Cambium Networks™

Troubleshooting Station Registration

System Release 1.0

Station fails to register with the AP

When an ePMP station is continuously failing to register with an ePMP AP, there are several items that should be verified. Troubleshooting these scenarios will require as a minimum, access to the failing ePMP station User Interface. If available, access to the desired ePMP AP may also be helpful.

The ePMP station needs to be able to "see" the desired AP during the scanning procedure for it to initiate registration. ePMP stations will display the system information for all APs that it can detect during the scanning procedure at the "Available AP List" table, at the bottom of the "Wireless Status" page under "MONITOR". If the desired AP is not listed in this table, the ePMP station is not detecting the AP during scanning and it will not be able to register with it. In this case, verify the following:

- The ePMP station is configured to scan only a specific set of frequencies that include the operational frequency of the desired AP.

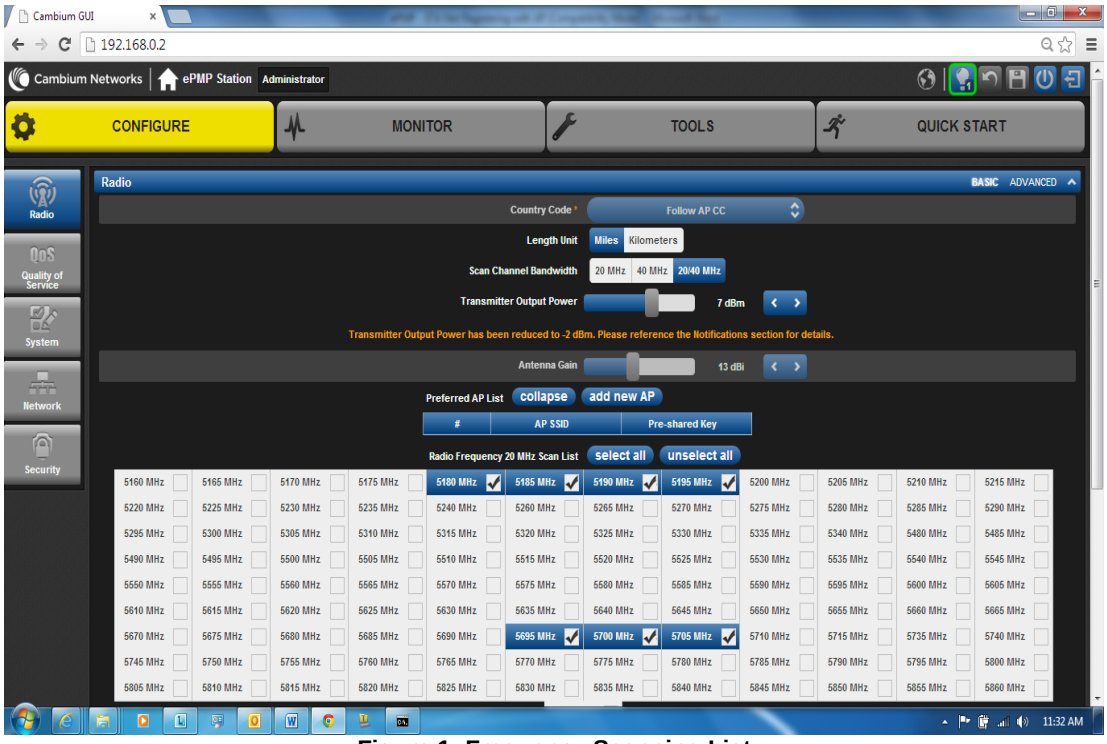

Figure 1: Frequency Scanning List

- If there are no frequencies with the checkbox selected at the "Radio" page under "CONFIGURE", the ePMP station will scan all frequencies listed.
- If one or more frequencies have the checkbox selected, the ePMP station will only scan those frequencies.
- Notice that the frequency scan lists for 20MHz and 40MHz channel bandwidths are separated. Make sure to look at the frequency scan list of interest based on the channel bandwidth.
- Ensure that the operational frequency for the desired AP is selected.
- If unsure of the operational frequency for the desired AP, unselect all frequencies.

