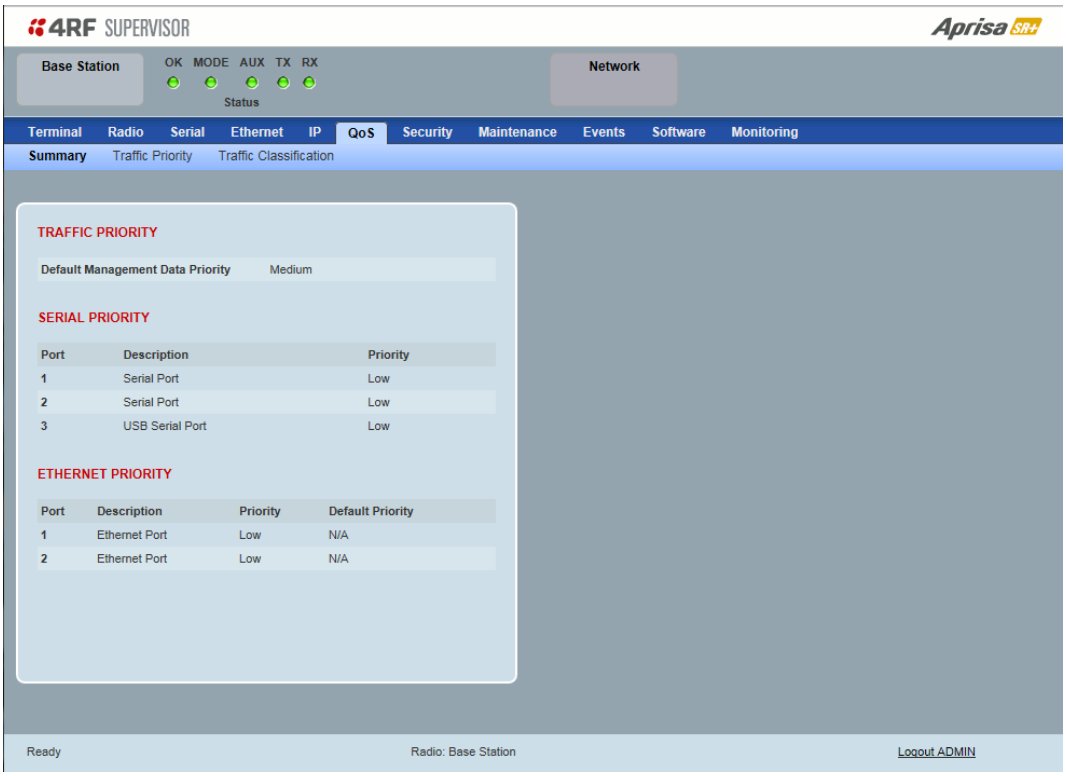
# QoS

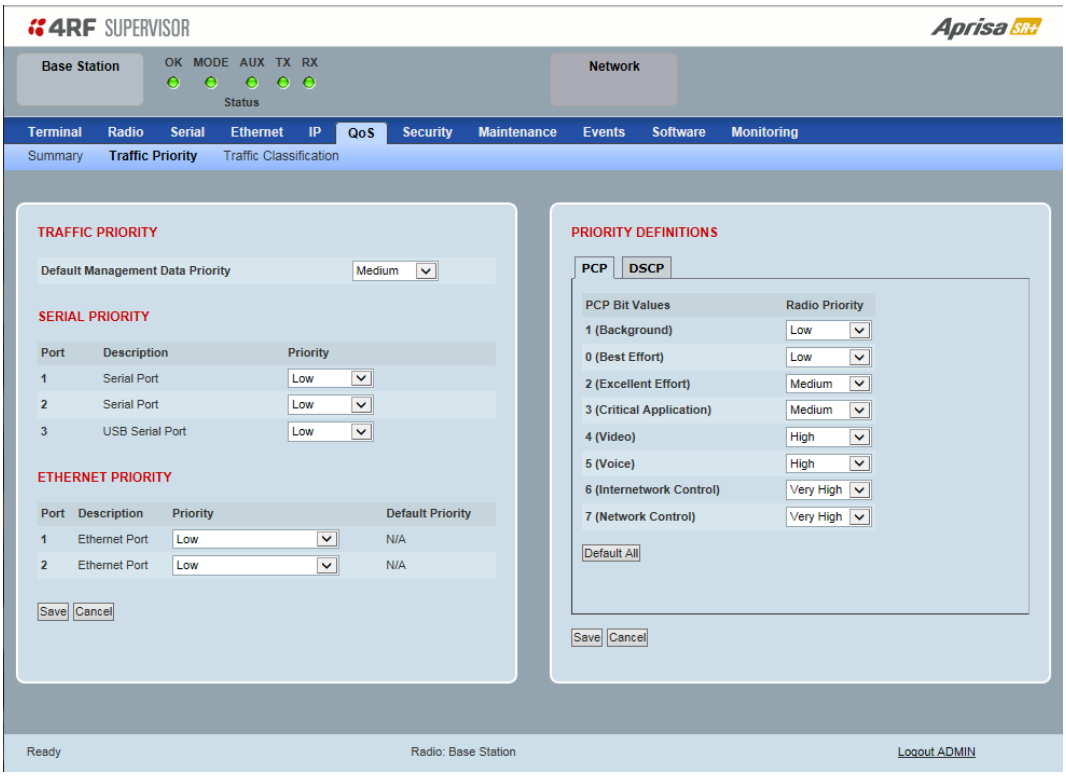
## QoS > Summary

This page provides a summary of the QoS Settings.




See ‘QoS > Traffic Priority’ and ‘QoS > Traffic Classification’ for configuration options.

## QoS > Traffic Priority




### TRAFFIC PRIORITY

*Default Management Data Priority*

The Default Management Data Priority controls the priority of the Ethernet management traffic relative to Ethernet customer traffic. It can be set to Very High, High, Medium and Low. The default setting is Medium.

This priority is also used for traffic if the remote serial port is not available for the radio hardware data port option e.g. if the base station is 2E2S and a remote radio is 4E0S.

### SERIAL PRIORITY

This parameter controls the per port priority of the serial customer traffic relative to the Ethernet customer traffic. If equal priority is required to Ethernet traffic, this setting must be the same as the Ethernet Data Priority setting.

The serial data priority can be set to Very High, High, Medium and Low. The default setting is Low.

A queuing system is used to prioritize traffic from the serial and Ethernet interfaces for over the air transmission. A weighting may be given to each data type and this is used to schedule the next transmission over the air e.g. if there are pending data packets in multiple buffers but serial data has a higher weighting it will be transmitted first. The serial buffer is 20 serial packets (1 packet can be up to 512 bytes).

There are four priority queues in the Aprisa SR: Very High, High, Medium and Low. Data is added to one of these queues depending on the priority setting. Data leaves the queues from highest priority to lowest: the Very High queue is emptied first, followed by High then Medium and finally Low.

## ETHERNET PRIORITY

This parameter controls the per port priority of the Ethernet customer traffic relative to the serial customer traffic. If equal priority is required to serial traffic, this setting must be the same as the Serial Data Priority setting.

The Ethernet Priority enables users to set the priority of Ethernet port ingress frames. The priority for each port can be:

1. From PCP priority bits (VLAN priority) in VLAN tagged frames or priority tag (VLAN 0) frames
2. From DSCP priority bits in an IP packet (DSCP in IPv4 TOS field)
3. All frames are set to 'very high' priority
4. All frames are set to 'high' priority
5. All frames are set to 'medium' priority
6. All frames are set to 'low' priority

The default setting is Low.

A queuing system is used to prioritize customer traffic from the serial and Ethernet interfaces for over the air transmission. A weighting may be given to each data type and this is used to schedule the next transmission over the air e.g. if there are pending data packets in multiple buffers but serial data has a higher weighting it will be transmitted first. The Ethernet buffer is 10 Ethernet packets (1 packet can be up to Ethernet MTU, 1536 bytes).

There are four priority queues in the Aprisa SR+: Very High, High, Medium and Low. Data is added to one of these queues depending on the priority setting. Data leaves the queues from highest priority to lowest: the Very High queue is emptied first, followed by High then Medium and finally Low.

### Default Priority

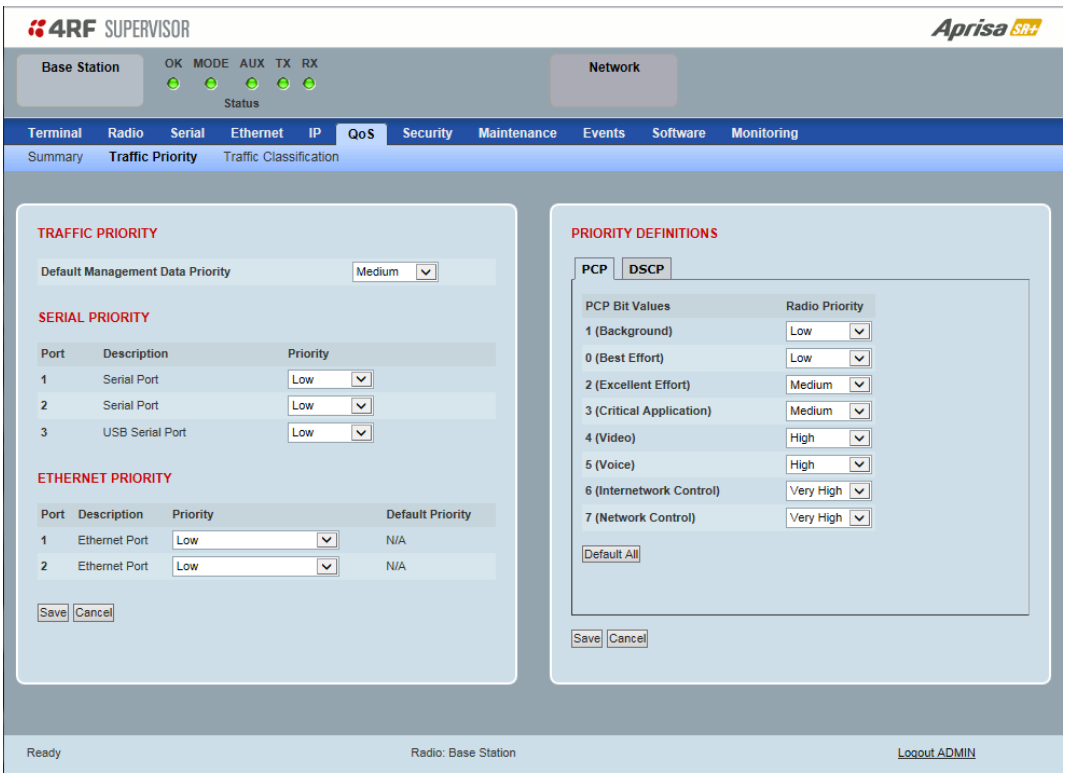
When the priority of an Ethernet port uses the PCP bits (VLAN priority) values the 'Default Priority' option is enabled, allowing the priority of untagged VLAN frames to be set.

When the priority of an Ethernet port uses the DSCP priority (in IPv4 TOS field) values the 'Default Priority' option is enabled, allowing the priority of ARP frames to be set.

*PRIORITY DEFINITIONS*

*PCP (Priority Code Point)*

These settings provide priority translation / mapping between the external radio LAN VLAN priority network and the radio internal VLAN priority network, using the VLAN tagged PCP (Priority Code Point) priority field in the Ethernet/VLAN frame.




The IEEE 802.1Q specification defines a standards-based mechanism for providing VLAN tagging and class of service (CoS) across Ethernet networks. This is accomplished through an additional VLAN tag, which carries VLAN tag ID and frame prioritization information (PCP field), inserted within the header of a Layer 2 Ethernet frame.

Priority Code Point (PCP) is a 3-bit field that indicates the frame priority level (or CoS). The operation of the PCP field is defined within the IEEE 802.1p standard, which is an extension of 802.1Q. The standard establishes eight levels of priority, referred to as CoS values, where CoS 7 ('111' in PCP filed) is the highest priority and CoS 0 ('000') is the lowest priority.

The radio in bridge mode used the PCP value in the VLAN tag to prioritize packets and provide the appropriate QoS treatment per traffic type. The radio implements 4 priority queuing techniques that base its QoS on the VLAN priority (PCP). Based on VLAN priority bits, traffic can be put into a particular Class of Service (CoS) queue. Packets with higher CoS will always serve first for OTA transfer and on ingress/egress Ethernet ports.

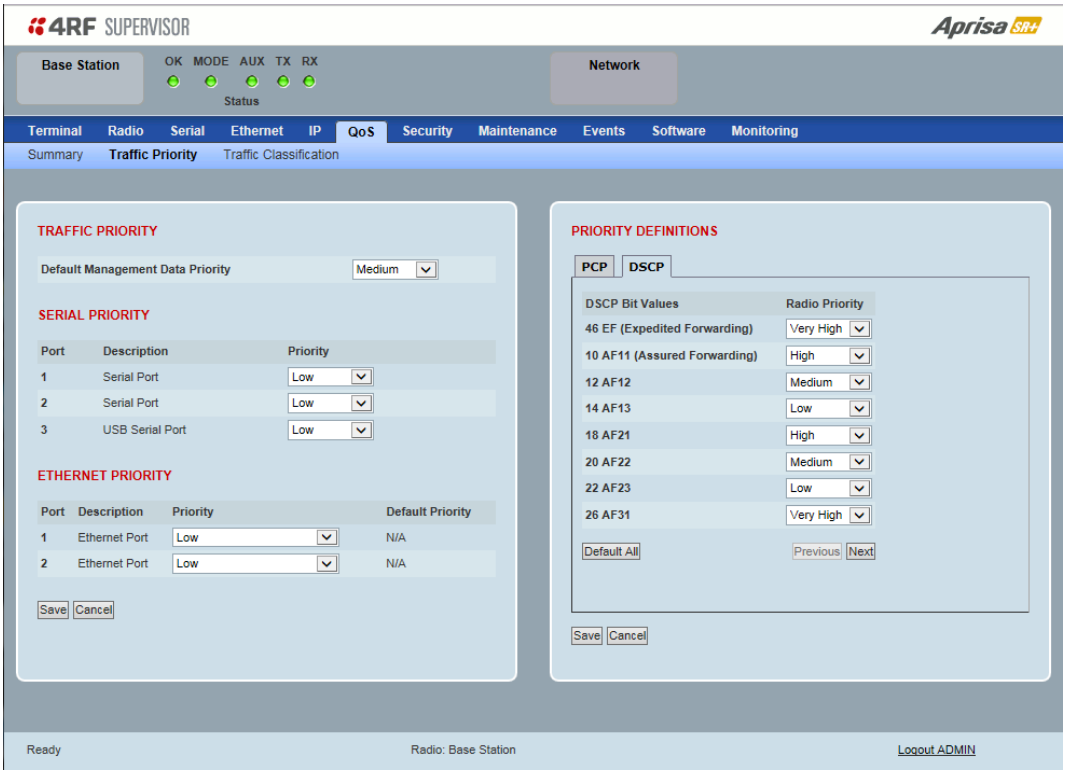
The 'PCP priority definition' tab is used to map ingress VLAN packet with PCP priority to the radio internal CoS (priority). Since, in most of the cases the radio VLAN network is connected to the corporate VLAN networks, the network administrator might like to have a different VLAN priority scheme of the radio network CoS. For example, management traffic in the multi-gigabit corporate VLAN network might be prioritize with priority 7 (highest priority) and SCADA traffic with priority 5, but in the narrow bandwidth radio network, SCADA traffic will be map to radio very high CoS / priority (i.e. set PCP 5 = Very high) and management traffic might will be map to radio medium CoS / priority (i.e. set PCP 7 = medium) in order to serve first the mission-critical SCADA traffic over the radio network.

This is done by mapping the external radio network VLAN priority to the internal radio CoS / priority using the 'PCP priority definition' tab. The radio support 4 queues, thus at maximum an 8 -> 4 VLAN priority / CoS mapping is done.

Default mapping of ingress packet VLAN priority to radio CoS / priority shown in the 'PCP priority definition' tab.

*DSCP (Differentiated Services Code Point)*

These settings provide translation / mapping between the external radio IP priority network and the radio internal IP priority network, using the DSCP (DiffServ Code Point) priority field in the IP packet header.




Differentiated Services (DiffServ) is a new model in which traffic is treated by routers with relative priorities based on the IPv4 type of services (ToS) field. DSCP (DiffServ Code Point) standard defined in RFC 2474 and RFC 2475. DiffServ increases the number of definable priority levels by reallocating bits of an IP packet for priority marking.

The DiffServ architecture defines the DiffServ (DS) field, which supersedes the ToS field in IPv4 to make per-hop behaviour (PHB) decisions about packet classification and traffic scheduling functions. The six most significant bits of the DiffServ field (in the IPv4 TOS field) is called as the DSCP. The standardized DiffServ field of the packet is marked with a value so that the packet receives a particular routing/forwarding treatment or PHB, at each router node. Using DSCP packet classification, traffic can be partition into multiple priority levels.

The radio in router mode uses the DSCP value in the IP header to select a PHB behaviour for the packet and provide the appropriate QoS treatment. The radio implements 4 priority queuing techniques that base its PHB on the DSCP in the IP header of a packet. Based on DSCP, traffic can be put into a particular priority / CoS (Class of Service) queue. Packets with higher CoS will always serve first for OTA transfer and on ingress / egress Ethernet ports.

The 'DSCP priority definition' tab is used to map ingress IP packet with DSCP priority to the radio internal priority / CoS. Since, in most of the cases the radio routed network is connected to the corporate routed networks, the network administrator might like to have a different routed network priority scheme of the radio network, for example management traffic in the multi-gigabit corporate routed network might be prioritize with DSCP EF (expedite forwarding) code (DSCP highest priority), and SCADA traffic with DSCP AF11 (assured forwarding) code (high priority), but in the narrow bandwidth radio network, SCADA traffic will be map to radio very high CoS / priority (i.e. set AF11 = Very high) and management traffic might map to radio low CoS / priority (i.e. set EF = Low) in order to serve first the mission-critical SCADA traffic over the radio network.

This is done by mapping the external radio network DSCP priority to the internal radio CoS / priority levels using the 'DSCP priority definition' tab. The radio support four queues, thus at maximum a 64 -> 4 CoS / priority mapping is done.

Default mapping of ingress packet DSCP priority to radio CoS shown in the 'DSCP priority definition' tab. The radio maps all 64 DSCP values. The user can configure most common used 21 DSCP codes and the rest are mapped by default to low CoS / priority.

## QoS > Traffic Classification

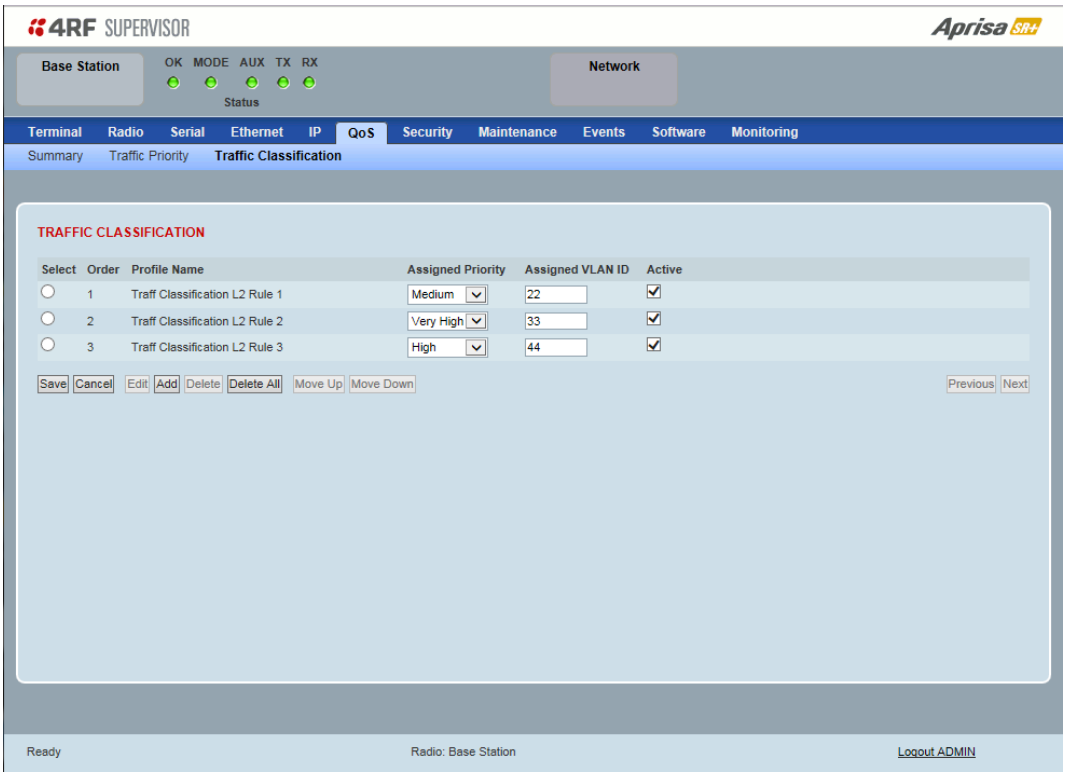
These settings provide multiple traffic classification profiles based on classification rules. Profiles for a specific traffic type, protocol or application can be assigned to a particular VLAN and CoS / priority in bridge mode or to CoS / priority in router mode to provide the appropriate QoS treatment.

For example SCADA traffic, management traffic, FTP traffic, can each have its own profile build with a set of classification rules. A profile can be build using multiple classification rules based on ports, Ethernet, IP, TCP / UDP headers fields (i.e. L1/2/3/4 header fields) such as: Ethernet port #1, VLAN ID, VLAN priority, IP DSCP Priority, MAC/IP address, TCP / UDP port fields to identify and classify the specific traffic type. When an ingress packet matches the profile L2/3/4 header fields settings, the packet is assigned to a particular VLAN and CoS / priority in bridge mode or to CoS / priority in router mode to provide the appropriate QoS treatment.

The radio supports four CoS / priority queues: very high, high, medium and low. These queues are connected to a strict priority scheduler which dispatches packets from the queues out to the egress port by always serving first the 'very high' priority queue, whenever there is a packet in this queue. When the highest priority queue empties, the scheduler will serve the next high priority queues and so on. So when SCADA traffic is assigned to a 'Very high' priority, it will always served first and send over-the-air (OTA) whenever SCADA traffic enters to the radio, giving it the highest priority over other traffic type.

These settings are different for Bridge Mode and Router Mode.

## Bridge Mode Traffic Classification Settings




### TRAFFIC CLASSIFICATION

VLAN bridge mode traffic classification settings provide mapping / assigning of profiles (set by rules to match a specific traffic type) to a VLAN ID and VLAN CoS / priority. The profile which is used to match to a specific traffic type will be identified in the radio network by its associated VLAN ID and VLAN CoS / priority to provide the appropriate QoS treatment. CoS / Priority can be set to very high, high, medium, low priority.

*Profile name*

A free form field to enter the profile name with a maximum of 32 chars.

*Assigned Priority*

Traffic packets that match the applied profile rules will be assigned to the selected 'assigned priority' setting of Very High, High, Medium and Low. This field cannot be set to Don't Care.

This applies profile rule mapping to the VLAN CoS / Priority with the appropriate internal radio assigned priority setting of Very High, High, Medium and Low.

*Assigned VLAN ID*

Traffic packets that match the applied profile rules will be assigned to the selected 'assigned VLAN ID' setting of VLAN ID in the range of 0 to 4095.

A VLAN ID of an ingress packet matching the classification rule (see 'VLAN ID' rule in next page) shall be changed to the 'assigned VLAN ID' setting, if below conditions are met:

1. The VLAN ID of Ingress packet is same as PVID of the ingress port.
2. Packet is received untagged at the port

If the VLAN ID of the tagged ingress packet is not the same as the PVID of the ingress port, then it shall not be changed and the 'assigned VLAN ID' setting is ignored i.e. ingress VLANs will pass-through unchanged.

If 'assigned VLAN ID' value is set in the 'port VLAN membership' under Ethernet > VLAN (port x tab), then this VLAN will be available for ingress and egress on the Ethernet and RF ports, otherwise this VLAN will only be available in one direction on the egress RF port.

For example, if the base station Ethernet port 1 'assigned VLAN ID' = 100 (VLAN-100) and it is also defined in the 'port VLAN membership' under Ethernet > VLAN (port 1 tab) and the remote sends a packet to the base with a VLAN of 100, this packet will be egress out to Ethernet port 1 (tagged or untagged based on the 'egress action' definition). If the VLAN-100 wasn't set in the 'port VLAN membership', then the base station will drop a packet from the remote.

This setting parameter can be 'Don't Care' (Assigned VLAN ID = 0) which means that the VLAN ID of ingress frame will never be modified.

*Active*

Activates or deactivates the profile rule.

## Controls

The Save button saves all profiles to the radio.

The Cancel button removes all changes since the last save or first view of the page if there has not been any saves. This button will un-select all the Select radio buttons.

The Edit button will show the next screen for the selected profile where the profile can be configured. This button will be disabled unless a profile is selected.

The Add button adds a new profile,

- If no profile was selected then the new profile is added to the end of the list,
- If a profile is selected the new profile is added after that profile.

The Delete button will delete the selected profile. The button will be disabled unless a profile has been selected.

The Delete All button will delete all the profiles. A pop-up will ask if the action is correct. If the answer is yes, then all profiles are deleted in SuperVisor. The Save button must be pressed to delete all the profiles in the radio.

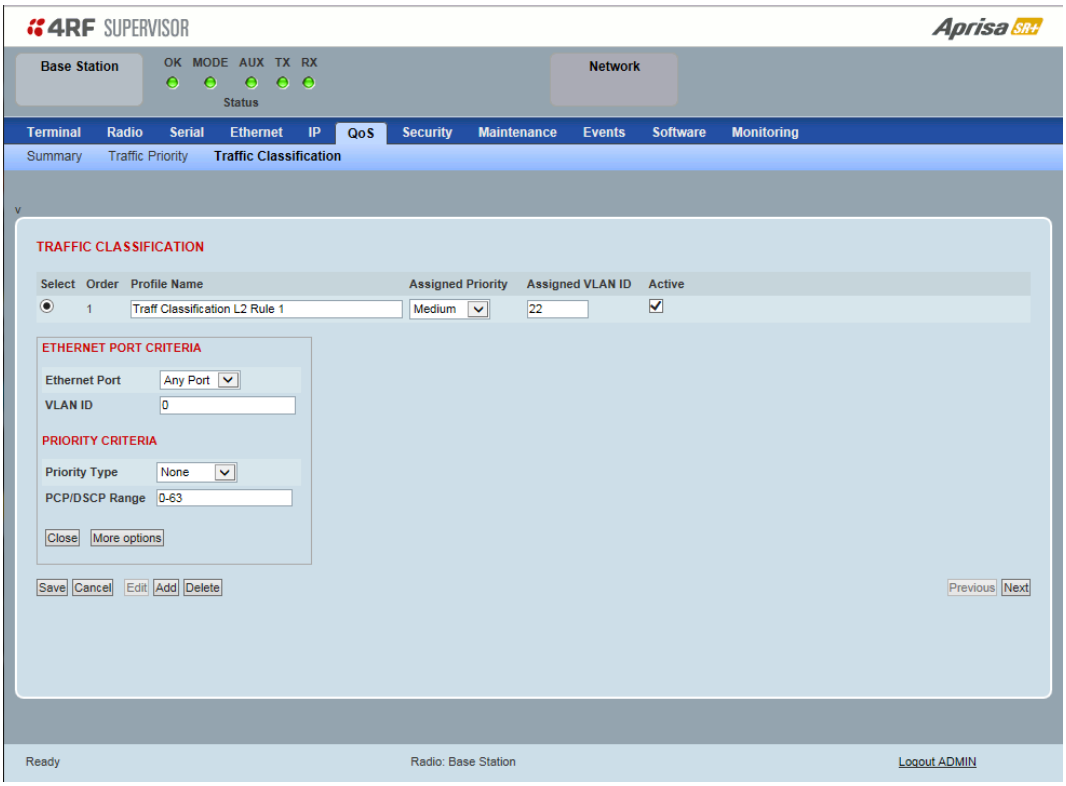
The Move up button will move the selected profile up one in the order of profiles

The Move Down button will move the selected profile down one in the order of profiles

The Previous button displays the previous page in the list of profiles. A pop up will be displayed if any profile has been modified and not saved, preventing the previous page being displayed.

The Next button will display the next page in the list of profiles.

To edit a traffic classification, select the profile and click on the Edit button




## ETHERNET PORT CRITERIA

### *Ethernet Port*

Set the layer 1 Ethernet port number or all Ethernet ports in the selected profile classification rule.

### *VLAN ID*

Sets the layer 2 packet Ethernet header VLAD ID field in the selected profile classification rule. Valid values are between 0 and 4095. This VLAN ID should be enabled in the system for using this parameter during classification.

Enable this VLAN in the network by setting the same VLAN ID value in PVID (port VLAN ID) and in the PORT VLAN MEMBERSHIP under 'VLAN PORT SETTINGS – Port 1' on page 144. If the VLAN ID is set to zero, all VLAN IDs will meet the criteria.

## PRIORITY CRITERIA

*Priority Type*

Set the layer 2 Ethernet or layer 3 IP packet header priority type fields in the selected profile classification rules.

| Priority Type | Description |
|---|---|
| None | Do not use any layer 2 / 3 Ethernet or IP header priority fields in the selected profile classification rules. |
| PCP | Use the layer 2 Ethernet header priority field of PCP (Priority Code Point) VLAN priority bits (per IEEE 802.1p/q) in the selected profile classification rules. |
| DSCP | Use the layer 3 IP header TOS field used as DSCP (Differentiated Services Code Point per RFC 2474 and RFC 2475) priority bit in the selected profile classification rules. |

*PCP / DSCP Range*

As per the 'priority type' selection, this parameter sets the PCP priority value/s or DSCP priority value/s fields in the selected profile classification rule. The value can be set to a single priority or a single range (no multiple ranges are allowed), for example, the PCP selected priority value can be 7 or a range of priority values like 4-7.

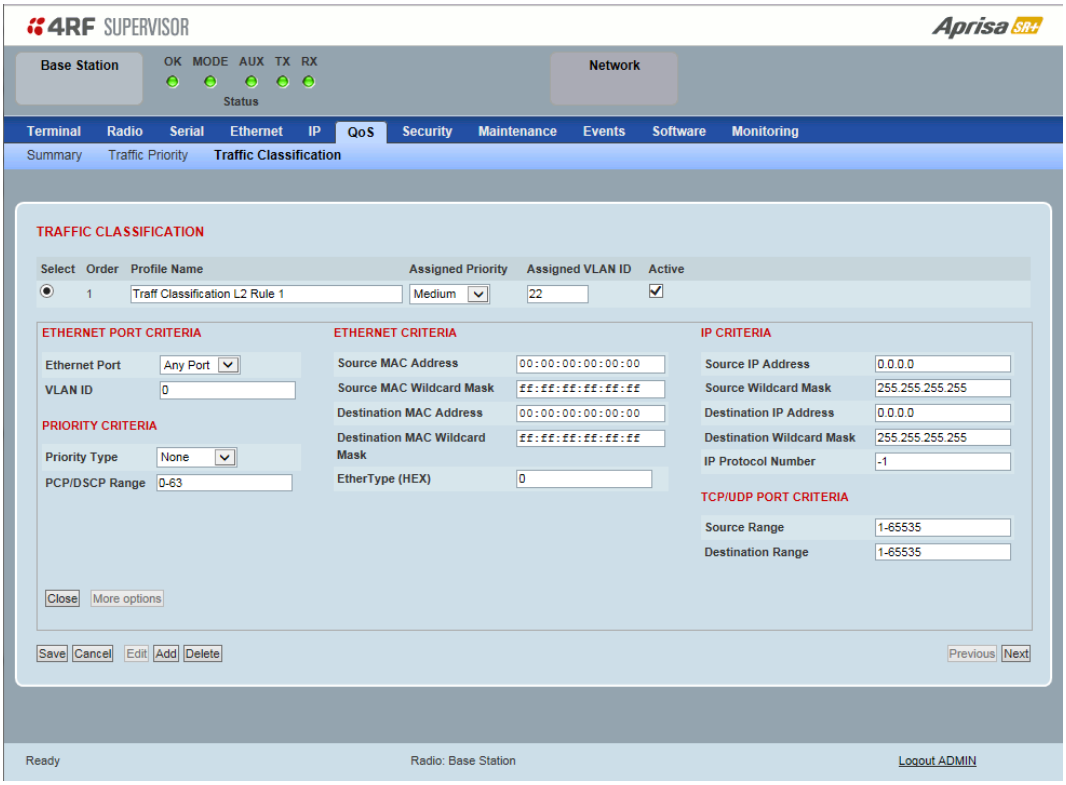
The following table shows the layer 2 packet VLAN tag header PCP priority field values

| PCP Value (Decimal) | PCP Priority | Priority Level |
|---|---|---|
| 7 | Priority [7] | Highest |
| 6 | Priority [6] | |
| 5 | Priority [5] | |
| 4 | Priority [4] | |
| 3 | Priority [3] | |
| 2 | Priority [2] | |
| 1 | Priority [1] | |
| 0 | Priority [0] | Lowest |

The following table shows the layer 3 packet IP header DSCP priority field values

| DSCP Value (Decimal) | DSCP Priority |
|---|---|
| 46 | EF (Expedited Forwarding) |
| 10 | AF11 (Assured Forwarding) |
| 12 | AF12 |
| 14 | AF13 |
| 18 | AF21 |
| 20 | AF22 |
| 22 | AF23 |
| 26 | AF31 |
| 28 | AF32 |
| 30 | AF33 |
| 34 | AF41 |
| 36 | AF42 |
| 38 | AF43 |
| 0 | CS0/Best Effort (BE) |
| 8 | CS1 (Class Selector ) |
| 16 | CS2 |
| 24 | CS3 |
| 32 | CS4 |
| 40 | CS5 |
| 48 | CS6 |
| 56 | CS7 |

Click on More Options if more Layer 2/3/4 (Ethernet / IP / TCP or UDP) packet header fields are required for the selected profile classification rule. This page describes all the possible fields that can be used for the classification rules in bridge mode.




## ETHERNET CRITERIA

### *Source MAC Address*

This parameter sets the Layer 2 Ethernet packet header Source MAC Address field in the selected profile classification rule in the format of ‘hh:hh:hh:hh:hh:hh’.

### *Source MAC Wildcard Mask*

This parameter sets the wildcard mask of the ‘Source MAC Address’. If the Source MAC Address is set to ‘FF:FF:FF:FF:FF:FF’, all source MAC addresses will meet the criteria.

### *Destination MAC Address*

This parameter sets the Layer 2 Ethernet packet header Destination MAC Address field in the selected profile classification rule in the format of ‘hh:hh:hh:hh:hh:hh’.

### *Destination MAC Wildcard Mask*

This parameter sets the wildcard mask of the ‘Destination MAC Address’. If the Destination MAC Address is set to ‘FF:FF:FF:FF:FF:FF’, all destination MAC addresses will meet the criteria.

*EtherType (Hex)*

This parameter sets the Layer 2 Ethernet packet header EtherType field in the selected profile classification rule. EtherType is a 16 bit (two octets) field in an Ethernet frame. It is used to indicate which protocol is encapsulated in the payload of an Ethernet Frame.

EtherType Examples:

| Protocol | EtherType Value (Hexadecimal) |
|---|---|
| IPv4 | 0800 |
| ARP | 0806 |
| IPv6 | 86DD |
| VLAN | 8100 |

## IP CRITERIA

*Source IP Address*

This parameter sets the Layer 3 IP packet header Source IP Address field in the selected profile classification rule. This parameter is written in the standard IPv4 format of 'xxx.xxx.xxx.xxx'.

*Source IP Wildcard Mask*

This parameter sets the wildcard mask applied to the 'Source IP Address'. This parameter is written in the standard IPv4 format of 'xxx.xxx.xxx.xxx'.

0 means that it must be a match. If the wildcard mask is set to 0.0.0.0, the complete Source IP Address will be evaluated for the classification rule.

If the wildcard mask is set to 0.0.255.255, the first 2 octets of the Source IP Address will be evaluated for the classification rule.

If the wildcard mask is set to 255.255.255.255, none of the Source IP Address will be evaluated for the classification rule.

Note: The wildcard mask operation is the inverse of subnet mask operation

*Destination IP Address*

This parameter sets the Layer 3 IP packet header Destination IP Address field in the selected profile classification rule. This parameter is written in the standard IPv4 format of 'xxx.xxx.xxx.xxx'.

*Destination IP Wildcard Mask*

This parameter sets the wildcard mask applied to the 'Destination IP Address'. This parameter is written in the standard IPv4 format of 'xxx.xxx.xxx.xxx'.

0 means that it must be a match. If the wildcard mask is set to 0.0.0.0, the complete Destination IP Address will be evaluated for the classification rule.

If the wildcard mask is set to 0.0.255.255, the first 2 octets of the Destination IP Address will be evaluated for the classification rule.

If the wildcard mask is set to 255.255.255.255, none of the Destination IP Address will be evaluated for the classification rule.

Note: The wildcard mask operation is the inverse of subnet mask operation

*IP Protocol Number*

This parameter sets the Layer 3 IP packet header 'Protocol' field in the selected profile classification rule. This field defines the protocol used in the data portion of the IP datagram.

Protocol number Examples:

| Protocol | Protocol value (decimal) |
|---|---|
| ICMP | 1 |
| TCP | 6 |
| UDP | 17 |

## TCP / UDP PORT CRITERIA

*Source Range*

This parameter sets the Layer 4 TCP / UDP packet header Source Port or Source Port range field in the selected profile classification rule. To specify a range, insert a dash between the ports e.g. 1000-2000. If the source port range is set to 1-65535, traffic from any source port will meet the criteria.

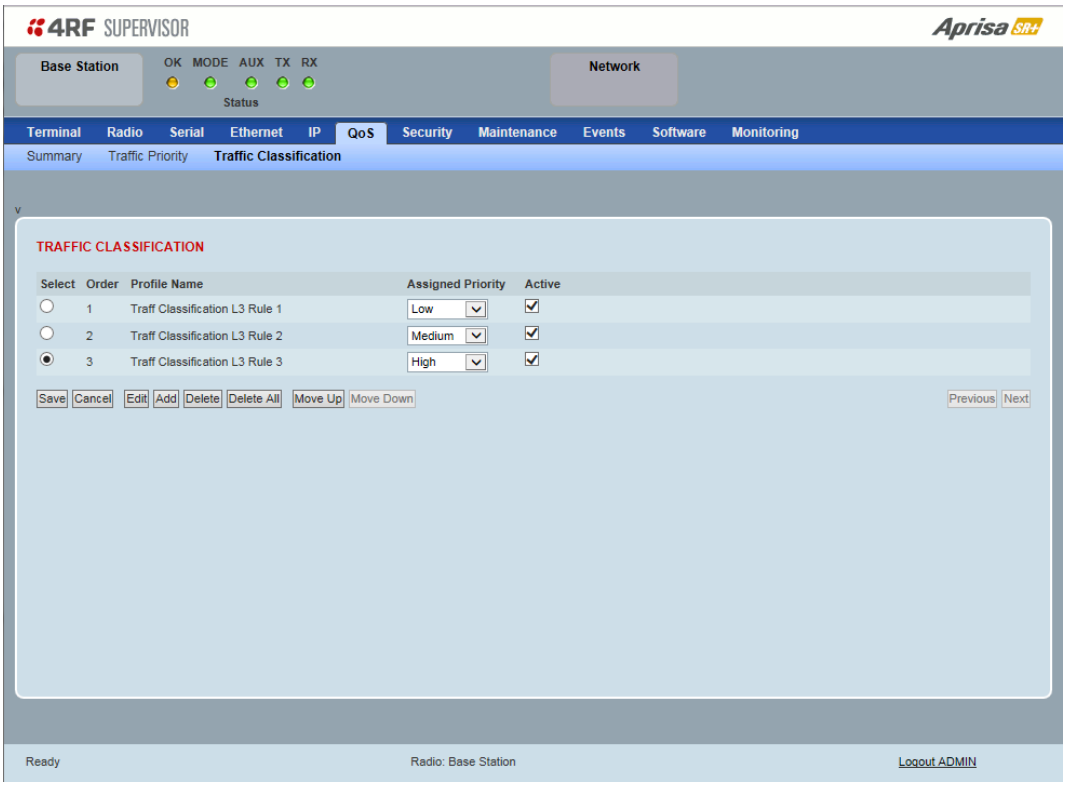
*Destination Range*

This parameter sets the Layer 4 TCP / UDP packet header Destination Port or Destination Port range field in the selected profile classification rules. To specify a range, insert a dash between the ports e.g. 1000-2000. If the source port range is set to 1-65535, traffic from any source port will meet the criteria.

Examples for TCP / UDP Port Numbers:

| Protocol | TCP / UDP Port # (decimal) |
|---|---|
| Modbus | 502 |
| IEC 60870-5-104 | 2,404 |
| DNP 3 | 20,000 |
| SNMP | 161 |
| SNMP TRAP | 162 |

## Router Mode Traffic Classification Settings




### *TRAFFIC CLASSIFICATION*

Router Mode traffic classification settings provide mapping / assigning of profiles (set by rules to match a specific traffic type) to a CoS / priority. The profile which is used to match to a specific traffic type will be identified in the radio network by its associated CoS / priority to provide the appropriate QoS treatment. CoS / Priority can be set to very high, high, medium, low priority.

### *Profile name*

A free form field to enter the profile name with a maximum of 32 chars.

### *Assigned Priority*

Traffic packets that match the applied profile rules will be assigned to the selected 'assigned priority' setting of Very High, High, Medium and Low. This field cannot be set to Don't Care.

### *Active*

Activated or deactivate the profile rule.

## Controls

The Save button saves all profiles to the radio.

The Cancel button removes all changes since the last save or first view of the page if there has not been any saves. This button will un-select all the Select radio buttons.

