



Aprisa **SR+**



Software Release Notes

Version 1.3.0a

November 2014

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1. Introduction

The Aprisa SR+ software release 1.3.0 is a general availability release.

Aprisa SR+ software version 1.3.0 is not backwards compatible with previous Aprisa SR+ software versions. If an Aprisa SR+ network contains a radio operating on software version 1.3.0, all radios in the network must be operating on version 1.3.0 or later.

Introduction

The previous Aprisa SR+ software version release relevant to this release is:

| Software Version | Release Date |
|------------------|----------------------------|
| 1.2.7 | 22 nd July 2014 |

This release of Aprisa SR+ software is:

| Software Version | Release Date |
|------------------|-------------------------------|
| 1.3.0 | 3 rd November 2014 |

This document covers the major changes, product enhancements, new functionality, and bug fixes since Aprisa SR+ software version 1.2.7.

2. Released Files

Release Files

The following is a list of files released for Aprisa SR+ Software Version 1.3.0

| File Name | File Type | File Function |
|-------------|---------------------|---|
| asrapp | Upgrade App Code | Used to initiate radio software upgrade |
| asrboot | Bootloader | Used to initiate radio software startup |
| asrmain | Application Code | Main radio system software |
| asrrootfs | Root File System | Catalog of system files |
| asrver | Version File | Release build version |
| version.txt | Public Version File | Release information |

3. Product Features

The Aprisa SR+ product release version 1.3.0 has the following new features. For more information, see the Aprisa SR+ User Manual 1.3.0.

3.1. New Features

Full Duplex Base Station Using AR MAC

In software Version 1.3.0, support has been added to enable a base station using Access Request channel access to operate in Full Duplex RF operation. In this version the full duplex base station will work with half duplex repeater and remote stations.

This feature will only operate on the newly released Aprisa SR+ full duplex hardware which has its own part number and pricing which is different from the half duplex hardware.

Full Duplex RF operation for remote and repeater radios will be available in a future software release.

QoS using Traffic Priority and Traffic Classification

In software Version 1.3.0, a new and enhanced QoS (Quality of Service) mechanism has been introduced to allow users to prioritize traffic per port, packet, protocol, and application etc. using most of the L2/3/4 header fields. To implement this, the radio supports the following QoS capabilities:

- VLAN and IP Traffic Priority mapping - to allow different priority schemes between corporate and radio networks with different network capacities. The radio provides:
 - Priority mapping between external / corporate VLAN priority (per IEEE 802.1p) networks and the radio internal priority network in bridge mode.
 - Priority mapping between external / corporate IP DSCP priority (DiffServ Code Point, per RFC 2474/5) networks and the radio internal priority network in router mode.

- Traffic Classification profiles are based on classification rules. A profile can be set to a particular VLAN ID and CoS / priority or only to CoS / priority to provide the appropriate QoS treatment. Each profile can be related a specific traffic type, protocol or application in the radio network.

For example SCADA traffic, management traffic, FTP traffic, each can have its own profile built with a set of classification rules. A profile can be built using multiple classification rules such as: port, VLAN ID, DSCP, MAC/IP address, TCP/UDP port to identify and classify the specific traffic type in order to provide the appropriate QoS treatment.

The radio supports traffic classification profiles / rules for both bridge and router modes.

- SuperVisor traffic priority settings have been moved to a new top menu level item 'QoS' with second level menu items of:

QoS > Traffic Priority
QoS > Traffic Classification

See Aprisa SR+ User Manual 1.3.0 for details on the settings.

Diagnostics and Performance Monitoring

In software Version 1.3.0, many new diagnostic and performance monitoring parameters have been added to the existing parameters in order to support the growing network complexity and enhance the ability to diagnose and monitor the network.

More diagnostic parameters have been added to the RF, serial and Ethernet port to enhance the diagnostic capabilities.

The radio now supports a major subset of RMON I (per RFC 2819) performance monitoring parameters on a per port basis. A subset of RMON II (RFC 4502) has been added to bridge mode using the L2 MAC address learning / aging table and the ARP table, in addition to the existing routing table in router mode.