- NOTE: This configuration may impact the duration of the network entry procedure as all supported frequencies will be scanned by the ePMP station. Once the operational frequency of the desired AP is known, the specific frequency can then be selected from the list of frequencies.

- Select the “Save Changes” button in the top right corner of the device GUI to apply your changes.

- The ePMP station is configured with the same channel bandwidth as the desired AP.
  - A mismatch of the channel bandwidth configuration between the ePMP station and the desired AP will prevent the station to detect the AP.
  - At the “Radio” page under “CONFIGURE”, ensure that the selected channel bandwidth in the “Scan Channel Bandwidth” parameter matches the configuration of the desired AP.
  - If unsure about the channel bandwidth configuration for the desired AP, select the “20/40 MHz” option which will allow the ePMP station to scan both 20MHz and 40MHz channels.
    - NOTE: This configuration may impact the duration of the network entry procedure as all supported frequencies will be scanned by the ePMP station. Once channel bandwidth of the desired AP is known, the specific channel bandwidth can then be selected from the list of frequencies.

  - Once the ePMP station detects the desired AP, the AP system information (e.g. SSID, operational frequency, security mode and channel bandwidth) will be displayed in the “Available AP List” at the “Wireless Status” page under MONITOR.

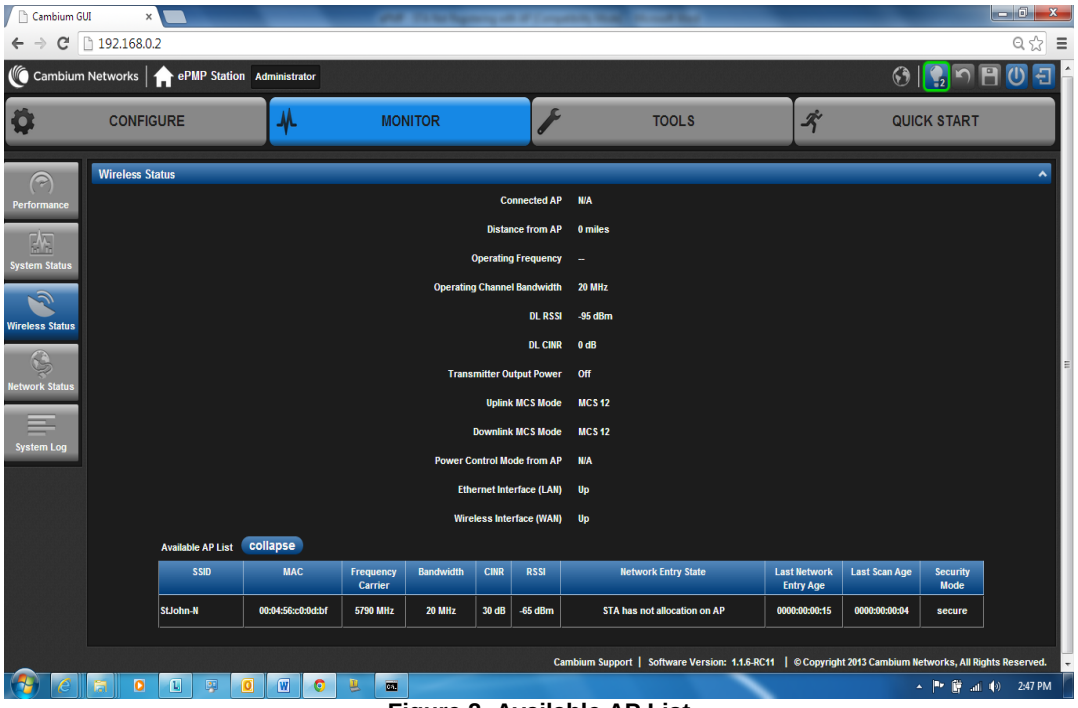

Figure 2: Available AP List

- The ePMP station is running a software version compatible with the desired AP software version.
    - In some cases, incompatible software versions will prevent ePMP stations to successfully connect to an AP.
    - Software version running in the ePMP device can be found in the “Software Upgrade” page under “TOOLS” or in the “System Status” page under “MONITOR”.
    - If syslog is configured to display all messaging (configurable from the “System” page under “CONFIGURE”) on the ePMP station, an entry indicating that the station has disassociated from the AP with the reason “SW VERSION INCOMPATIBILITY” will be logged.