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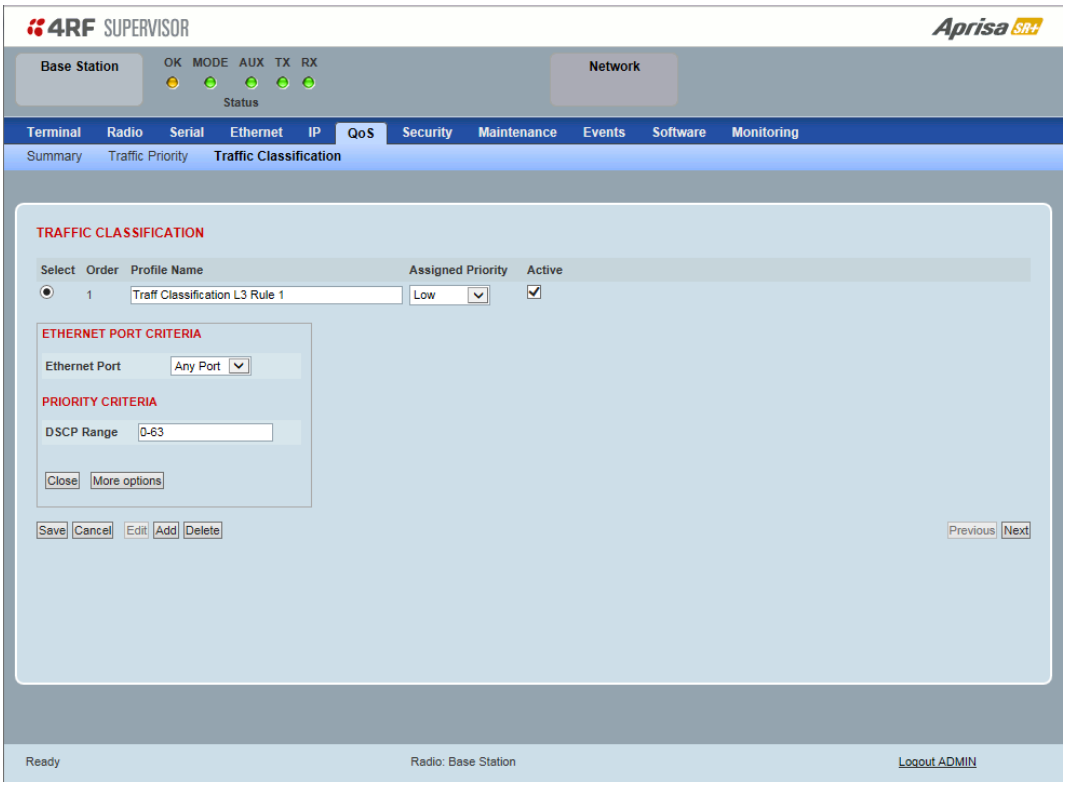



## ETHERNET PORT CRITERIA

### *Ethernet Port*

Set the layer 1 Ethernet port number or all Ethernet ports in the selected profile classification rules.

## PRIORITY CRITERIA

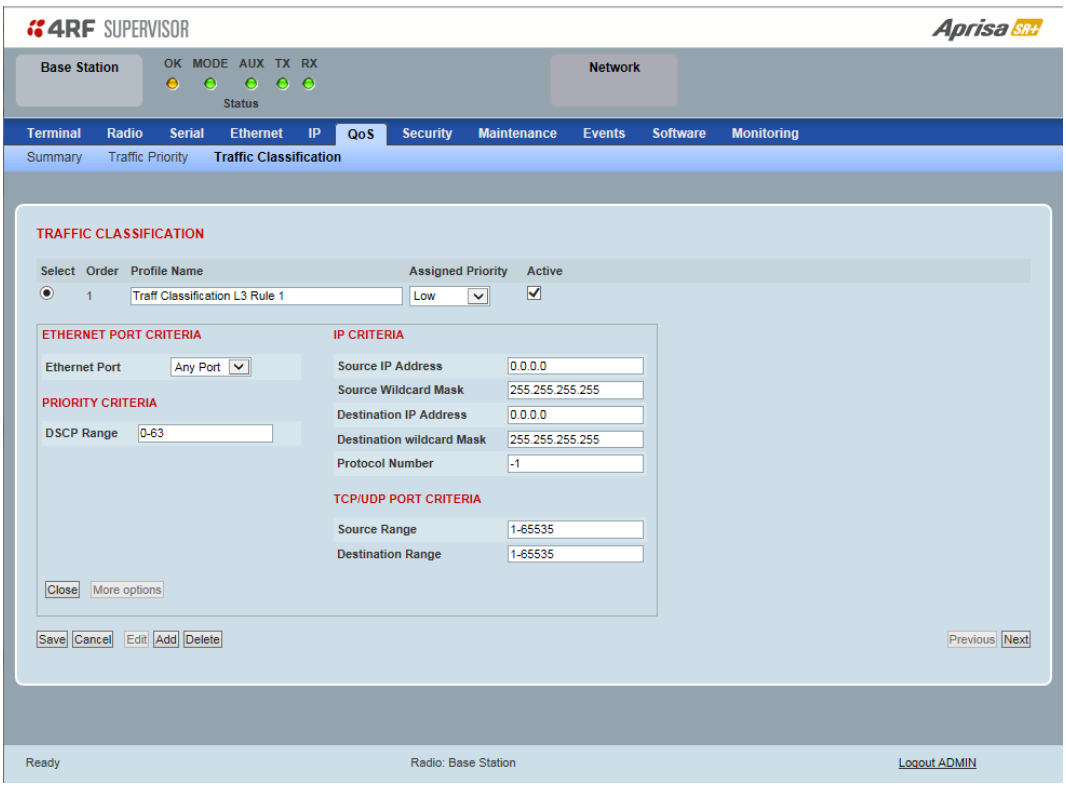
### *DSCP Range*

Sets the DSCP priority value/s field in the selected profile classification rule. The value can be set to a single priority or a single range (no multiple range are allowed), for example, priority value can be 46 (EF) or a range of priority values like 10-14.

The following table shows the layer 3 packet IP header DSCP priority field values

| DSCP Value (Decimal) | DSCP Priority |
|---|---|
| 46 | EF (Expedited Forwarding) |
| 10 | AF11 (Assured Forwarding) |
| 12 | AF12 |
| 14 | AF13 |
| 18 | AF21 |
| 20 | AF22 |
| 22 | AF23 |
| 26 | AF31 |
| 28 | AF32 |
| 30 | AF33 |
| 34 | AF41 |
| 36 | AF42 |
| 38 | AF43 |
| 0 | CS0/Best Effort (BE) |
| 8 | CS1 (Class Selector ) |
| 16 | CS2 |
| 24 | CS3 |
| 32 | CS4 |
| 40 | CS5 |
| 48 | CS6 |
| 56 | CS7 |

Click on More Options if more Layer 3/4 packet header fields are required for the selected profile classification rule. This page describes all the possible fields that can be used for the classification rules in router mode.




## IP CRITERIA

### *Source IP Address*

This parameter sets the Layer 3 packet IP header Source IP Address field in the selected profile classification rules. This parameter is written in the standard IPv4 format of ‘xxx.xxx.xxx.xxx’.

### *Source IP Wildcard Mask*

This parameter sets the wildcard mask applied to the ‘Source IP Address’. This parameter is written in the standard IPv4 format of ‘xxx.xxx.xxx.xxx’.

0 means that it must be a match. If the wildcard mask is set to 0.0.0.0, the complete Source IP Address will be evaluated for the classification rules.

If the wildcard mask is set to 0.0.255.255, the first 2 octets of the Source IP Address will be evaluated for the classification rules.

If the wildcard mask is set to 255.255.255.255, none of the Source IP Address will be evaluated for the classification rules.

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Note: The wildcard mask operation is the inverse of subnet mask operation

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### *Destination IP Address*

This parameter sets the Layer 3 packet IP header Destination IP Address field in the selected profile classification rules. This parameter is written in the standard IPv4 format of ‘xxx.xxx.xxx.xxx’.

*Destination IP Wildcard Mask*

This parameter sets the wildcard mask applied to the 'Destination IP Address'. This parameter is written in the standard IPv4 format of 'xxx.xxx.xxx.xxx'.

0 means that it must be a match. If the wildcard mask is set to 0.0.0.0, the complete Destination IP Address will be evaluated for the classification rules.

If the wildcard mask is set to 0.0.255.255, the first 2 octets of the Destination IP Address will be evaluated for the classification rules.

If the wildcard mask is set to 255.255.255.255, none of the Destination IP Address will be evaluated for the classification rules.

Note: The wildcard mask operation is the inverse of subnet mask operation

*Protocol Number*

This parameter sets the Layer 3 IP packet header 'Protocol' field in the selected profile classification rule. This field defines the protocol used in the data portion of the IP datagram.

Protocol number Examples:

| Protocol | Protocol value (decimal) |
|---|---|
| ICMP | 1 |
| TCP | 6 |
| UDP | 17 |

## TCP / UDP Port Criteria

*Source Range*

This parameter sets the Layer 4 TCP / UDP packet header Source Port or Source Port range field in the selected profile classification rule. To specify a range, insert a dash between the ports e.g. 1000-2000. If the source port range is set to 1-65535, traffic from any source port will meet the criteria.

*Destination Range*

This parameter sets the Layer 4 TCP / UDP packet header Destination Port or Destination Port range field in the selected profile classification rule. To specify a range, insert a dash between the ports e.g. 1000-2000. If the source port range is set to 1-65535, traffic from any source port will meet the criteria.

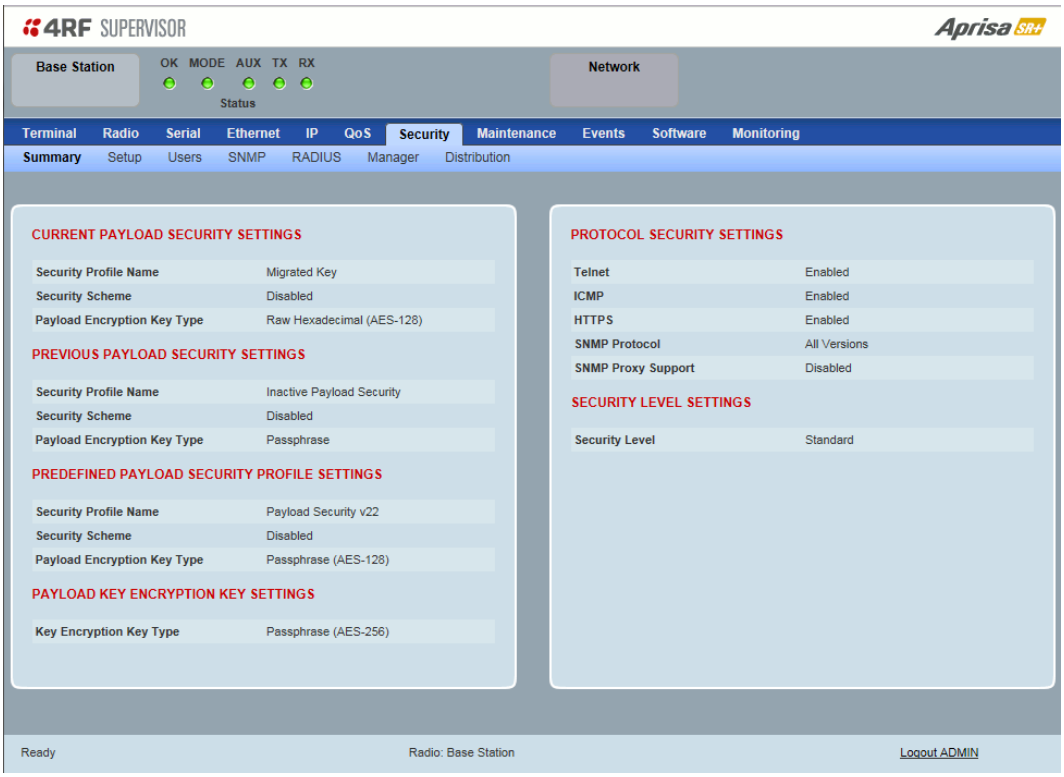
Examples for TCP / UDP Port Numbers:

| Protocol | TCP / UDP Port # (decimal) |
|---|---|
| Modbus | 502 |
| IEC 60870-5-104 | 2,404 |
| DNP 3 | 20,000 |
| SNMP | 161 |
| SNMP TRAP | 162 |

# Security

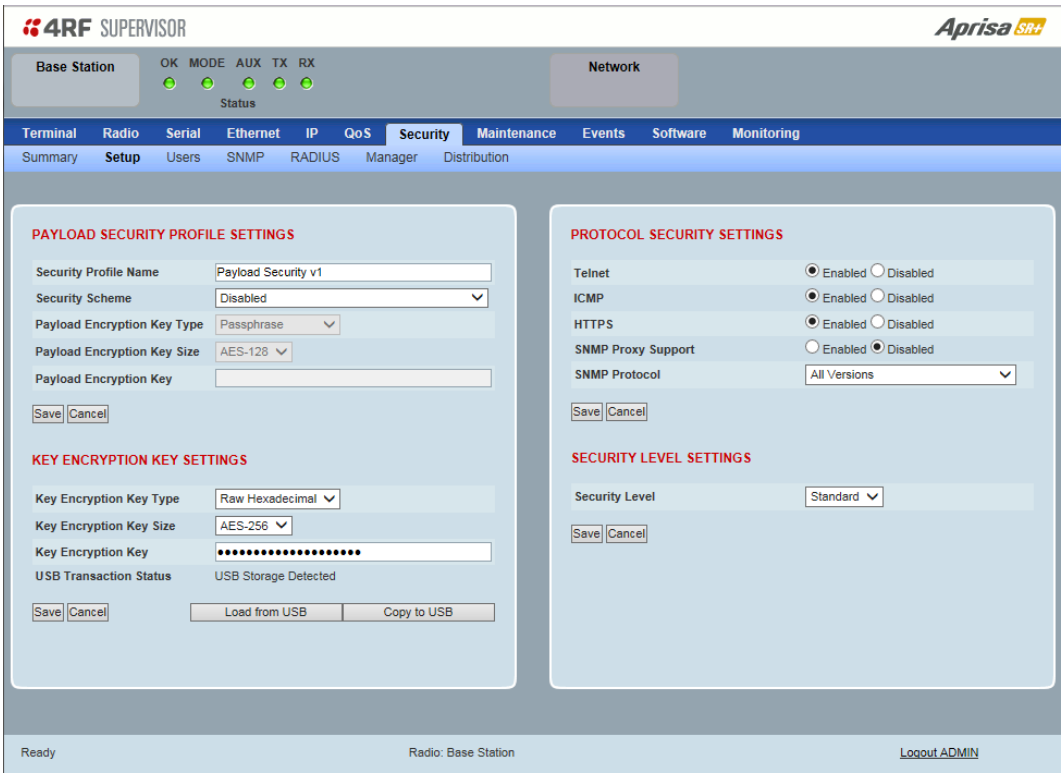
## Security > Summary

This page displays the current settings for the Security parameters.




See ‘Security > Setup’ and ‘Security > Manager’ for configuration options.

## Security > Setup




### PAYLOAD SECURITY PROFILE SETTINGS

*Security Profile Name*

This parameter enables the user to predefine a security profile with a specified name.

*Security Scheme*

This parameter sets the security scheme to one of the values in the following table:

| Security Scheme |
|---|
| Disabled (No encryption and no Message Authentication Code) |
| AES Encryption + CCM Authentication 128 bit |
| AES Encryption + CCM Authentication 64 bit |
| AES Encryption + CCM Authentication 32 bit |
| AES Encryption only |
| CCM Authentication 128 bit |
| CCM Authentication 64 bit |
| CCM Authentication 32 bit |

The default setting is Disabled.

*Payload Encryption Key Type*

This parameter sets the Payload Encryption Key Type:

| Option | Function |
|---|---|
| Pass Phrase | Use the Pass Phrase password format for standard security. |
| Raw Hexadecimal | Use the Raw Hexadecimal key format for better security. It must comply with the specified encryption key size e.g. if Encryption Type to AES128, the encryption key must be 16 bytes (32 chars) |

The default setting is Pass Phrase.

*Payload Encryption Key Size*

This parameter sets the Encryption Type to AES128, AES192 or AES256. The default setting is AES128.

The higher the encryption size the better the security.

*Payload Encryption Key*

This parameter sets the Payload Encryption password. This key is used to encrypt the payload.

Pass Phrase

Good password policy:

- contains at least eight characters, and
- contains at least one upper case letter, and
- contains at least one lower case letter, and
- contains at least one digit or another character such as @+... , and
- is not a term in a familiar language or jargon, and
- is not identical to or derived from the accompanying account name, from personal characteristics or from information from one's family/social circle, and
- is easy to remember, for instance by means of a key sentence

Raw Hexadecimal

The Raw Hexadecimal key must comply with the specified encryption key size e.g. if Encryption Type to AES128, the encryption key must be 16 bytes (32 chars).

KEY ENCRYPTION KEY SETTINGS

The Key Encryption Key provides the ability to encrypt the Payload Encryption Key so it can be safely transmitted over the radio link to remote radios.

The Key Encryption Key Type, Key Encryption Key Size and Key Encryption Key must be the same on all radios in the network.

*Key Encryption Key Type*

This parameter sets the Payload Encryption Key Type:

| Option | Function |
|---|---|
| Pass Phrase | Use the Pass Phrase password format for standard security. |
| Raw Hexadecimal | Use the Raw Hexadecimal key format for better security. It must comply with the specified encryption key size<br>e.g. if Encryption Type to AES128, the encryption key must be 16 bytes (32 chars) |

The default setting is Pass Phrase.

*Key Encryption Key Size*

This parameter sets the Encryption Type to AES128, AES192 or AES256. The default setting is AES128.

The higher the encryption type the better the security.

*Key Encryption Key*

This parameter sets the Key Encryption Key. This is used to encrypt the payload encryption key.

*USB Transaction Status*

This parameter shows if a USB flash drive is plugged into the radio host port .

| Option | Function |
|---|---|
| USB Storage Not Detected | A USB flash drive is not plugged into the radio host port. |
| USB Storage Detected | A USB flash drive is plugged into the radio host port. |

Note: Some brands of USB flash drives may not work with 4RF radios.

## Controls

The ‘Save’ button saves the Key Encryption Key settings to the radio. If the Security Level is set to Strong (see ‘Security Level’ on page 191), this button will be grayed out.

The ‘Load From USB’ button loads the Key Encryption Key settings from the USB flash drive. If a USB flash drive is not detected, this button will be grayed out

The ‘Copy To USB’ button copies the Key Encryption Key settings to a file called ‘asrkek.txt’ on the USB flash drive. This settings file can be used to load into other radios. If a USB flash drive is not detected or the Security Level is set to Strong (see ‘Security Level’ on page 191), this button will not be shown.

## Key Encryption Key Summary

The security of over-the-air-rekeying depends on a truly random Key Encryption Key. This is why the use of a Raw Hexadecimal key is recommended as a plain text phrase based on known spelling and grammar constructs is not very random. The *default* Key Encryption Key is provided only to allow testing of the security mechanism and is not intended for operational use. Using the default Key Encryption Key undermines the security of the AES payload encryption because an attacker using the default Key Encryption Key would immediately recover the AES payload key after the first over-the-air-rekeying event.

When the Security Level is set to Strong, various protections are applied to the Key Encryption Key setting to prevent tampering. In addition, the Key Encryption Key Type, Key Encryption Key Size, and the Key Encryption Key itself are all loaded from a customer prepared USB key. This is a one way operation to prevent key recovery from radios. While the ability to save a Key Encryption Key to USB exists in Standard Security Level, the Strong Security Level Key Encryption Key is not compromised because the Strong Key Encryption Key is not the same as the Standard Security Level Key Encryption Key.

PROTOCOL SECURITY SETTINGS

*Telnet option*

This parameter option determines if you can manage the radio via a Telnet session. The default setting is disabled.

*ICMP option (Internet Control Message Protocol)*

This parameter option determines whether the radio will respond to a ping. The default setting is disabled.

*HTTPS option*

This parameter option determines if you can manage the radio via a HTTPS session (via a Browser). The default setting is enabled.

*SNMP Proxy Support*

This parameter option enables an SNMP proxy server in the base station. This proxy server reduces the radio link traffic during SNMP communication to remote / repeater stations. This option applies to the base station only. The default setting is disabled.

This option can also be used if the radio has Serial Only interfaces.

*SNMP Protocol*

This parameter sets the SNMP Protocol:

| Option | Function |
|---|---|
| Disabled | All SNMP functions are disabled. |
| All Versions | Allows all SNMP protocol versions. |
| SNMPv3 Only | Only SNMPv3 transactions will be accepted. |
| SNMPv3 With Authentication Only | Only SNMPv3 transactions authenticated using HMAC-MD5 or HMAC-SHA will be accepted (as per table below). |
| SNMPv3 With Encryption Only | Only SNMPv3 transactions with an encrypted type of DES or AES will be accepted (as per table below). |

The default setting is All Versions.

The default SNMPv3 with Authentication User Details provided are:

| User Name | Encryption Type | Authentication Type | Context Name | Authentication Passphrase | Encryption Passphrase |
|---|---|---|---|---|---|
| noAuthUser | - | - | noAuth | noAuthUser | noAuthUser |
| desUserMD5 | DES | MD5 | priv | desUserMD5 | desUserMD5 |
| desUserSHA | DES | SHA | priv | desUserSHA | desUserSHA |
| authUserMD5 | - | MD5 | auth | authUserMD5 | authUserMD5 |
| authUserSHA | - | SHA | auth | authUserSHA | authUserSHA |
| privUserMD5 | AES | MD5 | priv | privUserMD5 | privUserMD5 |
| privUserSHA | AES | SHA | priv | privUserSHA | privUserSHA |

## SNMPv3 Authentication Passphrase

The SNMPv3 Authentication Passphrase can be changed via the SNMPv3 secure management protocol interface (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.

The SNMPv3 Authentication Passphrase of a user required to be changed cannot be changed by the same user i.e. a different user must be used for the transactions.

### Generate New Keys from SNMPv3 USM User Passphrases

Net-SNMP is a suite of open source software for using and deploying the SNMP protocol. Similar functionality is built into many commercial SNMP managers.

This next step of loading the Aprisa SR+ radios with keys generated from USM user passphrases requires the SNMPv3 USM Management utility provided as part of NET-SNMP.

The utility is called 'snmpusm'. It provides a range of commands including the management of changing passwords for SNMPv3 users. In order to use this utility, the user will need to install NET-SNMP on a Linux (or Windows®) or machine. The examples below are from the Linux environment. This tool automatically obtains the engine ID from the target radio before generating the keys and loading them into the target.

**To change a user authentication passphrase:**

The following are examples of:

Changing the privUserSHA user encryption key / password from privUserSHA to privUserSHANew:

```
c:\usr\bin>snmpusm -v 3 -u privUserSHA -n priv -l authPriv -a SHA -A privUserSHA -x AES -X privUserSHA -Cx 172.17.70.17 passwd privUserSHA privUserSHANew
```

Changing the privUserSHA user authentication key / password from privUserSHA to privUserSHANew:

```
c:\usr\bin>snmpusm -v 3 -u privUserSHA -n priv -l authPriv -a SHA -A privUserSHA -x AES -X privUserSHANew -Ca 172.17.70.17 passwd privUserSHA privUserSHANew
```

Changing the desUserSHA user encryption key / password from desUserSHA to desUserSHANew:

```
c:\usr\bin>snmpusm -v 3 -u desUserSHA -n priv -l authPriv -a SHA -A desUserSHA -x DES -X desUserSHA -Cx 172.17.70.17 passwd desUserSHA desUserSHANew
```

Changing the desUserSHA user authentication key / password from desUserSHA to desUserSHANew:

```
c:\usr\bin>snmpusm -v 3 -u desUserSHA -n priv -l authPriv -a SHA -A desUserSHA -x DES -X desUserSHANew -Ca 172.17.70.17 passwd desUserSHA desUserSHANew
```

Changing the privUserMD5 user encryption key / password from privUserMD5 to privUserMD5New:

```
c:\usr\bin>snmpusm -v 3 -u privUserMD5 -n priv -l authPriv -a MD5 -A privUserMD5 -x AES -X privUserMD5 -Cx 172.17.70.17 passwd privUserMD5 privUserMD5New
```

Changing the privUserMD5 user authentication key / password from privUserMD5 to privUserMD5New:

```
c:\usr\bin>snmpusm -v 3 -u privUserMD5 -n priv -l authPriv -a MD5 -A privUserMD5 -x AES -X privUserMD5New -Ca 172.17.70.17 passwd privUserMD5 privUserMD5New
```

Changing the desUserMD5 user encryption key / password from desUserMD5 to desUserMD5New:

c:\usr\bin>snmpusm -v 3 -u desUserMD5 -n priv -l authPriv -a MD5 -A desUserMD5 -x DES -X desUserMD5 -Cx 172.17.70.17 passwd desUserMD5 desUserMD5New

Changing the desUserMD5 user authentication key / password from desUserMD5 to desUserMD5New:

c:\usr\bin>snmpusm -v 3 -u desUserMD5 -n priv -l authPriv -a MD5 -A desUserMD5 -x DES -X desUserMD5New -Ca 172.17.70.17 passwd desUserMD5 desUserMD5New

Changing the authUserSHA user authentication key / password from authUserSHA to authUserSHANew:

c:\usr\bin>snmpusm -v 3 -u authUserSHA -n auth -l authNoPriv -a SHA -A authUserSHA -Ca 172.17.70.17 passwd authUserSHA authUserSHANew

Changing the authUserMD5 user authentication key / password from authUserMD5 to authUserMD5New:

c:\usr\bin>snmpusm -v 3 -u authUserMD5 -n auth -l authNoPriv -a MD5 -A authUserMD5 -Ca 172.17.70.17 passwd authUserMD5 authUserMD5New

*Notes*

-Cx option is to change the Encryption key/password

-Ca option is to change the Authentication key/password

Other information on this utility can be obtained from the utility command help itself or online

*Summary*

It is necessary to record the new passphrases loaded into the Aprisa SR+ radios and then load the passphrases into the SNMP manager. There is a separate passphrase for the two supported forms of authentication (MD5 and SHA1) only as well as the two forms of authentication used in combination the two forms of encryption (DES and AES). It is vital to change all passphrases even if the depreciated mechanism are not used (MD5 and DES) otherwise an attacker could still use the default passphrases.

## Reset Unknown Passphrases with the Command Line Interface

As it is not possible for users to read previously set passphrases, a CLI command is available from Aprisa SR+ software release 1.4.0 to 'reset' the SNMPv3 USM users back to defaults.

**Note**: USM users are not related to CLI and SuperVisor users. This command will only be accessible to the CLI 'admin' user logins.

**To reset unknown passphrases:**

1. Telnet into each radio in the network and via the CLI reset the passphrases
2. Login to the radio with:

   Login: admin

   Password: *********
3. Set all SNMP3 users to default values with the 'snmpusm reset' command (see 'SNMP3 users to default values' below for the list of default values).
4. Reboot the radio with the 'reboot' command.

SECURITY LEVEL SETTINGS

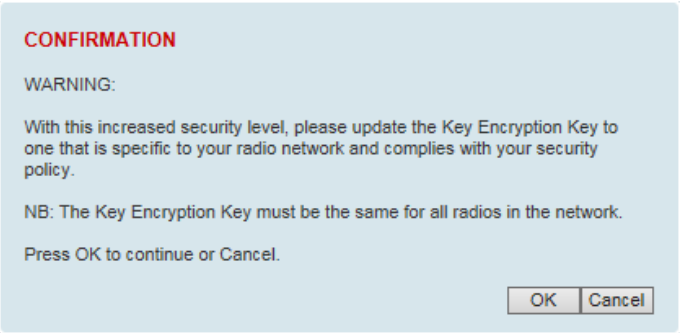
*Security Level*

This parameter sets the Security Level active security features. The default setting is Standard.

| Option | Payload Encryption | HTTPS | SNMPv3 | USB KEK Only |
|---|---|---|---|---|
| Standard | ✓ | ✓ | ✓ | |
| Strong | ✓ | ✓ | ✓ | ✓ |

If the Security Level is reduced, there will be a pop up message warning that Key Encryption Key will be reset to the default value.

If the Security Level is increased, there will be a pop up message reminding user to enter a new Key Encryption Key.



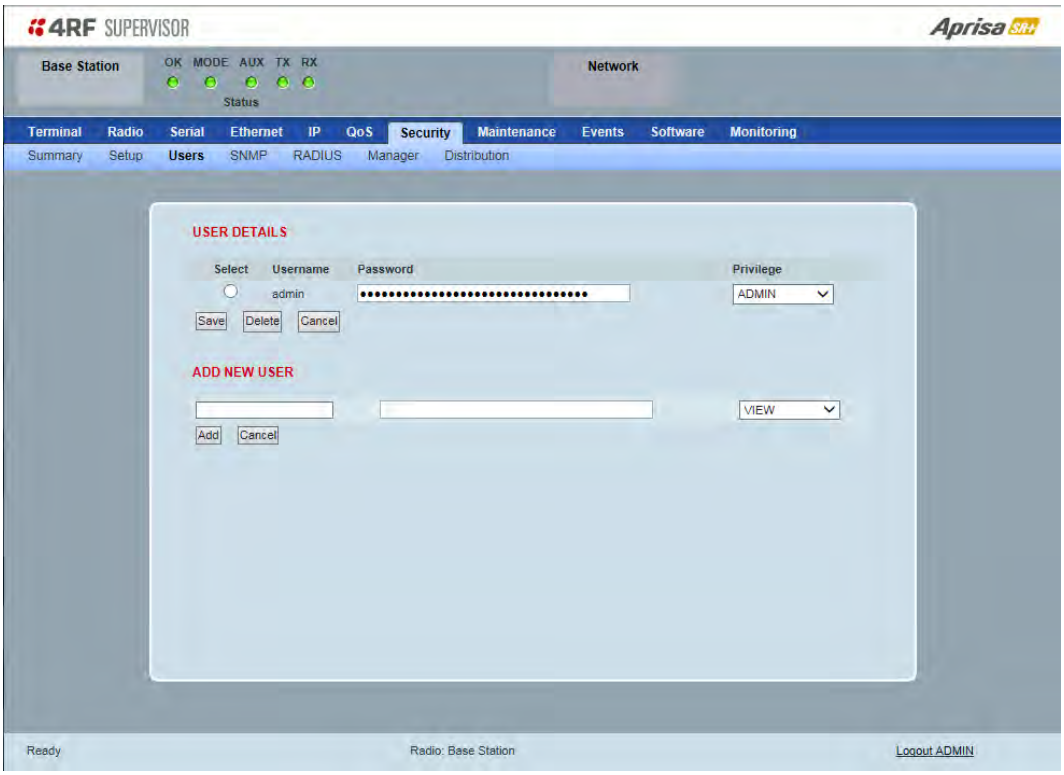

If the Security Level is set to Strong, the 'Save' button will be grayed out and the 'Copy To USB' button will not be shown.

SNMPv3 Context Addressing

SNMPv3 is not user configurable and user can use this option with any NMS. The radio SNMP management interface supports SNMPv3/2 context addressing. The SNMv3 context addressing allows the user to use secure SNMPv3 management while improving NMS performance.

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

## Security > Users




**Note:** You must login with 'admin' privileges to add, disable, delete a user or change a password.

USER DETAILS

Shows a list of the current users setup in the radio.

ADD NEW USER

**To add a new user:**

1. Enter the Username.

A username can be up to 32 characters but cannot contain back slashes, forward slashes, spaces, tabs, single or double quotes. Usernames are case sensitive.

2. Enter the Password.

A password can be 8 to 32 printable characters but cannot contain a tab. Passwords are case sensitive.

Good password policy:

- contains at least eight characters, and
- contains at least one upper case letter, and
- contains at least one lower case letter, and
- contains at least one digit or another character such as !@#$%^&(){}[]<>... , and
- is not a term in a familiar language or jargon, and
- is not identical to or derived from the accompanying account name, from personal characteristics or from information from one's family/social circle, and
- is easy to remember, for instance by means of a key sentence

3. Select the User Privileges

There are four pre-defined User Privilege settings to allocate access rights to users. These user privileges have associated default usernames and passwords of the same name.

The default login is 'admin'.

This login has full access to all radio parameters including the ability to add and change users. There can only be a maximum of two usernames with admin privileges and the last username with admin privileges cannot be deleted.

| User Privilege | Default Username | Default Password | User Privileges |
|---|---|---|---|
| View | | | Users in this group can only view the summary pages. |
| Technician | | | Users in this group can view and edit parameters except Security > Users and Security > Setup. |
| Engineer | | | Users in this group can view and edit parameters except Security > Users. |
| Admin | admin | admin | Users in this group can view and edit all parameters. |

See 'SuperVisor Menu Access' on page 80 for the list of SuperVisor menu items versus user privileges.

4. Click 'Add'

**To delete a user:**

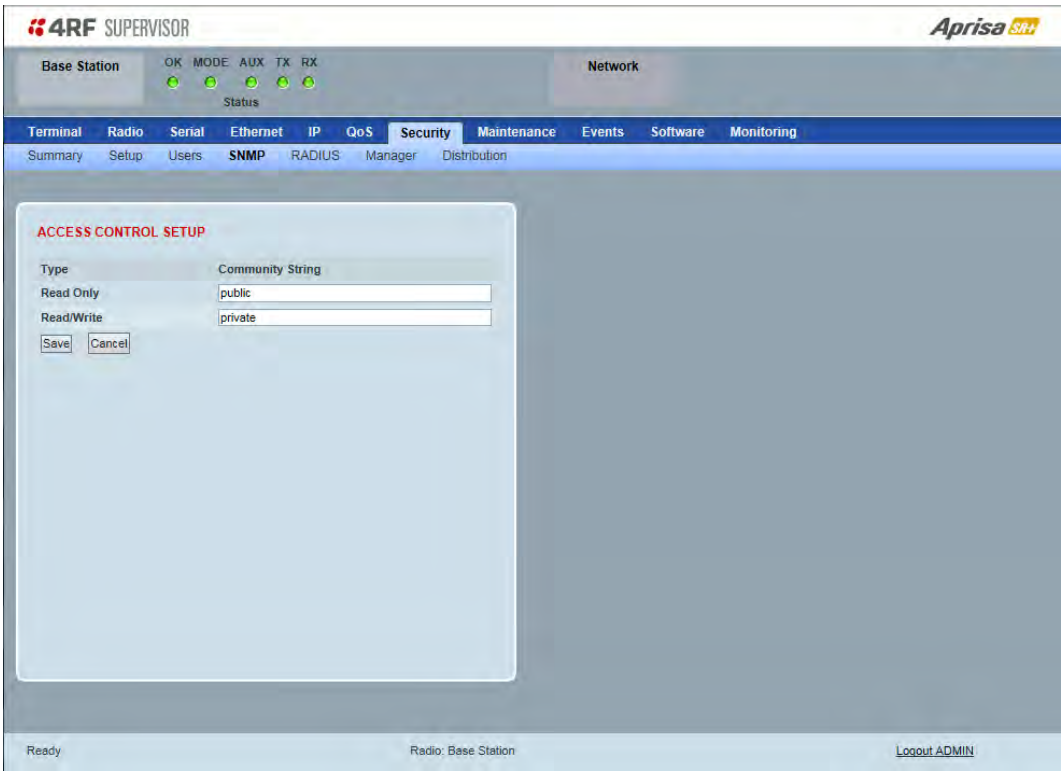
1. Select Terminal Settings > Security > Users
2. Click on the Select button for the user you wish to delete.
3. Click 'Delete

**To change a Password:**

1. Select Terminal Settings > Security > Users
2. Click on the Select button for the user you wish to change the Password.
3. Enter the Password.

A password can be 8 to 32 characters but cannot contain back slashes, forward slashes, spaces, tabs, single or double quotes.

## Security > SNMP




In addition to web-based management (SuperVisor), the network can also be managed using the Simple Network Management Protocol (SNMP) using any version of SNMP v1/2/3. MIB files are supplied, and these can be used by a dedicated SNMP Manager, such as Castle Rock's SNMPc, to access most of the radio's configurable parameters.

For communication between the SNMP manager and the radio, Access Controls and Community strings must be set up as described in the following sections.

A SNMP **Community String** is used to protect against unauthorized access (similar to a password). The SNMP agent (radio or SNMP manager) will check the community string before performing the task requested in the SNMP message.

### ACCESS CONTROL SETUP

A SNMP **Access Control** is the IP address of the radio used by an SNMP manager or any other SNMP device to access the radio. The Aprisa SR+ allows access to the radio from any IP address.

#### *Read Only*

The default Read Only community string is public.

#### *Read Write*

The default ReadWrite community string is private.

## SNMP Manager Setup

The SNMP manager community strings must be setup to access the base station and remote / repeater stations.

To access the base station, a community string must be setup on the SNMP manager the same as the community string setup on the radio (see ‘Security > SNMP’ on page 194).

SNMP access to remote / repeater stations can be achieved by using the radio’s IP address and the normal community string or by proxy in the base station.

## SNMP Access via Base Station Proxy

To access the remote / repeater stations via the base station proxy, the community strings must be setup on the SNMP manager in the format:

cccccccccc:bbbbbb

Where:

cccccccccc is the community string of the base station

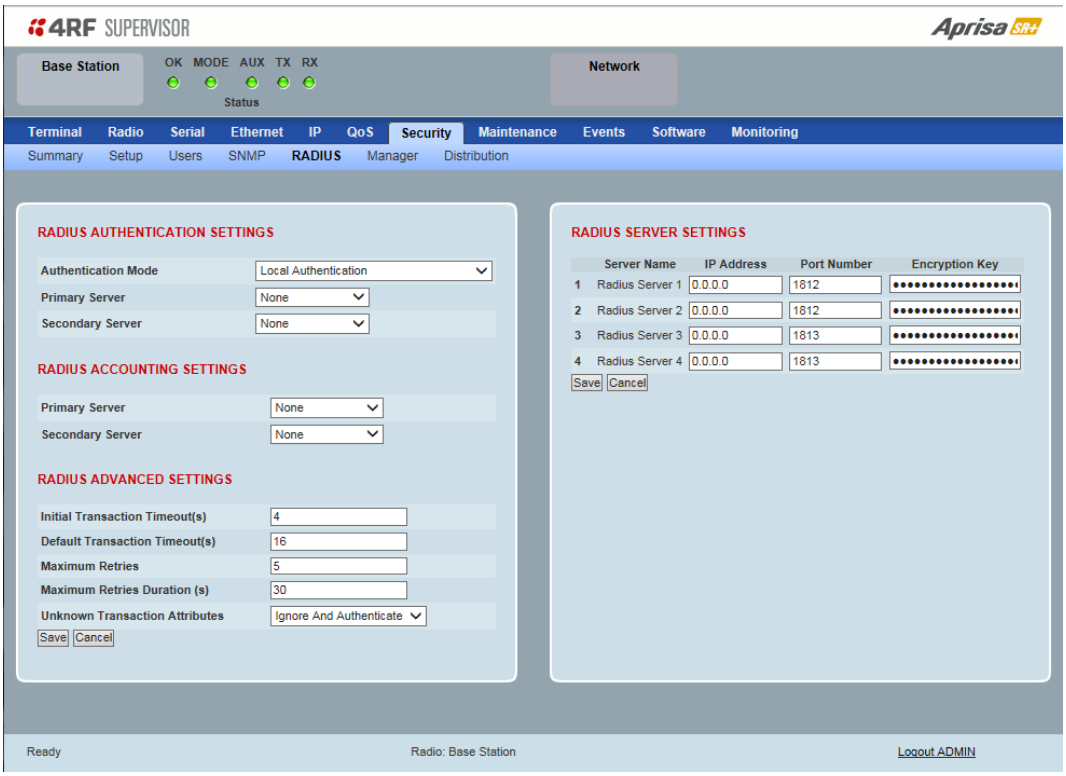
and

bbbbbb is the last 3 bytes of the remote station MAC address (see ‘Network Status > Network Table’ on page 271).

The SNMP Proxy Support must be enabled for this method of SNMP access to operate (see ‘SNMP Proxy Support’ on page 187).

## Security > RADIUS

This page displays the current settings for the Security RADIUS.




RADIUS - Remote Authentication Dial In User Service

RADIUS is a client / server system that secures the radio link against unauthorized access. It is based on open standard RFCs: RFC 2865/6, 5607, 5080 and 2869. It is used for remote user Authorization, Authentication and Accounting.

When a user logs into a radio with RADIUS enabled, the user's credentials are sent to the RADIUS server for authentication of the user.

Transactions between the RADIUS client and RADIUS server are authenticated through the use of a shared secret, which is never sent over the network.

For a RADIUS server to respond to the radio, it must configured with and respond to the following **Management-Privilege-level** attributes:

Admin Level = 4
Technician Level = 2
Viewer Level = 1

A RADIUS server can act as a proxy client to other RADIUS servers or other kinds of authentication servers.

## RADIUS AUTHENTICATION SETTINGS

*Authentication Mode*

This parameter sets the Authentication Mode.

| Option | Function |
|---|---|
| Local Authentication | No radius Authentication – allows any local user privilege |
| Radius Authentication | Only radius Authentication – no local user privilege |
| Radius Authentication and Local admin | Uses radius Authentication if it is available.<br>If radius Authentication is not available, uses local Admin login |
| Radius Then Local Authentication | If the user is not authenticated in the radius server, it allows any local user privilege. |
| Local Then Radius Authentication | If the user is not allowed in the local user privilege, radius authentication is used. |

*Primary Server*

This parameter sets which radius server is used as the primary server for authentication. Select one of the possible authentication servers setup in Radius Server Settings.

*Secondary Server*

This parameter sets which radius server is used as the secondary server for authentication. Select one of the possible authentication servers setup in Radius Server Settings.

## RADIUS ACCOUNTING SETTINGS

*Primary Server*

This parameter sets which radius server is used as the primary server for accounting (log of user activity). Select one of the possible accounting servers setup in Radius Server Settings.

*Secondary Server*

This parameter sets which radius server is used as the secondary server for accounting. Select one of the possible accounting servers setup in Radius Server Settings.

## RADIUS ADVANCED SETTINGS

*Initial Transaction Timeouts (IRT) (seconds)*

This parameter sets the initial time to wait before the retry mechanism starts when the server is not responding.

