MIB;
- Present equipment level high-resolution graphics.

Please feel free to provide this information to your customer and should they have any questions, they are welcome to contact me directly.

Sincerely, MegaSys Computer Technologies

Per: Dave V. Woronuk President & CEO



### MegaSys<sup>™</sup> Telenium NMS integration examples

NE 4RE-TEST-1	Logical View	Status Card 1	NE-SNMPV6
10 75 1 252	N Maintenance Mode		
10.75.1.252	Comm Enabled		
		-	- · · II
Comm 4PEASP	Re-Sync All Complete	Auto Discover	Complete
	09:46:31 31-JUL-14	14:27:39-30-JUL	-14
NE Info System Information	n		
Ethernet Ports	Analogs	Value	Condition EGU ^
Serial Ports	Last Sample Serial2 RX Data	0.000000	Coun
Alarms	Customer Serial2 Data RX Errors	0.000000	Rati
Antenna Interfaces	Last RX Packet RSSI	-50.9000	dBm
USB Interfaces	Last Sample USBSer RX Data	0.000000	Coun
Protect Interface	Last TX Packet BA Driver Current	279.0000	Rati
MGMT Port		34 0000	dBm
Power supply	Last RX Packet SNR	34.10000	dB
PM Monitoring	Last Sample RX CRC Error	0 000000	Rati
	Current VDC Power Supply	24.24400	V
	Current 3.3 Volts Power Supply	3.344000	V
	Current 5.0 Volts Power Supply	5.296000	V
	Current 15.0 Volts Power Supply	13.21000	V
	Last RX Packet Frequency Error	-128.000	Hz
	Last Sample RF RX Data	0.000000	Coun
	Last Sample Eth1 RX Data	0.000000	Coun
	Customer Eth1 Data RX Errors	0.000000	Rati
	Customer Eth1 Data TX Errors	0.000000	Rati
	Last Sample Eth2 RX Data	0.000000	Coun
	Customer Eth2 Data RX Errors	0.000000	Rati
			· · · · · · · · · · · · · · · · · · ·
		NAMES OF A DESCRIPTION OF A DESCRIPTION OF A DESCRIPTIONO	
👝 (#4RF) ( 💻	Aprisa	SR+	
WARNING EXPLOSION HAZARD: Do not connect ro disconnect when circu 10, 20 Vice, 40 ETHERNET	its are live unless area is know to be non-hazardous		
		Max input	
		RX RX	
			TELENIUM
4RFAPSRA10A1		(	MEGASYS.COM



### Proximetry<sup>™</sup> Airsync 5 NMS Dashboard



Dashboard has the following elements:

- Top Bar Always visible with Quick Search, Main Menu, ToDo, docs and account info
- Left Panel collapsible panel, for important and most recent events
- Right panel network visual representation (topology or map view) and health.
- Bottom bar network health indicators (configurable) and performance metrics

# of Problem Devices:

# of Warning Devices:

0%

### Proximetry<sup>™</sup> Airsync 5 NMS Integration – History Events

+ Definition that the second s	/# 1 DeviceHistory 0	GetAllDeviceHistory # 5 _ 🔎 👻 🔒	් එ 🥖 AirSync Topology Viewer 🛛 🗙		
File Edit View Favorites Tools	Help				
PRO> <imetry portal<="" th=""  =""><th>Search</th><th>ALL 🔻</th><th>DASHBOARD</th><th>DEVICES 🗸</th><th>LOG</th></imetry>	Search	ALL 🔻	DASHBOARD	DEVICES 🗸	LOG
Device History (Total: 138 items)					
Search: UUID / Device Name		Event Type: Velect some opt	ions		