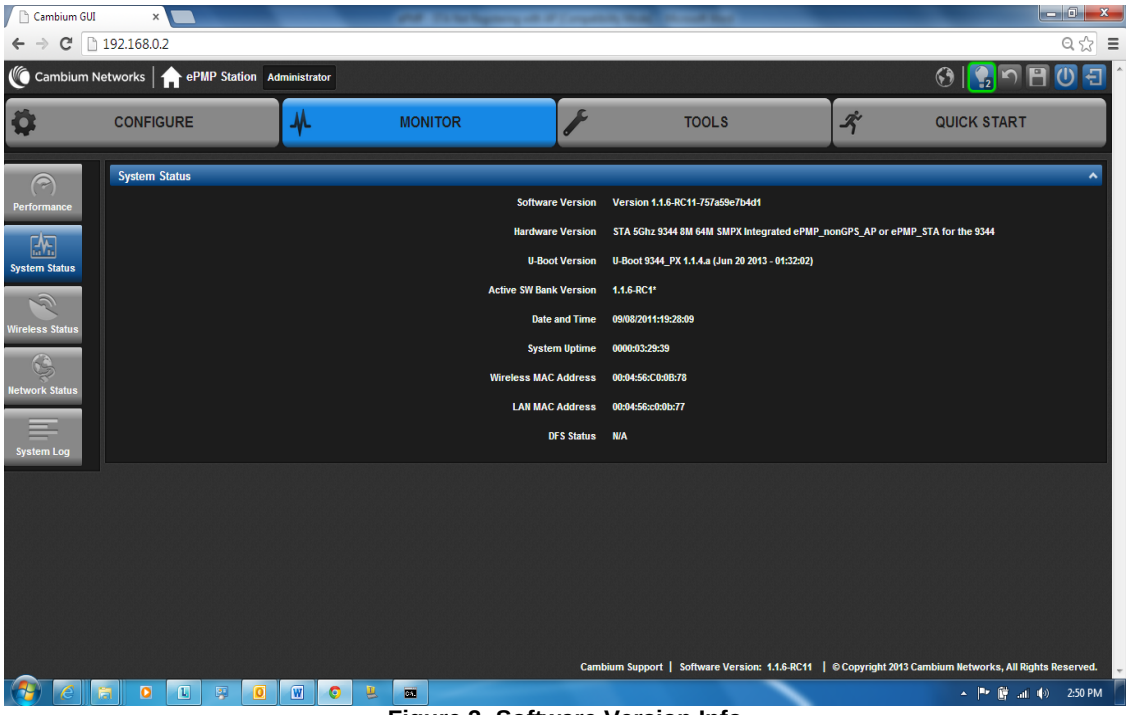

Figure 3: Software Version Info

- The ePMP station hardware is not defective.
    - To rule out potential issues with the ePMP station itself, use a known good ePMP station to scan all frequencies and channel bandwidths in that location.
    - If the known good ePMP station detects the desired AP, the AP system information (e.g. SSID, operational frequency, security mode and channel bandwidth) and signal strength (DL CINR/DL RSSI) will be displayed in the “Available AP List” at the “Wireless Status” page under MONITOR.

The ePMP station is designed to initiate scanning for APs right after powering up and attempt to connect the most suitable AP of the ones detected during the scanning process, based of RF conditions. Features like the Preferred AP List and STA Registration Limits, are provided to allow operators to have additional control over their system. But in some cases, these features may interfere with the operation of the system if not properly configured or if the operator is not fully aware of them. The next section attempts to cover some of those scenarios.