Due to the number of parameters added, the display of Monitored Parameters has been moved from Terminal > Parameters to its own top menu level item 'Monitoring' with second level menu items of:

- Monitoring > Terminal
- Monitoring > Serial
- Monitoring > Ethernet
- Monitoring > Radio
- Monitoring > User Selected
- Monitoring > TCP Connections
- Monitoring > Routing Table
- Monitoring > Address Tables

File Transfer For Configuration Settings And Log Files

In software Version 1.3.0, a file transfer save to and restore from PC or USB flash drive has been added to configuration and log files, when previously, only configuration settings files could be saved to and restored from only a USB flash drive.

SuperVisor > Maintenance > Advanced now contains a Maintenance Files section which can save / restore to / from PC or USB flash drive the following file types:

- Configuration Settings
- Event History Log
- Configuration Script

Scheduled Software Activation

In software Version 1.3.0, the user can now schedule when the software upgrade activation commences. Two types of activation methods are supported:

- Now
- Date and Time

This new software activation functionality is supported for base / master station activation (see SuperVisor > Software > Manager) and for all remote stations (see SuperVisor > Software > Remote Activation).

The radio SNMP management interface supports the management of the scheduled software activation via the existing SWMANAGER-MIB interface.

SNMPv3 Authentication Passphrase

In software Version 1.3.0, the radio SNMP management interface supports the SNMPv3 Authentication Passphrase change via the SNMPv3 secure management protocol (not via SuperVisor).

When viewing / managing the details of the users via SNMPv3, the standard SNMP-USER-BASED-SM-MIB interface is used. This interface can be used to change the SNMPv3 Authentication Passphrase of the users.

For more information see Aprisa SR+ User Manual 1.3.0

SNMPv3 Context Addressing

In software Version 1.3.0, the radio SNMP management interface now supports SNMPv3 Context Addressing, when previously it supported only for SNMPv2.

The SNMPv3 context addressing allows the user to use a secure SNMPv3 management while boosting the NMS performance when using the SNMPv3 context addressing.

A NMS (Network Management System) can access any remote radio directly by using its IP address or via base / master station SNMPv3 context addressing. The SNMPv3 context addressing can compress the SNMPv3 management traffic OTA (Over The Air) to remote station up to 90% relative to direct OTA SNMPv3 access to remote station, avoiding the radio narrow bandwidth traffic loading.

Aprisa SRx Compatible

In software Version 1.3.0, a 'SR Compatible' feature option has been added to Aprisa SR+. When activated, it enables over-the-air point-to-multipoint interoperation between an Aprisa SR+ network and Aprisa SRx radios (new Aprisa SR radio series variants).

When the Aprisa SR+ 'SR Compatible' option is activated, the SR+ locks its modulation to QPSK (as per the SRx modulation) and disables functionality which is not available in Aprisa SRx for full compatibility / interoperability operation.

Note: Any mix between Aprisa SRx and Aprisa SR+ in the network will force the whole network to work in SR Compatible mode.

For more information see Aprisa SR+ User Manual 1.3.0

3.2. Existing Features

The Aprisa SR+ product release version 1.3.0 has the following existing features.

Frequency Bands

Five frequency band products software selectable over the entire frequency band:

| | | |
|---------|-------------|----------------------------|
| VHF 220 | 215-240 MHz | FCC / IC compliance |
| UHF 320 | 320-400 MHz | ETSI compliance |
| UHF 400 | 400-470 MHz | ETSI / FCC / IC compliance |
| UHF 450 | 450-520 MHz | ETSI / FCC compliance |
| UHF 928 | 896-902 MHz | FCC / IC compliance |
| UHF 928 | 928-960 MHz | FCC / IC compliance |

Channel Sizes

Software selectable channel sizes of 12.5, 25 kHz and 50 kHz.

Gross Radio Capacity

Maximum gross radio capacity with 12.5 kHz and 25 kHz channel sizes:

| | |
|----------|-------------------|
| 12.5 kHz | 60 kbit/s (ETSI) |
| 25 kHz | 120 kbit/s (ETSI) |

Software selectable channel size of 50 kHz for 220 / 928 MHz FCC / IC bands and 320 MHz ETSI band for Austria.