All Device History Events (showing:	138 of 138 filtered)												
Event Type	Date/Time 🚽	Device UUID	Device I	Name	Device Model		Capabilities						
C Registration Update	04/16/2015 12:34 AM	B5DD5D0DA08A			4RF Aprisa SR+ 400 MHz	f	F						
Registration Update	04/11/2015 08:49 PM	9CB64984A2FA	400 MHZ	BASE	4RF Aprisa SR+ 400 MHz	f	F						
A Registration Update	03/25/2015 12:53 PM	B5DD5D0DA08A	400 MHZ	REMOTE B	4RF Aprisa SR+ 400 MHz		l.						
Registration Update	03/25/2015 12:52 PM	587DF946312/								DASUDOADD			ACT
Registration Update	03/25/2015 12:52 PM	9CB84984A2F		<b>VIETIKI</b> Porta	al Search					DASHBOARD	DEVICE	E3 Closs	ACI
Registration Update	03/20/2015 08:26 AM	B5DD5D0DA0											
Registration Update	03/20/2015 08:26 AM	587DF946312/	Alerts full	IISt (Total: 192 items)									
Registration Update	03/20/2015 08:26 AM	9CB64984A2F	Search	Mart / Device Nar	ne / III IID / Model	<b>C1</b>	atual 🖂 last also		Countito	I Distance	C. Minus		
Registration Update	03/18/2015 07:44 AM	B5DD5D0DA0	Search	Alert / Device Har	Ne / OOID / Model	50	atus: 🔄 inci. ciea	red	Seventy:	ii 🗹 Major	Minor	Vvarning	
Registration Update	03/18/2015 07:43 AM	587DF946312											
Registration Update	03/18/2015 07:43 AM	9CB64984A2F											
Registration Update	03/13/2015 08:39 AM	B5DD5D0DA0	Verts (show	ving: 8 of 8 filtered)									
Registration Update	03/13/2015 08:33 AM	587DF946312/	Severity	Set Date -	Clear Date	SCC	Alert			Device Name	1	Device UUID	De
Registration Update	03/13/2015 08:33 AM	9CB64984A2E	Critical	a day ago		0	Device Status			400 MHZ REMO	TE A	587DF946312A	4RF
Configuration Change	03/12/2015 09:50 AM	628687E4E74;	Warning	3 days ago		0	RSSI Threshold			400 MHZ BASE		9CB64984A2FA	4RF
Configuration Status Changed	03/11/2015 02:39 PM	628687E4E74	Critical	04/10/2015 10:39 AM		0	Device Status			BeagleBone-BC	6A299CAEEC	0106A88EE8CB	Bea
Registration Update	03/11/2015 09:23 AM	B5DD5D0DA0	Critical	04/10/2015 10:39 AM		0	Device Status			BeagleBone-001	18318E33B3	220F5276A451	Bea
Registration Update	03/11/2015 09:23 AM	587DF946312/	Critical	04/10/2015 10:38 AM		0	Device Status			BeagleBone-BC	6A298A54C6	628687E4E742	Bea
Registration Update	03/11/2015 09:23 AM	9CB64984A2F	Critical	04/10/2015 10:38 AM		0	Device Status			BeagleBone-D4	94418C1003	57DC7A754D82	Bes
Registration Update	03/06/2015 12:00 PM	B5DD5D0DA0	Critical	04/10/2015 10:38 AM		0	Device Status			BeagleBone-BC	64200CA188	9472C13864DC	Bee
Registration Update	03/06/2015 12:00 PM	587DF946312/	Critical	04/09/2015 11:07 AM			Device Status			BeesleBees BC	84200CA19B	8E4009B02004	Bee
Registration Update	03/06/2015 12:00 PM	9CB64984A2E	onucal	04/00/2010 11:07 AM			Device Status			Dealliegoue-po	UNLOOUNIOD	024000892004	Dea
Configuration Status Changed	03/04/2015 10:58 AM	628687E4E742	BeagleBo	ne-BC6A298A54C6	BeagleBone	1	1						
Configuration Change	03/04/2015 10:58 AM	628687E4E742	BeagleBo	ne-BC6A298A54C6	BeagleBone	1	1						
Configuration Change	03/04/2015 10:27 AM	628687E4E742	BeagleBo	ne-BC6A298A54C6	BeagleBone	1	1						
Configuration Status Changed	03/04/2015 10:27 AM	628687E4E742	BeagleBo	ne-BC6A298A54C6	BeagleBone	1	1						
Configuration Status Changed	03/04/2015 09:56 AM	628687E4E742	BesgleBo	ne-BC6A298A54C6	BeagleBone	1	1						