In the case that the ePMP station performs its scanning and it does display the desired AP system information in the “Available AP List”, but it is still failing to connect to the desired AP, verify the following:

- The desired AP’s SSID has been correctly entered in the “Preferred AP List” table at the “Radio” page under “CONFIGURE”.
    - An incorrectly provisioned SSID for the desired AP will prevent the station from successfully connecting to the AP.
    - Verify and, if needed, re-enter the SSID in the “Preferred AP List” table for the desired AP. Select the “Save Changes” button in the top right corner of the device GUI to apply your changes.

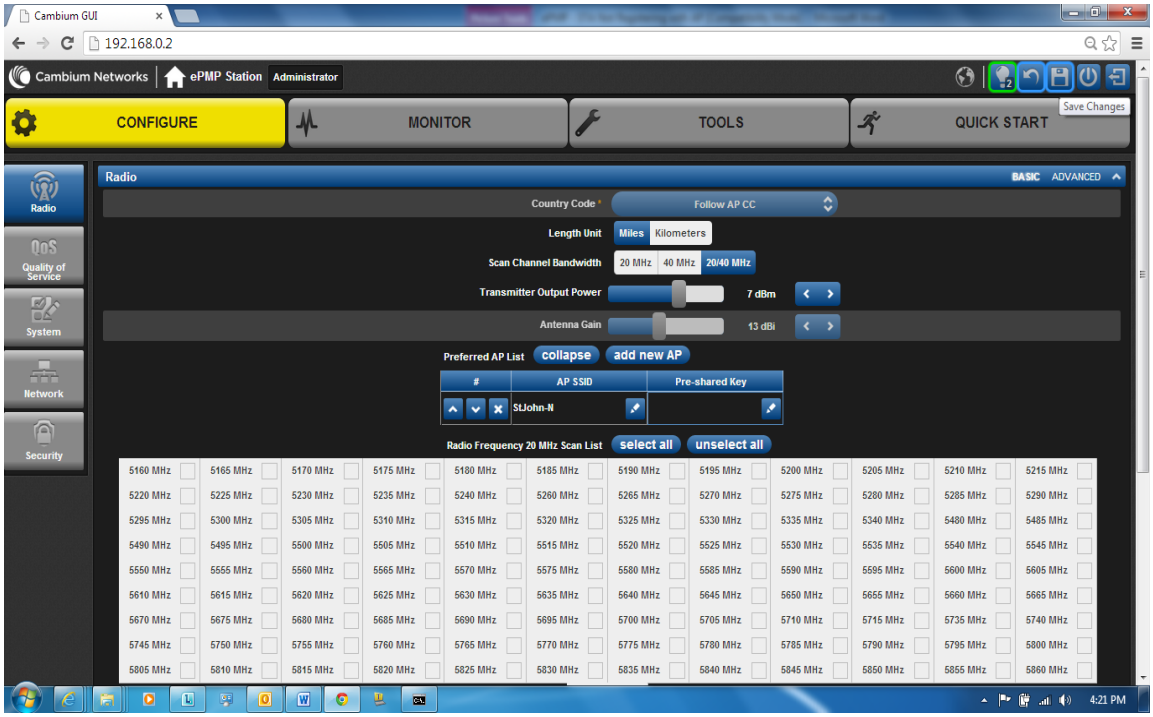

Figure 4: Preferred AP List

- A Pre-shared key has been provisioned for the desired AP in the “Preferred AP List” table at the “Radio” page under “CONFIGURE” if the “Security Mode” displayed for the desired AP is “Secure”.
    - If no pre-shared key is provisioned for an AP which “Security Mode” is Secure, the station will not be allowed to connect.
    - “Network Entry State” in the “Available AP List” in the ePMP station shows as “Unknown”.
    - Provision the pre-shared key in the “Preferred AP List” table and select the “Save Changes” button in the top right corner of the device GUI to apply your changes.

- The provisioned Pre-shared key is correct for the desired AP.
    - If the provisioned Pre-shared key for the desired AP is incorrect, the station will not be allowed to connect.

- “Network Entry State” in the “Available AP List” in the ePMP station shows “STA has no allocation on AP” error.