The maximum gross radio capacity for a 50 kHz channel size is:

| | |
|----------|---------------------------------------|
| ETSI | 216 kbit/s (320 MHz band for Austria) |
| FCC / IC | 216 kbit/s |

Compliance

FCC / IC compliance for the 220 MHz band
 ETSI compliance for the 320 MHz band
 ETSI / FCC / IC compliance for the 400 MHz band.
 ETSI / FCC compliance for the 450 MHz band
 FCC / IC compliance for the 896 and 928 MHz bands.
 Also RoHS, WEEE and HazLoc class 1 div 2.

Operating Mode

Operating modes of base, base-repeater, repeater and remote stations.

RF Operation

One or two frequency half duplex RF operation which eliminates the need for external duplexers. With the dual antenna port option, an external duplexer can be used for filtering.

| | |
|---|---|
| Channel Access Modes | <p>Channel access modes of Access Request (AR) and Listen Before Send (LBS) / CSMA for radio channel management.</p> <p>AR channel access has higher channel efficiency than LBS in a spontaneous message scheme (report by exception).</p> |
| MHSB 1+1 Protected Station | <p>The Aprisa SR+ 1+1 MHSB Protected Station (PS) supports:</p> <ul style="list-style-type: none"> • Operating modes of Base, Base-repeater, Repeater and Remote station • Protection types of Monitored Hot-standby and redundant • Ethernet / IP mode: Bridge or Router modes both with Virtual IP support for smooth fail switchover • Multiple Antenna and Duplexer options: single antenna with / without a duplexer and dual antenna with / without a duplexer (dual or single TNC port) • Active and standby RF ports monitored in 'monitor hot-standby' protection type |
| Adaptive Coding Modulation and Forward Error Correction | <p>Adaptive Coding Modulation (ACM) which maximizes the use of the RF path to provide the highest radio capacity available.</p> <p>ACM automatically adjusts the modulation coding and FEC code rate in the remote to base direction of transmission over the defined modulation range based on the signal quality and / or errored packets for each individual remote radio.</p> <p>When the RF path is healthy (no fading), modulation coding is increased and the FEC code rate is decreased to maximize the data capacity.</p> <p>If the RF path quality degrades, modulation coding is decreased and the FEC code rate is increased for maximum robustness to maintain path connectivity.</p> <p>ACM can be disabled and fixed modulations of 64 QAM, 16 QAM or QPSK used with Min / Max FEC per modulation.</p> |
| OTA Data Encryption | <p>OTA data encryption using Advanced Encryption Standard (AES) 128, 192 or 256.</p> |
| OTA Data Authentication | <p>OTA data authentication and data integrity using Cipher Block Chaining Message Authentication Code (CBC-MAC) using Advanced Encryption Standard (AES) 128, 192 or 256.</p> |
| OTA Data Compression | <p>Ethernet and serial payload compression to increase the narrow band radio capacity.</p> |
| KEK | <p>Enhanced Key Encryption Key (KEK) based on RFC 3394, for secure Over The Air Re-keying (OTAR) of encryption keys</p> |
| Header Compression | <p>Ethernet header and IP/TCP/UDP ROHC header compression to increase the narrow band radio capacity.</p> |