*Default Transaction Timeouts (MRT) (seconds)*

This parameter sets the maximum time between retries.

*Maximum Retries (MRC)*

This parameter sets the maximum number of retry attempts when the server is not responding.

*Maximum Retries Duration (MRD) (seconds)*

This parameter sets the maximum duration it will attempt retries when the server is not responding.

*Unknown Transaction Attributes*

This parameter sets the radio's response to unknown attributes received from the radius server.

| Option | Function |
|---|---|
| Ignore and Authenticate | Ignore the unknown attributes and accept the authentication received from the radius server |
| Reject and Deny | Reject the authentication received from the radius server |

## RADIUS SERVER SETTINGS

*Server Name*

You can enter up to four radius servers 1-4.

*IP Address*

The IP address of the Radius server.

*Port Number*

The Port Number of the Radius server. RADIUS uses UDP as the transport protocol.

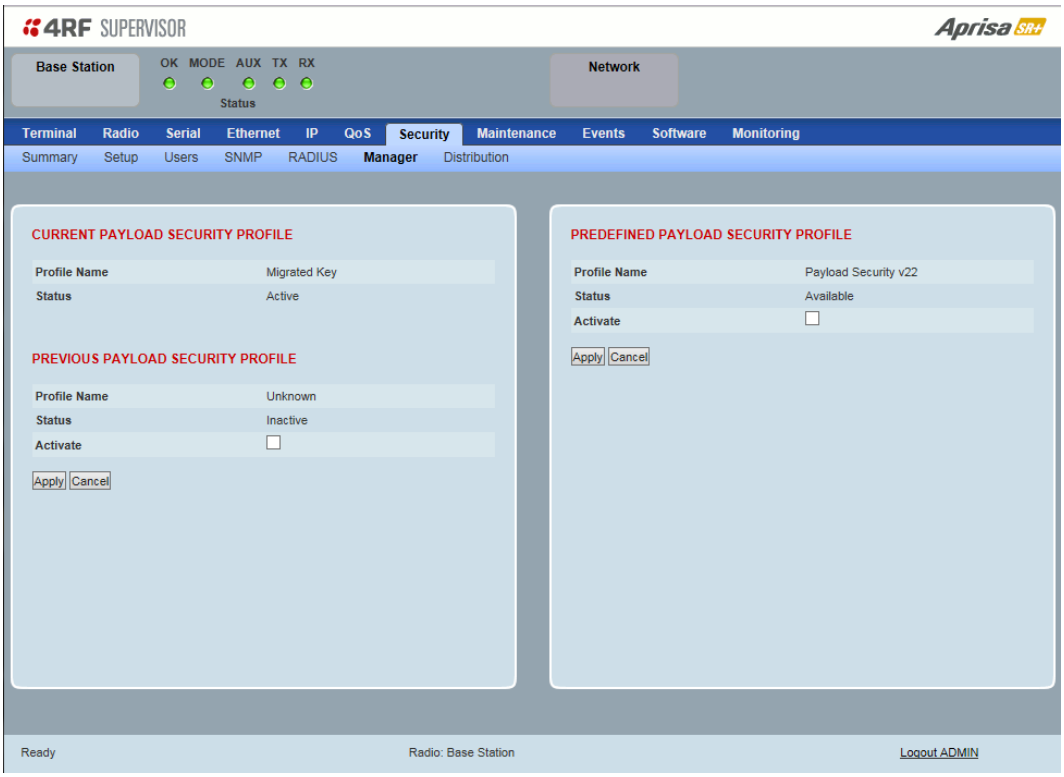
- UDP port 1812 is used for authentication / authorization
- UDP port 1813 is used for accounting.

Old RADIUS servers may use unofficial UDP ports 1645 and 1646.

*Encryption Key*

The password of the Radius server.

## Security > Manager




### CURRENT PAYLOAD SECURITY PROFILE

#### *Profile Name*

This parameter shows the predefined security profile active on the radio.

#### *Status*

This parameter displays the status of the predefined security profile on the radio (always active).

### PREVIOUS PAYLOAD SECURITY PROFILE

#### *Profile Name*

This parameter displays the security profile that was active on the radio prior to the current profile being activated.

#### *Status*

This parameter displays the status of the security profile that was active on the radio prior to the current profile being activated.

| Option | Function |
|---|---|
| Active | The security profile is active on the radio. |
| Inactive | The security profile is not active on the radio but could be activated if required. |

*Activate*

This parameter activates the previous security profile (restores to previous version).

PREDEFINED PAYLOAD SECURITY PROFILE

*Profile Name*

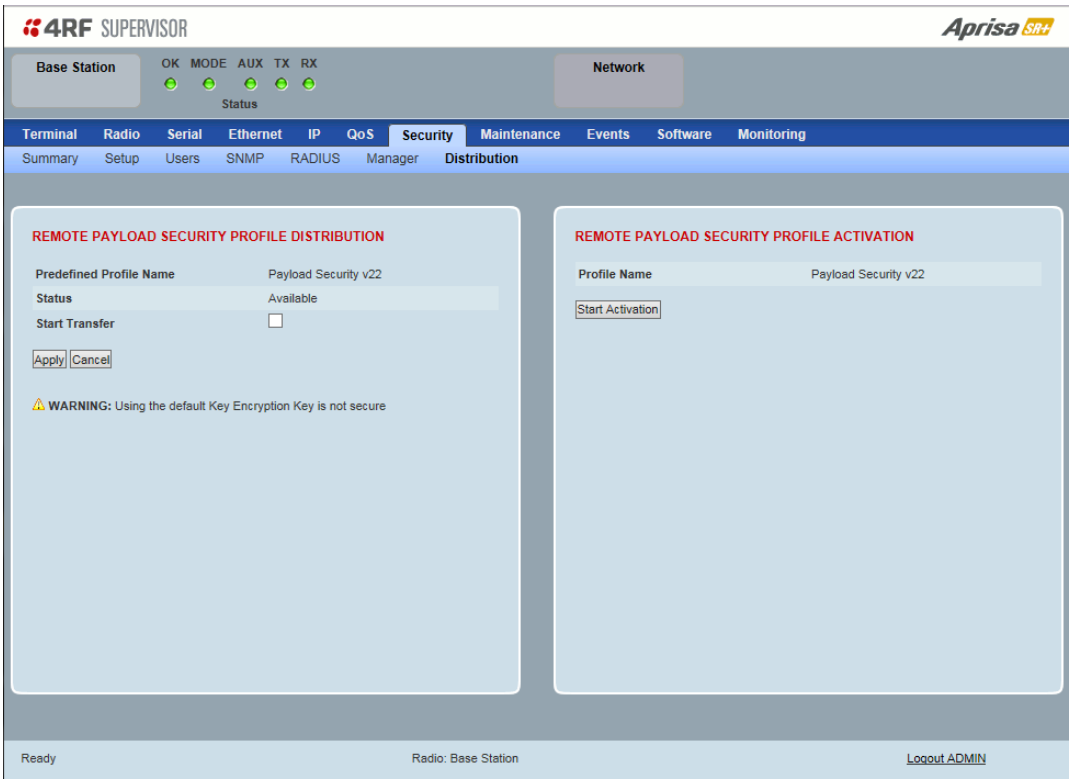
This parameter displays the new security profile that could be activated on the radio or distributed to all remote radios with Security > Distribution.

*Status*

This parameter displays the status of the new security profile.

| Option | Function |
|---|---|
| Unavailable | A predefined security profile is not available on this radio.<br>To create a predefined security profile, go to 'Security > Setup' on page 183. |
| Available | A predefined security profile is available on this radio for distribution and activation. |

## Security > Distribution




REMOTE PAYLOAD SECURITY PROFILE DISTRIBUTION

*Predefined Profile Name*

This parameter displays the predefined security profile available for distribution to remote stations.

*Status*

This parameter shows if a predefined security profile is available for distribution to remote stations.

| Option | Function |
|---|---|
| Unavailable | A predefined payload security profile is not available on this radio. |
| Available | A predefined payload security profile is available on this radio for distribution and activation. |

*Start Transfer*

This parameter when activated distributes (broadcasts) the new payload security profile to all remote stations in the network.

---

**Note:** The distribution of the payload security profile to remote stations does not stop customer traffic from being transferred.

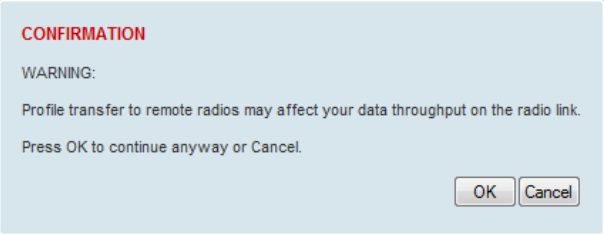
Payload security profile distribution traffic is classified as 'management traffic' but does not use the Ethernet management priority setting. Security profile distribution traffic priority has a fixed priority setting of 'very low'.

---

**To distribute the payload security profile to remote stations:**

This process assumes that a payload security profile has been setup (see ‘Security > Setup’ on page 183).

1. Tick Start Transfer and click Apply.




**Note:** This process could take up to 1 minute per radio depending on channel size, Ethernet Management Priority setting and the amount of customer traffic on the network.

2. When the distribution is completed, activate the software with the Remote Payload Security Profile Activation.

REMOTE PAYLOAD SECURITY PROFILE ACTIVATION

When the security profile has been distributed to all the remote stations, the security profile is then activated in all the remote stations with this command.

The base station will always attempt to distribute the profile successfully. This broadcast distribution has its own retry mechanism. The user can find out if all the remote radios have the latest profile when the managed activation process is attempted. A pop up confirmation will be shown by SuperVisor with relevant information and the user can decide to proceed or not. The user can attempt to redistribute again if needed. If the decision is made to continue, on completion of the activation process, communication with the remote radios that did not have the new security profile will be lost.

*Predefined Profile Name*

This parameter displays the predefined security profile available for activation on all remote stations.

**To activate the security profile in remote stations:**

This process assumes that a security profile has been setup into the base station (see ‘Security > Setup’ on page 183) and distributed to all remote radios in the network.

---

**Note:** Do not navigate SuperVisor away from this page during the activation process (SuperVisor can lose PC focus).

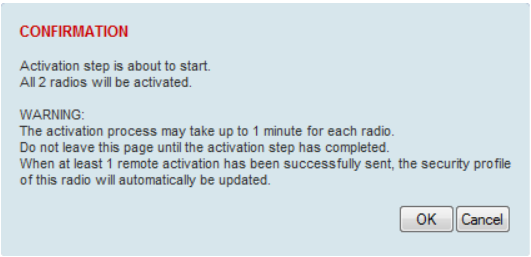
---

1. Click Start Activation

The remote stations will be polled to determine which radios require activation:

| Result | Function (X of Y) |
|---|---|
| Remote Radios Polled for New Profile | X is the number of radios polled to determine if the radio contains the new security profile.<br>Y is the number of remote radios registered with the base station. |
| Remote Radios Activated | X is the number of radios activated.<br>Y is the number of radios with the new security profile requiring activation. |
| Remote Radios On New Profile | X is the number of radios activated and on the new security profile.<br>Y is the number of radios with the new security profile that have been activated. |

When the activation is ready to start:

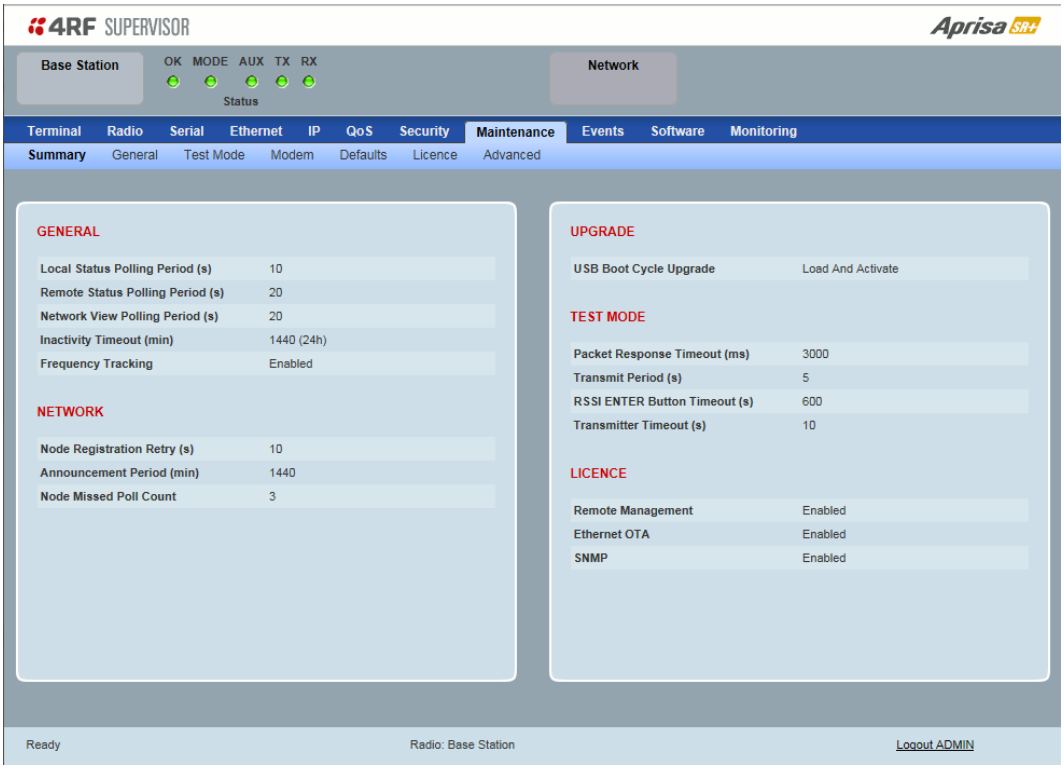



3. Click on ‘OK’ to start the activation process or Cancel to quit.

# Maintenance

## Maintenance > Summary

This page displays the current settings for the Maintenance parameters.




DIAGNOSTICS

*Last RX Packet RSSI (dBm)*

This parameter displays the receiver RSSI reading taken from the last data packet received.

GENERAL

*Local Status Polling Period (sec)*

This parameter displays the rate at which SuperVisor refreshes the Local Radio alarm LED states and RSSI value.

*Remote Status Polling Period (sec)*

This parameter displays the rate at which SuperVisor refreshes the Remote Radio alarm LED states and RSSI value.

*Network View Polling Period (sec)*

This parameter displays the rate at which SuperVisor polls all remote radios for status and alarm reporting.

*Inactivity Timeout (min)*

This parameter displays the period of user inactivity before SuperVisor automatically logs out of the radio.

*Frequency Tracking*

This parameter displays if Frequency Tracking is enabled or disabled.

NETWORK

*Node Registration Retry (sec)*

This parameter displays the base station poll time at startup or the remote / repeater station time between retries until registered.

*Base Station Announcement Period (min)*

This parameter displays the period between base station polls post startup. The default setting is 1440 minutes (24 hours).

*Node Missed Poll Count*

This parameter displays the number of times the base station attempts to poll the network at startup or if a duplicate IP is detected when a remote / repeater station is replaced.

UPGRADE

*USB Boot Cycle Upgrade*

This parameter shows the type of USB Boot Cycle upgrade defined in 'Software Setup > USB Boot Upgrade' on page 237.

TEST MODE

*Packet Response Timeout (ms)*

This parameter displays the time Test Mode waits for a response from the base station before it times out and retries.

*Transmit Period (sec)*

This parameter displays the time between Test Mode requests to the base station.

*Response Timeout (ms)*

This parameter sets the time Test Mode waits for a response from the base station before it times out and retries. The default setting is 3000 ms.

*RSSI Enter Button Timeout (sec)*

This parameter displays the Test Mode timeout period. The radio will automatically exit Test Mode after the Timeout period.

*Transmitter Timeout (sec)*

This parameter displays the transmitter Test Mode timeout period. The radio will automatically exit the transmitter Test Mode after the Timeout period.

## LICENCE

*Remote Management*

This parameter displays if Remote Management is enabled or disabled. The default setting is enabled.

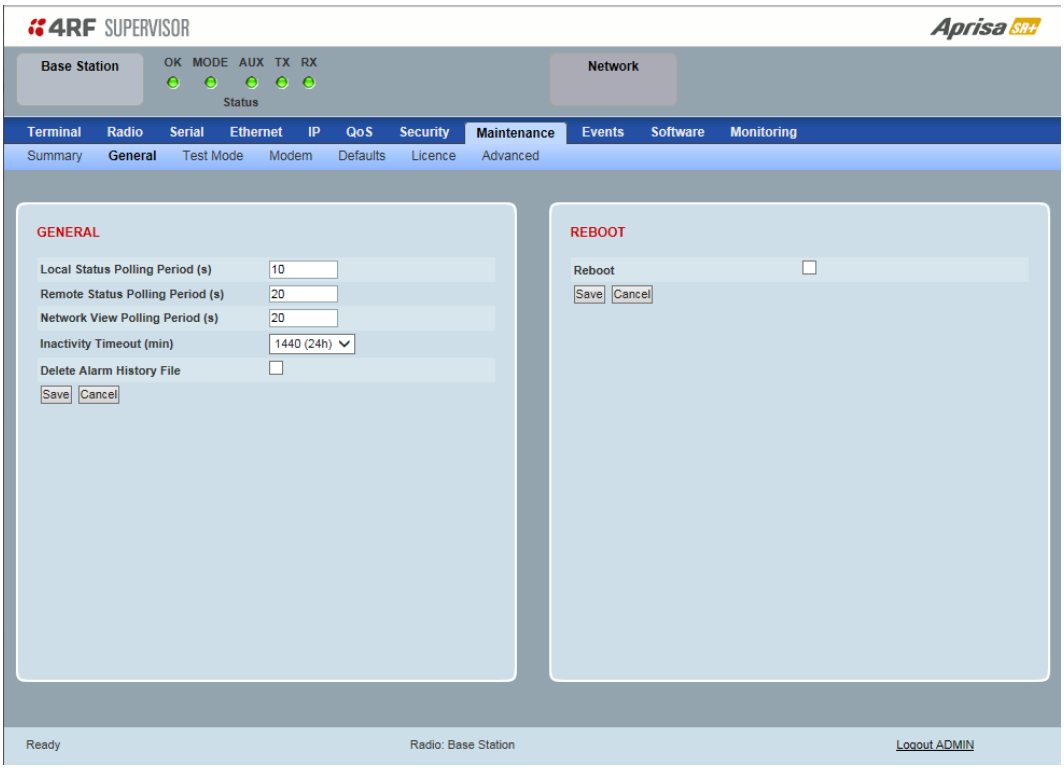
*Ethernet OTA (over the air)*

This parameter displays if Ethernet traffic is enabled or disabled. The Ethernet OTA will be enabled if the Ethernet feature licence has been purchased (see ‘Maintenance > Licence’ on page 216).

## SNMP Management

This parameter displays if SNMP management is enabled or disabled. The default setting is enabled.

## Maintenance > General




GENERAL

*Local Status Polling Period (sec)*

This parameter sets the rate at which SuperVisor refreshes the Local Radio alarm LED states and RSSI value. The default setting is 10 seconds.

*Network View Polling Period (sec)*

This parameter sets the rate at which SuperVisor polls all remote radios for status and alarm reporting. The default setting is 20 seconds.

*Remote Status Polling Period (sec)*

This parameter sets the rate at which SuperVisor refreshes the Remote Radio alarm LED states and RSSI value. To avoid problems when managing Aprisa SR+ Networks, ensure that the Remote Polling Period is set to be longer than the Inband Management Timeout (set on page 88). The default setting is 20 seconds.

*Inactivity Timeout (min)*

This parameter sets the period of user inactivity before SuperVisor automatically logs out of the radio. The default setting is 15 minutes.

*Delete Alarm History file*

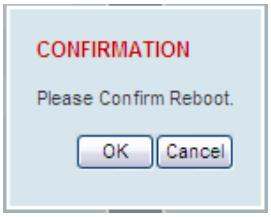
This parameter when activated deletes the alarm history file stored in the radio.

REBOOT

**To reboot the radio:**

1. Select Maintenance > General.
2. Tick the 'Reboot' checkbox.

3. Click 'Save' to apply the changes or 'Cancel' to restore the current value.




4. Click 'OK' to reboot the radio or 'Cancel' to abort.

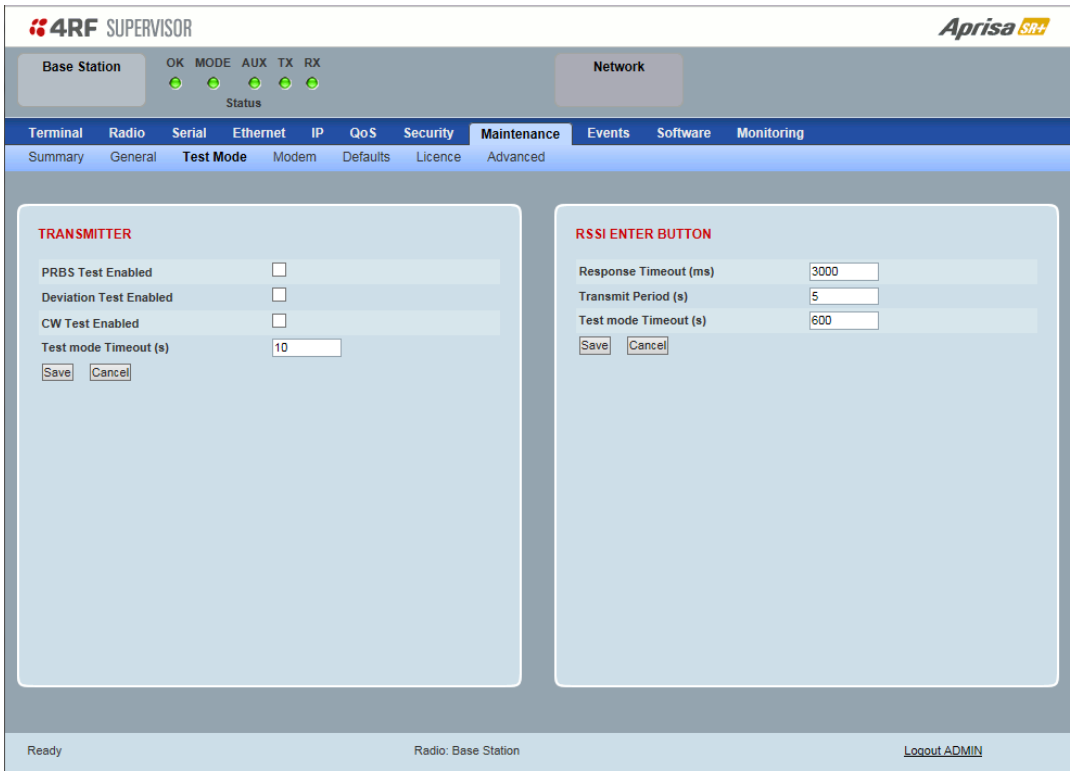
All the radio LEDs will flash repeatedly for 1 second.

The radio will be operational again in about 10 seconds.

The OK, MODE, and AUX LEDs will light green and the TX and RX LEDs will be green (steady or flashing) if the network is operating correctly.

5. Login to SuperVisor.

## Maintenance > Test Mode




### TRANSMITTER

#### *PRBS Test Enabled*

When active, the transmitter outputs a continuous PRBS signal. This can be used for evaluating the output spectrum of the transmitter and verifying adjacent channel power and spurious emission products.

#### *Deviation Test Enabled*

When active, the transmitter outputs a sideband tone at the deviation frequency used by the CPFSK modulator. This can be used to evaluate the local oscillator leakage and sideband rejection performance of the transmitter.

#### *CW Test Enabled*

When active, the transmitter outputs a continuous wave signal. This can be used to verify the frequency stability of the transmitter.

#### *Test Mode Timeout (s)*

This parameter sets the Transmitter Test Mode timeout period. The radio will automatically exit Transmitter Test Mode after the Timeout period. The default setting is 10 seconds.

## RSSI TEST BUTTON

*Response Timeout (ms)*

This parameter sets the time RSSI Test Mode waits for a response from the base station before it times out and retries. The default setting is 3000 ms.

*Transmit Period (sec)*

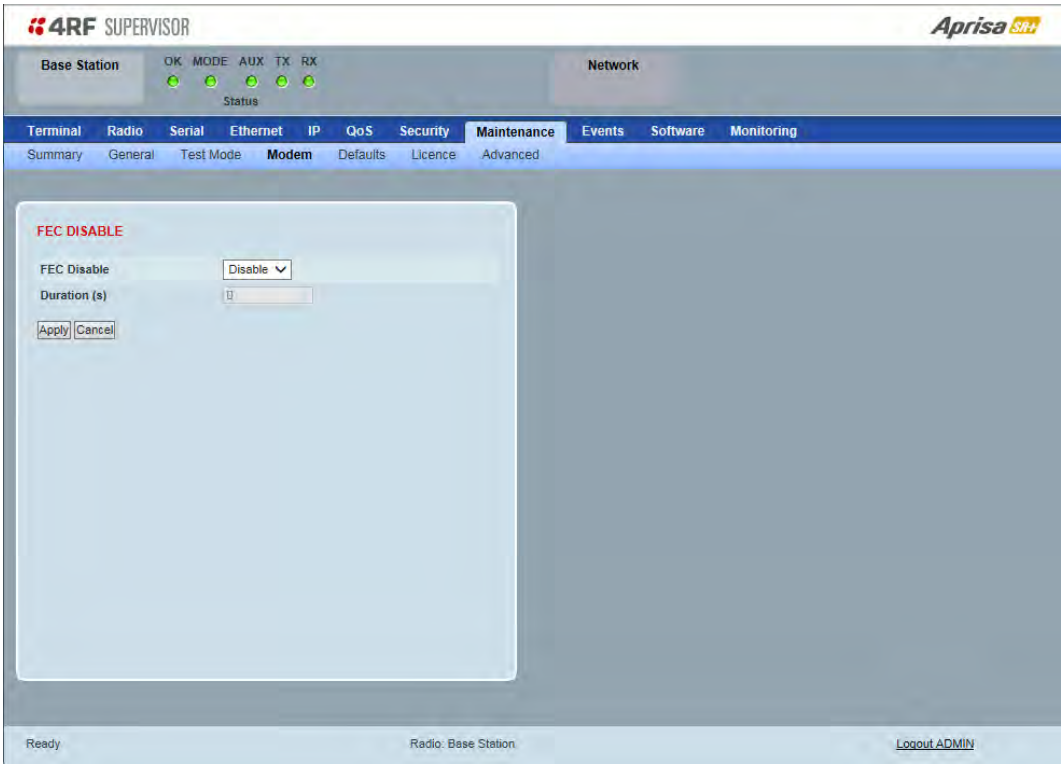
This parameter sets the time between RSSI Test Mode requests to the base station. The default setting is 5 seconds.

*Test Mode Timeout (s)*

This parameter sets the RSSI Test Mode timeout period. The radio will automatically exit RSSI Test Mode after the Timeout period. The default setting is 600 seconds.

## Maintenance > Modem

Base Station




FEC DISABLE

*FEC Disable*

This diagnostic function allows the user to temporarily disable forward error correction on the channel when diagnosing problems on the link.

Therefore, enabling this diagnostic function would temporarily disable FEC on the channel and the associated maintenance mode alarm would activate.

Note that the opposite is not true for this diagnostic function. In other words, this diagnostic function does not provide the user with the option to temporarily enable forward error correction on the channel.

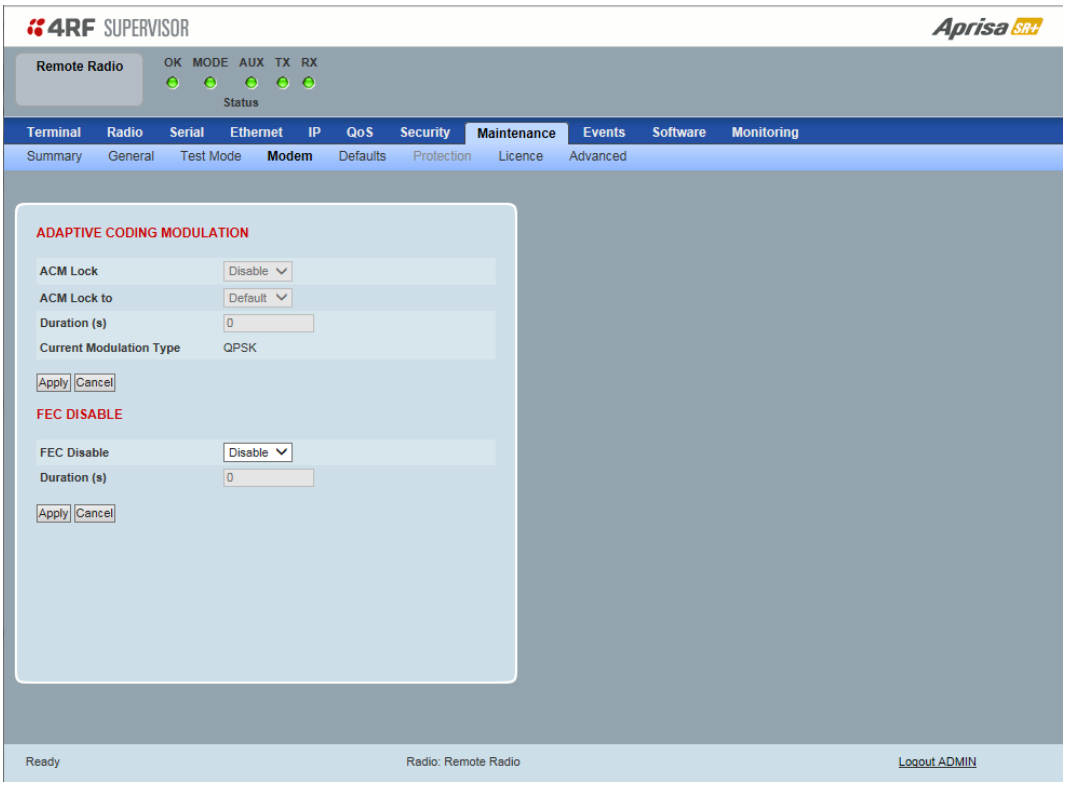
All diagnostic functions are not persistent and will be return to disabled states should the system restart.

| Option | Function |
|---|---|
| Enable | Enables the FEC Disable diagnostic function |
| Disable | Disables the FEC Disable diagnostic function |
| Timer | Allows the FEC to be disabled but only for a predetermined period. |

*Duration (s)*

This parameter defines the period required for disabling of the FEC. When this period elapses, the FEC is enabled.

Remote Station




ADAPTIVE CODING AND MODULATION

*ACM Lock*

This parameter sets whether adaptive modulation can be locked or not.

| Option | Function |
|---|---|
| Disable | Disables manual locking of the adaptive modulation i.e. allows for automatic adaptive modulation. |
| Enable | Allows the adaptive modulation to be manually locked |
| Timer | Allows the adaptive modulation to be manually locked but only for a predetermined period. |

*ACM Lock To*

This parameter manually locks the adaptive modulation.

| Option | Function |
|---|---|
| Default | Manually locks the adaptive modulation to the default modulation defined in 'Default Modulation' on page 113. |
| Current | Manually locks the adaptive modulation to the current modulation at that time. |

*Duration (s)*

This parameter defines the period required for manually locking the adaptive modulation. When this period elapses, the adaptive modulation becomes automatic.

FEC DISABLE

*FEC Disable*

This diagnostic function allows the user to temporarily disable forward error correction on the channel when diagnosing problems on the link.

Therefore, enabling this diagnostic function would temporarily disable FEC on the channel and the associated maintenance mode alarm would activate.

Note that the opposite is not true for this diagnostic function. In other words, this diagnostic function does not provide the user with the option to temporarily enable forward error correction on the channel.

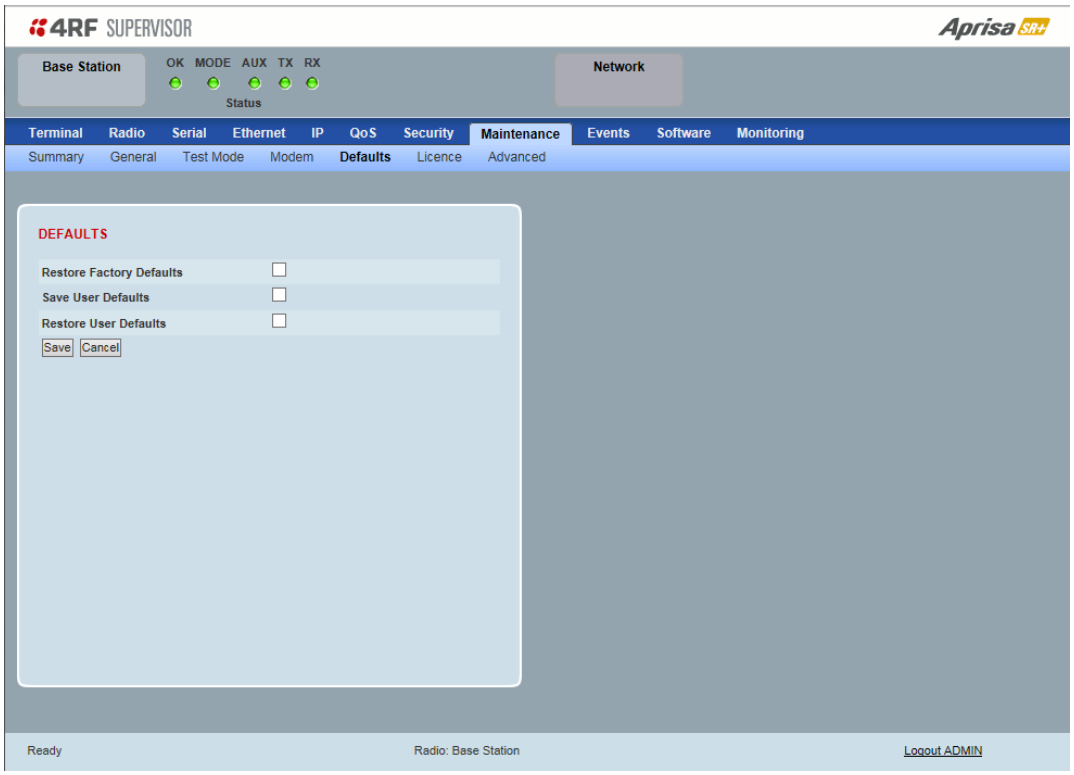
All diagnostic functions are not persistent and will be return to disabled states should the system restart.

| Option | Function |
|---|---|
| Enable | Enables the FEC Disable diagnostic function |
| Disable | Disables the FEC Disable diagnostic function |
| Timer | Allows the FEC to be disabled but only for a predetermined period. |

*Duration (s)*

This parameter defines the period required for disabling of the FEC. When this period elapses, the FEC is enabled.

## Maintenance > Defaults

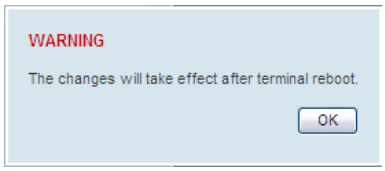



DEFAULTS

The Maintenance Defaults page is only available for the local terminal.

*Restore Factory Defaults*

When activated, all radio parameters will be set to the factory default values. This includes resetting the radio IP address to the default of 169.254.50.10.




**Note**: Take care using this command.

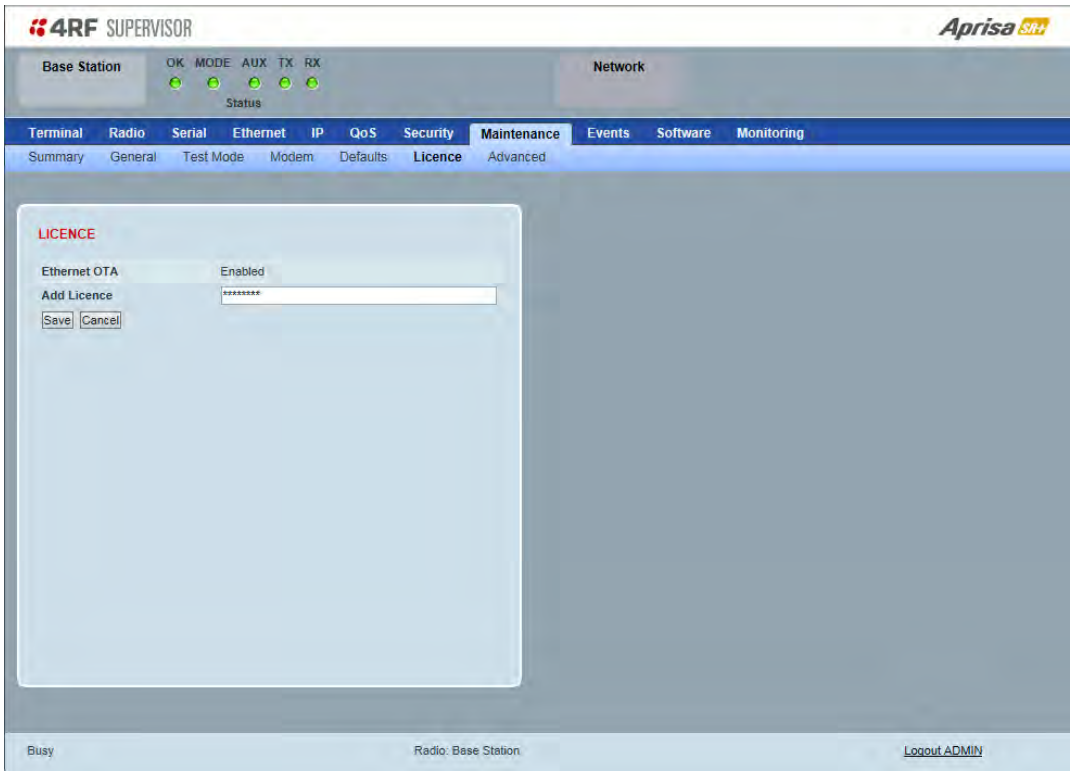
*Save User Defaults*

When activated, all current radio parameter settings will be saved to non-volatile memory within the radio.

*Restore User Defaults*

When activated, all radio parameters will be set to the settings previously saved using 'Save User Defaults'.

## Maintenance > Licence




### LICENCE

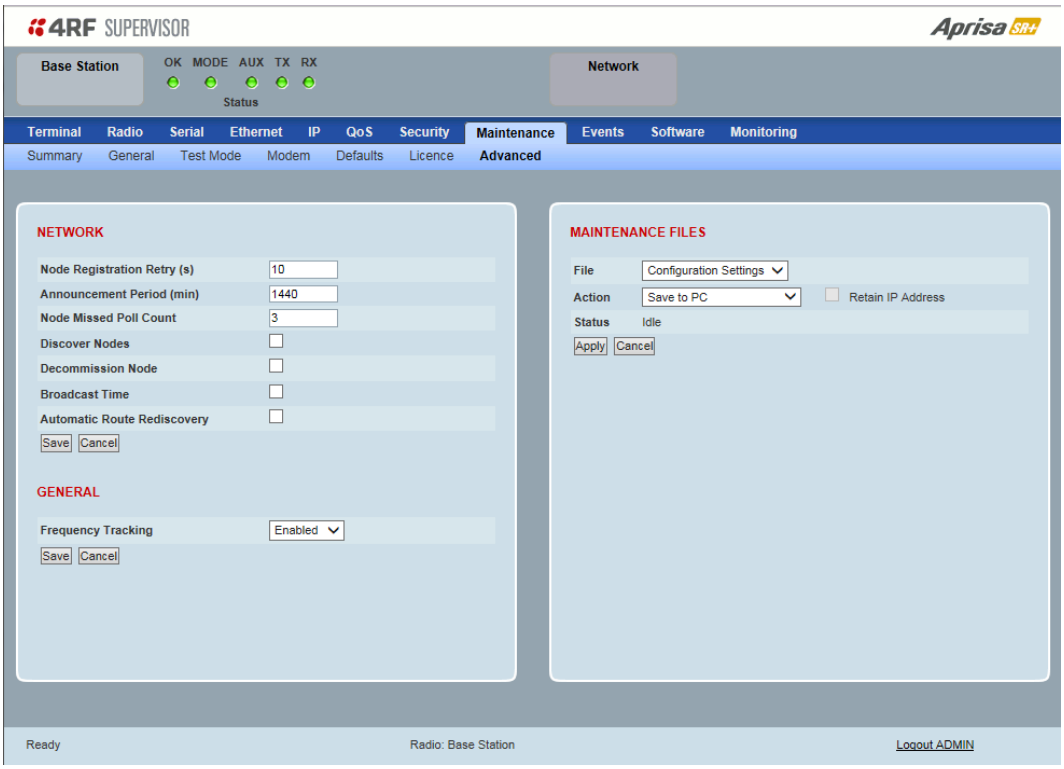
### Fully Featured Radio

When a fully featured Aprisa SR+ radio is purchased (indicated by the AA), it contains the licences which activate Remote Management, Ethernet Traffic, and SNMP Management e.g.

| Part Number | Part Description |
|---|---|
| APSQ-N400-SSC-HD-22-ENAA | 4RF SR+, BR, 400-470 MHz, SSC, Half Duplex, 2E2S, EN, STD |

In this software version, Remote Management, Ethernet Traffic and SNMP management are enabled by default.

## Maintenance > Advanced




NETWORK

*Node Registration Retry (sec)*

This parameter sets the base station poll time at startup or the remote / repeater station time between retries until registered. The default setting is 10 seconds.

*Base Station Announcement Period (min)*

This parameter sets the period between base station polls post startup. The default setting is 1440 minutes (24 hours).

When a new base station powers on, it announces its presence and each remote that receives the announcement message will be advised that a new base station is present and that they should re-register. This allows the new base station to populate its Network Table, with knowledge of the nodes in the network.

If, during this initial period, there is some temporary path disturbance to one or more remotes, they may miss the initial announcement messages and be left unaware of the base station change. For this reason, the base station must periodically send out announcement messages to pick up any stray nodes and the period of these messages is the base station Announcement Period.

Setting this parameter to 0 will stop periodic announcement messages being transmitted.

If a critical parameter is changed in the base station, such as IP address, then the change is distributed to the network using base station announcement message. Note that in this case, an announcement is sent immediately independent of the Announcement Period setting.

