Aprisa SR+ Demo Kit Guide

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Contents

1.   Introduction

The following instructions outline the equipment and procedure for demonstrating the operation of the Aprisa SR+. It runs through the steps to show the web browser management and Test Button operation.

The demo kit demonstrates;

- concurrent Ethernet and RS-232 serial data communications between an Aprisa SR+ base station and two Aprisa SR+ remote stations
- utilizing the built in Moxa RTU to control various inputs and outputs
- optional IP Camera operation

Demo Kit List

The Aprisa SR+ Demo Kit contains the following:

1. 3x Aprisa SR+ Radios (nominal 13.8 VDC)
2. RF Interconnect cables, RF combiner / splitter and attenuators
3. Universal power supply 90 to 264 VAC input, 24 VDC 6.25 A, 150W output
4. Moxa RTU, RTU switch Inputs and RTU LED outputs
5. Accessory kit of cables etc (located under the radios)
6. Power Cable IEC to country specific power plug (located under the radios)
7. Aprisa SR+ Demo Kit Guide

The Accessory Kit contains the following:

1x USB cable USB A to USB micro B, 1m	Cable to connect the radio management micro USB port to a PC USB port for Command Line management
2x RJ45 to RJ45 patch cables 2m red	General purpose RJ45 to RJ45 patch cables for use with the RJ45 to DB9 female adaptors for serial traffic connection to the Aprisa SR+ serial ports
2x RJ45 to RJ45 patch cables 2m grey	General purpose RJ45 to RJ45 patch cables for Ethernet port connections
2x RJ45 to DB9 female adaptors	RJ45 to DB9 female DCE adaptors for use with the 2m red patch cables for serial traffic connection to the Aprisa SR+ serial ports
1x USB to Ethernet adaptor	USB to Ethernet adaptor for connecting Aprisa SR+ Ethernet ports to a PC USB port for management with SuperVisor
2x RS-232 serial to USB converter cables 0.4m	RS-232 DB9 male DTE to USB converter for connecting Aprisa SR+ serial ports to a PC USB port for RS-232 serial traffic testing
1x USB to RS-232 serial converter cable 1.8m	USB converter to RS-232 DB9 female DCE for connecting the Aprisa SR+ USB port to an RS-232 device for serial traffic testing
1x serial port loopback plug	RJ45 RS-232 serial loopback plug with red boot fitted
1x USB flash drive	USB flash drive containing: - Drivers and applications - Aprisa SR+ product collateral - Aprisa SR+ product software

Equipment List

The following equipment is required to perform the tests and demonstrations as described in this document.

Hardware

1. Aprisa SR+ Demo Kit
2. Laptop or PC
3. IP Camera (optional extra   to purchase please contact your 4RF representative)

Software

The software required for the demonstration has been provided on the included USB Flash Drive.

1. Web Browser (Internet Explorer)
2. Advanced HMI 4RF SR+ SCADA Demo
3. Terminal Emulator (HyperTerminal or Putty)

Warning:

On low capacity radio based IP networks used for SCADA, general network broadcast traffic can overload the radio communication channel. This broadcast traffic may come from servers, laptops, and other network devices e.g. DHCP requests, DNS traffic, NetBIOS traffic, and ARP requests.

Low capacity radio networks must be isolated from other LANs such as main SCADA and corporate LANs using routers to block traffic not intended for the SCADA radio network.

This needs to be considered when demonstrating and testing the Aprisa SR+ radios.