| | |
|---------------------------------|---|
| Antenna Port Options | Software selectable dual / single antenna port options (dual antenna port for external duplexers or filters using dual frequency). |
| Data Interface Port Options | Multiple data interface port options for combinations of Ethernet and RS-232 serial for a total of four interface ports i.e. port options of 2E2S, 3E1S or 4E0S, where E=Ethernet, S=Serial port. Optional: Additional RS-232 / RS-485 port via USB converter. |
| Pseudo Peer to Peer | Pseudo peer to peer communication between remote stations through base-repeater or repeater stations. |
| Terminal Server | Terminal server operation for transporting RS-232 / RS-485 traffic over IP or Ethernet. |
| L3 Router Mode | L3 Router mode with standard static IP route for simple routing network integration. |
| L2 Bridge Mode | L2 Bridge mode with VLAN aware for standard Industrial LAN integration. |
| VLAN Support | IEEE 802.1Q VLAN support with single and double VLAN tagged and add/remove VLAN manipulation to adapt to the appropriate RTU / PLCs. |
| QoS Support | QoS support using IEEE 802.1p VLAN priority bits to prioritize and handle the VLAN / traffic types. |
| L2/3/4 Filtering | L2/3/4 filtering for blocking security attacks and blocking unwanted traffic avoiding narrow band radio network overload. |
| Hardware Alarm Inputs / Outputs | Two hardware alarm inputs and two hardware alarm outputs mappable to any radio alarm event. |
| SCADA Protocol Support | Transparent to all common SCADA protocols; e.g. Modbus, IEC 60870-5-101/104, DNP3 or similar. |
| SuperVisor Web Management | SuperVisor web management support for element and sub-network (base-repeater-remotes) management. |
| Secure SuperVisor | HTTPS secure SuperVisor web access management using SSL secure protocol. |

| | |
|---|--|
| SNMP and NMS | SNMPv1/2/3 MIB supports for 4RF NMS SNMP manager or third party NMS SNMP agent network management. |
| SNMP Security | SNMPv1/2/3 encryption and authentication using HMAC-MD5 or HMAC-SHA for secure NMS / SNMP access and management transactions. |
| SNTP | Simple Network Time Protocol (SNTP) for accurate wide radio network time and date. |
| Multi Repeater | Multi repeater, where the Network Radius = 1 (i.e. the multi repeater is in the first hop from the base station) in AR and LBS channel access mode. |
| Daisy Chain | Daisy chain used for daisy chain repeaters when remote stations are very far from base station coverage. Daisy chain repeaters can only be used in LBS channel access mode. |
| Alarm and Event Parameter Logging | Alarm event parameters can be configured for all alarm events. All active alarms for configured alarm events will be displayed on the SuperVisor Parameters page. The last 1500 events are stored in the radio and the complete event list can be downloaded to flash drive via the radio USB host port. |
| Software Upgrades | Over-the-air software distribution and upgrades. |
| Multiple Management Session Detection | A 'Multiple Management Sessions popup' to show if there is more than one user logged into the same radio. |
| Frequency Tracking | A 'Frequency Tracking' setting which enables the receiver to track any frequency drift in the transmitter to maintain optimum SNR and radio link performance over the full temperature range. |

4. Software Enhancements

4.1. Major Enhancements

None

4.2. Minor Enhancements

New Terminal Unit Informational Event

In software Version 1.3.0, a new event 'Terminal Unit Informational' has been added to the radio information events. The purpose of this event is to indicate miscellaneous activity occurring on the radio.

One of the uses for this event is to indicate when a remote station registers to the base / master station and joins the network. The message reads 'New Registration: Radio Name (IP Address) joined the network'.

This information event will appear in the Event History log and can be configured to send a trap (from the base / master station) to the management system (NMS) like any other event.

Date / Time Settings

In software Version 1.3.0, the Date / Time settings have been moved from Terminal > Device to its own top menu level item 'Date / Time'.

Default Frequencies

In software Version 1.3.0, the 896 and 928 frequency band factory default RX and TX frequencies have been changed to be more reflective of typical license allocations. The following is a list of the current factory default frequencies:

| Frequency Band | Frequency Range | Default TX (MHz) | Default RX (MHz) |
|----------------|-----------------|------------------|------------------|
| 220 | 215-240 MHz | 228.125 | 228.125 |
| 320 | 320-400 MHz | 358.125 | 358.125 |
| 400 | 400-470 MHz | 433.125 | 433.125 |
| 450 | 450-520 MHz | 483.125 | 483.125 |
| 896 | 896-902 MHz | 898.125 | 896.125 |
| 928 | 928-960 MHz | 944.125 | 935.125 |

Change Login Banner

In software Version 1.3.0, the login banner has been changed to warn that only authorized personnel are allowed to access the radio network.