*Node Missed Poll Count*

This parameter sets the number of times the base station attempts to poll the network at startup or if a duplicate IP is detected when a remote / repeater station is replaced. The default setting is 3.

*Discover Nodes*

This parameter when activated triggers the base station to poll the network with Node Missed Poll Count and Node Registration Retry values.

*Decommission Node(s)*

This parameter when activated resets the network registrations to remove the entire network from service.

**Note**: Take care using this option.

*Broadcast Time*

This parameter when activated sends the base station Date / Time setting to all the remote and repeater stations in the network and sets their Date / Time. This option applies to the base station only.

*Automatic Route Rediscovery*

This parameter enables the radio to transmit route discovery messages when packets are unacknowledged.

When enabled, unacknowledged unicast packets are converted into uni-broadcast messages and sent through the network. All nodes see the message and populate their routing tables accordingly.

When the destination node is reached, it sends a route response message via the shortest path. The intermediate nodes see this message and populate their routing tables in the reverse direction, thus re-establishing the route.

The default setting is disabled.

GENERAL

*Frequency Tracking*

Frequency Tracking enables the receiver to track any frequency drift in the transmitter to maintain optimum SNR and radio link performance over the full temperature range.

When enabled, remote stations adjust their receive frequency to the frequency of the incoming packet rate and the base station notifies remote stations if their transmit frequency requires adjustment.

The default setting is Enabled.

## MAINTENANCE FILES

There are three maintenance file types which can saved / restored to / from PC or USB flash drive:

Note: Some brands of USB flash drives may not work with 4RF radios.

*File - Configuration Settings*

Action

| Action | Option |
|---|---|
| Save to PC | This saves the file with a filename of 'Config.4' to a binary encrypted file. This can then be saved from the Browser popup (example is Windows Internet Explorer 11). The file should be renamed to be able to identify the radio it was saved from. |

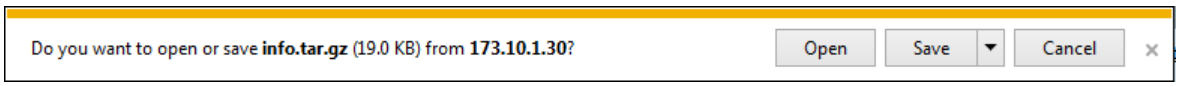
| | |
|---|---|
| Save to Radio USB | This saves the file with a filename of 'asrcfg_1.6.0' to a binary encrypted file on the radio USB flash drive root directory. |
| Restore from PC | This restores all user configuration settings from a binary encrypted file on a PC directory to the radio.<br>A reboot warning message will warn of a pending reboot after the PC file is selected. Clicking OK will open a browser file selection window to select the file.<br>**Note:** If you are using Explorer, it must be IE10 or above for this feature to work correctly. |
| Restore from Radio USB | This restores all user configuration settings from a binary encrypted file on the USB root directory to the radio. |

**Note**: 'Payload Encryption Key' and 'Key Encryption Key' parameters (see 'Security > Setup') are not saved to the configuration file. When a 'Restore from PC' or 'Restore from Radio USB' is used, these parameters will retain their existing values so are not changed by the operation of restoring the configuration file.

*File - Event History Log*

Action

| Action | Option |
|---|---|
| Save to PC | This saves the file with a filename of 'Info.tar.gz' to a binary encrypted file. This can then be saved from the Browser popup (example is Windows Internet Explorer 11). The file should be renamed to be able to identify the radio it was saved from.<br>The 'gz' file is normally for sending back to 4RF Limited for analysis but can be opened with WinRar. |




| | |
|---|---|
| Save to Radio USB | This saves the file with a filename of e.g. 'alarm_173.10.1.30_2014-11-10,15.54.14.txt' to a text file on the radio USB flash drive root directory. |

*File - Configuration Script*

Action

| Action | Option |
|---|---|
| Load and Execute | This loads and executes configuration script files.<br>There are sample configuration script files on the product CD in a directory called 'Master Configuration'.<br>The purpose of these files is to use as templates to create your own configuration scripts.<br>Note: Be careful using this feature as incompatible configurations will change the radios settings and break radio connectivity. |

**Note:** Activating this function will over-write all existing configuration settings in the radio (except for the non-saved settings e.g. security passwords, licence keys etc) without any verification of the command setting in the radio. Precautions should be taken to prevent radio outages with incorrect radio configurations. The following process steps are recommended:

a. Save the current radio configuration to a PC or USB before uploading the new configuration script file

b. Upload the new configuration script file to the radio

c. If for some reason the radio doesn't work as expected, the saved configuration file can be uploaded to the radio (roll back to previous configuration).

*Retain IP Address*

This parameter when enabled ensures that the radio IP address is not changed when the radio configuration settings are restored from a configuration file with a different IP radio address. It prevents the radio losing connectivity when the configuration settings are restored from a configuration file.

*Revert Config if Connection Lost*

When the Maintenance Files feature is used on remote radios from the base station, this parameter allows the configurations to be restored to the previous configuration if the connection is lost.

This must be set before executing the Configuration Settings / Configuration Script restore functions.

# Events

The Events menu contains the setup and management of the alarms, alarm events and traps.

## Events > Alarm Summary

There are two types of events that can be generated on the Aprisa SR+ radio. These are:

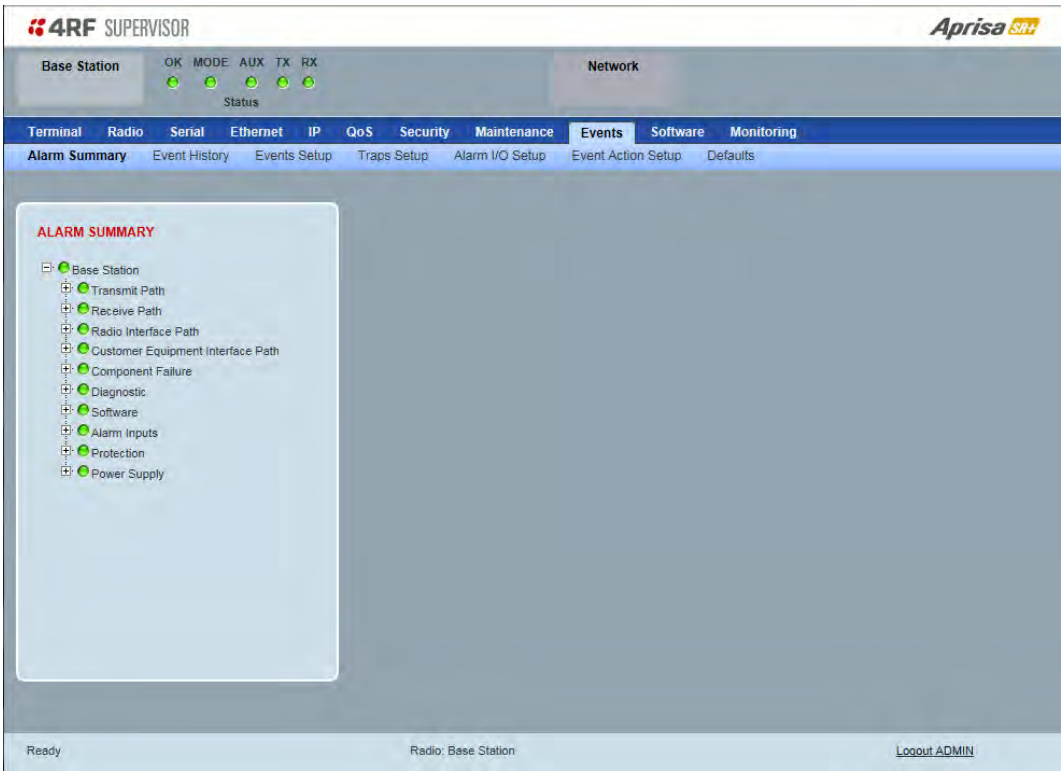
1. Alarm Events

Alarm Events are generated to indicate a problem on the radio.

2. Informational Events

Informational Events are generated to provide information on key activities that are occurring on the radio. These events do not indicate an alarm on the radio and are used to provide information only.

See 'Alarm Types and Sources' on page 368 for a complete list of events.

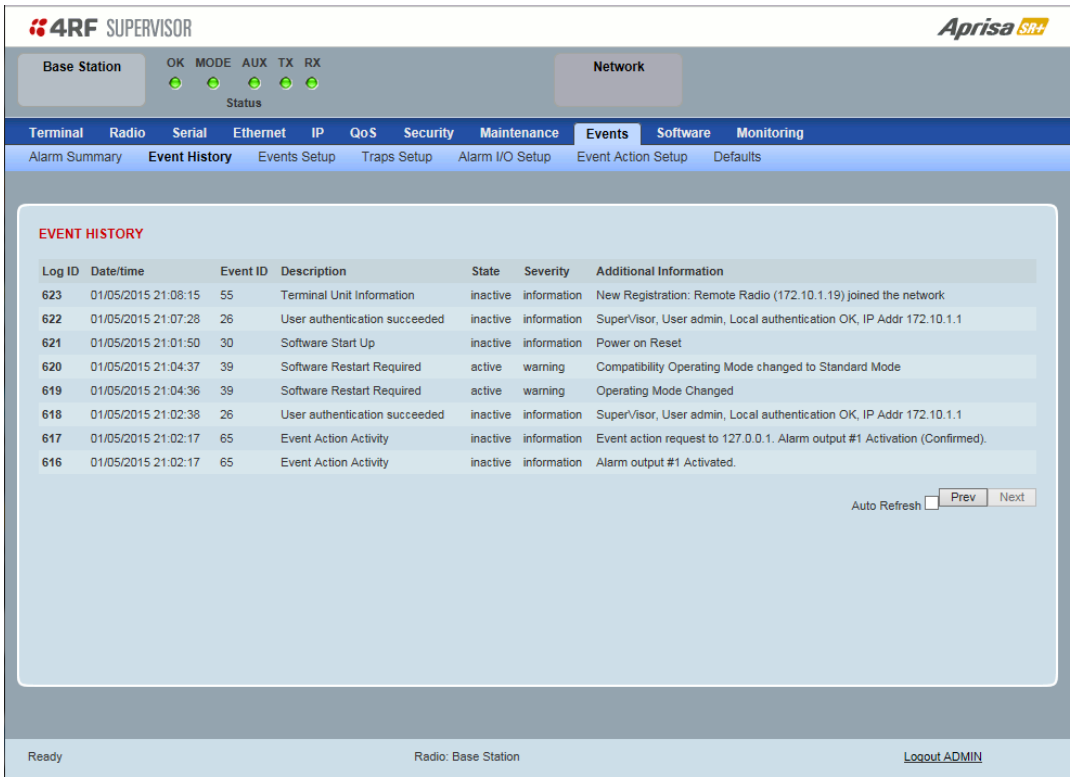



### ALARM SUMMARY

The Alarm Summary is a display tree that displays the current states of all radio alarms. The alarm states refresh automatically every 12 seconds.

| LED Colour | Severity |
|---|---|
| Green | No alarm |
| Orange | Warning alarm |
| Red | Critical, major or minor alarm |

## Events > Event History




### EVENT HISTORY

The last 1500 events are stored in the radio. The complete event history list can be downloaded to a USB flash drive (see ‘File - Event History Log’ on page 220).

The Event History can display the last 50 events stored in the radio in blocks of 8 events.

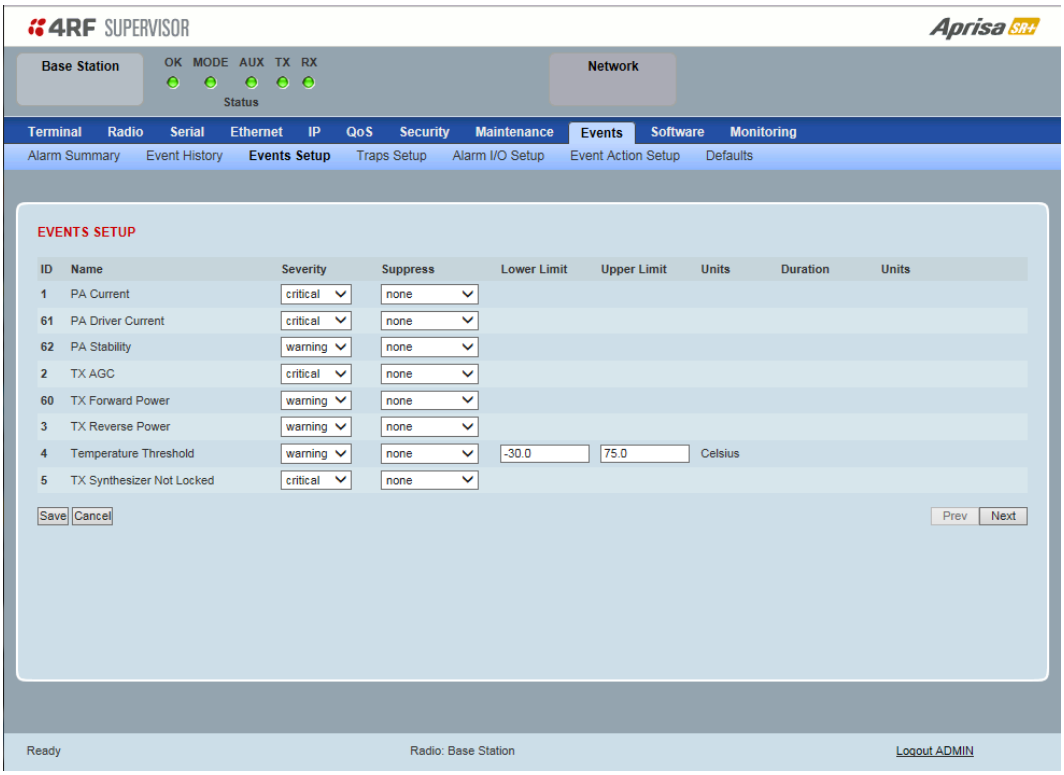
The Next button will display the next page of 8 events and the Prev button will display the previous page of 8 events. Using these buttons will disable Auto Refresh to prevent data refresh and page navigation contention.

The last 50 events stored in the radio are also accessible via an SNMP command.

#### *Auto Refresh*

The Event History page selected will refresh automatically every 12 seconds if the Auto Refresh is ticked.

## Events > Events Setup




EVENTS SETUP

Alarm event parameters can be configured for all alarm events (see 'Alarm Events' on page 369).

All active alarms for configured alarm events will be displayed on the Monitoring pages (see 'Monitoring' on page 253).

This Switch and Block parameters are only visible / applicable when the radio is part of a Protected Station.

### *Severity*

The Severity parameter sets the alarm severity.

| Severity | Function |
|---|---|
| Critical | The Critical severity level indicates that a service affecting condition has occurred and an immediate corrective action is required. Such a severity can be reported, for example, when a managed object becomes totally out of service and its capability must be restored. |
| Major | The Major severity level indicates that a service affecting condition has developed and an urgent corrective action is required. Such a severity can be reported, for example, when there is a severe degradation in the capability of the managed object and its full capability must be restored. |
| Minor | The Minor severity level indicates the existence of a non-service affecting fault condition and that corrective action should be taken in order to prevent a more serious (for example, service affecting) fault.<br>Such a severity can be reported, for example, when the detected alarm condition is not currently degrading the capacity of the managed object. |
| Warning | The Warning severity level indicates the detection of a potential or impending service affecting fault, before any significant effects have been felt. Action should be taken to further diagnose (if necessary) and correct the problem in order to prevent it from becoming a more serious service affecting fault. |

| | |
|---|---|
| Information | No problem indicated – purely information |

*Suppress*

This parameter determines if the action taken by an alarm.

| Option | Function |
|---|---|
| None | Alarm triggers an event trap and is logged in the radio |
| Traps | Alarm is logged in the radio but does not trigger an event trap |
| Traps and Log | Alarm neither triggers an event trap nor is logged in the radio |

*Lower Limit / Upper Limit*

Threshold alarm events have lower and upper limit settings. The alarm is activated if the current reading is outside the limits.

Example: 9 RX CRC Errors

The Upper Limit is set to 0.7 and the Duration is set to 5 seconds.

If in any 5 second period, the total number of errored packets divided by the total number of received packets exceeds 0.7, the alarm will activate.

*Units (1)*

The Units parameter shows the unit for the Lower Limit and Upper Limit parameters.

Duration

This parameter determines the period to wait before an alarm is raised if no data is received.

*Units (2)*

This parameter shows the unit for the Duration parameters.

*Switch*

This parameter determines if the alarm when active causes a switch over of the Protection Switch.

This parameter is only applicable when the radio is part of a Protected Station.

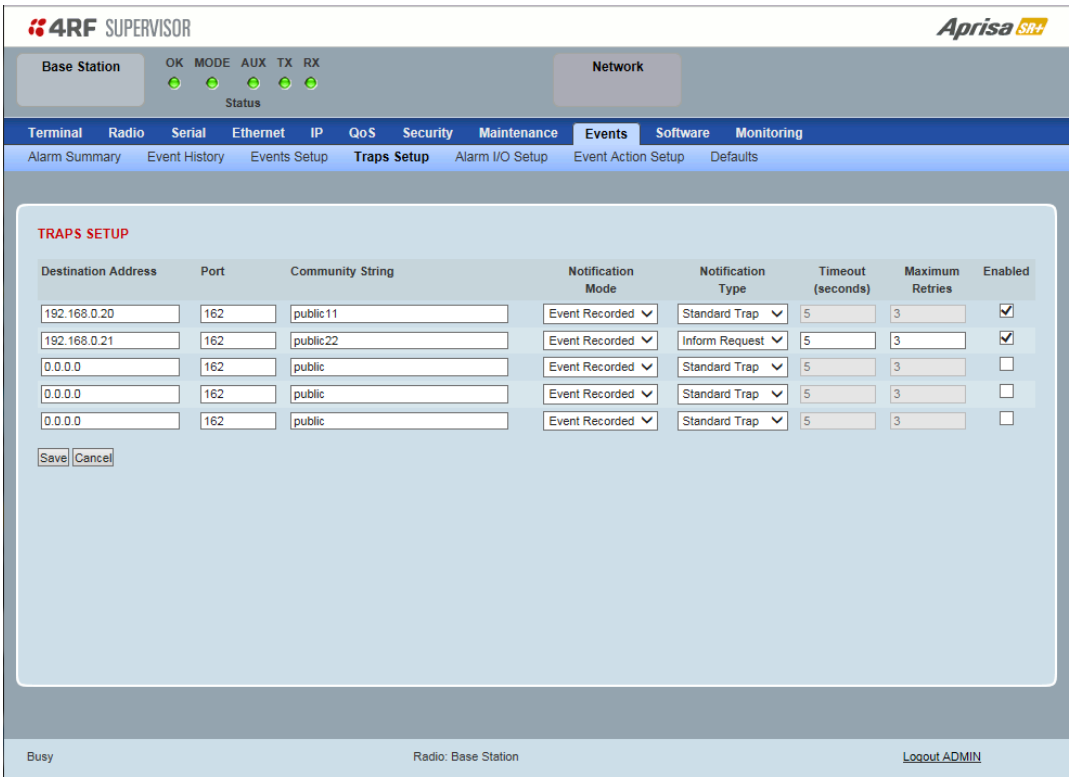
*Block*

This parameter determines if the alarm is prevented from causing a switch over of the Protection Switch.

This parameter is only applicable when the radio is part of a Protected Station.

The Next button will display the next page of 8 alarm events and the Prev button will display the previous page of 8 alarm events.

## Events > Traps Setup




### TRAPS SETUP

All events can generate SNMP traps. The types of traps that are supported are defined in the 'Notification Mode'.

#### *Destination Address*

This parameter sets the IP address of the server running the SNMP manager.

#### *Port*

This parameter sets the port number the server running the SNMP manager.

#### *Community String*

This parameter sets the community string which is sent with the IP address for security. The default community string is 'public'.

#### *Notification Mode*

This parameter sets when an event related trap is sent:

| Option | Function |
|---|---|
| None | No event related traps are sent. |
| Event Recorded | When an event is recorded in the event history log, a trap is sent. |
| Event Updated | When an event is updated in the event history log, a trap is sent. |
| All Events | When an event is recorded or updated in the event history log, a trap is sent. |

*Notification Type*

This parameter sets the type of event notification:

| Option | Function |
|---|---|
| Standard Trap | Provides a standard SNMP trap event |
| Inform Request | Provides a SNMP v2 Inform Request trap event including trap retry and acknowledgement |

Notification Type set to Inform Request:

*Timeout (second)*

This parameter sets the time interval to wait for an acknowledgement before sending another retry.

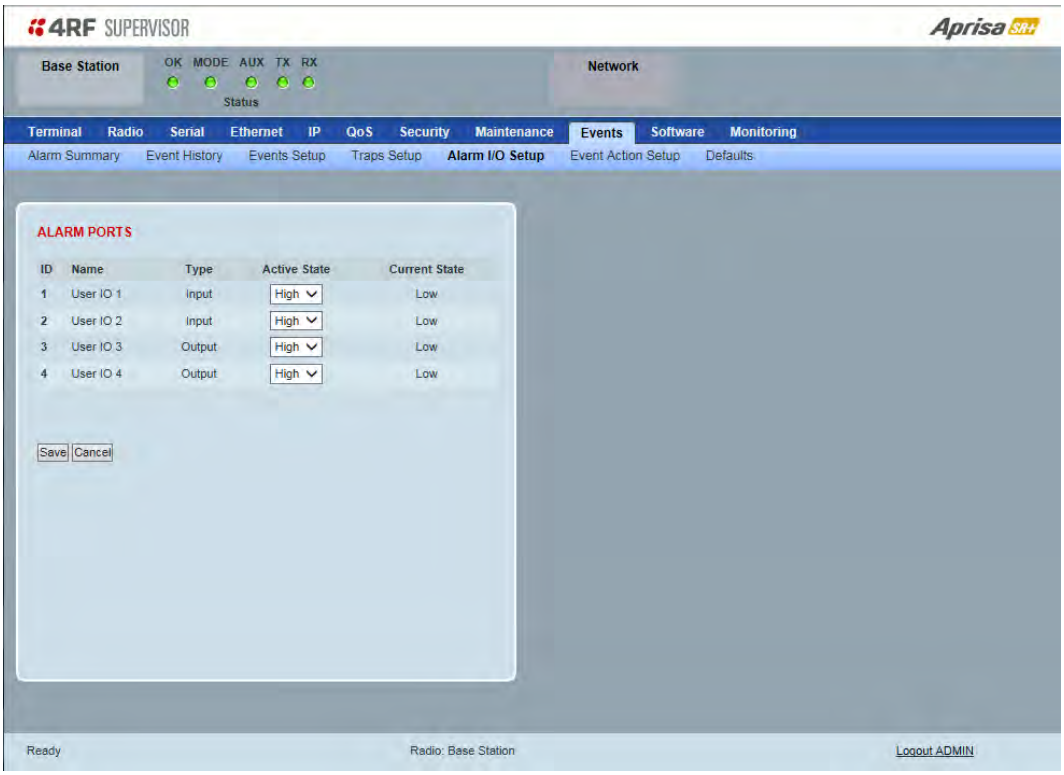
*Maximum Retries*

This parameter sets the maximum number of retries to send the event without acknowledgement before it gives up.

*Enabled*

This parameter determines if the entry is used.

## Events > Alarm I/O Setup




ALARM PORTS

This page provides control of the two hardware alarm inputs and two hardware alarm outputs provided on the alarm connector.

The alarm inputs are used to transport alarms to the other radios in the network. The alarm outputs are used to receive alarms from other radios in the network.

These alarms are only available when the station is non protected.

*Name*

The alarm IO number.

*Type*

The Type shows if the alarm is an input or output.

*Active State*

The Active State parameter sets the alarm state when the alarm is active.

Alarm Input

| Option | Function |
|---|---|
| Low | The alarm is active low i.e. a ground contact on the port will cause an active alarm state |
| High | The alarm is active high i.e. an open contact on the port will cause an active alarm state |

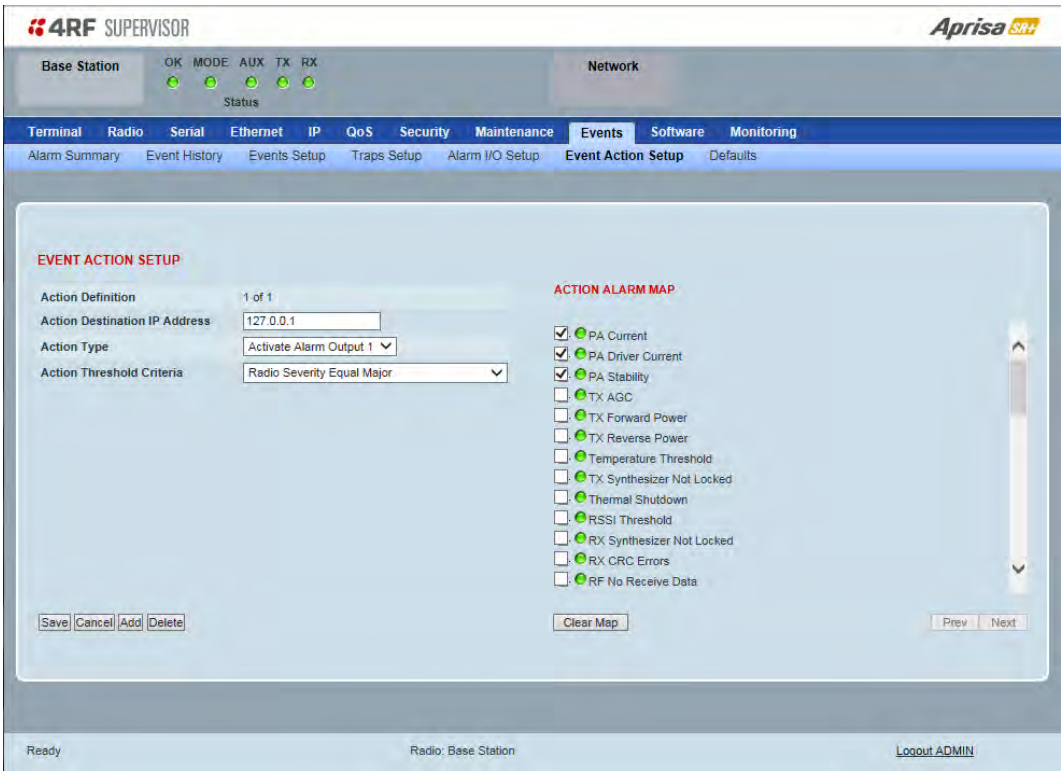
Alarm Output

| Option | Function |
|---|---|
| Low | The alarm is active low i.e. the active alarm state will generate a ground contact output |
| High | The alarm is active high i.e. the active alarm state will generate a open contact output |

*Current State*

The Current State shows the current state of the alarm.

## Events > Event Action Setup




### EVENT ACTION SETUP

This page provides control of the mapping of events to specific actions. Specific alarm events can setup to trigger outputs.

*Action Definition*

This parameter shows the number of the event action setup and the maximum number of setups stored.

*Action Destination IP Address*

This parameter sets the IP address of the radio that will output the action type.

*Action Type*

This parameter sets the action type that will be activated on the radio.

| Option | Function |
|---|---|
| None | This action setup does not activate any alarm output |
| Activate Alarm Output 1 | This action setup activates alarm output 1 |
| Activate Alarm Output 2 | This action setup activates alarm output 2 |

*Action Threshold Criteria*

This parameter sets the radio event that will trigger the action output.

| Option | Function |
|---|---|
| None | No action output. |
| Radio Severity Equal Critical | Activates the action output when a radio alarm is critical alarm |
| Radio Severity Equal Major | Activates the action output when a radio alarm is a major alarm |
| Radio Severity Equal Minor | Activates the action output when a radio alarm is minor alarm |
| Radio Severity Equal Warning | Activates the action output when a radio alarm is a warning alarm |
| Radio Severity Equal Cleared | Activates the action output when a radio alarm is cleared |
| Radio Severity Equal or Worse than Major | Activates the action output when a radio alarm is a major alarm or a critical alarm |
| Radio Severity Equal or Worse than Minor | Activates the action output when a radio alarm is a minor alarm, a major alarm or a critical alarm |
| Radio Severity Equal or Worse than Warning | Activates the action output when a radio alarm is a warning, a major alarm, a minor alarm or a critical alarm |

## Controls

The Save button saves the current event action setup.

The Cancel button cancels the new event action setup.

The Add button adds a new event action setup.

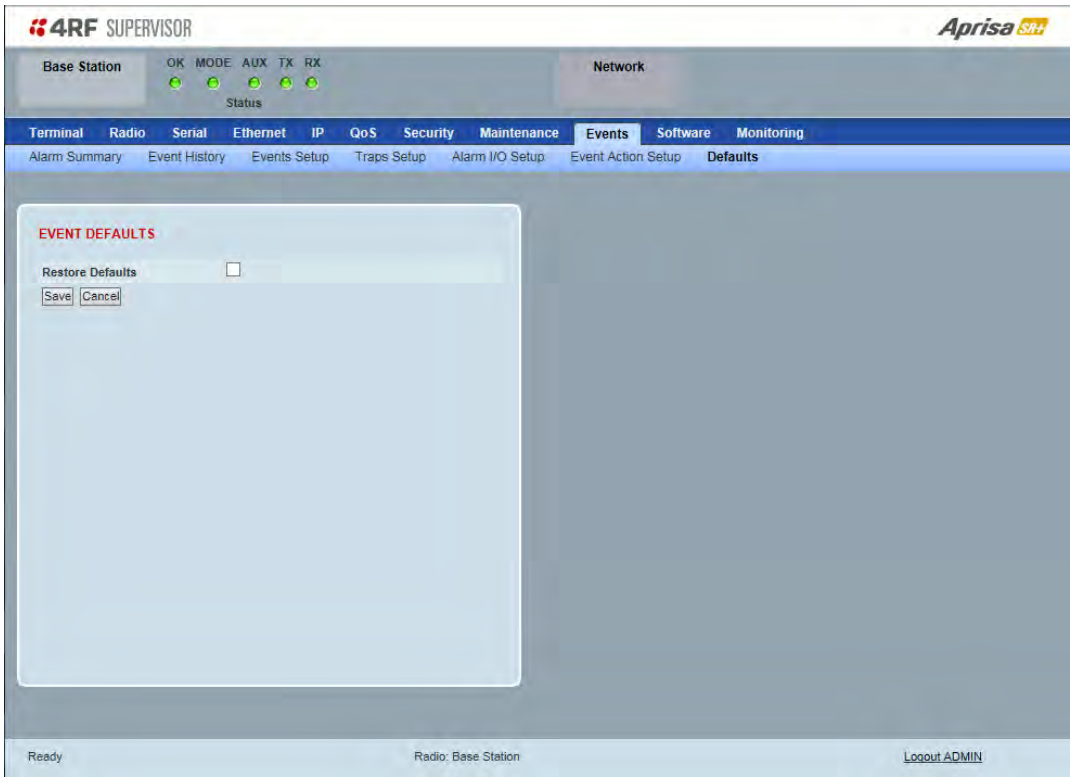
The Delete button deletes the current event action setup.

The Clear Map button clears all alarm selections on the current setup.

**To add an event action setup:**

1. Click on the Add button.
2. Enter the Action Destination IP Address. This is the IP address of the radio that will output the action type.
3. Select the Action Type from the list.
4. Select the Action Threshold Criteria from the list.
5. Tick the alarms required for the event action setup from the Action Alarm Map. You can clear all alarm selections with the Clear Map button.
6. Click on Save.

## Events > Defaults




### EVENT DEFAULTS

#### *Restore Defaults*

This parameter when activated restores all previously configured event parameters using 'Events > Events Setup' to the factory default settings.

## Software

The Software menu contains the setup and management of the system software including network software distribution and activation. The distribution of the system software to the remote radios is encrypted by the AES session key over-the-air.

### Single Radio Software Upgrade

The radio software can be upgraded on a single Aprisa SR+ radio (see ‘Single Radio Software Upgrade’ on page 362). This process would only be used if the radio was a replacement or a new station in an existing network.

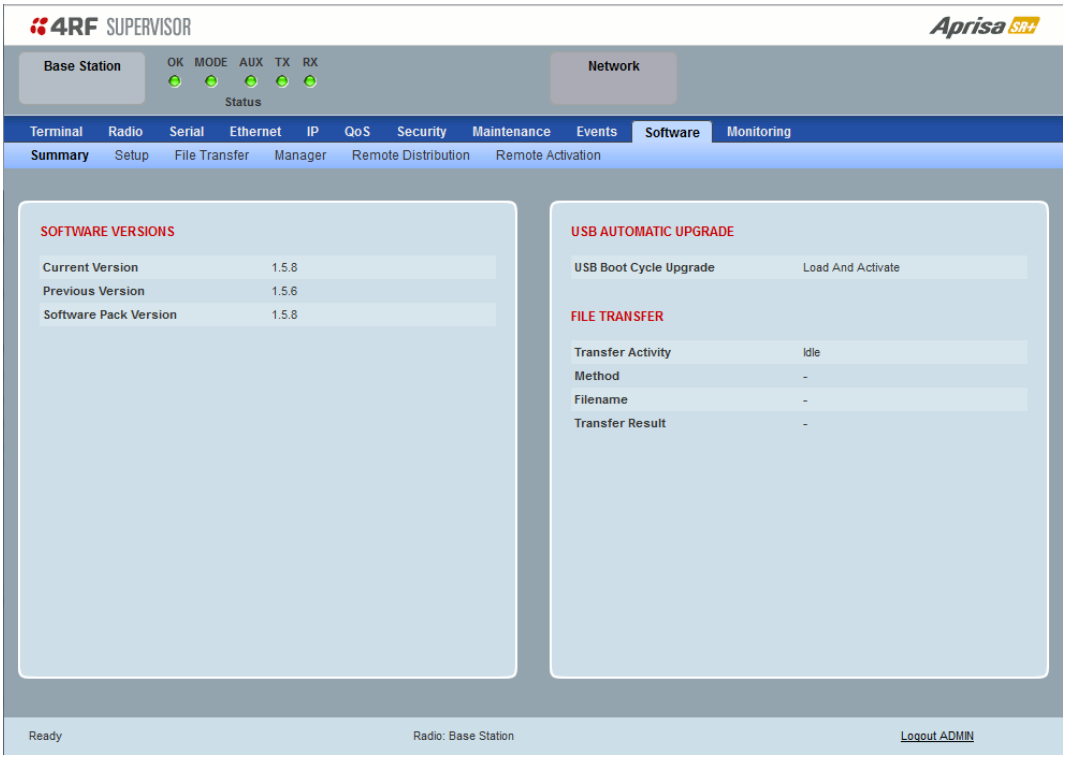
### Network Software Upgrade

The radio software can be upgraded on an entire Aprisa SR+ radio network remotely over the radio link (see ‘Network Software Upgrade’ on page 358). This process involves following steps:

1. Transfer the new software to base station with ‘Software > File Transfer’
2. Distribute the new software to all remote stations with ‘Software > Remote Distribution’
3. Activate of the new software on remote stations with ‘Software > Remote Activation’.
4. Finally, activate the new software on the base station radio with ‘Software > Manager’. Note: activating the software will reboot the radio.

## Software > Summary

This page provides a summary of the software versions installed on the radio, the setup options and the status of the File Transfer.




### SOFTWARE VERSIONS

*Current Version*

This parameter displays the software version running on the radio.

*Previous Version*

This parameter displays the software version that was running on the radio prior to the current software being activated.

*Software Pack Version*

On the base station, this parameter displays the software version available for distribution to all radios in the network.

On the all stations, this parameter displays the software version ready for activation.

### USB AUTOMATIC UPGRADE

*USB Boot Upgrade*

This parameter shows the type of USB Boot upgrade defined in ‘Software Setup > USB Boot Upgrade’ on page 237.

FILE TRANSFER

*Transfer Activity*

This parameter shows the status of the transfer, 'Idle', 'In Progress' or 'Completed'.

*Method*

This parameter shows the file transfer method. When the software distribution is in progress, this parameter will change to 'Over the Air' (from xx.xx.xx.xx) to show that the interface is busy and the transfer is in progress.

*File*

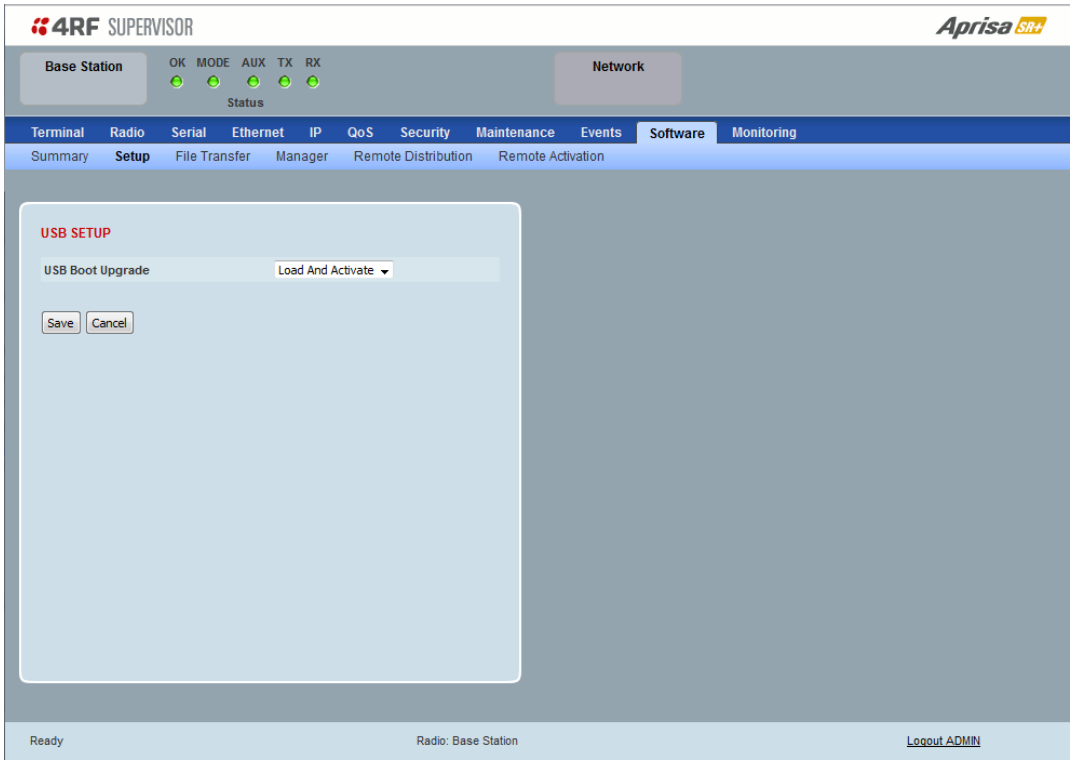
This parameter shows the software file source.

*Transfer Result*

This parameter shows the progress of the transfer.

## Software > Setup

This page provides the setup of the USB flash drive containing a Software Pack.




USB SETUP

*USB Boot Upgrade*

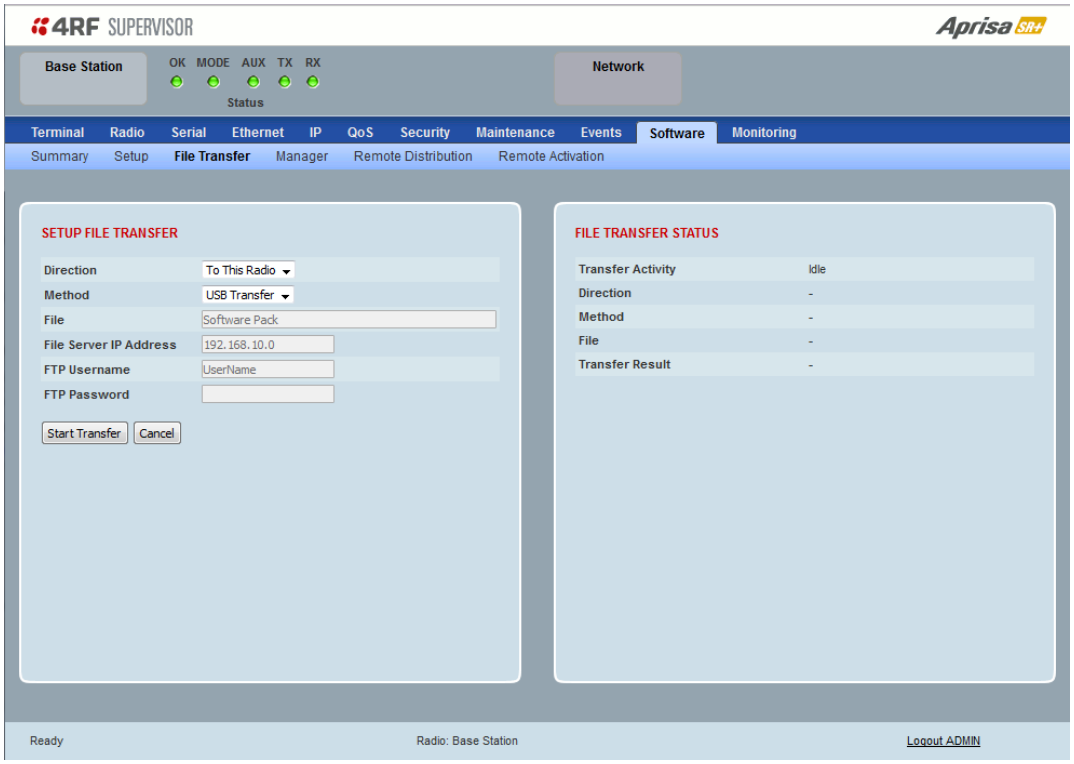
This parameter determines the action taken when the radio power cycles and finds a USB flash drive in the Host port. The default setting is 'Load and Activate'.

| Option | Function |
|---|---|
| Load and Activate | New software will be uploaded from a USB flash drive in to the Aprisa SR+ when the radio is power cycled and activated automatically. |
| Load Only | New software will be uploaded from a USB flash drive in to the Aprisa SR+ when the radio is power cycled. The software will need to be manually activated (see 'Software > Manager' on page 242). |
| Disabled | Software will not be uploaded from a USB flash drive into the Aprisa SR+ when the radio is power cycled. |

**Note:** This parameter must be set to 'Disabled' if the 'File Transfer and Activate' method of upgrade is used. This 'Disabled' setting prevents the radio from attempting another software upload when the radio boots (which it does automatically after activation).