2. Demonstration Setup

The following is a typical demonstration setup:
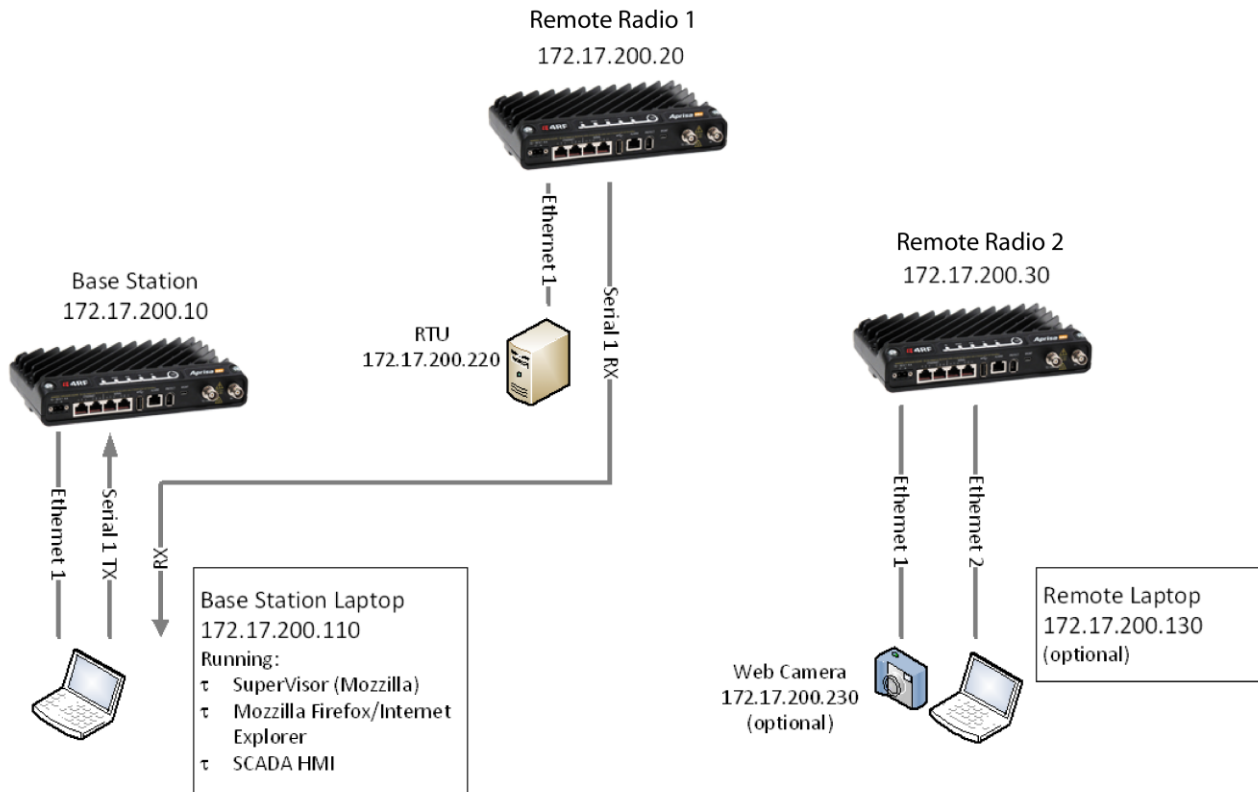
When setting up the equipment for testing, note the following:

Attenuators

In a bench setup, there should be 60 - 80 dB at up to 1 GHz of 50 ohm coaxial attenuation, capable of handling the transmit power of +37 dBm (5 W) between the radios' antenna connectors.

Splitter

The splitter should be 50 ohm coaxial up to 1 GHz and capable of handling the transmit power of +37 dBm (5 W).

Cables

Use double-screened coaxial cable that is suitable for use up to 1 GHz at ≈ 1 metre.

CAUTION: Do not apply signals greater than +10 dBm to the antenna connection as they can damage the receiver.

3. Demonstration Settings

PC Settings

The following are the PC settings required for this demo:

Network Connections		Terminal Emulator	
Local Area Connection		COM Port Settings	
Properties		BaudRate	38400
Internet Protocol TCP/IP Settings		Data	8 bit
IP Address	172.17.200.110	Parity	None
Subnet Mask	255.255.0.0	Stop	1 bit
Default Gateway	0.0.0.0 (none)	Flow Control	None
Advanced TCP/IP Settings		Terminal Settings	
WNS	Disable NetBIOS over TCP/IP	ASCII Receiving	CR+LF (line feed after receiving a text file)
Wireless Network Connection	Disable	Character delay	0
		Line delay	0

Radio Settings

The demo kit radios have been preset with User Defaults. The radio settings can be reset to these defaults if required.