The following statement added to the login banner: 'This system is for use by authorized users only'.

Increase of Control Message Error Immunity

In software Version 1.3.0, the robustness and immunity from errors of radio control messages been increased in very low signal level or high noise environments.

5. Hardware Enhancements

5.1. Major Enhancements

Full Duplex Base Station Using AR MAC

Associated with software Version 1.3.0, new hardware support has been added to enable a base station using Access Request channel access to operate in Full Duplex RF operation.
Full Duplex RF operation for remote and repeater radios will be available in a future software release.

5.2. Minor Enhancements

None

6. Known Issues

None

7. Software Bug Fixes

7.1. Major Bug Fixes

None

7.2. Minor Bug Fixes

Test Mode LED Display

Previously, when Test Mode was activated and then the radio TX frequency was changed while test mode was running, the LED Display Panel continued to indicate that Test Mode was active (flashing LEDs) even if test mode was disabled in supervisor.

This condition could only be cleared by making a further radio TX frequency change after disabling Test Mode, or by rebooting the radio.

In software version 1.3.0, this problem has been corrected.
Issue #3335.

8. Radio Software Upgrade

Upgrade Type

A software upgrade can be performed on a single radio or an entire Aprisa SR+ network. If you have an existing network of Aprisa SR+ radios, follow the procedure 'Network Software Upgrade'.

If you have a single Aprisa SR+ radio requiring upgrade, follow the procedure 'Single Radio Upgrade'.

See the Aprisa SR+ User Manual 1.3.0 for more information.

8.1. Network Software Upgrade

File Transfer Method

This process allows customers to upgrade their Aprisa SR+ network from the central base / master station location without the need for visiting remote sites.

The Software Pack is loaded into the base station with the file transfer process and distributed via the radio link to all remote stations.

When all remote stations receive the Software Pack version, the software can be remotely activated on all remote stations.

Process Steps

1. Unzip the software pack in to the root directory of a USB flash drive.
2. Insert the USB flash drive into the Host Port .
3. Using File Transfer, load the software pack into the base station (see SuperVisor > Software > File Transfer).
4. Remove the USB flash drive from the Host Port .
5. Distribute the software to the entire network of remote radios (see SuperVisor > Software > Remote Distribution).

Note: The distribution of software to remote stations does not stop customer traffic from being transferred. However, due to the volume of traffic, the software distribution process may affect customer traffic.

Software distribution traffic is classified as 'management traffic' but does not use the Ethernet management priority setting. Software distribution traffic priority has a fixed priority setting of 'very low'.

6. Activate the software on the entire network of remote radios (see SuperVisor > Software > Remote Activation).

Note: When the new software activates on the remote radios, all link communication from the base station to the remote will be lost. The base station will attempt to re-establish connectivity to the remote radios for the new version verification but this will fail. However, when the new software activates on the remote radios, the remote radio will reboot automatically and link communication will restore when the base station software is activated.

When the Remote Activation process gets to the 'Remote Radios On New Version' step, don't wait for this to complete but proceed to step 7.

7. Activate the software on the base station radio (see SuperVisor > Software > Manager).
8. When the base station restarts with the new software, rediscover the nodes (see SuperVisor > Maintenance > Advanced > Discover Nodes).
9. Check that all remote radios are now running on the new software (see SuperVisor > Network Table).

Note: The following steps will only be necessary if for some reason steps 1-9 did not operate correctly or if software activation is attempted before the distribution process ends or the remote radio was off during steps 1-7 and turns on later. Thus, the following steps will most likely not be required.