## Software > File Transfer

This page provides the mechanism to transfer new software from a file source into the radio.




SETUP FILE TRANSFER

### *Direction*

This parameter sets the direction of file transfer. In this software version, the only choice is 'To the Radio'.

### *Method*

This parameter sets the method of file transfer.

| Option | Function |
|---|---|
| USB Transfer | Transfers the software from the USB flash drive to the radio. |
| FTP | Transfers the software from an FTP server to the radio. |
| HTTP / HTTPS | Transfers the software directly from a PC software pack file to the radio. |

### *File*

This parameter shows the software file source.

### *FTP Username*

This parameter sets the Username to access the FTP server.

### *FTP Password*

This parameter sets the Password to access the FTP server.

FILE TRANSFER STATUS

*Transfer Activity*

This parameter shows the status of the transfer, 'Idle', 'In Progress' or 'Completed'.

*Direction*

This parameter shows the direction of file transfer. In this software version, the only choice is 'To The Radio'.

*Method*

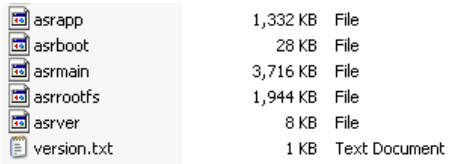
This parameter shows the file transfer method.

*File*

This parameter shows the software file source.

*Transfer Result*

This parameter shows the progress of the transfer:

| **Transfer Result** | **Function** |
|---|---|
| Starting Transfer | The transfer has started but no data has transferred. |
| In Progress (x %) | The transfer has started and has transferred x % of the data. |
| Successful | The transfer has finished successfully. |
| File Error | The transfer has failed.<br>Possible causes of failure are:<br>• Is the source file available e.g. USB flash drive plugged in<br>• Does the file source contain the Aprisa SR+ software release files;<br>  <br> |

**To transfer software into the Aprisa SR+ radio:**

USB Transfer Method

1. Unzip the software release files in to the root directory of a USB flash drive.
2. Insert the USB flash drive into the host port .
3. Click on 'Start Transfer'.

| FILE TRANSFER STATUS | |
|---|---|
| Transfer Activity | In Progress |
| Direction | To This Radio |
| Method | USB Transfer |
| File | Software Pack |
| Transfer Result | In Progress ( 30% ) |

4. When the transfer is completed, remove the USB flash drive from the host port. If the SuperVisor 'USB Boot Upgrade' setting is set to 'Disabled' (see 'USB Boot Upgrade' on page 237), the USB flash drive doesn't need to be removed as the radio won't try to load from it.

Go to Supervisor > Software > Manager and activate the Software Pack (see 'Software > Manager' on page 242). The radio will reboot automatically.

If the file transfer fails, check the Event History page (see 'Events > Event History' on page 223) for more details of the transfer.

---

Note: Some brands of USB flash drives may not work with 4RF radios.

---

FTP Method

1. Unzip the software release files in to a temporary directory.
2. Open the FTP server and point it to the temporary directory.
3. Enter the FTP server IP address, Username and password into SuperVisor.
4. Click on 'Start Transfer'.

| FILE TRANSFER STATUS | |
|---|---|
| Transfer Activity | In Progress |
| Direction | To This Radio |
| Method | FTP (172.17.10.11) |
| File | Software Pack |
| Transfer Result | In Progress ( 1% ) |

Go to Supervisor > Software > Manager and activate the Software Pack (see 'Software > Manager' on page 242). The radio will reboot automatically.

If the file transfer fails, check the Event History page (see 'Events > Event History' on page 223) for more details of the transfer.

HTTP / HTTPS Method

1. Unzip the software release files in to a temporary directory.
2. Click on 'Start Transfer'.
3. Browse to the *.swpack file in the temporary directory and open the file.

| FILE TRANSFER STATUS | |
|---|---|
| Transfer Activity | In Progress |
| Direction | To This Radio |
| Method | HTTPS |
| File | Software Pack |
| Transfer Result | In Progress ( 5% ) |

Go to Supervisor > Software > Manager and activate the Software Pack (see 'Software > Manager' on page 242). The radio will reboot automatically.

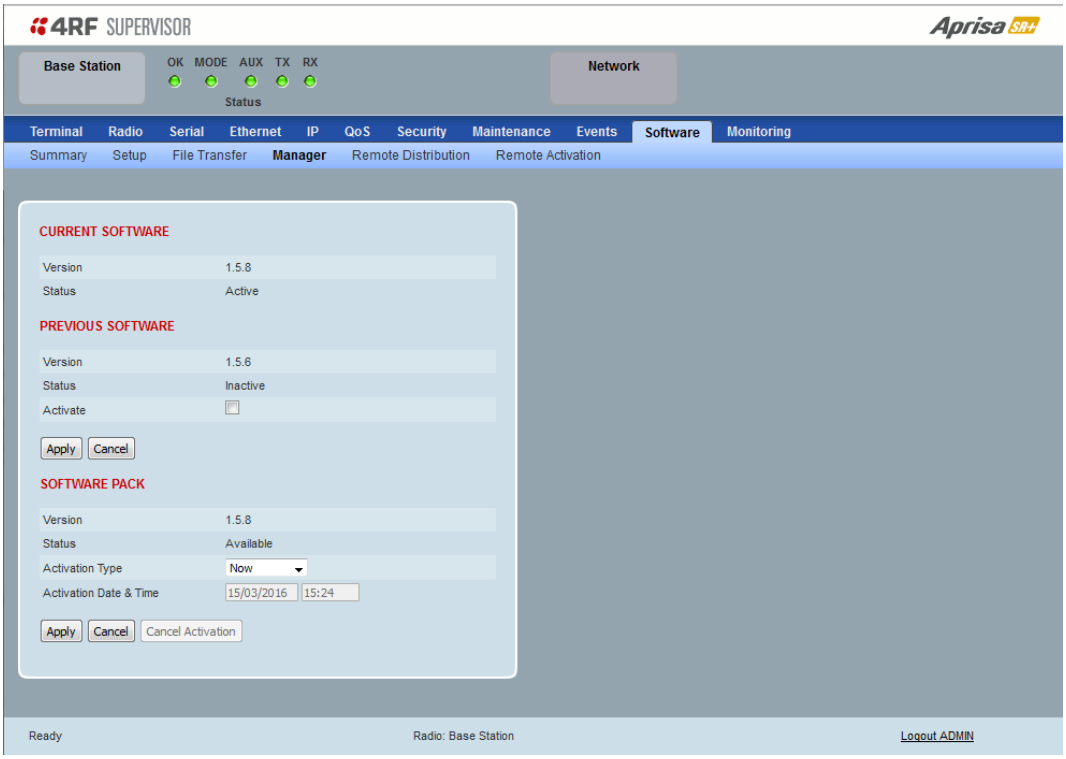
If the file transfer fails, check the Event History page (see 'Events > Event History' on page 223) for more details of the transfer.

## Software > Manager

This page summarises and manages the software versions available in the radio.

The manager is predominantly used to activate new software on single radios. Network activation is performed with 'Software > Remote Activation'.

Both the previous software (if available) and Software Pack versions can be activated on the radio from this page.




### CURRENT SOFTWARE

*Version*

This parameter displays the software version running on the radio.

*Status*

This parameter displays the status of the software version running on the radio (always active).

PREVIOUS SOFTWARE

*Version*

This parameter displays the software version that was running on the radio prior to the current software being activated.

*Status*

This parameter displays the status of the software version that was running on the radio prior to the current software being activated.

| Option | Function |
|---|---|
| Active | The software is operating the radio. |
| Inactive | The software is not operating the radio but could be re-activated if required. |

*Activate*

This parameter activates the previous software version (restores to previous version).

The Aprisa SR+ will automatically reboot after activation.

SOFTWARE PACK

*Version*

This parameter displays the software pack version available for distribution on base station and activate on all stations.

*Status*

This parameter displays the status of the software pack version.

| Option | Function |
|---|---|
| Available | On the base station, the software pack is available for distribution.<br>On all stations, the software pack is available for activation. |
| Activating | The software pack is activating in the radio. |
| Unavailable | There is no software pack loaded into the radio. |

*Activate*

This parameter activates the software pack.

The Aprisa SR+ will automatically reboot after activation.

*Activation Type*

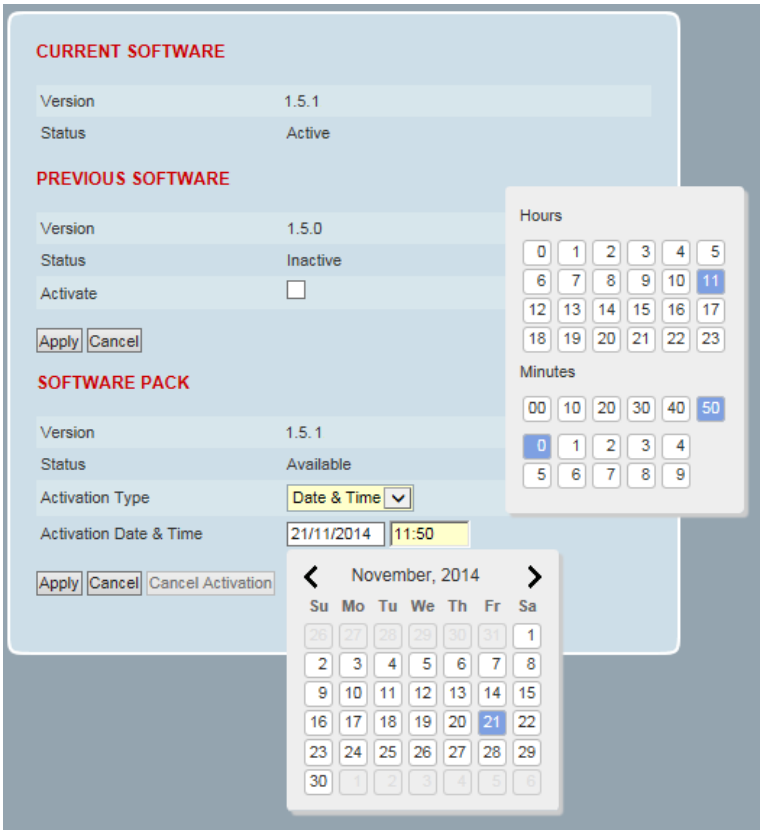
This parameter sets when the software pack activation will occur.

| Option | Function |
|---|---|
| Now | Activates the software pack now. |
| Date & Time | Activates the software pack at the Date & Time set in the following parameter. |

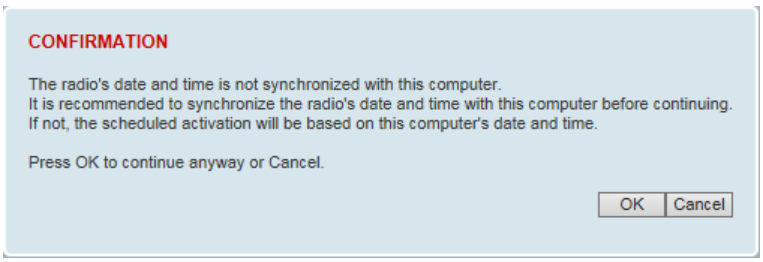
*Activation Date & Time*

This parameter sets the Date & Time when the software pack activation will occur.

This setting can be any future date and 24 hour time.




If the network base station radio date / time is not synchronized, you will get the following popup:




You can manually enter the base station radio date / time or use the Date And Time Synchronization from a SNTP server feature (see ‘Terminal > Date / Time’ on page 92).

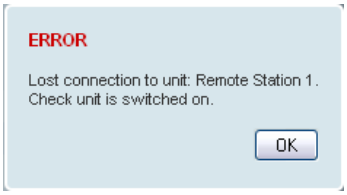
**To activate a software version:**

1. Tick the software version required to be activated (previous software or software pack).
2. Click ‘Apply’.

The page will display a Status of ‘Activating’.

Once started, activation cannot be cancelled.

When the activation is completed, the radio will reboot. This will cause the current SuperVisor session to expire.




3. Login to SuperVisor to check the result.

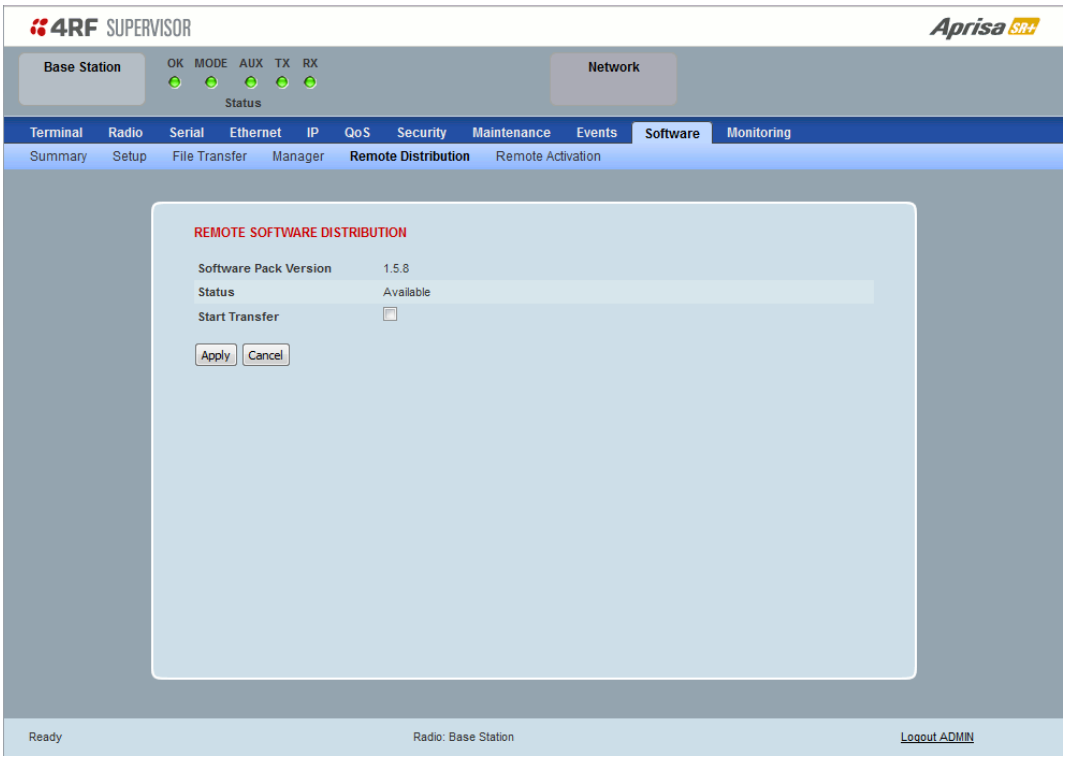
## Software > Remote Distribution

This page provides the mechanism to distribute software to all remote stations into the Aprisa SR+ network (network) and then activate it.

The Software Pack that was loaded into the base station with the file transfer process (see 'Software > File Transfer' on page 238) can be distributed via the radio link to all remote stations.

This page is used to manage the distribution of that software pack to all remote radios on the network.

This page is only available when the radio is configured as a Base Station.




REMOTE SOFTWARE DISTRIBUTION

*Software Pack Version*

This parameter displays the software pack version available for distribution on base station and activate on all stations.

*Status*

This parameter displays the status of the software pack version.

If a Software Pack is not available, the status will display 'Unavailable' and the software distribution mechanism will not work.

*Start Transfer*

This parameter when activated distributes (broadcasts) the new Software Pack to all remote stations in the network.

---

**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.

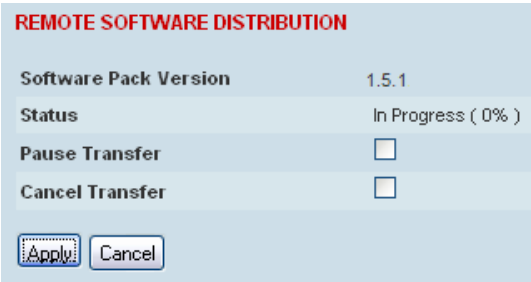
Software distribution traffic is classified as 'management traffic' but does not use the Ethernet management priority setting. Software distribution traffic priority has a fixed priority setting of 'very low'.

---

**To distribute software to remote stations:**

This process assumes that a Software Pack has been loaded into the base station with the file transfer process (see 'Software > File Transfer' on page 238).

1. To ensure that the Network Table is up to date, it is recommended running the node discover function (see 'Discover Nodes' on page 218).
2. Click on 'Start Transfer'.




---

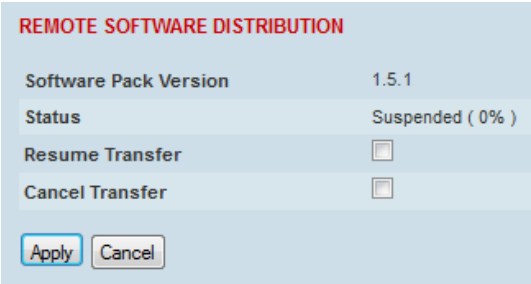
**Note:** This process could take anywhere between 40 minutes and several hours depending on channel size, Ethernet Management Priority setting and the amount of customer traffic on the network.

---

3. When the distribution is completed, activate the software with the Remote Software Activation.

*Pause Transfer*

This parameter when activated, pauses the distribution process and shows the distribution status. The distribution process will continue from where it was paused with Resume Transfer.




*Cancel Transfer*

This parameter when activated, cancels the distribution process immediately.

During the distribution process, it is possible to navigate away from this page and come back to it to check progress. The SuperVisor session will not timeout.

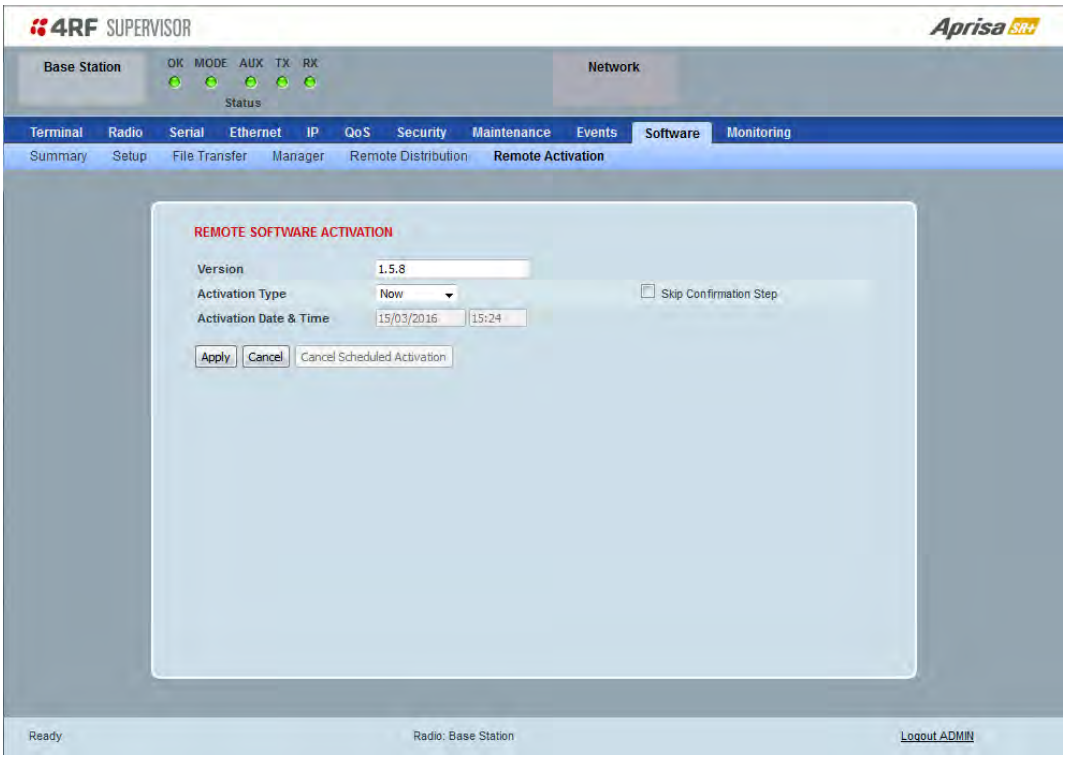
## Software > Remote Activation

This page provides the mechanism to activate software on all remote stations.

The Software Pack was loaded into the base station with the file transfer process (see 'Software > File Transfer' on page 238) and was distributed via the radio link to all remote stations.

This page is used to manage the activation of that software pack on all remote radios on the network.

This page is only available when the radio is configured as a Base Station.




### REMOTE SOFTWARE ACTIVATION

When the software pack version has been distributed to all the remote stations, the software is then activated in all the remote stations with this command. If successful, then activate the software pack in the base station to complete the network upgrade.

#### *Version*

This parameter displays the software version for activation. The default version is the software pack version but any valid software version can be entered in the format 'n.n.n'.

#### *Activation Type*

This parameter sets when the software pack activation will occur.

| Option | Function |
|---|---|
| Now | Activates the software pack now. |
| Date & Time | Activates the software pack at the Date & Time set in the following parameter. |

*Activation Date & Time*

This parameter sets the Date & Time when the software pack activation will occur.

This setting can be any future date and 24 hour time.

*Skip Confirmation Step*

This parameter when enabled skips the confirmation step during the activation process.

Normally, the confirmation step will require use intervention to accept the confirmation which will halt the activation process. Skipping the confirmation will enable the activation process to continue without use intervention.

**To activate software in remote stations:**

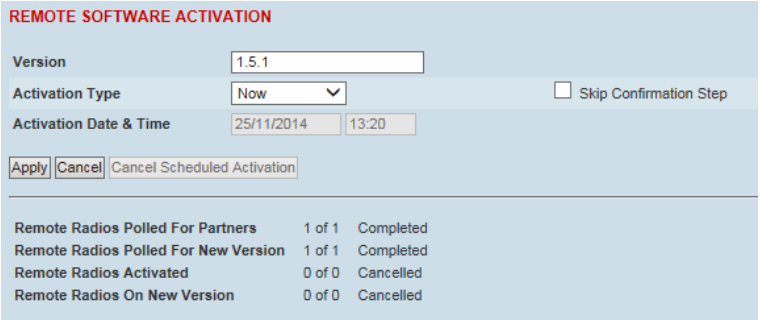
This process assumes that a Software Pack has been loaded into the base station with the file transfer process (see 'Software > File Transfer' on page 238) and distributed to all remote radios in the network.

---

**Note:** Do not navigate SuperVisor away from this page during the activation process (SuperVisor can lose PC focus).

---

1. Enter the Software Pack version (if different from displayed version).

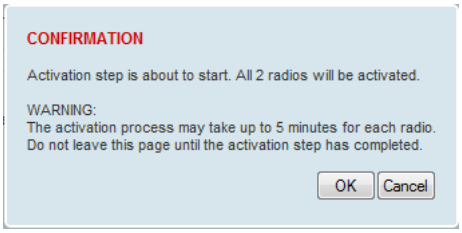



2. Select the Activation type.
3. Click Apply.

The remote stations will be polled to determine which radios require activation:

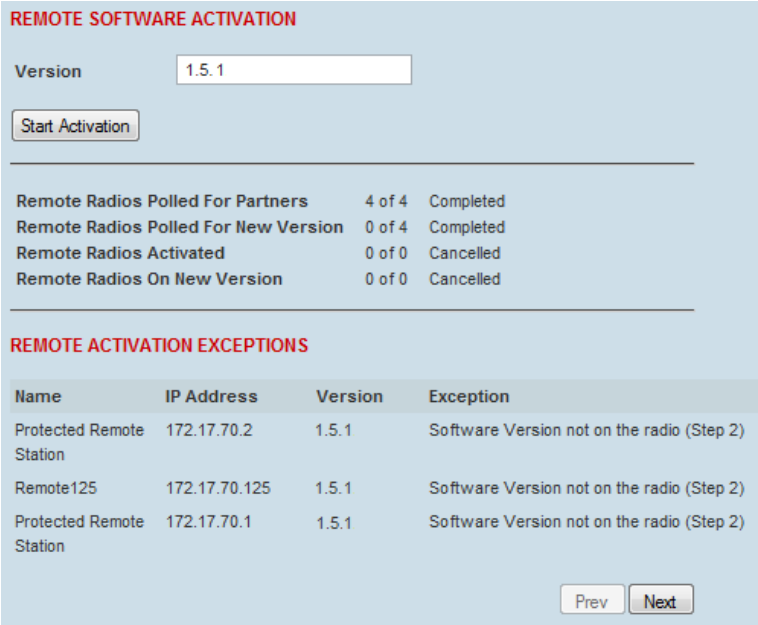
| Result | Function (X of Y) |
|---|---|
| Remote Radios Polled for Partners | X is the number of radios polled to determine the number of protected stations in the network.<br>Y is the number of remote radios registered with the base station. |
| Remote Radios Polled for New Version | X is the number of radios polled to determine the number of radios that contain the new software version.<br>Y is the number of remote radios registered with the base station. |
| Remote Radios Activated | X is the number of radios that contain the new software version and have been activated.<br>Y is the number of radios that contain the new software version and can be activated. |
| Remote Radios On New Version | X is the number of radios that has been successfully activated and now running the new version of software.<br>Y is the number of radios that the activation command was executed on.<br>**Note:** When upgrading from software version 1.2.5 to 1.2.6 or later, communication to all remote radios will be lost due to a MAC protocol change. This will prevent this function from working correctly. In this case, activate the new software on the base station and run the 'Maintenance > Advanced' Discover Nodes function on page 217. |

When the activation is ready to start:



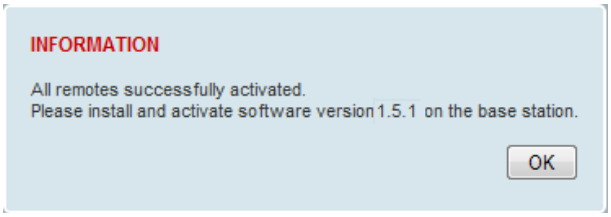

4. Click on 'OK' to start the activation process or Cancel to quit.

The page will display the progress of the activation.




The example shows that during the activation process there were exceptions that may need to be investigated.

When all the remote radios have been activated, the base station radio must now be activated with (see ‘Software > Manager’ on page 242).




4. Click on ‘OK’ to start the activation on the base station.

*Activation Type*

This parameter sets when the remote software activation will occur.

| Option | Function |
|---|---|
| Now | Activates the remote software now. |
| Date & Time | Activates the remote software at the Date & Time set in the following parameter. |

*Skip Confirmation Step*

This parameter when enabled skips the confirmation step during the activation process.

Normally, the confirmation step will require use intervention to accept the confirmation which will halt the activation process. Skipping the confirmation will enable the activation process to continue without use intervention.

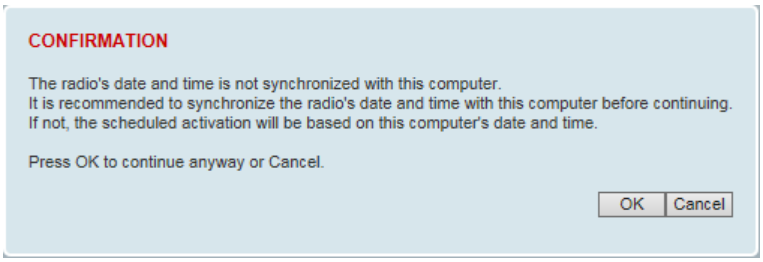
*Activation Date & Time*

This parameter sets the Date & Time when the remote software activation will occur.

This setting can be any future date and 24 hour time.

When the date and time is set, the remotes will be polled to setup the scheduled activation date and time.

If the network base station radio date / time is not synchronized, you will get the following popup:




You can manually enter the base station radio date / time or use the Date And Time Synchronization from a SNTP server feature (see ‘Terminal > Date / Time’ on page 92).

# Monitoring

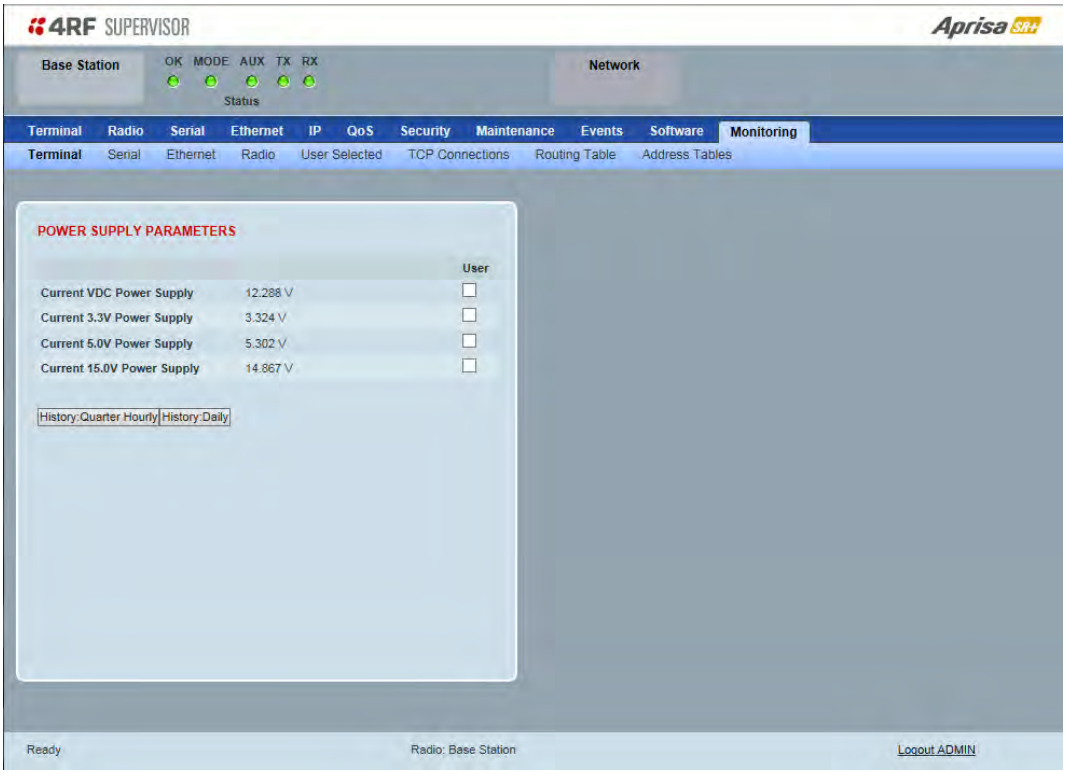
The Terminal, Serial, Ethernet, Radio and User Selected Monitored Parameter results have history log views for both Quarter Hourly and Daily.

Monitored parameter data is accumulated into 2 sets:

- 15 minutes of data, for 96 readings for the last 24 hours
- 24 hours of data, for 31 readings for the last 31 days.

## Monitoring > Terminal

This page displays the current radio internal and external input source radio power supply voltage diagnostic parameters.

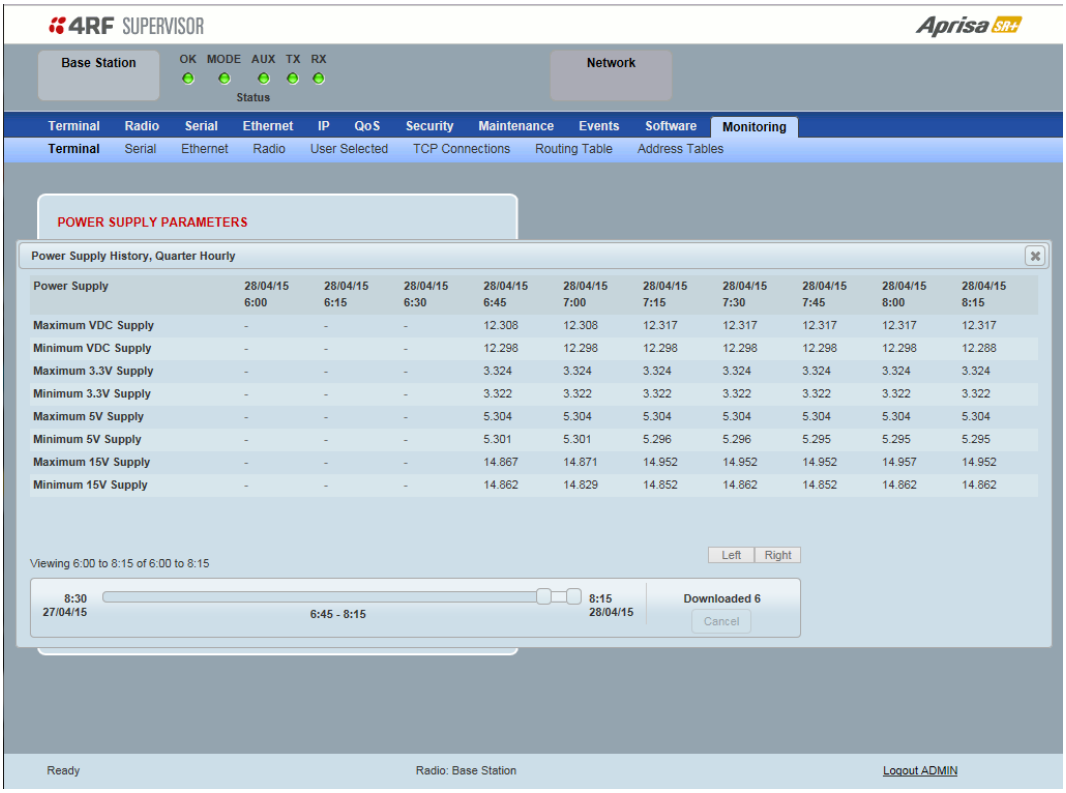



## POWER SUPPLY PARAMETERS

| Monitored Parameter | Function | Normal Operating Limits |
|---|---|---|
| Current VDC Power Supply | Parameter to show the current power supply input voltage | 10 to 30 VDC |
| Current 3.3 Volts Power Supply | Parameter to show the current 3.3 volt power rail voltage | 3.1 to 3.5 VDC |
| Current 5.0 Volts Power Supply | Parameter to show the current that the current 5.0 volt power rail voltage | 4.7 to 5.5 VDC |
| Current 7.2 Volts Power Supply | Parameter to show the current that the current 7.2 volt power rail voltage | 6.9 to 7.5 VDC |
| Current 15 Volts Power Supply | Parameter to show the current that the current 15 volt power rail voltage.<br>The 15 volt power supply is used to power the transmitter driver and power amplifier. | 320, 400 and 450 MHz<br>14.5 to 15.3 VDC<br>135, 220, 896 and 928 MHz<br>12.7 to 13.5 VDC |

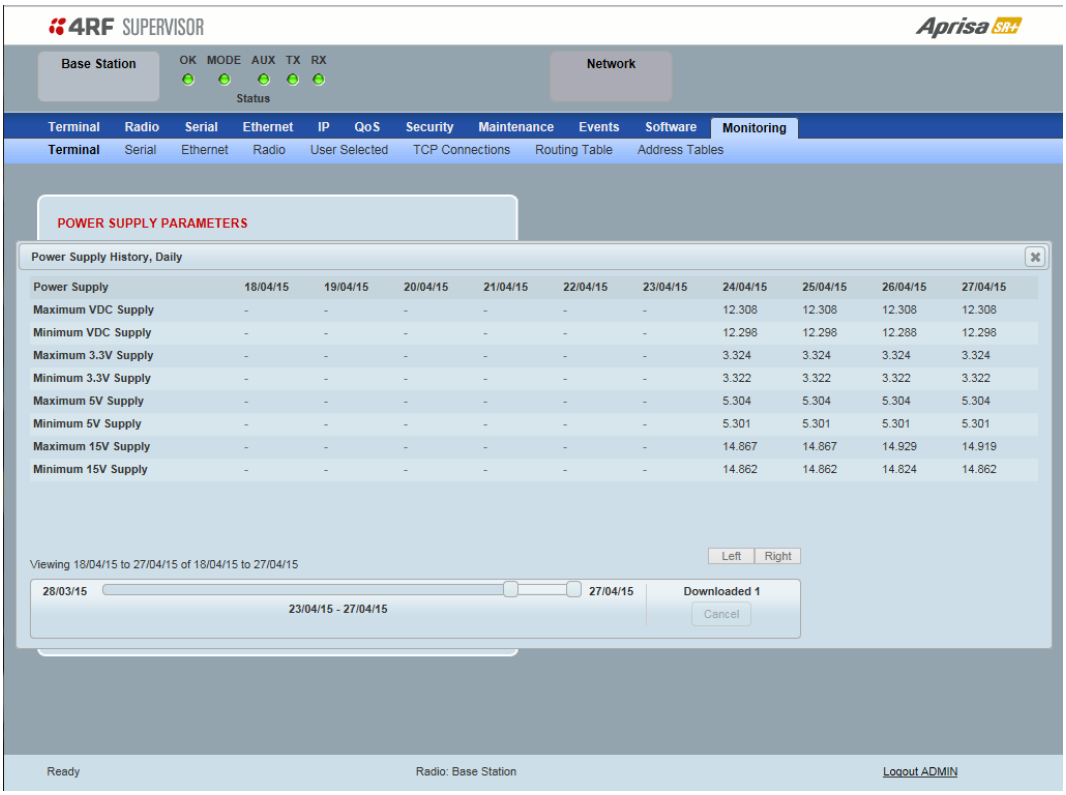
## Controls

The History Quarter Hourly button presents a log of results every quarter of an hour.




| Power Supply | 28/04/15 6:00 | 28/04/15 6:15 | 28/04/15 6:30 | 28/04/15 6:45 | 28/04/15 7:00 | 28/04/15 7:15 | 28/04/15 7:30 | 28/04/15 7:45 | 28/04/15 8:00 | 28/04/15 8:15 |
|---|---|---|---|---|---|---|---|---|---|---|
| Maximum VDC Supply | - | - | - | 12.308 | 12.308 | 12.317 | 12.317 | 12.317 | 12.317 | 12.317 |
| Minimum VDC Supply | - | - | - | 12.298 | 12.298 | 12.298 | 12.298 | 12.298 | 12.298 | 12.288 |
| Maximum 3.3V Supply | - | - | - | 3.324 | 3.324 | 3.324 | 3.324 | 3.324 | 3.324 | 3.324 |
| Minimum 3.3V Supply | - | - | - | 3.322 | 3.322 | 3.322 | 3.322 | 3.322 | 3.322 | 3.322 |
| Maximum 5V Supply | - | - | - | 5.304 | 5.304 | 5.304 | 5.304 | 5.304 | 5.304 | 5.304 |
| Minimum 5V Supply | - | - | - | 5.301 | 5.301 | 5.296 | 5.296 | 5.295 | 5.295 | 5.295 |
| Maximum 15V Supply | - | - | - | 14.867 | 14.871 | 14.952 | 14.952 | 14.952 | 14.957 | 14.952 |
| Minimum 15V Supply | - | - | - | 14.862 | 14.829 | 14.852 | 14.862 | 14.852 | 14.862 | 14.862 |

The History Daily button presents a log of results every day.

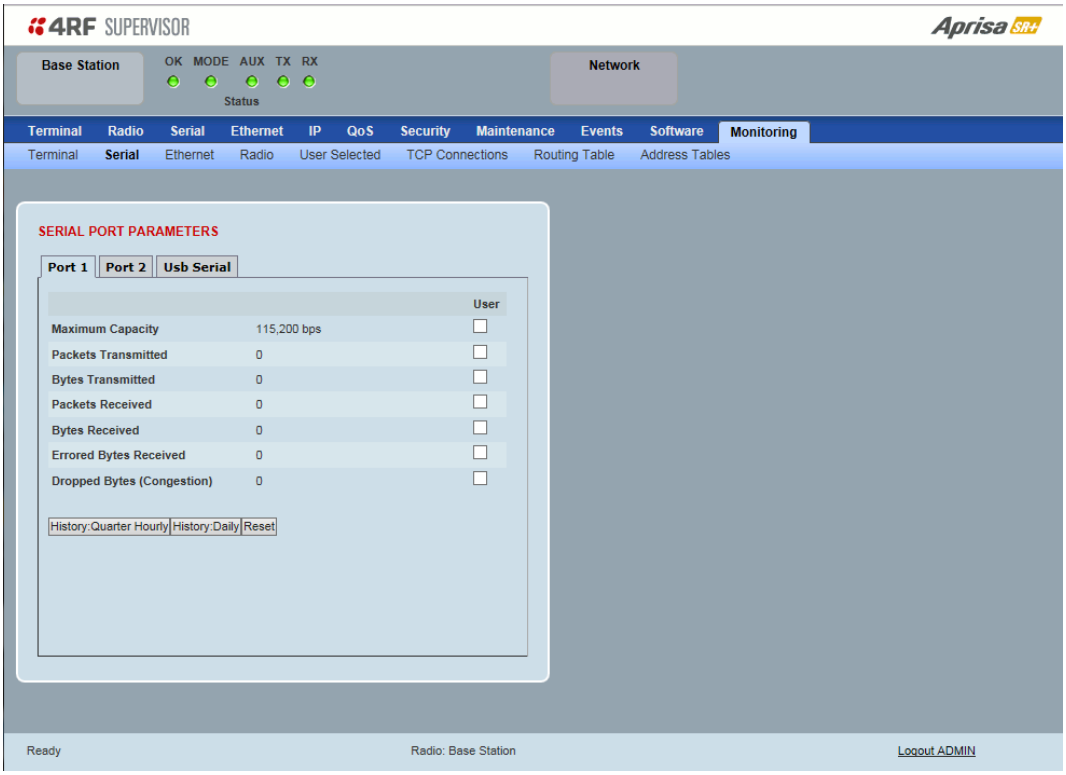



| Power Supply | 18/04/15 | 19/04/15 | 20/04/15 | 21/04/15 | 22/04/15 | 23/04/15 | 24/04/15 | 25/04/15 | 26/04/15 | 27/04/15 |
|---|---|---|---|---|---|---|---|---|---|---|
| Maximum VDC Supply | - | - | - | - | - | - | 12.308 | 12.308 | 12.308 | 12.308 |
| Minimum VDC Supply | - | - | - | - | - | - | 12.298 | 12.298 | 12.288 | 12.298 |
| Maximum 3.3V Supply | - | - | - | - | - | - | 3.324 | 3.324 | 3.324 | 3.324 |
| Minimum 3.3V Supply | - | - | - | - | - | - | 3.322 | 3.322 | 3.322 | 3.322 |
| Maximum 5V Supply | - | - | - | - | - | - | 5.304 | 5.304 | 5.304 | 5.304 |
| Minimum 5V Supply | - | - | - | - | - | - | 5.301 | 5.301 | 5.301 | 5.301 |
| Maximum 15V Supply | - | - | - | - | - | - | 14.867 | 14.867 | 14.929 | 14.919 |
| Minimum 15V Supply | - | - | - | - | - | - | 14.862 | 14.862 | 14.824 | 14.862 |

## Monitoring > Serial

This page displays the current radio performance monitoring parameters per serial port in packet and byte level granularity, for serial port high level statistics and troubleshooting.