All events in the system are logged for further auditing categories:

• User History, Device History and Alerts History

### Proximetry<sup>™</sup> Airsync 5 NMS Integration – Monitoring Radios

PR0> <imet< th=""><th>'RY   Portal</th><th></th><th></th><th>DASHBOARD DEVICES V LOGS V ACTIONS V ADMIN V</th><th>🕫 🕐 sdgeadmin 🗸</th><th>v5.3</th></imet<>	'RY   Portal			DASHBOARD DEVICES V LOGS V ACTIONS V ADMIN V	🕫 🕐 sdgeadmin 🗸	v5.3
400 MHZ BAS	SE		≁ ± 0			
Summary	Alerts Provisioning				TOPOLOGY STATS MAP	
Device Data						ZOOM
UUID	9CB64984A2FA					100%
Name	400 MHZ BASE	HARF -	Aprice III (1)			+
Model	4RF Aprisa SR+ 400					
Running Firmware	1.2.1	And				
Backup Firmware	1.2.0					
Health Status	S	Provisioning				
Status	Active	Configuration Status	Out of Sync			0
Last Alert	3 d 2 h 3 m 58 s 3 d 1 h 45 m 48 s	Operating Mode	Base			
		Terminal Name	Base 172.16.20.21			
		IP Address	172.16.20.21			
		Interface Mode	Bridge	<b>*</b>		
Radio Inform	nation	Network Info	rmation			
Compliance Mode	ECC Part 90 lc Rss 119	Network ID (EAN)	CAFE			
TX Frequency (Hz)	405000000	Node Address	0.0.0.0			
TX Power (dBm)	30	Network Radius	1			
RX Frequency (Hz)	425000000	Network Repeater	No Repeater			
Channel Size (kHz)	25	Proximity Inband Management	Enabled			
Current Modulation	64qamLoCodeGain	Inband Management	10			
Device Attrib	outes					
			DELETE DEVICE	Network Performance Total # of Problem Devices: 10 91% 4 of Problem Devices: # of Warning Devices: # of Under Maintenan # of Under Maintenan	146 114 17 ce Devices: 1	

Topology view of NMS with two base/master stations and their attached remote radios. Device (bold green in topology) monitoring information

### Proximetry<sup>™</sup> Airsync 5 NMS Integration – Monitoring Radios



The statistics viewer can be launched by selecting the STATS option placed in the topright corner of the device view



## Proximetry<sup>™</sup> Airsync 5 NMS Integration – Radios Configuration

Device UUID	Device Name	Owner	Device Model	Capabilities	Stat	Group configuration	Chan		
B5DD5D0DA08A           9CB64984A2FA	400 MHZ REMOTE B 400 MHZ BASE	Group Configuration	n Change		Available configuration parameters				
		Available configuration parameters				System			
		System	Device	Radio		Network			
		Network	Actions	Ethernet Port 1		Hotwork			
		Ethernet Port 2	Serial Port 1	Serial Port 2		Ethernet Port 2			
		Polling	Traffic Shaping	Connection		Polling			
		Operating Mode: Terminal Name: IP Address: Subnet Mask: Interface Mode:	Select an op	ion V		Compliance Mode: TX Frequency (Hz): TX Power (dBm): RX Frequency (Hz): Channel Size (kHz):			
		* device restart required							

# Group Configuration Change Available configuration parameters System Device Radio Network Actions Ethernet Port 1 Ethernet Port 2 Serial Port 1 Serial Port 2 Polling Traffic Shaping Connection Compliance Mode: Select an option TX Frequency (Hz): RX Frequency (Hz): Channel Size (kHz): Select an option

Devices can be configured individually or in groups

### Network operations centres





SNMP managers can be used in small to medium scale systems while 'managers of managers', such as Netcool from IBM, are used in large systems, gathering and collating reports from other managers via a north bound interface



### Summary

Evolving IP SCADA requirements are driving proven conservative radio technology forward to meet 21<sup>st</sup> century needs

New developments in narrow band radio technology now providing speeds of more than 200 kbps with built in security and management

# Ethernet Management Sunger

**Questions?** 