10. If step 9 shows that not all remote radios are running the latest software version, restore the base / master station to the previous software version (see SuperVisor > Software > Manager).
 11. Attempt to re-establish connectivity to the remote radios that have failed to upgrade by navigating to and remotely managing the remote radios individually. Navigate to the remote radio history log and review the logs to determine the reason for the failure to activate the new software version. Take appropriate actions to address the reported issue. If connectivity restores with the failed remotes, repeat steps 5-9 if required.
-

8.2. Single Radio Upgrade

8.2.1. Single Radio Upgrade File Transfer Method

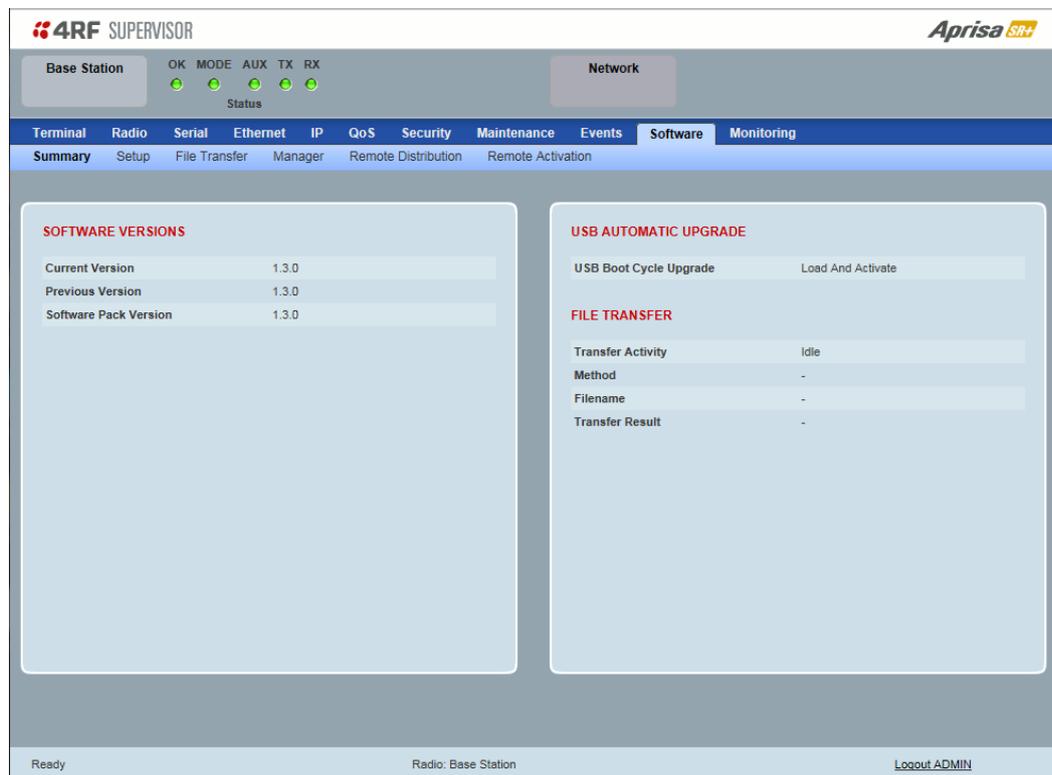
File Transfer Method

This process allows customers to upgrade a single Aprisa SR+ radio.

The Software Pack is loaded into the radio with the file transfer process and activated.

Process Steps

1. Unzip the software pack in to the root directory of a USB flash drive.
2. Insert the USB flash drive into the Host Port .
3. Using File Transfer, load the software pack into the radio (see SuperVisor > Software > File Transfer).
4. Remove the USB flash drive from the Host Port .
5. Activate the software on the radio (see SuperVisor > Software > Manager). This can take up to a few minutes.
6. The new software version can verified with SuperVisor > Software > Summary Current Version.



Upgrade Did Not Start

If the upgrade process did not start, the Aprisa SR+ could already be operating on the version of software on the USB flash drive. This will be indicated by flashing display panel OK LED and then the OK, MODE and AUX will light steady green.

If any display panel LED flashes red or is steady red during the upgrade process, it indicates that the upgrade has failed. This could be caused by incorrect files on the USB flash drive or a radio hardware failure.

8.2.2. Single Radio Upgrade Boot Method

Method

The Aprisa SR+ radio software is upgraded simply by plugging a USB flash drive containing the new software into the USB A host port  on the Aprisa SR+ front panel and power cycling the radio.