The results shown are since the page was opened and are updated automatically every 12 seconds.




### SERIAL PORT PARAMETERS

#### All Serial Ports

| Monitored Parameter | Function | Normal Operating Limits |
|---|---|---|
| Maximum Capacity | Parameter to show the maximum serial data rate of the serial port | Equal to the serial port baud rate setting |
| Packets Transmitted | Parameter to show the number of packets transmitted to the customer from the serial port | |
| Packets Received | Parameter to show the number of packets received from the customer into the serial port | |
| Bytes Received | Parameter to show the number of bytes received from the customer into the serial port | |
| Errored Bytes Received | Parameter to show the number of bytes received from the customer into the serial port that have errors | |
| Dropped Bytes (Congestion) | Parameter to show the number of bytes received from the customer into the serial port that are dropped due to over the air congestion | |

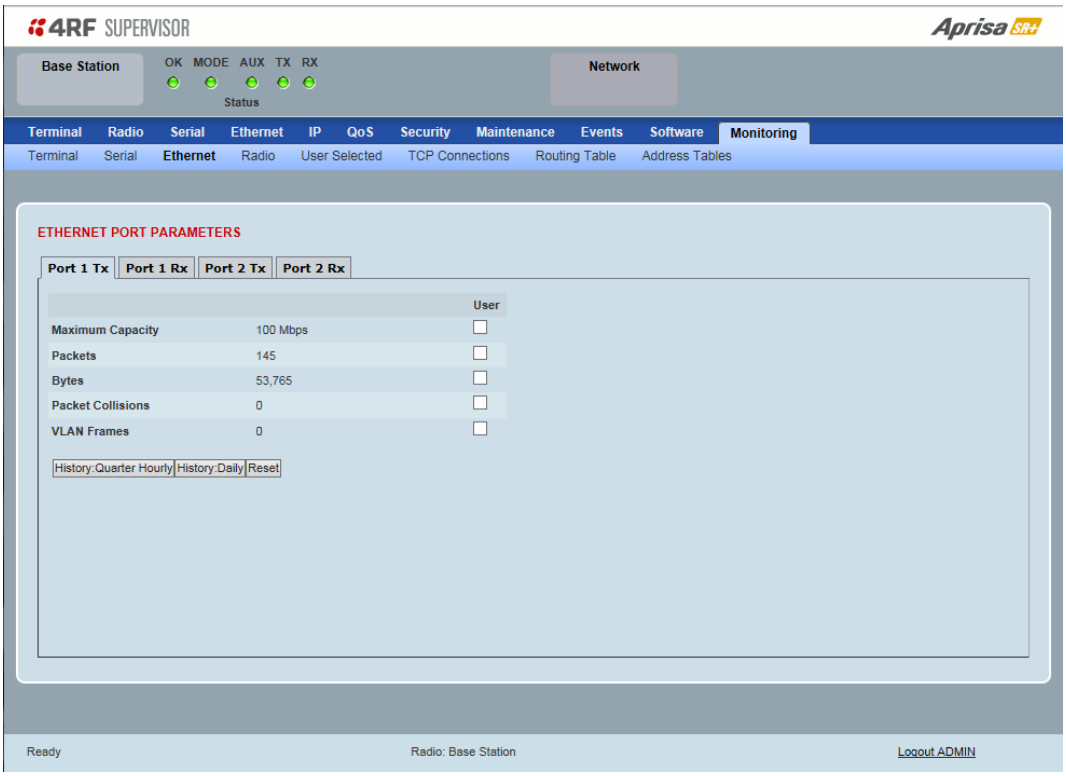
#### Controls

The Reset button clears the current results.

## Monitoring > Ethernet

This page displays the current radio performance monitoring parameters per Ethernet port transmission (TX) out of the radio in packet and byte level granularity, for Ethernet port high level statistics and troubleshooting.

The results shown are since the page was opened and are updated automatically every 12 seconds.




## ETHERNET PORT PARAMETERS

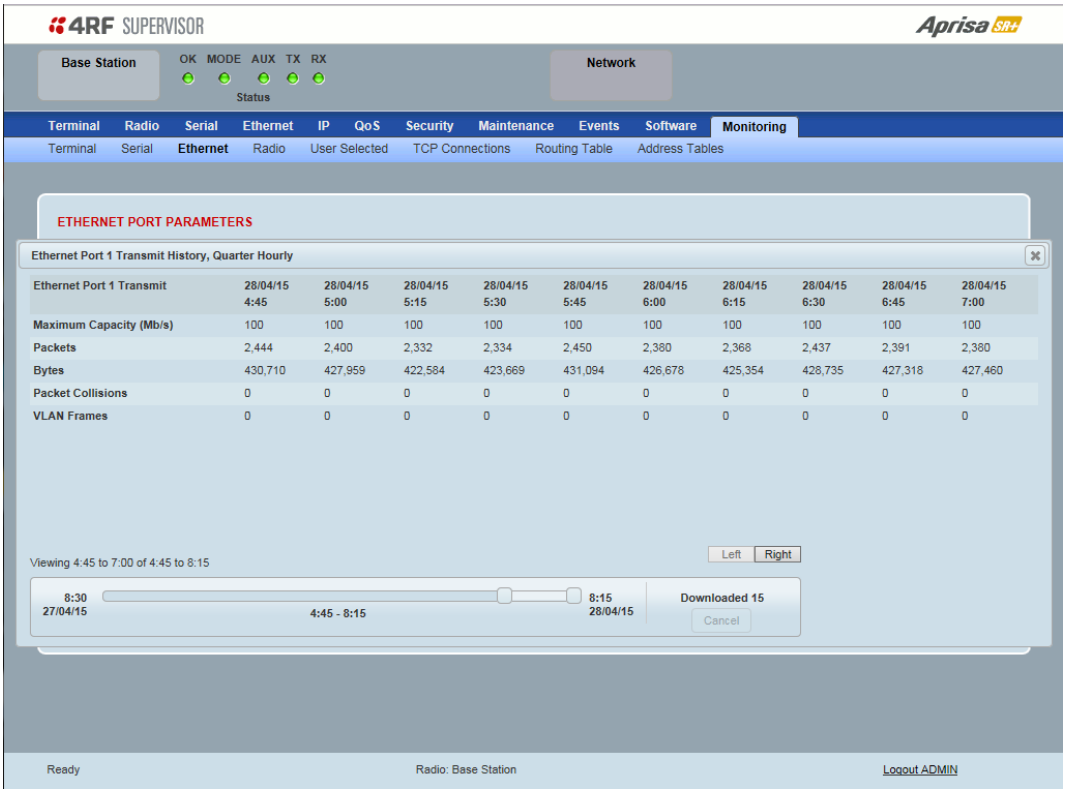
### All Ethernet Ports TX

| Monitored Parameter | Function | Normal Operating Limits |
|---|---|---|
| Maximum Capacity | Parameter to show the maximum Ethernet data rate of the Ethernet port | Equal to the Ethernet port speed setting |
| Packets | Parameter to show the number of packets transmitted to the customer from the Ethernet port | |
| Bytes | Parameter to show the number of bytes transmitted to the customer from the Ethernet port | |
| Packet Collisions | Parameter to show the number of packet collisions on the data transmitted to the customer from the Ethernet port on a shared LAN | |
| VLAN Frames | Parameter to show the number of VLAN tagged frames transmitted to the customer from the Ethernet port | |

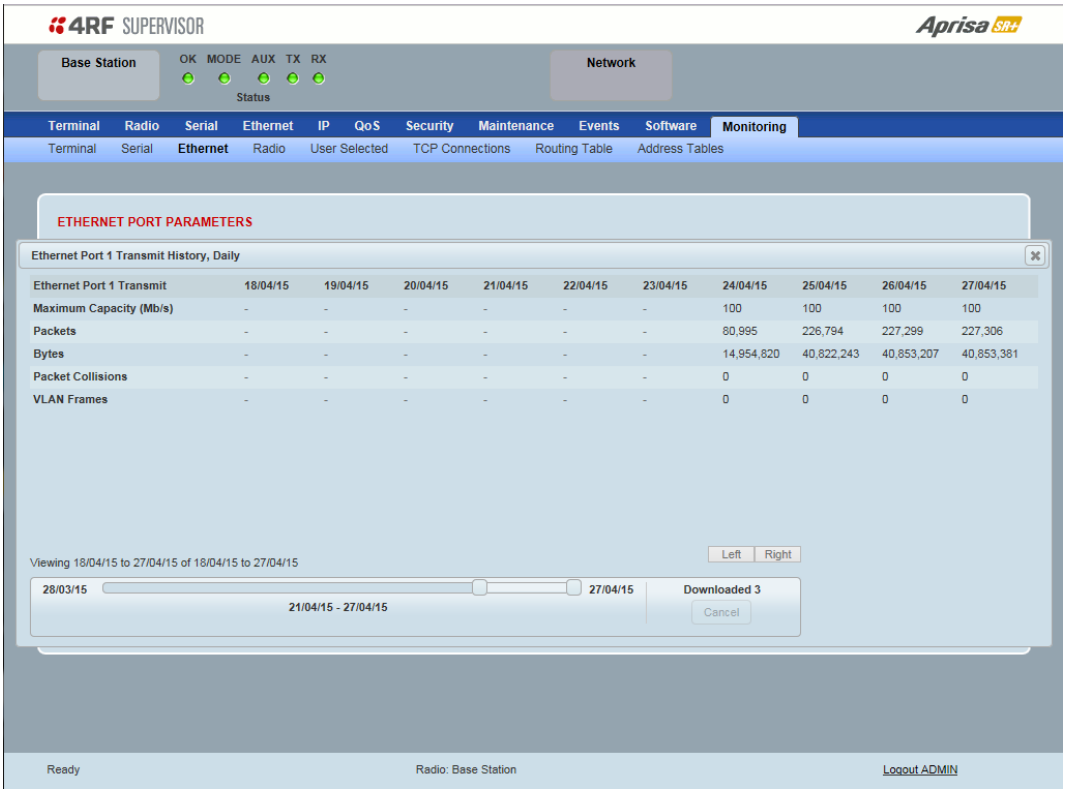
Controls

The Reset button clears the current results.

The History Quarter Hourly button presents a log of results every quarter of an hour.

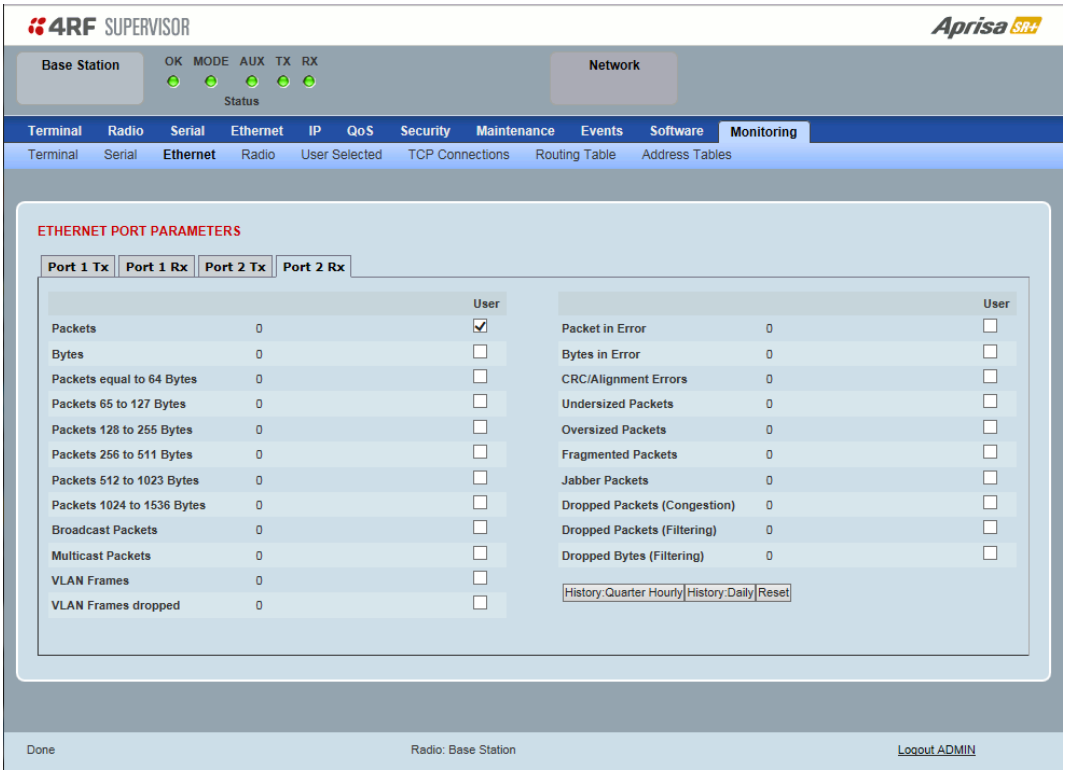



The History Daily button presents a log of results every day.



This page displays the current radio performance monitoring parameters per Ethernet port received (RX) data in packet and byte level granularity, for Ethernet port high level statistics and troubleshooting.

The results shown are since the page was opened and are updated automatically every 12 seconds.




## ETHERNET PORT PARAMETERS

### All Ethernet Ports RX

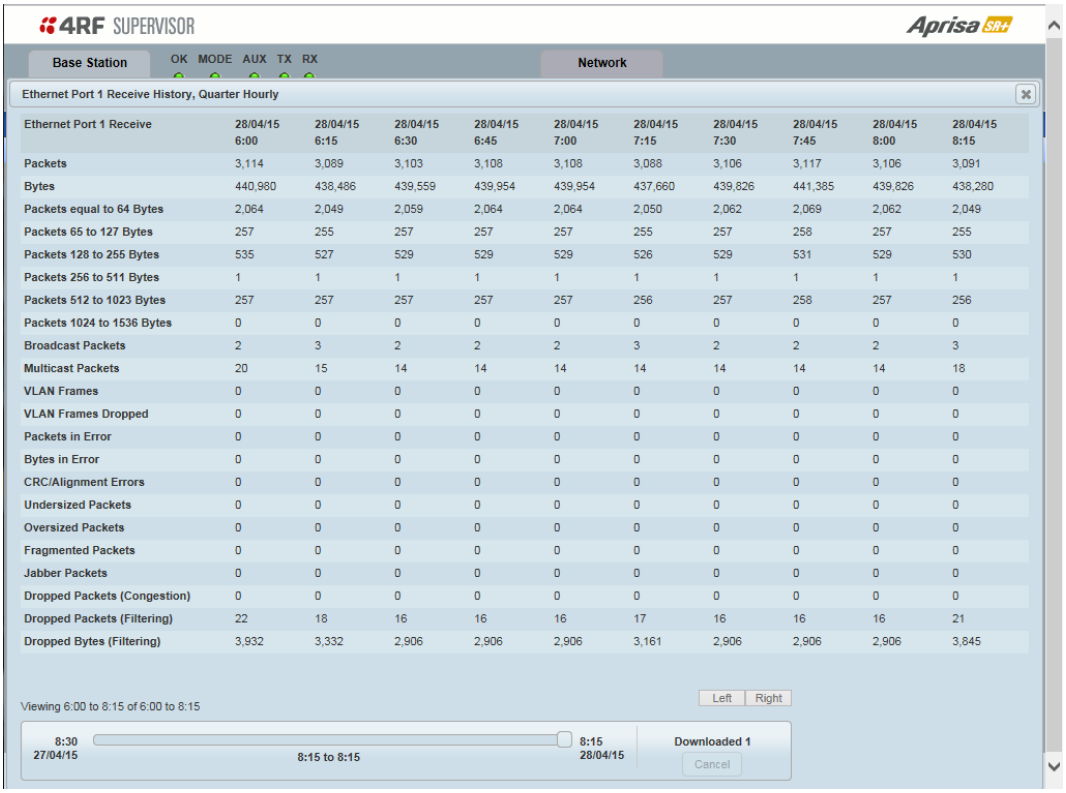
| Monitored Parameter | Function |
|---|---|
| Packets | Parameter to show the number of packets received by the customer from the Ethernet port (including bad packets, broadcast packets, and multicast packets) |
| Bytes | Parameter to show the number of bytes received (including those in bad packets) by the customer from the Ethernet port (excluding framing bits but including FCS octets) |
| Packets equal to 64 bytes | Parameter to show the number of packets received (including bad packets) from the customer into the Ethernet port that are equal to 64 bytes (excluding framing bits but including FCS octets) |
| Packets 65 to 127 bytes | Parameter to show the number of packets received (including bad packets) from the customer into the Ethernet port that are between 65 and 127 bytes (excluding framing bits but including FCS octets) |
| Packets 128 to 255 bytes | Parameter to show the number of packets received (including bad packets) from the customer into the Ethernet port that are between 128 and 255 bytes (excluding framing bits but including FCS octets) |
| Packets 256 to 511 bytes | Parameter to show the number of packets received (including bad packets) from the customer into the Ethernet port that are between 256 and 511 bytes(excluding framing bits but including FCS octets) |
| Packets 512 to 1023 bytes | Parameter to show the number of packets received (including bad packets) from the customer into the Ethernet port that are between 512 and 1023 bytes(excluding framing bits but including FCS octets) |
| Packets 1024 to 1536 bytes | Parameter to show the number of packets received (including bad packets) from the customer into the Ethernet port that are between 1024 and 1536 bytes(excluding framing bits but including FCS octets) |
| Broadcast Packets | Parameter to show the number of broadcast packets received from the customer into the Ethernet port. Broadcast packets are good packets received that were directed to the broadcast address. Note that this does not include multicast packets. |

| Monitored Parameter | Function |
|---|---|
| Multicast Packets | Parameter to show the number of multicast packets received from the customer into the Ethernet port. Multicast packets are packets that were directed to a multicast address. Note that this number does not include packets directed to the broadcast address. |
| VLAN Frames | Parameter to show the number of VLAN tagged frames received from the customer into the Ethernet port |
| VLAN Frames Dropped | Parameter to show the number of VLAN tagged frames received from the customer into the Ethernet port that were dropped due to CRC errored frames, filtered VLAN frames, undersized frames or oversized frames. |
| Packet In Error | Parameter to show the number of errored packets received from the customer into the Ethernet port caused by CRC errors, FCS Errors, alignment errors, oversized packets, undersized packets, fragmented packets and jabber packets |
| Bytes In Error | Parameter to show the number of errored bytes received from the customer into the Ethernet port |
| CRC / Alignment Error | Parameter to show the number of CRC / alignment errors received from the customer into the Ethernet port. CRC / alignment errors are defined as frames that had a length excluding framing bits, but including FCS octets of between 64 and 1518 octets, inclusive, but had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets. |
| Undersized Packets | Parameter to show the number of undersized packets received from the customer into the Ethernet port. Undersized packets are less than 64 octets long excluding framing bits, but including FCS octets. |
| Oversized Packets | Parameter to show the number of oversized packets received from the customer into the Ethernet port. Oversized packets are longer than 1518 octets excluding framing bits, but including FCS octets. |
| Fragmented Packets | Parameter to show the number of fragmented packets received from the customer into the Ethernet port. Fragmented packets have either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS. |
| Jabber Packets | Parameter to show the number of jabber packets received from the customer into the Ethernet port |
| Dropped Packets (congestion) | Parameter to show the number of dropped packets received from the customer into the Ethernet port caused by congestion |
| Dropped Packets (filtering) | Parameter to show the number of dropped packets received from the customer into the Ethernet port caused by packet L2 / L3 filtering |
| Dropped Bytes (filtering) | Parameter to show the number of dropped bytes received from the customer into the Ethernet port caused by packet L2 / L3 filtering |

Controls

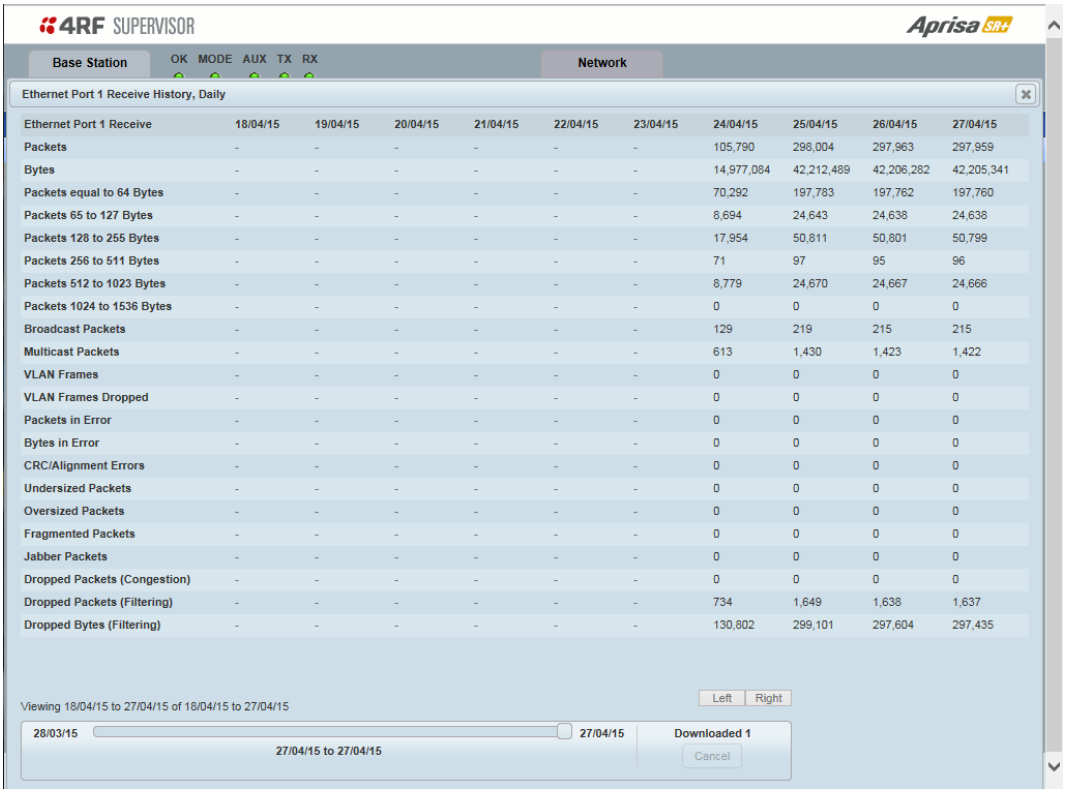
The Reset button clears the current results.

The History Quarter Hourly button presents a log of results every quarter of an hour.




| Ethernet Port 1 Receive | 28/04/15 6:00 | 28/04/15 6:15 | 28/04/15 6:30 | 28/04/15 6:45 | 28/04/15 7:00 | 28/04/15 7:15 | 28/04/15 7:30 | 28/04/15 7:45 | 28/04/15 8:00 | 28/04/15 8:15 |
|---|---|---|---|---|---|---|---|---|---|---|
| Packets | 3,114 | 3,089 | 3,103 | 3,108 | 3,108 | 3,088 | 3,106 | 3,117 | 3,106 | 3,091 |
| Bytes | 440,980 | 438,486 | 439,559 | 439,954 | 439,954 | 437,660 | 439,826 | 441,385 | 439,826 | 438,280 |
| Packets equal to 64 Bytes | 2,064 | 2,049 | 2,059 | 2,064 | 2,064 | 2,050 | 2,062 | 2,069 | 2,062 | 2,049 |
| Packets 65 to 127 Bytes | 257 | 255 | 257 | 257 | 257 | 255 | 257 | 258 | 257 | 255 |
| Packets 128 to 255 Bytes | 535 | 527 | 529 | 529 | 529 | 526 | 529 | 531 | 529 | 530 |
| Packets 256 to 511 Bytes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Packets 512 to 1023 Bytes | 257 | 257 | 257 | 257 | 257 | 256 | 257 | 258 | 257 | 256 |
| Packets 1024 to 1536 Bytes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Broadcast Packets | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 3 |
| Multicast Packets | 20 | 15 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 18 |
| VLAN Frames | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| VLAN Frames Dropped | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Packets in Error | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bytes in Error | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CRC/Alignment Errors | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Undersized Packets | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Oversized Packets | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fragmented Packets | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jabber Packets | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dropped Packets (Congestion) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dropped Packets (Filtering) | 22 | 18 | 16 | 16 | 16 | 17 | 16 | 16 | 16 | 21 |
| Dropped Bytes (Filtering) | 3,932 | 3,332 | 2,906 | 2,906 | 2,906 | 3,161 | 2,906 | 2,906 | 2,906 | 3,845 |

The History Daily button presents a log of results every day.

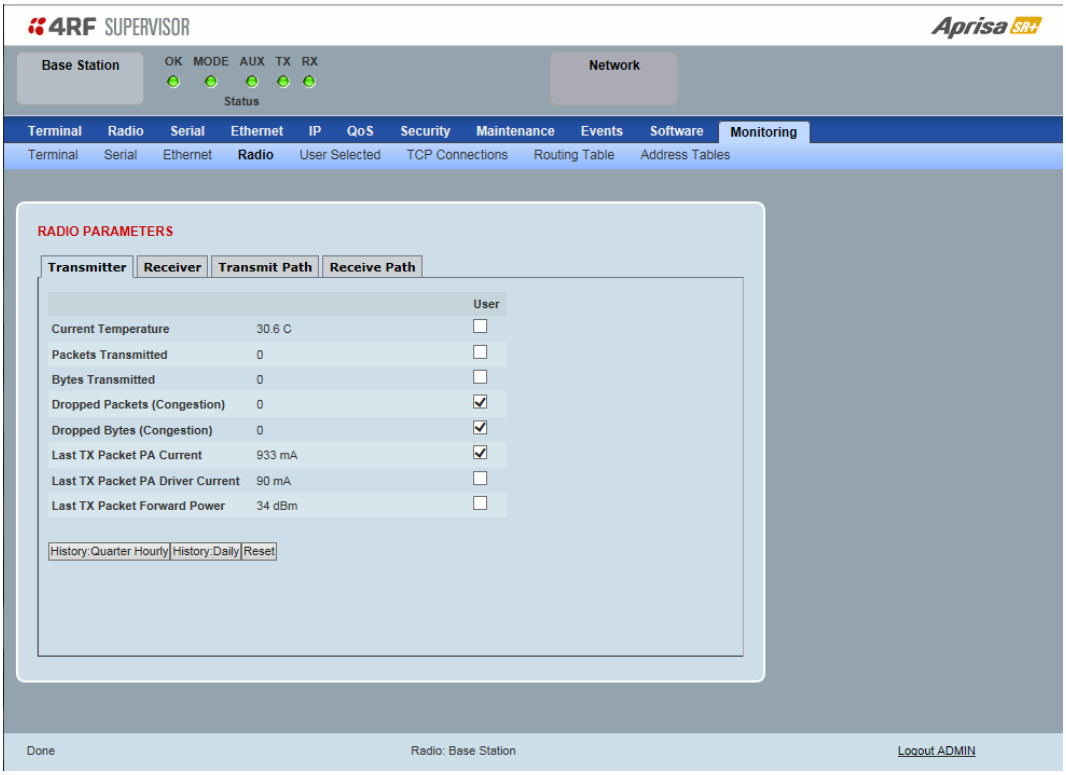



| Ethernet Port 1 Receive | 18/04/15 | 19/04/15 | 20/04/15 | 21/04/15 | 22/04/15 | 23/04/15 | 24/04/15 | 25/04/15 | 26/04/15 | 27/04/15 |
|---|---|---|---|---|---|---|---|---|---|---|
| Packets | - | - | - | - | - | - | 105,790 | 298,004 | 297,963 | 297,959 |
| Bytes | - | - | - | - | - | - | 14,977,084 | 42,212,489 | 42,206,282 | 42,205,341 |
| Packets equal to 64 Bytes | - | - | - | - | - | - | 70,292 | 197,783 | 197,762 | 197,760 |
| Packets 65 to 127 Bytes | - | - | - | - | - | - | 8,694 | 24,643 | 24,638 | 24,638 |
| Packets 128 to 255 Bytes | - | - | - | - | - | - | 17,954 | 50,811 | 50,801 | 50,799 |
| Packets 256 to 511 Bytes | - | - | - | - | - | - | 71 | 97 | 95 | 96 |
| Packets 512 to 1023 Bytes | - | - | - | - | - | - | 8,779 | 24,670 | 24,667 | 24,666 |
| Packets 1024 to 1536 Bytes | - | - | - | - | - | - | 0 | 0 | 0 | 0 |
| Broadcast Packets | - | - | - | - | - | - | 129 | 219 | 215 | 215 |
| Multicast Packets | - | - | - | - | - | - | 613 | 1,430 | 1,423 | 1,422 |
| VLAN Frames | - | - | - | - | - | - | 0 | 0 | 0 | 0 |
| VLAN Frames Dropped | - | - | - | - | - | - | 0 | 0 | 0 | 0 |
| Packets in Error | - | - | - | - | - | - | 0 | 0 | 0 | 0 |
| Bytes in Error | - | - | - | - | - | - | 0 | 0 | 0 | 0 |
| CRC/Alignment Errors | - | - | - | - | - | - | 0 | 0 | 0 | 0 |
| Undersized Packets | - | - | - | - | - | - | 0 | 0 | 0 | 0 |
| Oversized Packets | - | - | - | - | - | - | 0 | 0 | 0 | 0 |
| Fragmented Packets | - | - | - | - | - | - | 0 | 0 | 0 | 0 |
| Jabber Packets | - | - | - | - | - | - | 0 | 0 | 0 | 0 |
| Dropped Packets (Congestion) | - | - | - | - | - | - | 0 | 0 | 0 | 0 |
| Dropped Packets (Filtering) | - | - | - | - | - | - | 734 | 1,649 | 1,638 | 1,637 |
| Dropped Bytes (Filtering) | - | - | - | - | - | - | 130,802 | 299,101 | 297,604 | 297,435 |

## Monitoring > Radio

This page displays the current radio diagnostic and performance monitoring parameters of the radio transmitter.

The results shown are since the page was opened and are updated automatically every 12 seconds.




## RADIO PARAMETERS

### Transmitter

| Monitored Parameter | Function | Normal Operating Limits |
|---|---|---|
| Current Temperature | Parameter to show the current temperature of the transmitter | 0 to 70 °C |
| Packets Transmitted | Parameter to show the number of packets transmitted over the air | |
| Bytes Transmitted | Parameter to show the number of bytes transmitted over the air | |
| Dropped Packets (congestion) | Parameter to show the number of dropped packets transmitted over the air caused by congestion | |
| Dropped Bytes (congestion) | Parameter to show the number of dropped bytes transmitted over the air caused by congestion | |
| Last TX Packet PA Current | Parameter to show the current consumed by the transmitter power amplifier in mA. The value is stored from the last time the transmitter was active and transmitted a packet. | This value will change depending on the transmitter power setting, modulation, temperature and the VSWR of the antenna. The alarm limits for this are 50 mA to 2.5 A |
| Last TX Packet Driver Current | Parameter to show the current consumed by the transmitter power amplifier driver in mA. The value is stored from the last time the transmitter was active and transmitted a packet. | This value will change depending on the transmitter power setting, modulation and temperature. The alarm limits for the PA Driver Current are 10 mA to 500 mA. |

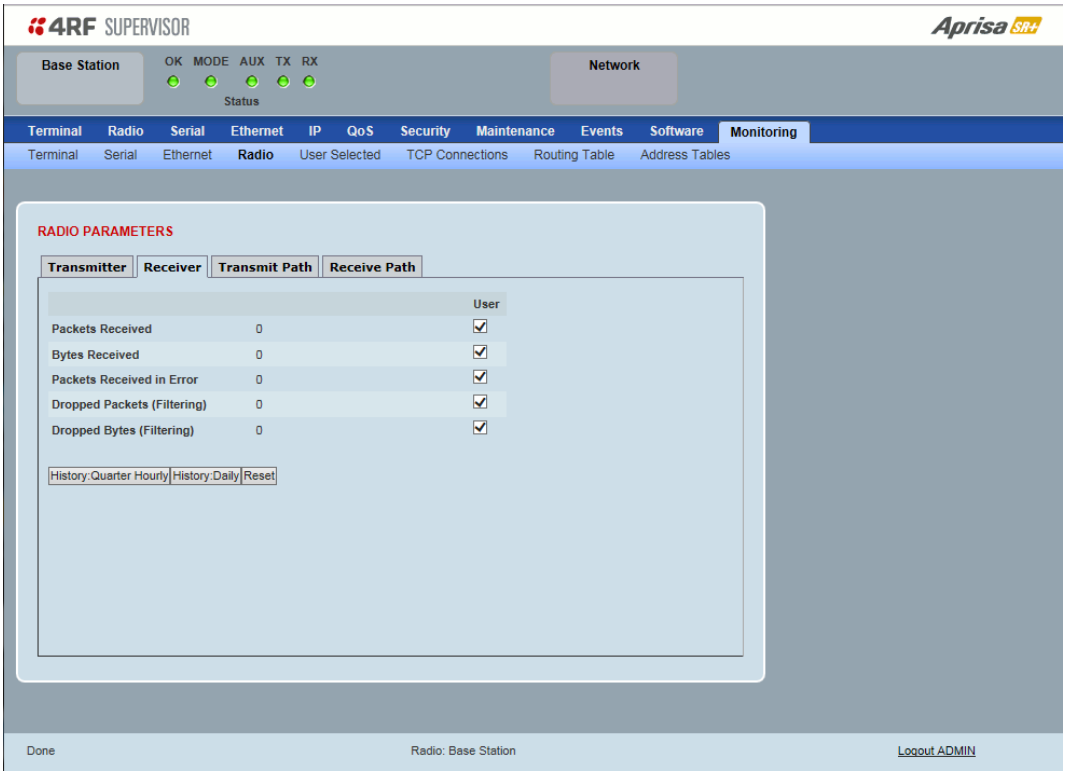
| Monitored Parameter | Function | Normal Operating Limits |
|---|---|---|
| Last TX Packet Forward Power | Parameter to show the actual transmitter power in dBm. The value is stored from the last time the transmitter was active and transmitted a packet. | This value will be dependent on the output power, the temperature and the VSWR of the antenna. The alarm limits for the Tx forward power are +/-4 dB. |

Controls

The Reset button clears the current results.

This page displays the current radio performance monitoring parameters of radio receiver.

The results shown are since the page was opened and are updated automatically every 12 seconds.




## RADIO PARAMETERS

### Receiver

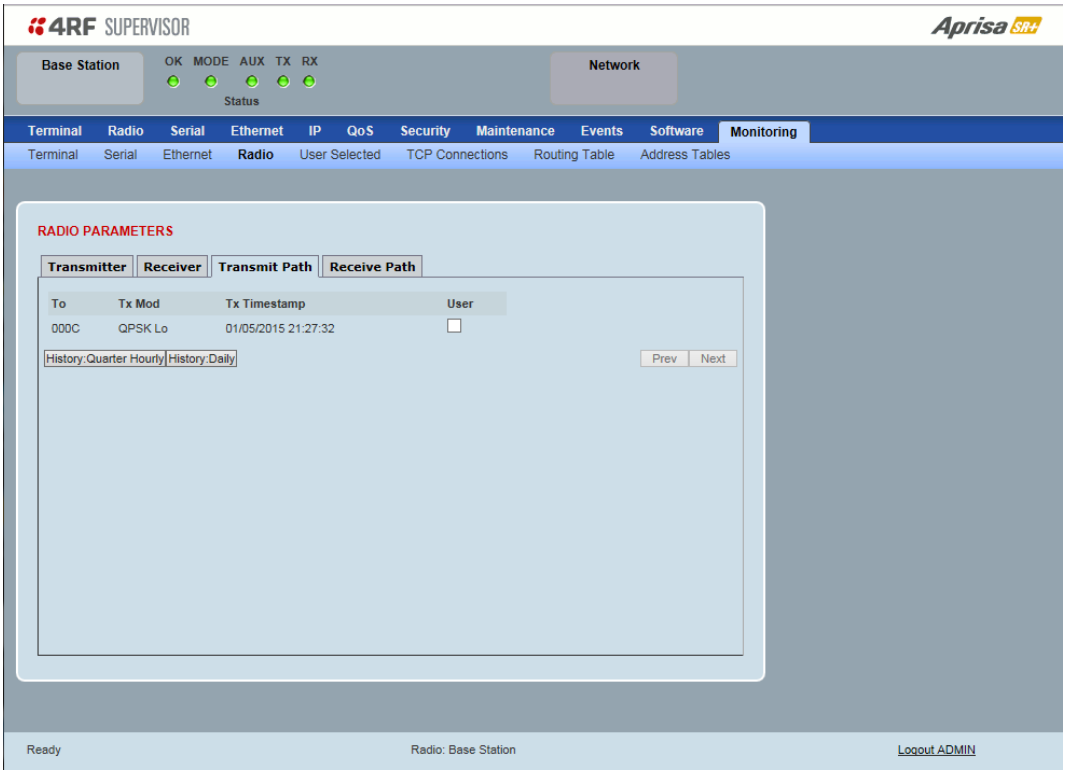
| Monitored Parameter | Function |
|---|---|
| Packets Received | Parameter to show the number of packets received over the air |
| Bytes Received | Parameter to show the number of bytes received over the air |
| Packets Received In Error | Parameter to show the number of packets received over the air |
| Dropped Packets (filtering) | Parameter to show the number of dropped packets received over the air caused by L2 / L3 filtering |
| Dropped Bytes (filtering) | Parameter to show the number of dropped bytes received over the air caused by L2 / L3 filtering |

### Controls

The Reset button clears the current results.

This page displays the current radio RF transmit path modulation setting to single or multiple destination radios that the radio is transmitting to.

The results shown are since the page was opened and are updated automatically every 12 seconds.




## RADIO PARAMETERS

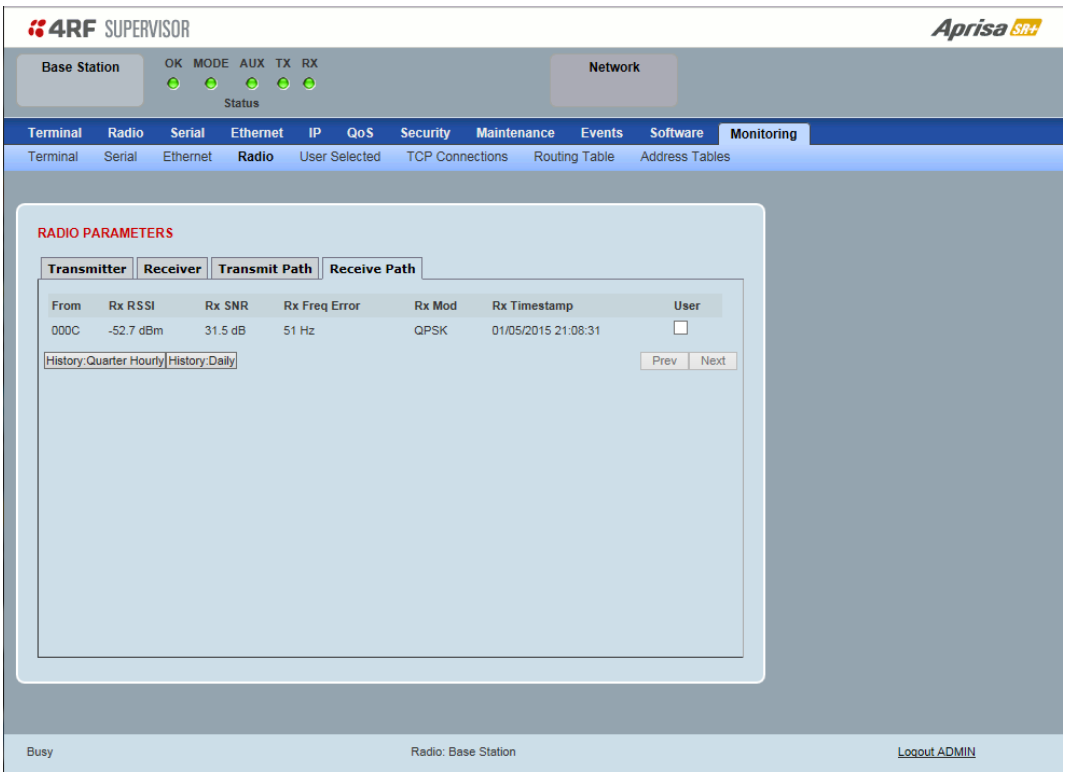
| Result | Function |
|---|---|
| To | The destination Node Address of the radio/s transmitting data to. |
| Tx Mod | The current radio transmitter modulation being used to communicate with the destination radio/s. |
| Tx Timestamp | The timestamp of the last transmitted packet to the destination radio/s. |

### Controls

The Next button will display the next page of 8 radios and the Prev button will display the previous page of 8 radios.

This page displays the current radio RF receive path parameters from single or multiple source radios that the radio is receiving from.

The results shown are since the page was opened and are updated automatically every 12 seconds.