On SuperVisor, click on Maintenance > Defaults > Restore User Defaults

When activated, all radio parameters will be set to User Defaults.

4. Demonstration Procedure

All commands to be typed are shown in *italics*.

Basic Operation

1. Open Internet Explorer and access 172.17.200.10

    a. Username: *admin*

    b. Password: *admin*

2. Show basic Web browser management

    a. Tab through the various screens and explain about remote management

3. Show Test Button operation

    a. Press and hold the Test Button on remote radio 1 until the LEDs flash. Five green LEDs should appear indicating >-80 dBm RSSI

    b. Disconnect the RF cable on remote radio 1 and hold it close to the RF connector. The LEDs should turn orange

    c. Pull the cable away completely and the LEDs should turn red

    d. Reconnect the cable. The LEDs should turn back to all green

    e. Press and hold the Test Button until the LEDs flash to exit the test mode

4. Open Terminal Emulator configured for RS-232 serial data and show transfer of a text file

    a. Fit the RJ45 RS-232 loopback plug to remote radio 1 serial port 1

    b. Send a text file from the base station. The details should reappear on the screen indicating that the file has been sent to that remote station, looped back at the remote station RS-232 serial port and sent back to the base station

    c. Remove the RS-232 loopback connector from the remote radio 1 and re-demonstrate showing the break in the loopback connection

5. Open cmd window and show Ethernet data transfer   note the flashing of Tx and Rx LEDs

    a. *ping 172.17.200.20*

    b. *ping 172.17.200.30*

6. Show data compression

    a. In cmd window: *ping 172.17.200.30 l 1000*

    b. Ping test should show transfer of 1000 bytes to be almost as fast as the 32 byte transfer from previous test

7. Show Ethernet and RS-232 serial. This test pings Remote Station 2 and loops back serial data through remote radio 1

    a. Fit the RJ45 RS-232 loopback plug to remote radio 2 serial port 1

    b. In cmd window: *ping 172.17.200.20 t*

    c. With the Terminal Emulator, send serial data

    d. In cmd window Ctrl C to stop the Ethernet test

8. Show RSSI change

    a. In Web browser, browse to the base station Maintenance Summary page and note the RSSI

    b. Browse to the remote radio 1 Radio Setup page

    c. Change the Tx Power from +37 dBm to +27 dBm and save this change

    d. Return to the base station Maintenance Summary page

    e. In cmd window: *ping 172.17.200.20*

    f. In Web Browser RSSI should drop by 10 dB

    g. Return to the remote radio 1 Radio Setup page and change the power back to +37 dBm

Advanced HMI 4RF SR+ SCADA Demo

Laptop Configuration and Installation

A USB flash drive containing all of the required software has been included with this demo kit. All of the software is required to be loaded on the base station laptop.

1. From the 4RF demo kit USB flash drive, open the 4RF Advance HMI Install folder

2. Launch the setup.exe and install with default configurations

3. The program will now appear in the computers start menu

SCADA Simulation / HMI

Ensure the base station laptop is configured to the correct IP address: 172.17.200.110

1. Ensure the base station laptop is connected to Ethernet Port 1 of the base station radio

2. Ensure the Moxa RTU is powered on and displays the following LEDs:

   a. Power: orange

   b. Ready: green

   c. Port 1: green

3. On the base station laptop, go to Start menu > All Programs > 4RF Advanced HMI

4. Proceed with selecting the various inputs via either the laptop or the switches on the demo kit and observe the results

Momentary LED
Continually polls the heartbeat LED and displays indicates the state

Heartbeat Buttons
Turns on and off the 2sec heartbeat LED (blue/green)