Procedure

To minimize disruption of link traffic and prevent your radios from being rendered inoperative, please follow the procedures described in this section together with any additional information or instructions supplied with the upgrade package.

The radio software must be identical on all radios in the Aprisa SR+ network.

Process Steps

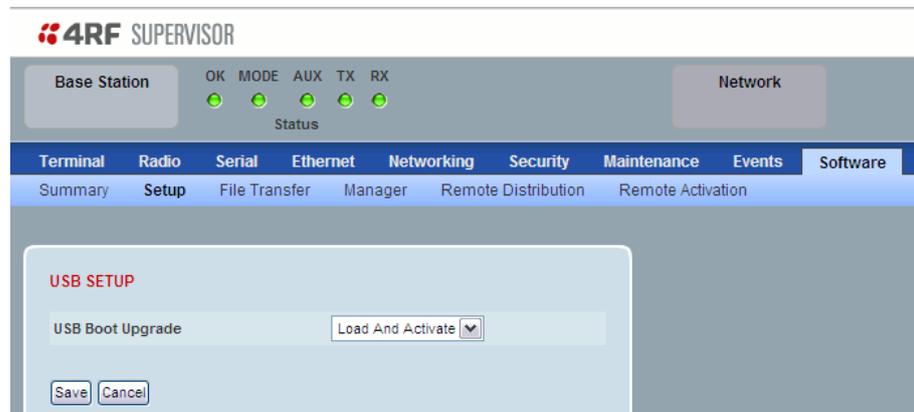
1. Check that the SuperVIsor USB Boot Upgrade setting is set to 'Load and Activate' (see SuperVIsor > Software > Setup).
 2. Unzip the software release files in to the root directory of a USB flash drive.
 3. Power off the Aprisa SR+ and insert the USB flash drive into the Host Port .
 4. Power on the Aprisa SR+.
 5. The software upgrade process is complete when the OK LED lights solid green. This can take about 2 minutes.
 6. Remove the USB flash drive from the Host Port .
 7. Power cycle the Aprisa SR+.
-

Upgrade Did Not Start

If the USB boot upgrade process did not start, the Aprisa SR+ could already be operating on the version of software on the USB flash drive. This will be indicated by flashing display panel OK LED and then the OK, MODE and AUX will light steady green.

If any display panel LED flashes red or is steady red during the upgrade process, it indicates that the upgrade has failed. This could be caused by incorrect files on the USB flash drive or a radio hardware failure.

Check that the SuperVIsor USB Boot Upgrade setting is set to 'Load and Activate'.



Check the Result

Login in to SuperVisor and select Terminal > Details to view the Active and Previous software versions.

The screenshot displays the 4RF SUPERVISOR web interface. At the top, there is a header with the 4RF logo and 'SUPERVISOR' text on the left, and the 'Aprisa SR+' logo on the right. Below the header, there are two main tabs: 'Base Station' and 'Network'. The 'Base Station' tab is active and shows a status bar with five green indicator lights labeled 'OK', 'MODE', 'AUX', 'TX', and 'RX'. Below this, a navigation menu includes 'Terminal', 'Radio', 'Serial', 'Ethernet', 'IP', 'QoS', 'Security', 'Maintenance', 'Events', 'Software', and 'Monitoring'. Under the 'Terminal' tab, there are sub-tabs: 'Summary', 'Details', 'Device', 'Date/Time', and 'Operating Mode'. The 'Details' sub-tab is selected, and a light blue box titled 'MANUFACTURING DETAILS' is displayed. This box contains a table with the following information:

| MANUFACTURING DETAILS | |
|----------------------------|-------------------|
| Radio Serial Number | R1310000522 |
| Sub-Assembly Serial Number | 13092449 |
| HW Variant Type | 400 - 470MHz |
| Radio MAC Address | 00:22:b2:10:09:9c |
| Active Software Version | 1.3.0 |
| Previous Software Version | 1.3.0 |

At the bottom of the interface, there is a status bar with the text 'Busy', 'Radio: Base Station', and a 'Logout ADMIN' link.