## RADIO PARAMETERS

### Receive Path

| Result | Function |
|---|---|
| From | The source Node Address of the radio receiving data from. |
| Rx RSSI | The RSSI of the RF signal received from the source radio/s. This parameter displays the receiver RSSI reading taken from the last data packet received. |
| Rx SNR | The SNR of the RF signal received from the source radio/s. This parameter displays the receiver SNR reading taken from the last data packet received. |
| Rx Freq Error | The frequency difference between this radio's receiver and the frequency of the incoming packet rate from the source radio/s. |
| Rx Mod | The current radio receive modulation being used to communicate with the source radio/s. |
| Rx Timestamp | The timestamp of the last received packet from the source radio/s. |

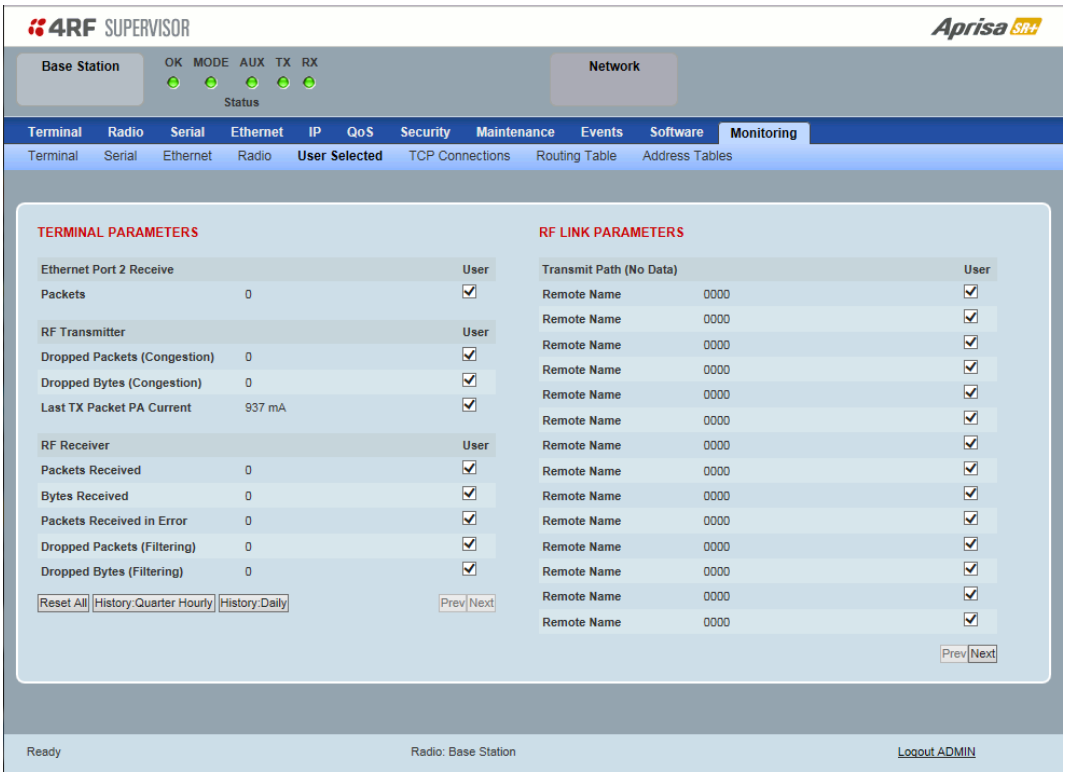
### Controls

The Next button will display the next page of 8 radios and the Prev button will display the previous page of 8 radios.

## Monitoring > User Selected

This page displays the 'User' parameters setup in all the other Monitoring screens e.g. in the Monitoring > Radio > Transmitter, the User checkbox is ticked for the Dropped Packets (Congestion) and Dropped Bytes (Congestion).

The results shown are since the page was opened and are updated automatically every 12 seconds.

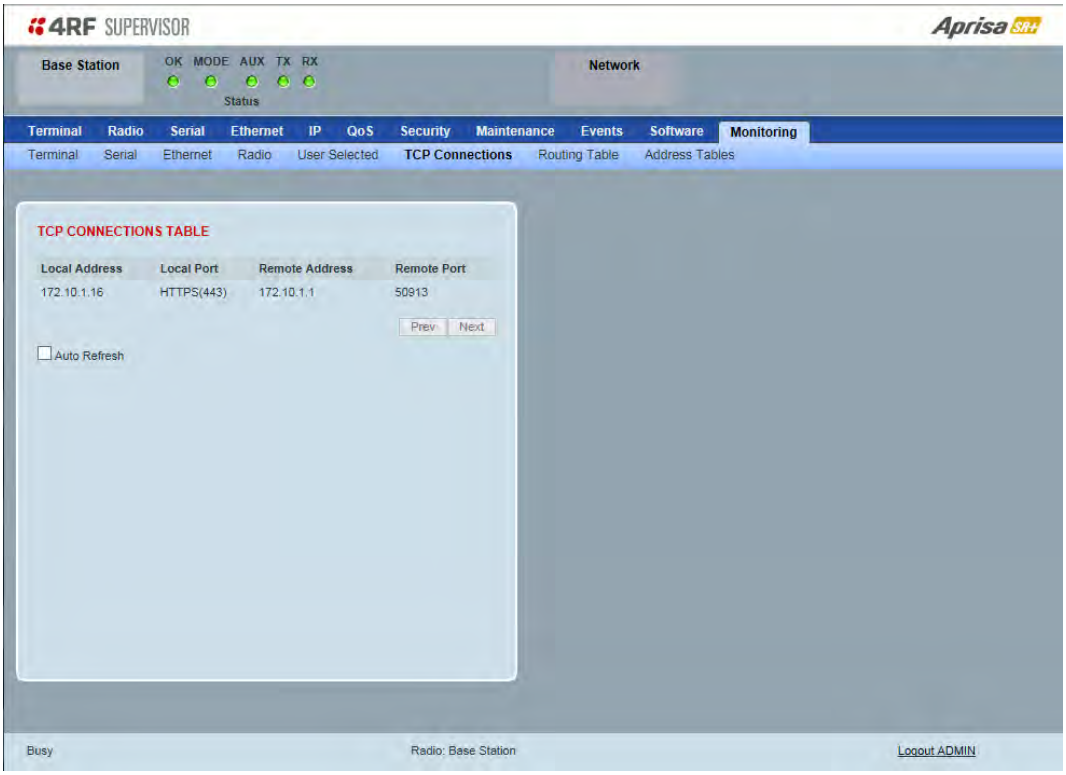



### Controls

The Reset button clears the current results.

## Monitoring > TCP Connections

This page displays the list of active TCP connections on the radio.




### TCP CONNECTIONS TABLE

| Result | Function |
|---|---|
| Local Address | The local radio IP address |
| Local Port | The local radio TCP port number |
| Remote Address | The remote host IP address (in most case a host PC connected to radio/network) |
| Remote Port | The local radio TCP port number (in most case a host PC connected to radio / network) |

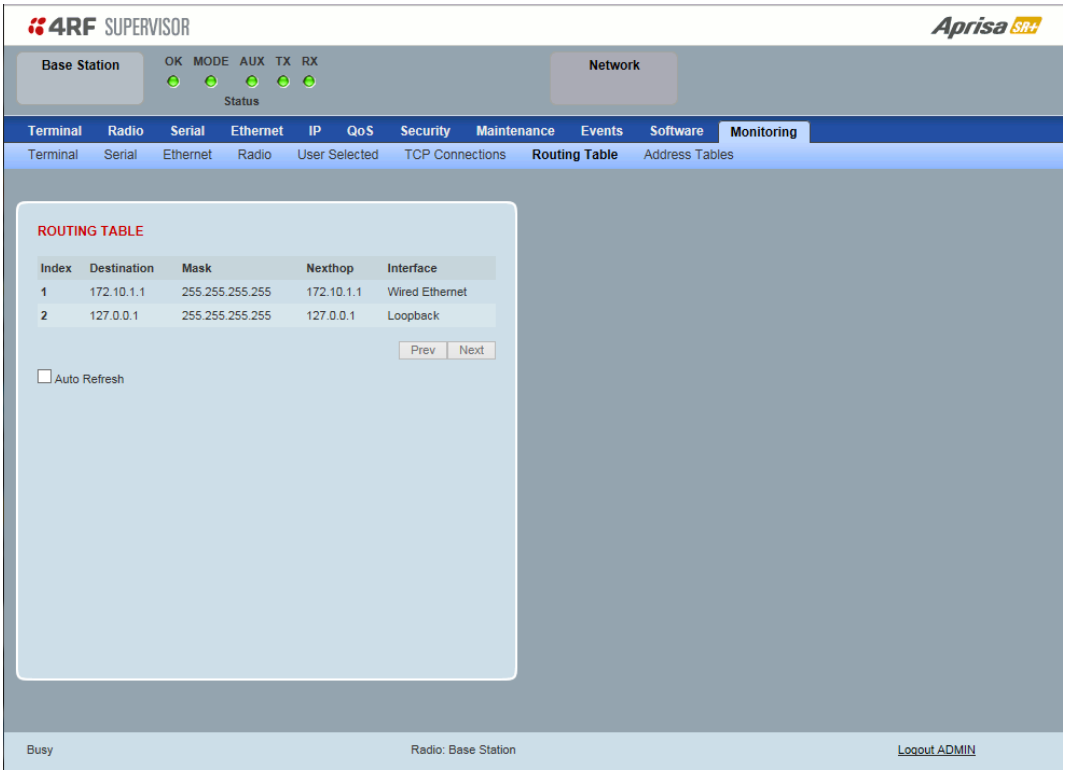
### Controls

The Next button will display the next page of 8 connections and the Prev button will display the previous page of 8 connections.

If the Auto Refresh option is ticked, the TCP Connections table will refresh every 12 seconds.

## Monitoring > Routing Table

This page displays the list of active routes on the radio.




### ROUTING TABLE

| Result | Function |
|---|---|
| Index | The routing table index |
| Destination | The target destination IP address of the route |
| Mask | The subnet mask of the destination IP address of the route |
| Next Hop | The next hop IP address on the path to the destination IP address of the route |
| Interface | The physical interface output on the path to the destination IP address of the route |

### Controls

The Next button will display the next page of 8 routes and the Prev button will display the previous page of 8 routes.

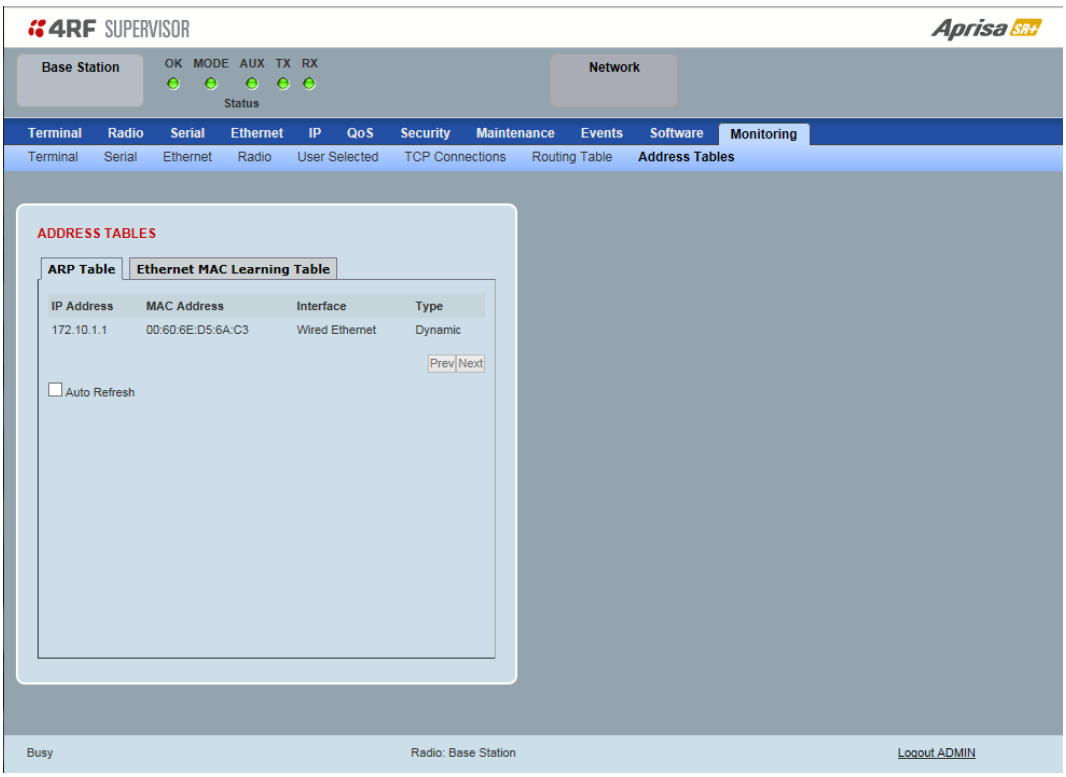
If the Auto Refresh option is ticked, the routing table will refresh every 12 seconds.

## Monitoring > Address Tables

### ARP Table

This page displays the current Address Resolution Protocols (ARP) on the radio. The radio implemented ARP protocol is used for resolution of network layer addresses into link layer addresses. It is used to map a IPv4 address to an Ethernet MAC address. The ARP table shows the results of the ARP protocol linkage between IPv4 address and Ethernet MAC address of the devices attached to the radio.

In a layer 2 bridge LAN, an upper layer protocol may include the IP address of the destination, but since it is an Ethernet LAN network, it also needs to know the destination MAC address. First, the radio uses a cached ARP table to look up the IPv4 destination address for the matching MAC address records. If the MAC address is found, it sends the IPv4 packet encapsulated in Ethernet frame with the found MAC address. If the ARP cache table did not produce a result for the destination IPv4 address, the radio sends a broadcast ARP message requesting an answer (of MAC address that matches) for IP address. The destination device responds with its MAC address (and IP). The response information is cached in radios' ARP table and the message can now be sent with the appropriate destination MAC address.




### ADDRESS TABLES

| Title | Function |
|---|---|
| IP Address | The IPv4 address of a neighboring device in the radio LAN network |
| MAC Address | The ARP result matching or mapping MAC address from the IPv4 address. |
| Interface | The Ethernet port interface the ARP results found the matching/mapping |
| Type | 'Dynamic' indicates an ARP result and 'Static' indicates a user static mapping. |

#### Controls

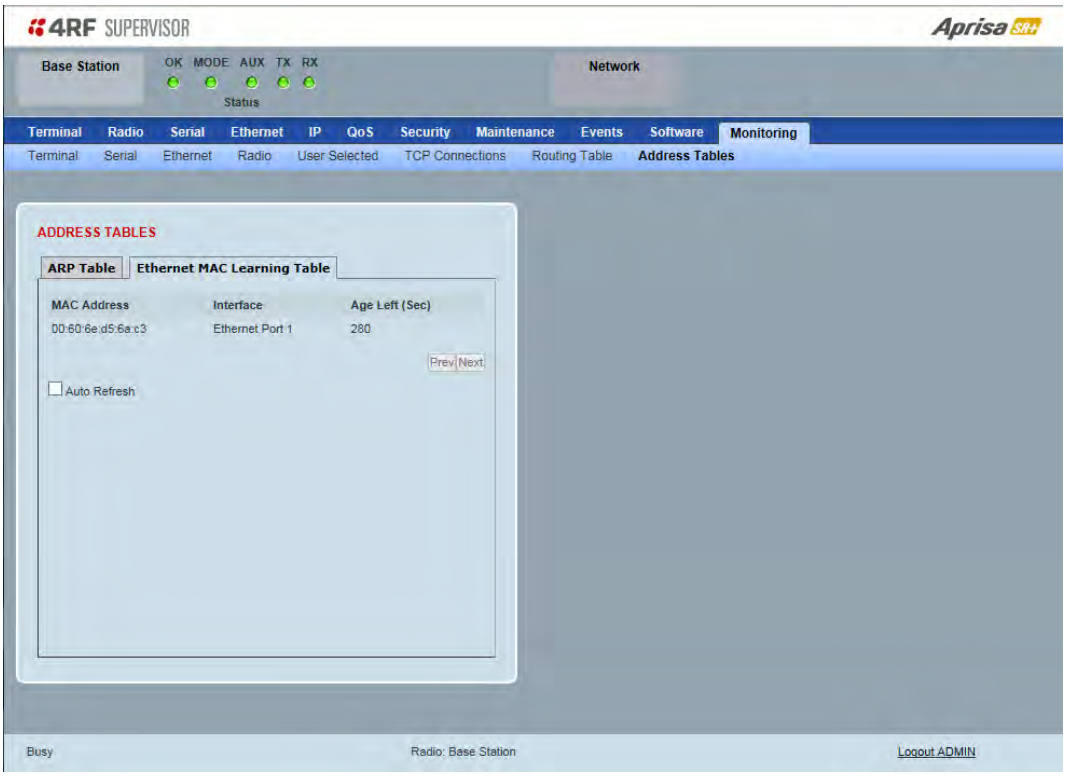
The Next button will display the next page of 8 addresses and the Prev button will display the previous page of 8 addresses.

If the Auto Refresh option is ticked, the ARP table will refresh every 12 seconds.

Ethernet MAC Learning Table

This page displays the current Ethernet Media Access Control (MAC) Address table on the radio LAN network. In order for the radio to switch frames between Ethernet LAN ports efficiently, the radio layer 2 bridge maintains a MAC address table. When the radio bridge receives a frame, it associates the MAC address of the sending network device with the LAN port on which it was received.

The bridge dynamically learns and builds the MAC address table by using the MAC source address of the frames received. When the radio bridge receives a frame for a MAC destination address not listed in its address table, it floods the frame to all LAN ports of the same LAN (or in case of VLAN, to the specific VLAN) except the port that received the frame. When the destination bridge device replies, the radio bridge adds its relevant MAC source address and interface port number to the MAC address table. The switch then forwards subsequent frames to a single LAN port without flooding all LAN ports.




## ADDRESS TABLES

| Title | Function |
|---|---|
| MAC Address | The learned MAC address of a neighboring bridge device in the LAN network. |
| Interface | The Ethernet port interface the MAC address has learned |
| Age left | The aging time of this MAC entry will stay in the table, even if this MAC address is not used. Every time this MAC address is used, the aging time restarts from its maximum. Default is 300 sec. |

Controls

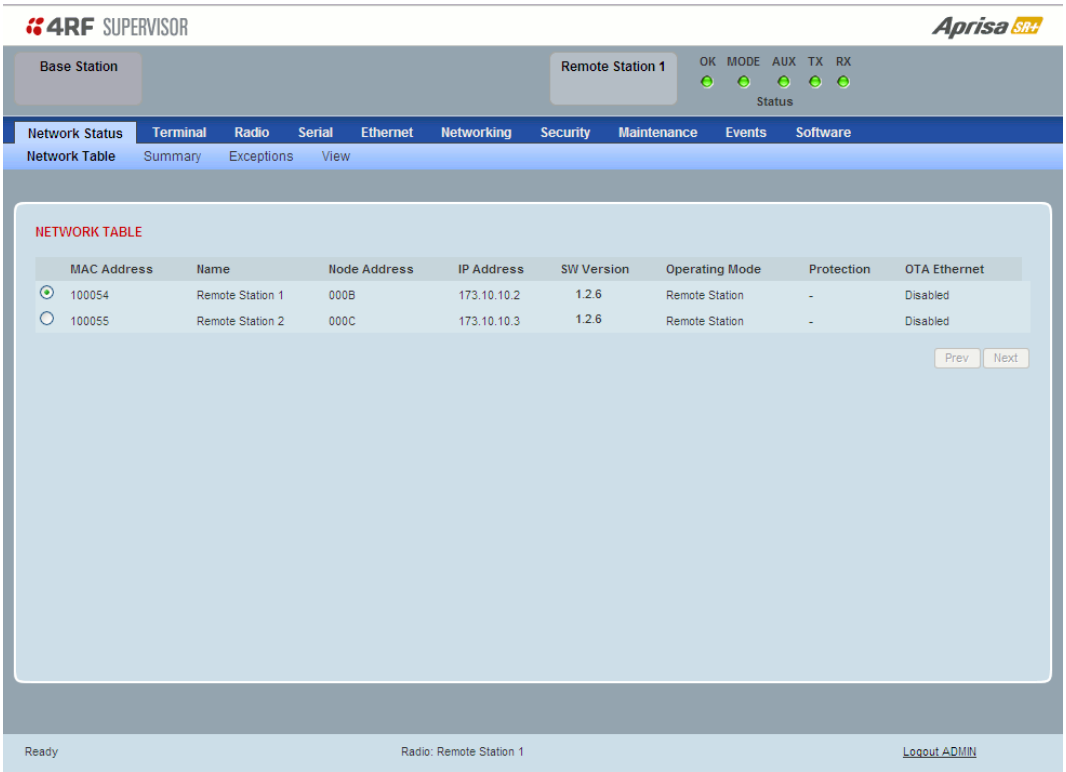
The Next button will display the next page of 8 addresses and the Prev button will display the previous page of 8 addresses.

If the Auto Refresh option is ticked, the routing table will refresh every 12 seconds.

# Network Status

## Network Status > Network Table

This page displays a list of all the registered remote stations for the base station and provides management access to each of the remote stations.




### NETWORK TABLE

This Network Table is only available when the local radio is the base station i.e. SuperVisor is logged into the base station.

**To manage a remote / repeater station with SuperVisor:**

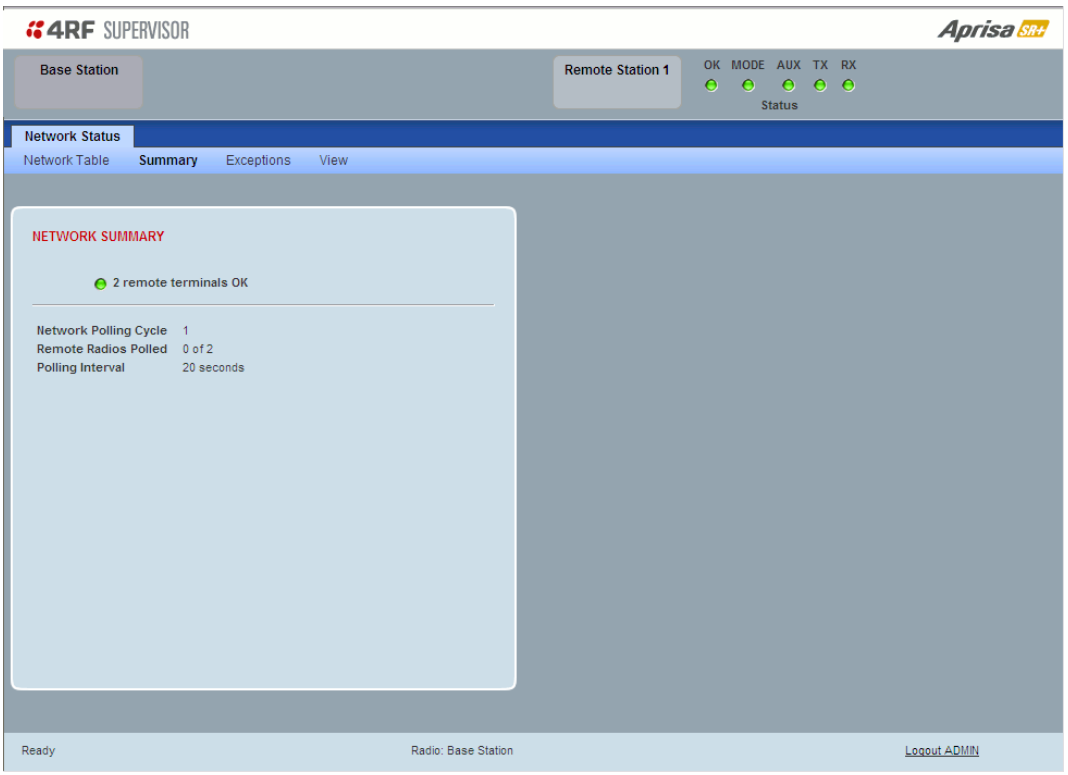
Click on the radio button of the required station. The remaining menu items then apply to the selected remote station.

## Network Status > Summary

Network View is an overview of the health of the network providing the ability to investigate issues directly within SuperVisor.

This page provides an overall summary view of the alarm status of all registered remote stations for the base station. When open, it provides a continuous monitor of the network.

Depending on the poll period set (20 seconds minimum) and the number of remotes in the network, it will take at least three poll cycles to indicate a failure in the network. Initial results may indicate 'All ok' until at least three poll cycles completed. This could take Number Of Remotes * Poll Period * 3 seconds to complete.



NETWORK SUMMARY

A network poll will start when any of the Network Status pages are opened (Summary, Exceptions or View). The network poll will only continue to poll the remote stations if one of the Network Status pages is open (SuperVisor can lose PC focus). The network poll continues from where it was stopped last time it was polling.

The initial result assumes that all remote stations are operating correctly.

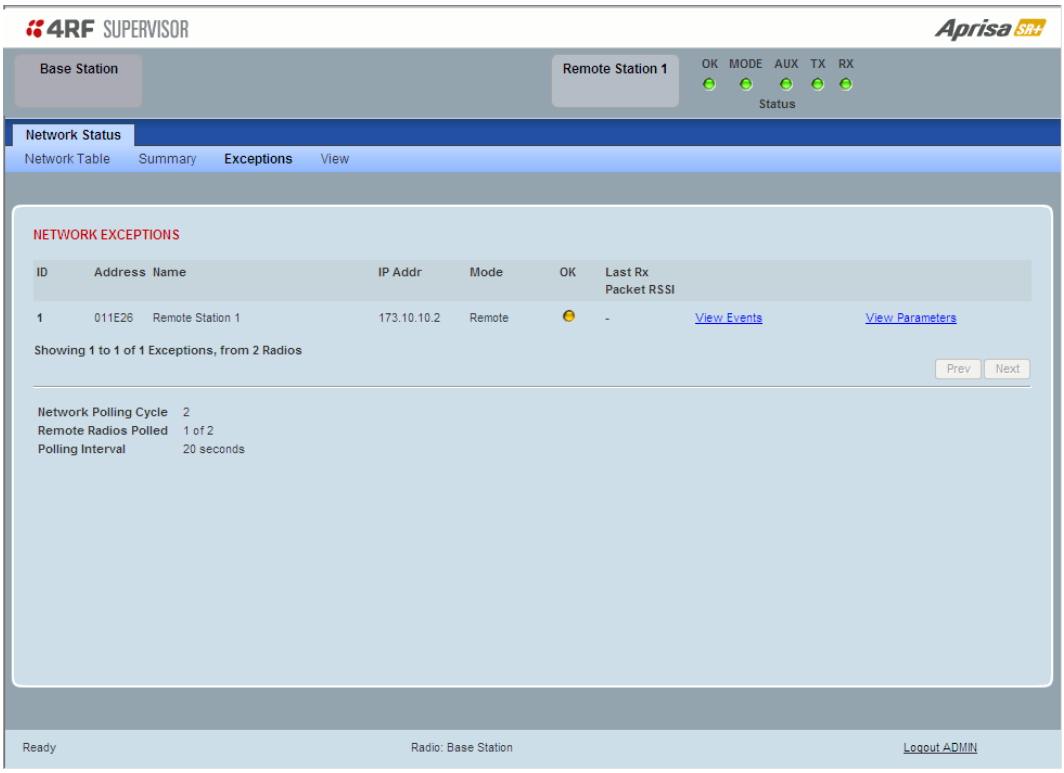
Network Summary Example:

| Result | Function |
|---|---|
| Network Polling Cycle | The number of poll cycles since first opening a Network Status > Summary, Exceptions or View page.<br>The page example shows 6 polling cycles. |
| Remote Radios Polled | This shows the number of radios polled for the current polling cycle out of the number remote radios registered with the base station.<br>The page example shows 1 radio polled for the current polling cycle out of 3 remote radios registered. |
| Polling Interval | The time interval between the completion of one radio poll and the start of the next radio poll. To set the polling interval, see 'Maintenance > General' on page 208. |

If a remote radio does not respond to a poll request within 10 seconds, the previous readings from that radio will be presented. Connectivity to a remote radio will be show as 'lost' if the remote radio has not responded to 3 consecutive poll requests.

## Network Status > Exceptions

This page provides a list of all registered remote radios that are in an alarmed state or have stopped responding to the SuperVisor polling. When open, it provides a continuous monitor of the network.




### NETWORK EXCEPTIONS

A network poll will start when any of the Network Status pages are opened (Summary, Exceptions or View). The network poll will only continue to poll the remote stations if one of the Network Status pages is open (SuperVisor can lose PC focus). The network poll continues from where it was stopped last time it was polling.

Network Exceptions Example:

| Result | Function |
|---|---|
| Network Polling Cycle | The number of poll cycles since first opening a Network Status > Summary, Exceptions or View page.<br>The page example shows 4 polling cycles. |
| Remote Radios Polled | This shows the number of radios polled for the current polling cycle out of the number remote radios registered with the base station.<br>The page example shows 3 radios polled for the current polling cycle out of 4 remote radios registered. |
| Polling Interval | The time interval between the completion of one radio poll and the start of the next radio poll. To set the polling interval, see 'Maintenance > General' on page 208. |

If a remote radio does not respond to a poll request within 10 seconds, the previous readings from that radio will be presented. Connectivity to a remote radio will be show as 'lost' if the remote radio has not responded to 3 consecutive poll requests.

If a remote radio on the list is detected to be responding to a poll request and no longer be in an alarmed state, the entry for this remote radio will be removed from the list.

*View Events*

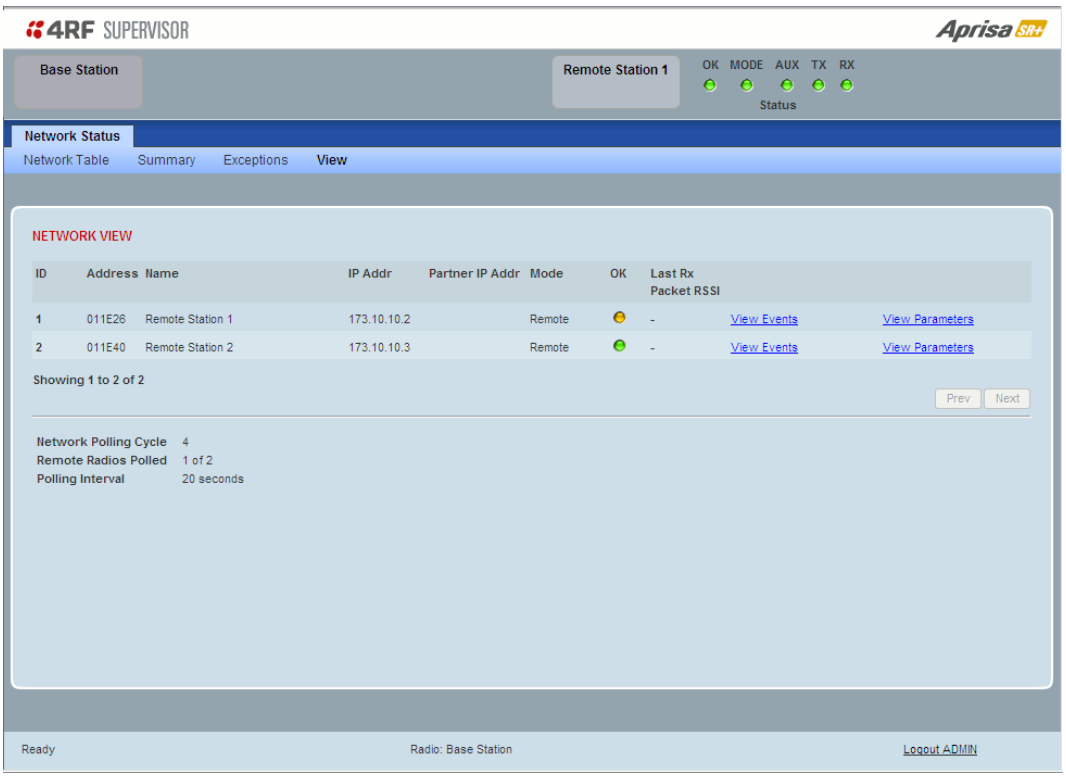
Clicking on View Events navigates to the Events page (see 'Events' on page 222) for the specific remote radio where the radio events will be displayed.

*View Parameters*

Clicking on View Parameters navigates to the Monitoring page (see 'Monitoring' on page 253) for the specific remote radio where the radio parameters will be displayed.

## Network Status > View

This page provides a complete list of all registered remote radios. It is similar to the Exceptions page but it shows all radios, not limited to the radios with alarms. When open, it provides a continuous monitor of the network.




### NETWORK VIEW

A network poll will start when any of the Network Status pages are opened (Summary, Exceptions or View). The network poll will only continue to poll the remote stations if one of the Network Status pages is open (SuperVisor can lose PC focus). The network poll continues from where it was stopped last time it was polling.

Network View Example:

| Result | Function |
|---|---|
| Network Polling Cycle | The number of poll cycles since first opening a Network Status > Summary, Exceptions or View page.<br>The page example shows 2 polling cycles. |
| Remote Radios Polled | This shows the number of radios polled for the current polling cycle out of the number remote radios registered with the base station.<br>The page example shows 1 radio polled for the current polling cycle out of 3 remote radios registered. |
| Polling Interval | The time interval between the completion of one radio poll and the start of the next radio poll. To set the polling interval, see 'Maintenance > General' on page 208.<br>Note: as this polling feature utilizes air time, the polling interval should be selected to suit the network traffic. |

If a remote radio does not respond to a poll request within 10 seconds, the previous readings from that radio will be presented. Connectivity to a remote radio will be show as 'lost' if the remote radio has not responded to 3 consecutive poll requests.

*View Events*

Clicking on View Events navigates to the Events page (see 'Events' on page 222) for the specific remote radio where the radio events will be displayed.

*View Parameters*

Clicking on View Parameters navigates to the Monitoring page (see 'Monitoring' on page 253) for the specific remote radio where the radio parameters will be displayed.

# Protected Station

The majority of SuperVisor screens are the same for the standard radio and the protected station. The following screens are specific to the protected station.

## Logging into a Protected Station

When SuperVisor detects a protected station, it operates in Single Session Management operation mode.

When in Single Session Management mode, SuperVisor will automatically detect the two individual Aprisa SR+ radios configured to pair together for protection, and manage the two units in a single browser session. To the user, it will appear as managing a single unit, but SuperVisor will interact with the two individual units at a lower level.

The user can login with the IP address of either the Primary or Secondary radio to manage the protected station (don't use the PVIP address as it is not a management IP address). SuperVisor will present all information appropriately where 'Common Parameters' will be presented to the user as a single parameter e.g. TX and RX Frequencies and 'Unit Specific Parameters' will be presented to the user as Primary or Secondary parameters e.g. Events and Alarms.

When saving data, SuperVisor will also validate and ensure that the correct settings are written to both units. The SuperVisor Single Session Management ensures that both units of the protected station are always configured correctly to complement each other as protected partners.

The user can still login with two different sessions to the active and standby radios. If the user opens two session management, one session logged into the active radio and a second session logged into the standby radio, the Multiple Management Sessions pop-up message will show the user names and IP addresses of the active and standby radio.

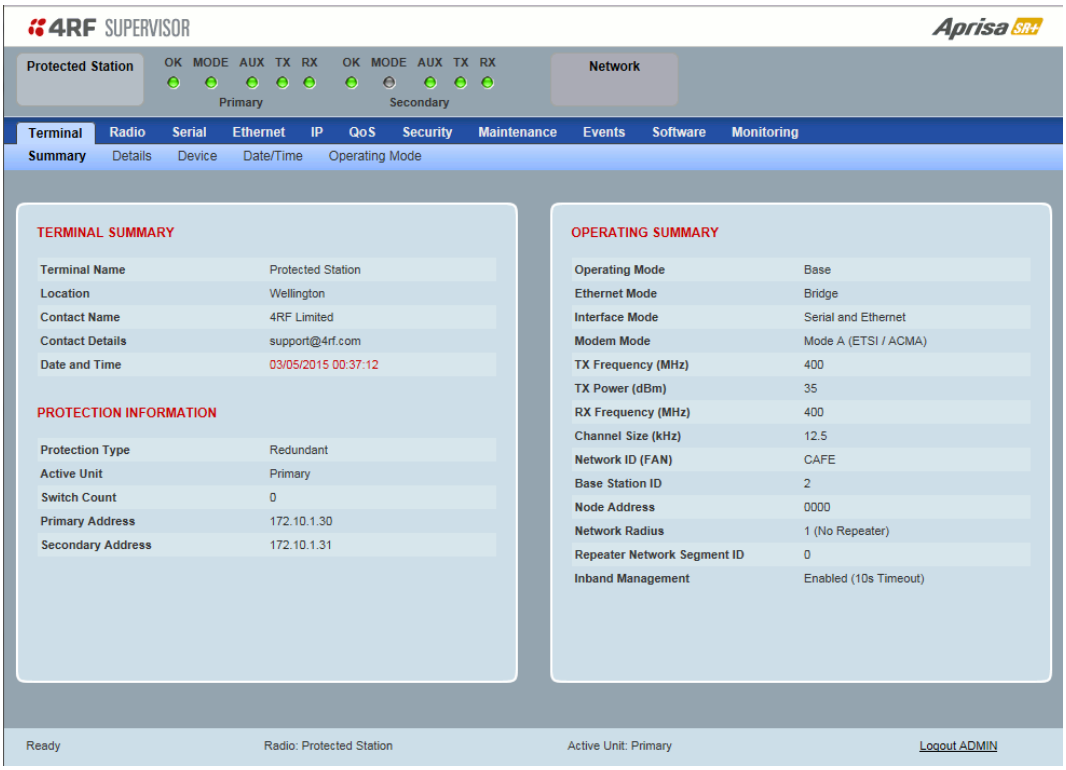
## Parameter Errors

On protected station screens, parameter values displayed in red indicate discrepancies in common parameter values between the primary and secondary radios (see 'Protected Station: Terminal > Summary' on page 279 for an example of the red display). The value displayed is from the 'addressed radio'.

These value discrepancies can occur if the two protected station radios have been separately configured. The discrepancies can be corrected by re-entering the values in one of the radios. The value will be copied to the partner radio.

# Terminal

## Protected Station: Terminal > Summary




### TERMINAL SUMMARY

This page displays the current settings for the Terminal parameters.

### PROTECTION INFORMATION

*Protection Type*

This parameter shows the type of protection:

| Option | Function |
|---|---|
| Serial Data Driven Switching | Provides radio and RS-232 serial port user interface protection for Aprisa SR+ radios. |
| Monitored Hot Standby (Protected Station) | The RF ports and interface ports from two standard Aprisa SR+ radios are switched to the standby radio if there is a failure in the active radio.<br>The standby radio is monitored to ensure its correct operation should a switch-over be required. See 'Monitored Alarms' on page 333 for the list of monitored alarms. |
| Redundant (Protected Station) | The RF ports and interface ports from two standard Aprisa SR+ radios are switched to the standby radio if there is a failure in the active radio |

*Active Unit*

This parameter shows the radio which is currently active (Primary or Secondary).

*Switch Count*

This parameter shows the number of protection switch-overs since the last radio reboot (volatile).

*Primary Address*

This parameter shows the IP address of the primary radio (usually the left side radio A).

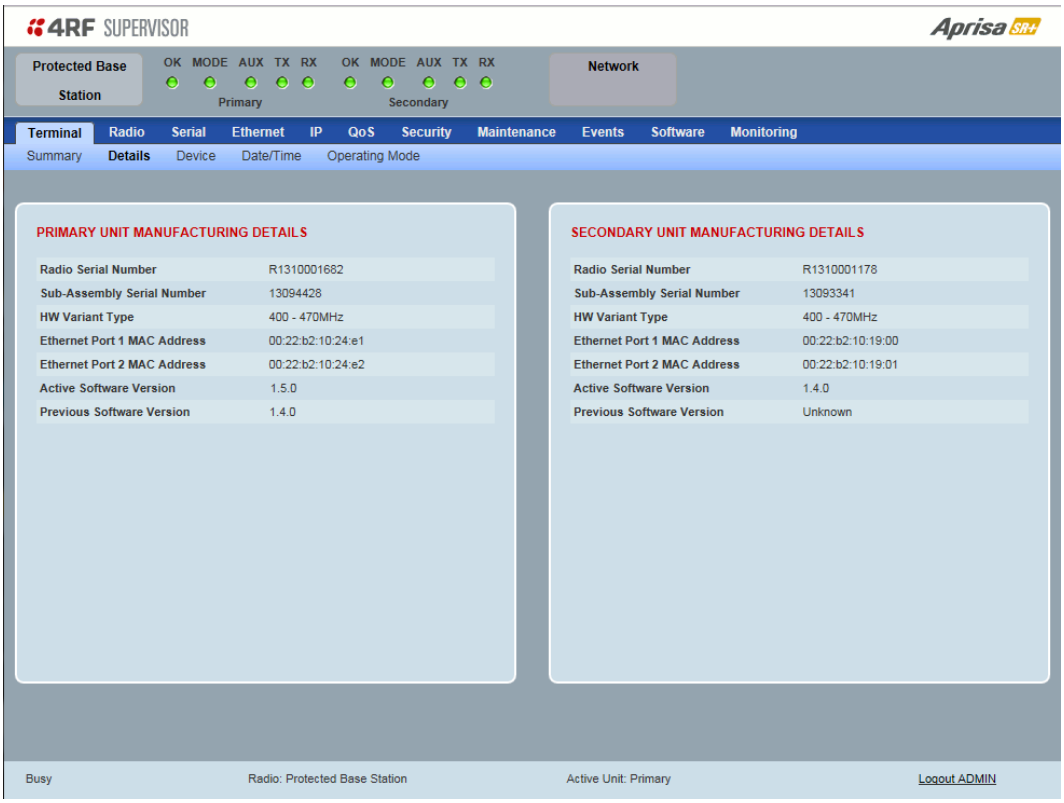
*Secondary Address*

This parameter shows the IP address of the secondary radio (usually the right side radio B).

## OPERATING SUMMARY

See ‘Terminal > Summary’ on page 83 for parameter details.