Momentary Button
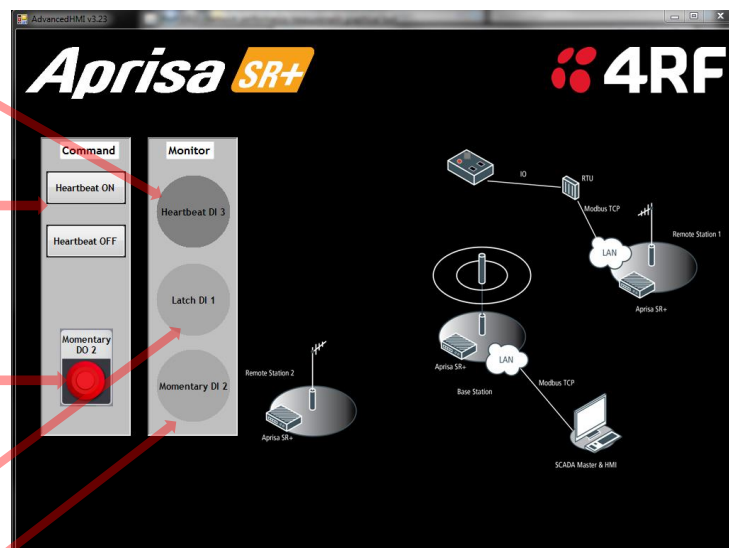Turns on an off the orange switchbox LED

Black switch indicator
Indicates the state of the black latching switch

Red switch indicator
Indicates the state of the red momentary switch

5. Close the application by closing the window

5. Default Configurations

The Aprisa SR+ Demo Kit has been preconfigured to specific parameters in keeping with the demonstrations outlined in this document.

Should at any stage parameters be changed and a reset to the original state is required, the following procedures may be used.

Aprisa SR+ Radios

The demo kit radios have been preset with User Defaults. The radio settings can be reset to these defaults if required.

1. On SuperVisor, click on Maintenance > Defaults > Restore User Defaults. When activated, all radio parameters will be set to User Defaults.

The configurations set have been detailed below:

Channel Access

Access mode:	access request
Default/Serial/Ethernet Packet Time-to-live (ms):	0
Default/Serial/Ethernet Packet back off (ms):	4 or 2

Security

ICMP:	enabled

Serial Port Settings

Baud rate:	115200
Data Bits:	8
Parity:	n
Stop Bits:	1
Flow Control:	RTS/CTS

Ethernet Settings

Ethernet Port 1:	User+ Management
Ethernet Port 2:	User+ Management
Ethernet Bridge OTA:	Enabled

Layer 2 Filter

Layer 2 Filter	enabled

Layer 2 Filter Rules	Source MAC Address	Destination MAC Address	Protocol Type
Allow ARPS	FF:FF:FF:FF:FF:FF	FF:FF:FF:FF:FF:FF	ARP
Allow Unicasts from ANY source	FF:FF:FF:FF:FF:FF	FE:FF:FF:FF:FF:FF	ANY

Moxa RTU

The RTU has been preconfigured to the requirements of this demo kit. However, should the settings be changed in any way, the parameters can be re-configured by following these steps:

The factory default IP address of the RTU (MOXA ilogik E2124) is 192.168.127.254

1. Open Web browser and enter: 192.168.127.254
2. Navigate to Network Settings > Ethernet Configuration
   a. Set the IP address to: 172.17.200.220
   b. Set the subnet mask to: 255.255.0.0
   c. Set the gateway to: 0.0.0.0
3. Navigate to I/O Settings > D0 Channel Settings
   a. Configure D0 channel 3 to Power Settings "ON"

Laptop

Network Connections		Terminal Emulator	
Local Area Connection		COM Port Settings	
Properties		BaudRate	38400
Internet Protocol TCP/IP Settings		Data	8 bit
IP Address	172.17.200.110	Parity	None
Subnet Mask	255.255.0.0	Stop	1 bit
Default Gateway	0.0.0.0 (none)	Flow Control	None
Advanced TCP/IP Settings		Terminal Settings	
WNS	Disable NetBIOS over TCP/IP	ASCII Receiving	CR+LF (line feed after receiving a text file)
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