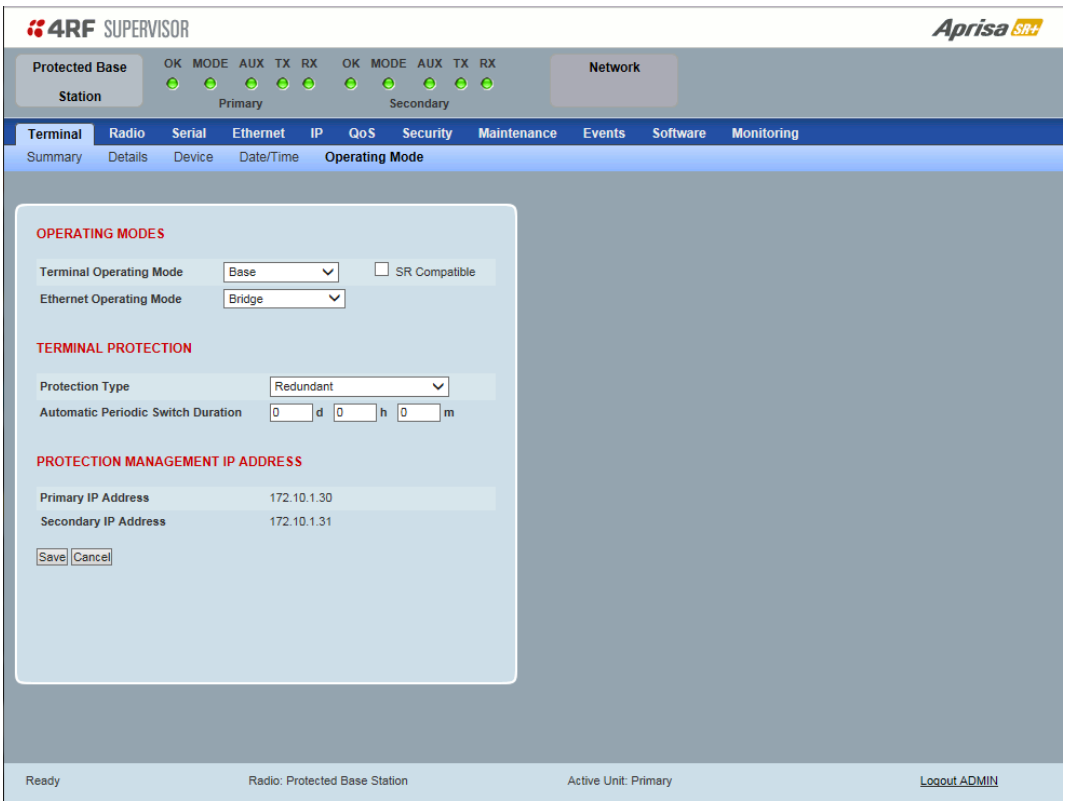
## Protected Station: Terminal > Details




### PRIMARY UNIT / SECONDARY UNIT MANUFACTURING DETAILS

See ‘Terminal > Details’ on page 86 for parameter settings.

## Protected Station: Terminal > Operating Mode




### OPERATING MODES

*Terminal Operating Mode*

The Terminal Operating Mode can be set to Base, Base Repeater, Repeater, Remote or Point-To-Point station. The default setting is Remote.

| Option | Function |
|---|---|
| Base | The base station manages all traffic activity between itself, repeaters and remotes. It is the center-point of network where in most cases will be connected to a SCADA master. |
| Base Repeater | The Base-Repeater has the same function as the base station (and repeater station), but used when peer to peer connections between remotes is required via the base station. |
| Base MMS | The Base-MMS has the same function as the base station, but used when Migration Master Station operation is required (see Aprisa SR+ MMS User Manual). |
| Repeater | The repeater forwards packets coming from base station and other repeaters e.g. in daisy chain LBS mode and /or remote stations. |
| Remote | The remote in most cases is used as the end-point of the SCADA network connected to an RTU or PLC device for SCADA network control and monitoring. |
| Point To Point | Configures a full duplex radio for Point-To-Point (PTP) operation. Changing from PMP or PTP or vice versa requires the radio to be 'restored to factory default settings' which will clear all previous radio setup and configuration.<br>See Aprisa SR+ User Manual 1.6.0 PTP for all Point-To-Point setup and configuration. |

*Ethernet Operating Mode*

The Ethernet Operating Mode defines how Ethernet / IP traffic is processed in the radio. The default setting is Bridge.

| Option | Function |
|---|---|
| Bridge | Bridge mode inspects each incoming Ethernet frame source and destination MAC addresses to determine if the frame is forwarded over the radio link or discarded. |
| Gateway Router | Gateway Router mode inspects each incoming IP source and destination IP addresses to determine if the packet is forwarded over the radio link or discarded. In this mode, all Ethernet interfaces have the same IP address and subnet. |
| Router | Router mode inspects each incoming IP source and destination IP addresses to determine if the packet is forwarded over the radio link or discarded. In this mode, each Ethernet interface has a different IP address and subnet. |

*SR Compatible*

The SR Compatible option enables over-the-air point-to-multipoint interoperation between an Aprisa SR+ network and New Aprisa SR radios. The default setting is unticked.

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

This compatibility option allows the user a smooth migration to Aprisa SR+ when higher speeds of 120, 60 kbit/s (at 25, 12.5 kHz channel sizes), Adaptive Coding and Modulation, full duplex and more features are required.

## TERMINAL PROTECTION

*Protection Type*

The Protection Type defines if a radio is a stand-alone radio or part of an Aprisa SR+ Protected Station. The default setting is None.

| Option | Function |
|---|---|
| None | The SR+ radio is a stand-alone radio (not part of an Aprisa SR+ Protected Station). |
| Redundant (Protected Station) | The SR+ radio is part of an Aprisa SR+ Protected Station.<br>The RF ports and interface ports from two standard Aprisa SR+ radios are switched to the standby radio if there is a failure in the active radio |
| Monitored Hot Standby (Protected Station) | Set to make this SR+ radio part of an Aprisa SR+ Protected Station.<br>The RF ports and interface ports from two standard Aprisa SR+ radios are switched to the standby radio if there is a failure in the active radio.<br>The standby radio is monitored to ensure its correct operation should a switch-over be required. See 'Monitored Alarms' on page 333 for the list of monitored alarms. |
| Serial Data Driven Switching | The SR+ radio is part of an Aprisa SR+ Data Driven Protected Station.<br>Provides radio and RS-232 serial port user interface protection for Aprisa SR+ radios. |

*Automatic Periodic Switch Duration*

The Automatic Periodic Switch Duration sets the time interval for automatic switch-over from the active radio to the standby radio.

This feature will automatically switch-over from the active radio to the standby radio if there are no alarms preventing the switch-over to the standby radio. It can be used to provide confidence that the standby radio is still operational maybe after many days of standby operation.

The maximum number of days that can be set is 49 days.

The default setting is 0 which disables the automatic switch-over feature.

### *PROTECTION MANAGEMENT IP ADDRESS*

*Primary Address*

This parameter shows the IP address of the primary radio (usually the left side radio A).

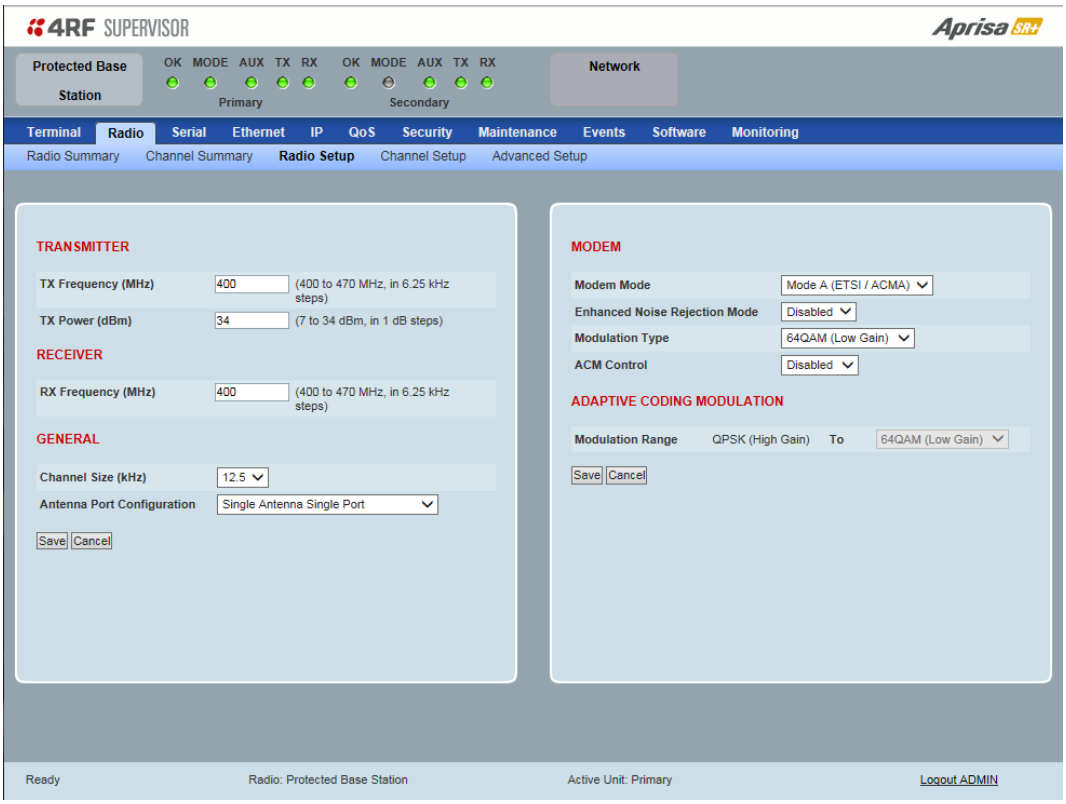
*Secondary Address*

This parameter shows the IP address of the secondary radio (usually the right side radio B).

# Radio

## Protected Station: Radio > Radio Setup

Transmit frequency, transmit power and channel size would normally be defined by a local regulatory body and licensed to a particular user. Refer to your site license details when setting these fields.




### *Antenna Port Configuration*

This parameter sets the Antenna Port Configuration for the radio. For more information on single and dual antenna port part numbers and cabling options, see 'Cabling' on page 340.

| Option | Function |
|---|---|
| Single Antenna Single Port | Select Single Antenna Single Port for a single antenna protected station using one or two frequency half duplex transmission. The antenna is connected to the ANT port. |
| Single Antenna Dual Port (duplexer) | Select Single Antenna Dual Port for a single antenna protected station using:<br>(1) One or two frequency in half duplex transmission with an external duplexer (for filtering) connected to the ANT/TX and RX antenna ports and single antenna connected to the duplexer.<br>(2) Two frequency in full duplex transmission with an external duplexer (for full duplex operation) connected to the ANT/TX and RX antenna ports and single antenna connected to the duplexer.<br>(3) Single frequency in half duplex transmission with external dual antennas, connected to the ANT/TX and RX antenna ports.<br>(4) Two frequency in half or full duplex transmission with external dual antennas, connected to the ANT/TX and RX antenna ports. |

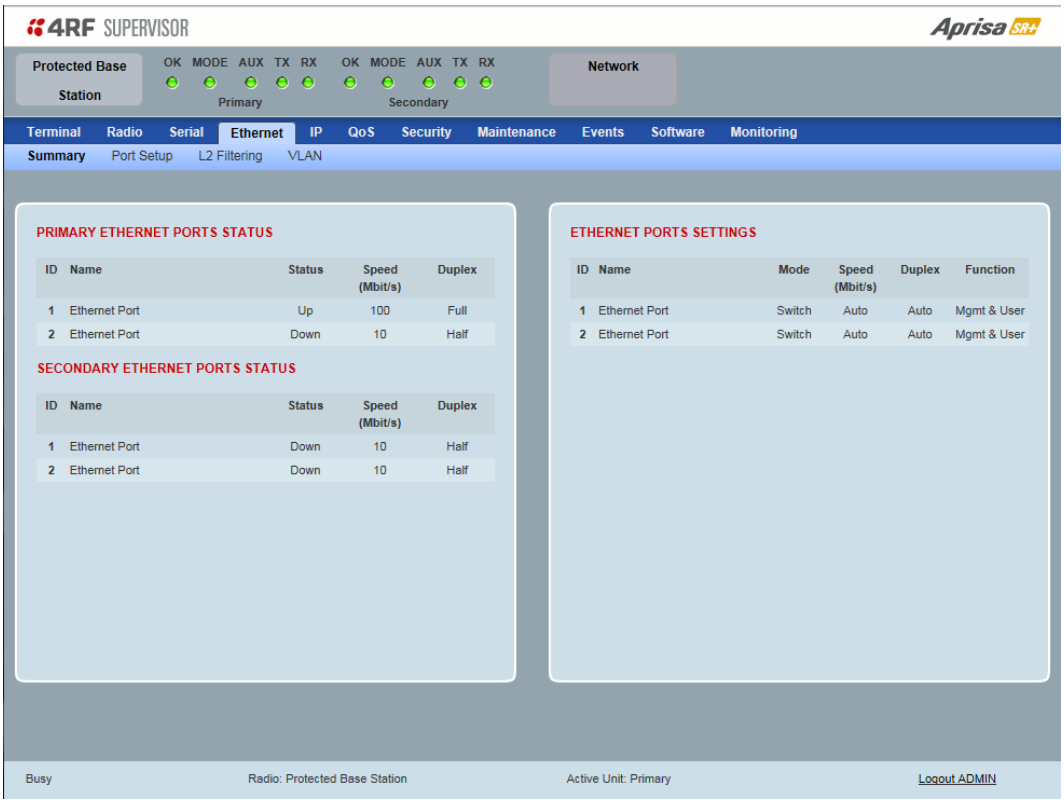
| | |
|---|---|
| Dual Antenna Single Port | Select Dual Antenna Single Port for a dual antenna protected station using one or two frequency half duplex transmission. The antenna is connected to the A and B TX/ANT ports. |
| Dual Antenna Dual Port (duplexer) | Select Dual Antenna Dual Port for a dual antenna protected station using:<br>(1) One or two frequency in half duplex transmission with two external duplexer (for filtering) connected to the A and B ANT/TX and RX antenna ports and single antenna connected to the duplexer.<br>(2) Two frequency in full duplex transmission with an external duplexer (for full duplex operation) connected to the A and B ANT/TX and RX antenna ports and single antenna connected to the duplexer.<br>(3) Single frequency in half duplex transmission with an external dual antennas, connected to the A and B ANT/TX and RX antenna ports.<br>(4) Two frequency in half or full duplex transmission with external dual antennas, connected to the A and B ANT/TX and RX antenna ports. |

The default setting is Single Antenna Single Port.

# Ethernet

## Protected Station: Ethernet > Summary

This page displays the current settings for the Protected Station Ethernet port parameters.

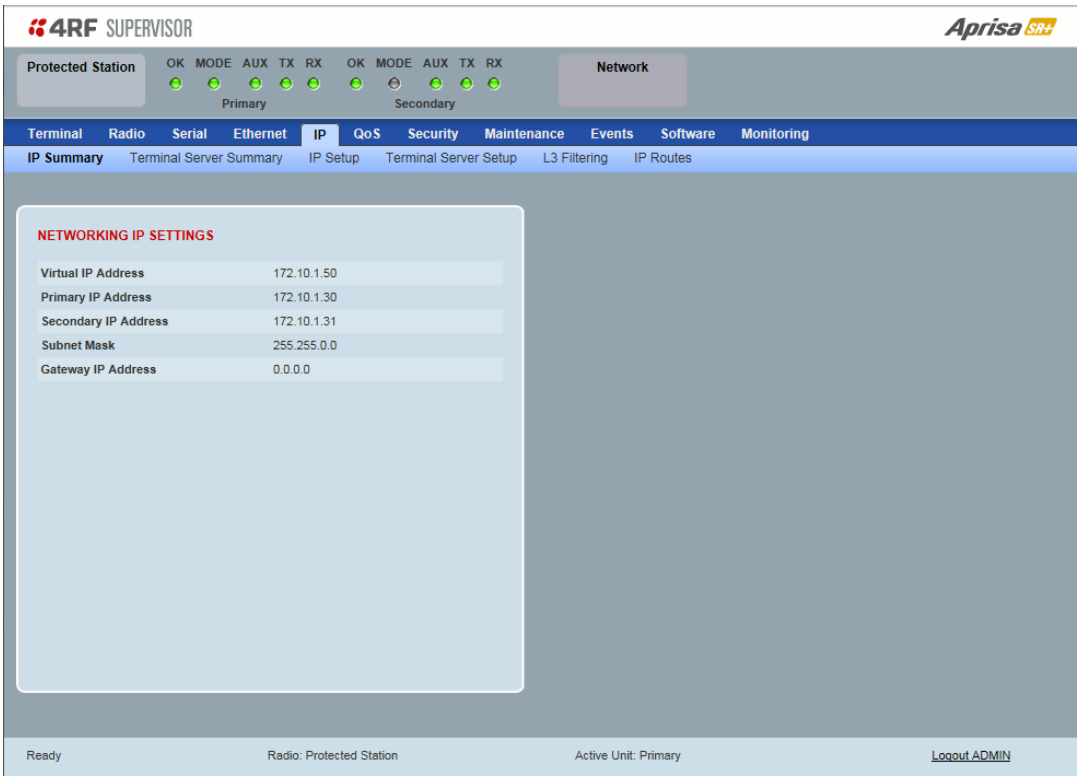



See ‘Ethernet > Port Setup’ for configuration options.

# IP

## Protected Station: IP > IP Summary

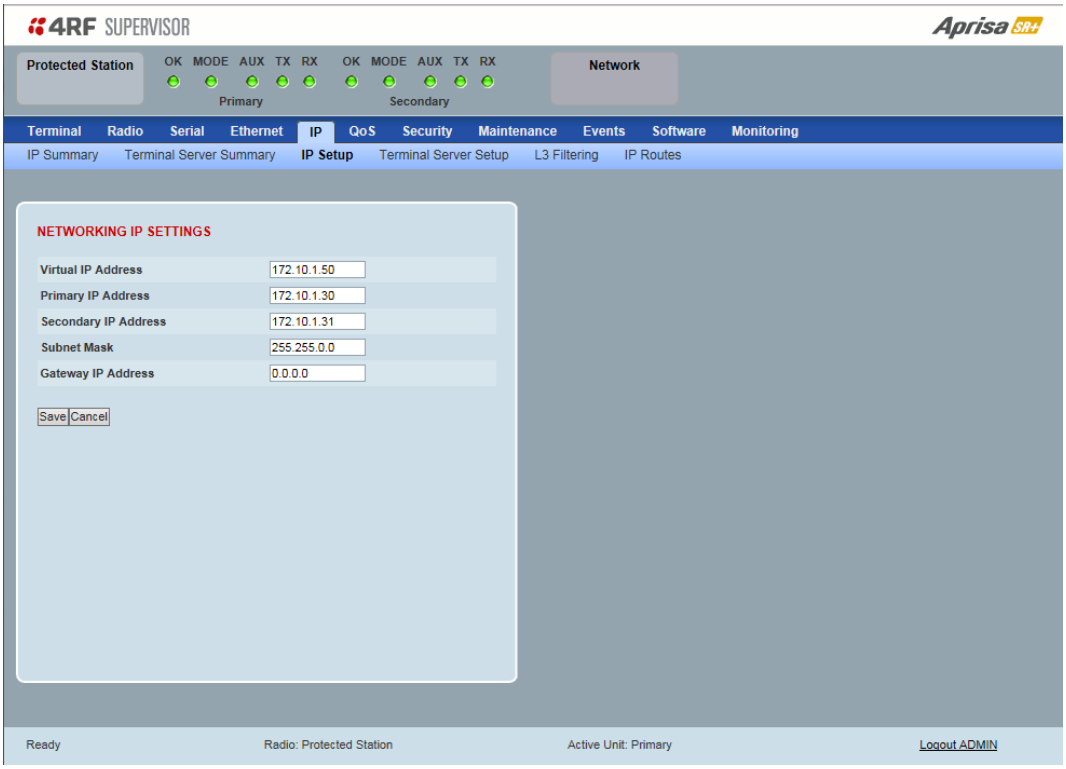
This page displays the current settings for the Protected Station Networking IP settings.




See ‘IP > IP Summary > Bridge / Gateway Router Modes’ on page 147 for configuration options.

## Protected Station: IP > IP Setup

This page provides the setup for the Protected Station Networking IP setup.




### NETWORKING IP SETTINGS

Changes in these parameters are automatically changed in the partner radio.

#### *Primary IP Address*

Set the static IP Address of the primary radio assigned by your site network administrator using the standard format xxx.xxx.xxx.xxx. The default IP address is in the range 169.254.50.10.

#### *Secondary IP Address*

Set the static IP Address of the secondary radio assigned by your site network administrator using the standard format xxx.xxx.xxx.xxx. The default IP address is in the range 169.254.50.10.

*Protected Station Virtual IP Address (PVIP)*

The Protected Station Virtual IP Address (PVIP) is the IP Address of the active radio whether it is the primary radio or the secondary radio.

The PVIP is available in both bridge and router modes.

In router mode, the PVIP can be used as 'next hop' IP address by external routers to reach the protected station so the protection station switch will always be transparent to the external devices and routers.

In both bridge and router modes, the PVIP is used in terminal server mode in remote protected stations. The PVIP is used to reach the protected remote station from the SCADA master connected to base station in terminal server mode.

---

**Note:** The radio IP address should be used for SNMP management as using the PVIP for SNMP management will result in undefined behaviour if a switch-over occurs during an SNMP transaction. Thus, using PVIP for SNMP network management is not recommended.

---

After a switch-over, new active radio owns the PVIP and will send out a gratuitous ARP to clear the MAC learning tables of upstream switches/routers.

Set the static IP Address of the PVIP using the standard format xxx.xxx.xxx.xxx. The default IP address is 0.0.0.0.

*Subnet Mask*

Set the Subnet Mask of the radio using the standard format xxx.xxx.xxx.xxx. The default subnet mask is 255.255.0.0.

*Gateway*

Set the Gateway address of the radio, if required, using the standard format xxx.xxx.xxx. The default Gateway is 0.0.0.0.

## RADIO INTERFACE IP SETTINGS

The RF interface IP address is the address that traffic is routed to for transport over the radio link. This IP address is only used when Router Mode is selected i.e. not used in Bridge Mode.

*Radio Interface IP Address*

Set the IP Address of the RF interface using the standard format xxx.xxx.xxx.xxx. The default IP address is in the range 10.0.0.0.

*Radio Interface Subnet Mask*

Set the Subnet Mask of the RF interface using the standard format xxx.xxx.xxx.xxx. The default subnet mask is 255.255.0.0 (/16).

---

**Note 1:** If the base station RF interface IP address is a network IP address, and if the remote radio is also using a network IP address within the same subnet or different subnet, then the base radio will assign an automatic RF interface IP address from its own subnet.

When the base radio has a host specific RF interface IP address, then all the remotes must have a host specific RF interface IP address from the same subnet.

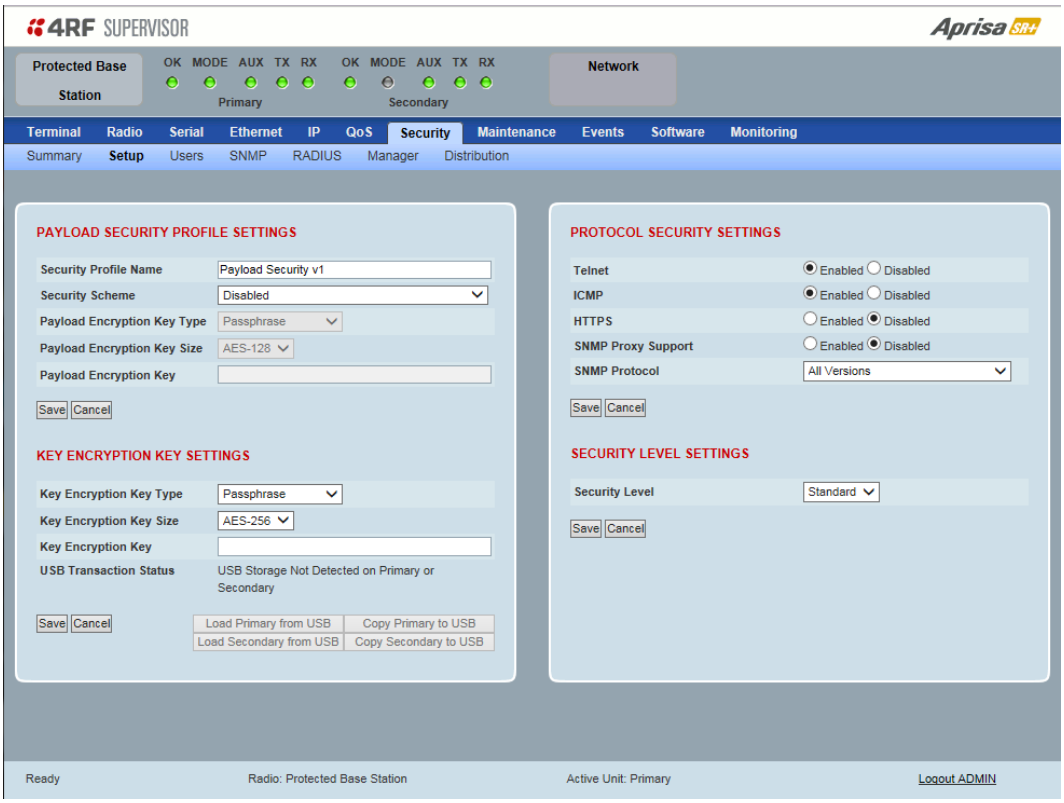
**Note 2:** When a remote radio is configured for Router Mode and the base radio is changed from Bridge Mode to Router Mode and the RF interface IP address is set to AUTO IP configuration (at least the last octet of the RF interface IP address is zero), it is mandatory to configure the network topology by using the 'Decommission Node' and 'Discover Nodes' (see 'Maintenance > Advanced' on page 217).

---

# Security

## Protected Station: Security > Setup

This page displays the current settings for the Security parameters.




### KEY ENCRYPTION KEY SETTINGS

*USB Transaction Status*

This parameter shows if a USB flash drive is plugged into the radio host port.

| Option | Function |
|---|---|
| USB Storage Disconnected | A USB flash drive is not plugged into the radio host port. |
| USB Storage Connected | A USB flash drive is plugged into the radio host port. |

## Controls

These buttons are grayed out if a USB flash drive is not plugged into the radio host port.

The ‘Load Primary From USB’ button loads the Key Encryption Key settings from the primary radio USB flash drive into the primary radio.

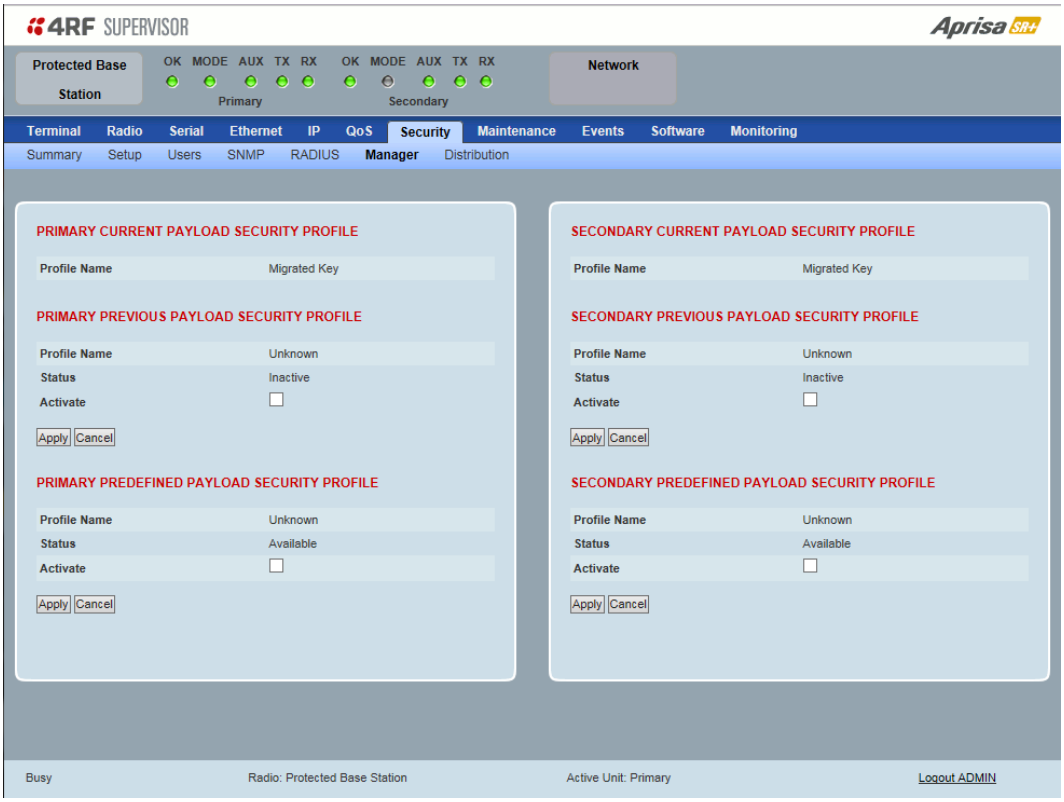
The ‘Copy To Primary USB’ button copies the Key Encryption Key settings from the primary radio to the primary radio USB flash drive.

The ‘Load Secondary From USB’ button loads the Key Encryption Key settings from the secondary radio USB flash drive into the secondary radio.

The ‘Copy To Secondary USB’ button copies the Key Encryption Key settings from the secondary radio to the secondary radio USB flash drive.

## Protected Station: Security > Manager

This page provides the management and control of the Protected Station Networking Security settings.



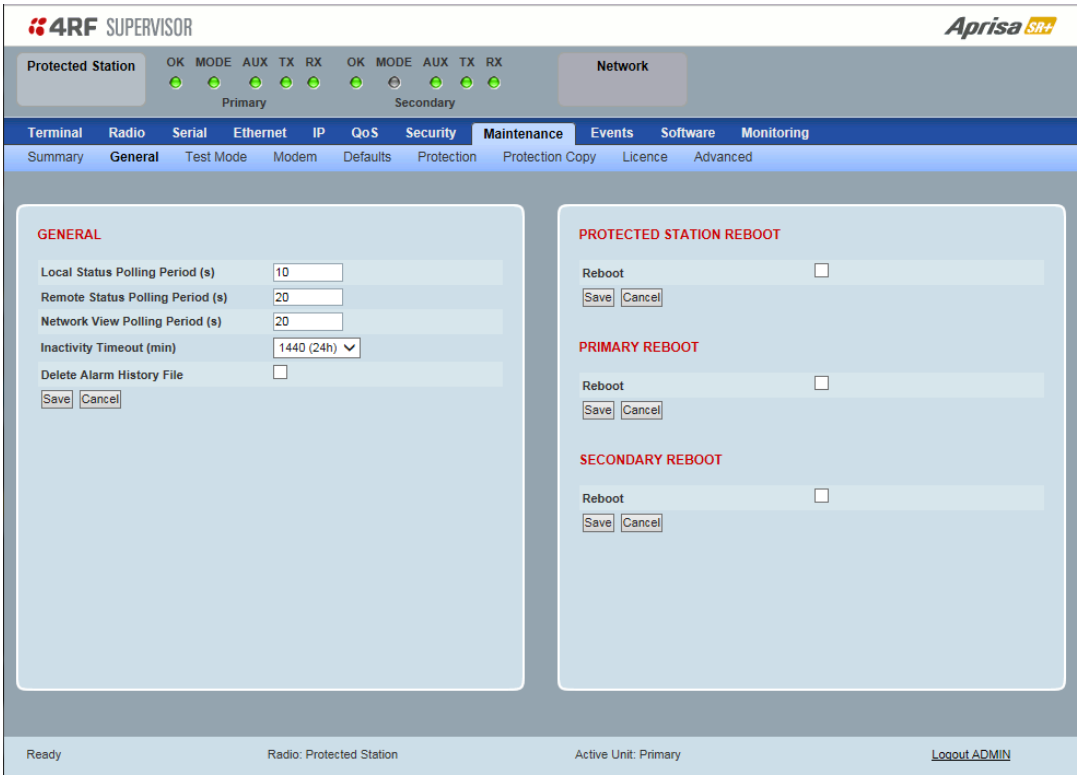

### PRIMARY / SECONDARY SECURITY PROFILE

See ‘Security > Manager’ on page 199 for parameter details.

# Maintenance

## Protected Station: Maintenance > General

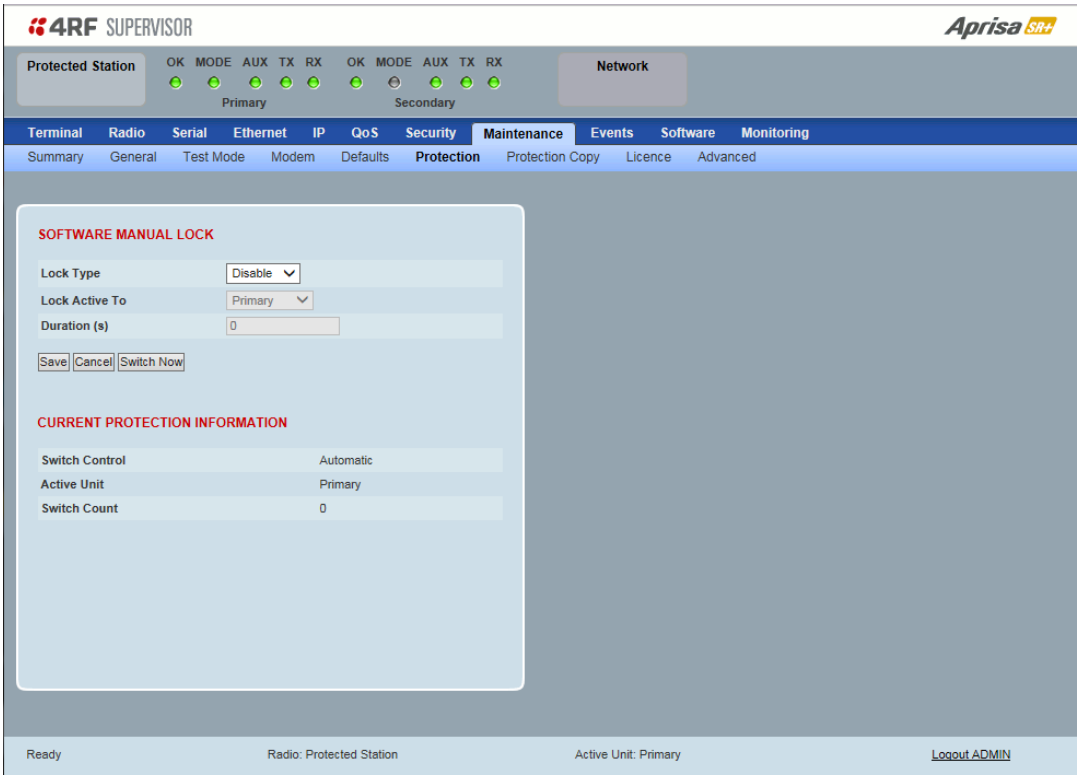
This page provides the management and control of the Protected Station Maintenance General settings.




See ‘Maintenance > General’ on page 208 for parameter details.

## Protected Station: Maintenance > Protection

This page provides the management and control of the Protected Station Maintenance Protection settings.




### SOFTWARE MANUAL LOCK

The software Manual Lock is a software implementation of the Hardware Manual Lock switch on the Protection Switch.

#### *Lock Active To*

This parameter sets the Protection Switch Software Manual Lock. The Software Manual Lock only operates if the Hardware Manual Lock is deactivated (set to the Auto position).

| Option | Function |
|---|---|
| Automatic | The protection is automatic and switching will be governed by normal switching and blocking criteria. |
| Primary | The primary radio will become active i.e. traffic will be switched to the primary radio. |
| Secondary | The secondary radio will become active i.e. traffic will be switched to the secondary radio. |

#### *Duration (s)*

This parameter defines the period required for manually locking to the primary or secondary radios. When this period elapses, the Lock To becomes automatic.

#### *Switch Now Button*

This button forces a switch-over independent of the state of Lock Type.

## CURRENT PROTECTION INFORMATION

*Switch Control*

This parameter shows the status of the switch control i.e. which mechanism is in control of the protection switch.

| Option | Function |
|---|---|
| Automatic | The protection is automatic and switching will be governed by normal switching and blocking criteria. |
| Software Manual Lock | The Software Manual Lock has control of the protection switch. |
| Hardware Manual Lock | The Hardware Manual Lock has control of the protection switch. |

*Active Unit*

This parameter shows the radio which is currently active (Primary or Secondary).

*Switch Count*

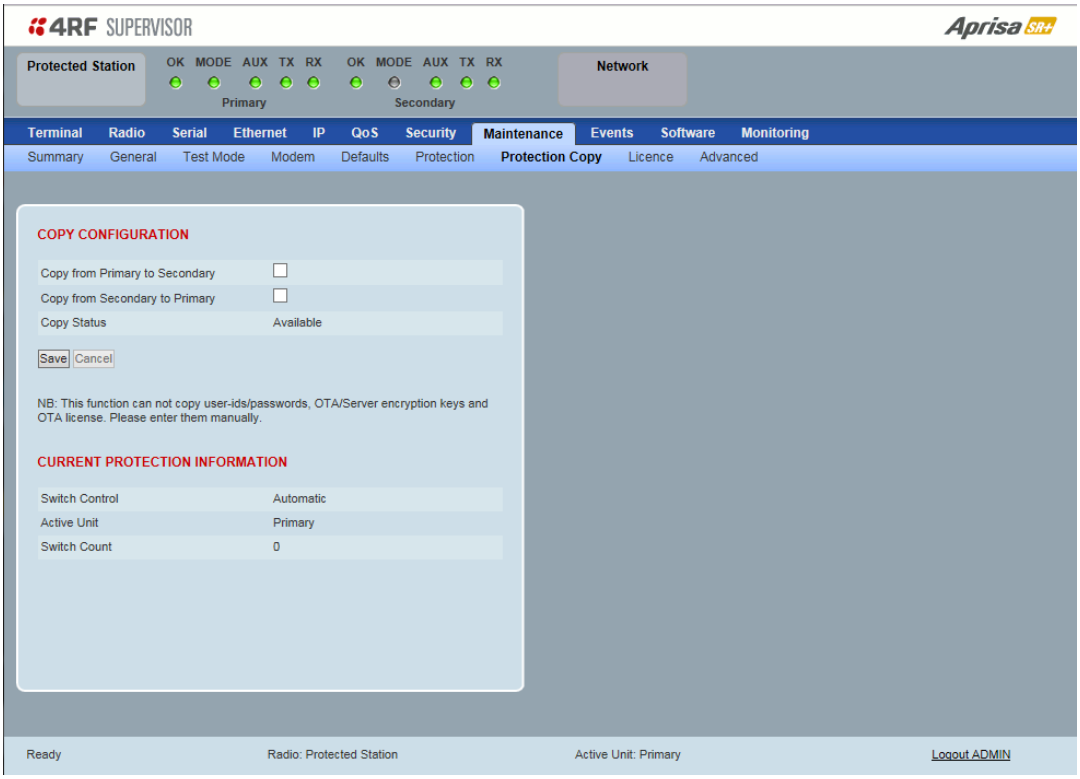
This parameter shows the number of protection switch-overs since the last radio reboot (volatile).

*Automatic Periodic Switch will occur in*

If this parameter is visible, the Automatic Periodic Switch feature has been enabled and will show the period before the next automatic switch-over.

## Protected Station: Maintenance > Protection Copy

This page provides the management and control of the Protected Station Maintenance Protection Copy.




### COPY CONFIGURATION

When common parameters are changed in one radio, they are automatically changed in the partner radio but if one radio has been replaced in the protected station, common parameters will need to be updated in the new radio.

---

**Note:** This function does not copy user IDs, passwords, encryption keys or licenses. These must be entered manually.

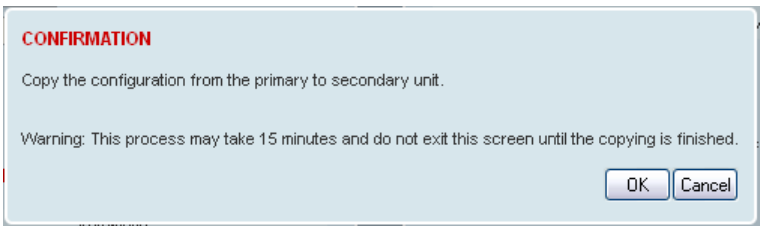
---

*Copy from Primary to Secondary*

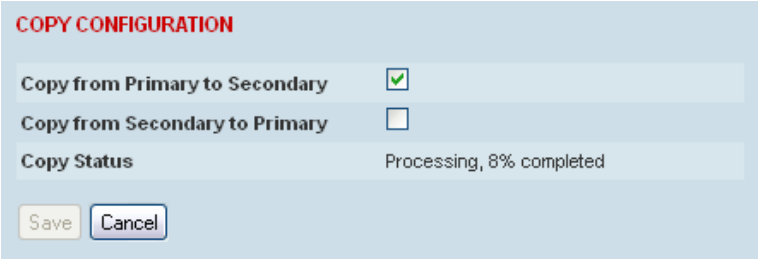
This parameter copies all common parameters from the primary to the secondary radio.

**To activate copy configuration:**

1. Tick the Copy from Primary to Secondary and click Save.



2. To continue, click OK.




*Copy from Secondary to Primary*

This parameter copies all common parameters from the secondary to the primary radio.

*Copy Status*

This parameter displays the status of the Copy Configuration.

| Option | Function |
|---|---|
| Available | The Copy Configuration feature can be used (but not necessarily required). |
| Processing | The Copy Configuration feature is running and the % completed. |

## CURRENT PROTECTION INFORMATION

*Switch Control*

This parameter shows the status of the switch control i.e. which mechanism is in control of the protection switch.

| Option | Function |
|---|---|
| Automatic | The protection is automatic and switching will be governed by normal switching and blocking criteria. |
| Software Manual Lock | The Software Manual Lock has control of the protection switch. |
| Hardware Manual Lock | The Hardware Manual Lock has control of the protection switch. |

*Active Unit*

This parameter shows the radio which is currently active (Primary or Secondary).

*Switch Count*

This parameter shows the number of protection switch-overs since the last radio reboot (volatile).

*Automatic Periodic Switch will occur in*

If this parameter is visible, the Automatic Periodic Switch feature has been enabled and will show the period before the next automatic switch-over.