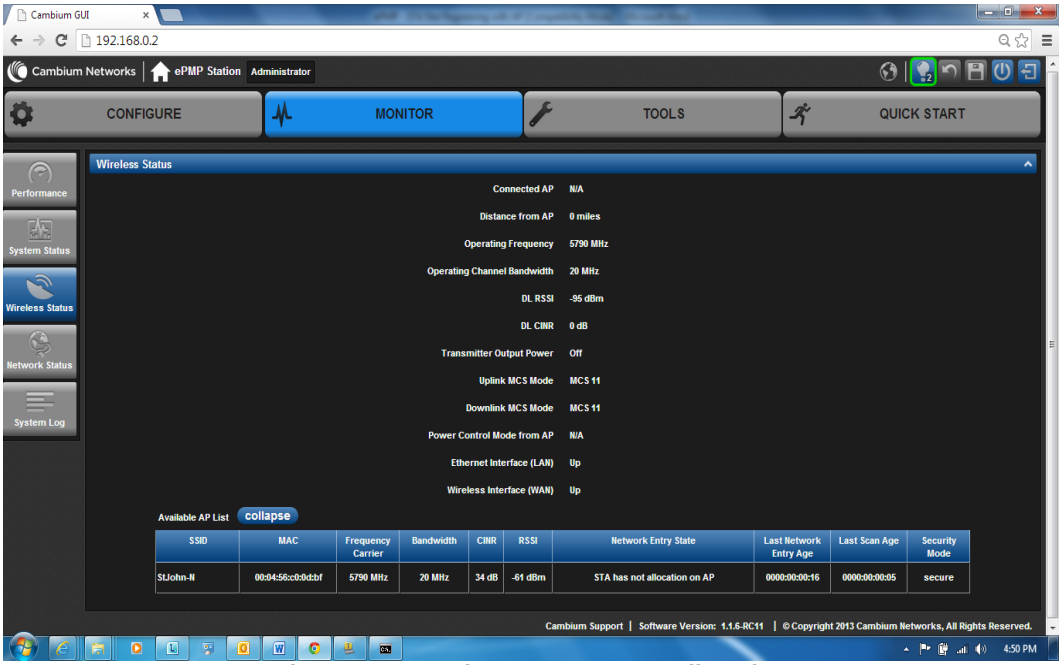

Figure 5: Network Entry State - No Allocation

- If syslog is configured to display all messaging (configurable from the “System” page under “CONFIGURE”) on the desired AP, an entry will be logged for the ePMP station containing its MAC address, association identifier (aid) and the reason “INVALID KEY” for its disassociation.
- If syslog is configured to display all messaging (configurable from the “System” page under “CONFIGURE”) on the ePMP station, an entry indicating that the station has disassociated from the AP with the reason “NO ALLOCATION ON AP” will be logged.
- Ensure the Pre-share key matches the desired AP’s and, if needed, re-provision the pre-shared key in the “Preferred AP List” table. Select the “Save Changes” button in the top right corner of the device GUI to apply your changes.

- The ePMP station is not out of range of the desired AP.
  - If the station is out of the configured cell range for the desired AP, the station will not be allowed to connect.
  - If syslog is configured to display all messaging (configurable from the “System” page under “CONFIGURE”) on the ePMP station, an entry will be logged indicating that the station cannot complete registration with the reason “STA IS OUT OF CONFIGURED CELL SIZE”.
  - The AP default cell range is 3 miles.
  - Cell max range is configurable from the “Radio” page under “CONFIGURE”.

- The desired ePMP AP has not reached its registration limit.
    - If the desired AP has reached its maximum number of registered stations it is configured for, all additional registration attempts will be rejected.
    - The default number of allowed registering STAs is 60.
    - If syslog is configured to display all messaging (configurable from the “System” page under “CONFIGURE”) on the ePMP station, an entry indicating that the station has been rejected by the AP with the reason “MAX CAPACITY” will be logged.
    - “Network Entry State” in the “Available AP List” in the ePMP station shows “Rejected by Capacity” error.

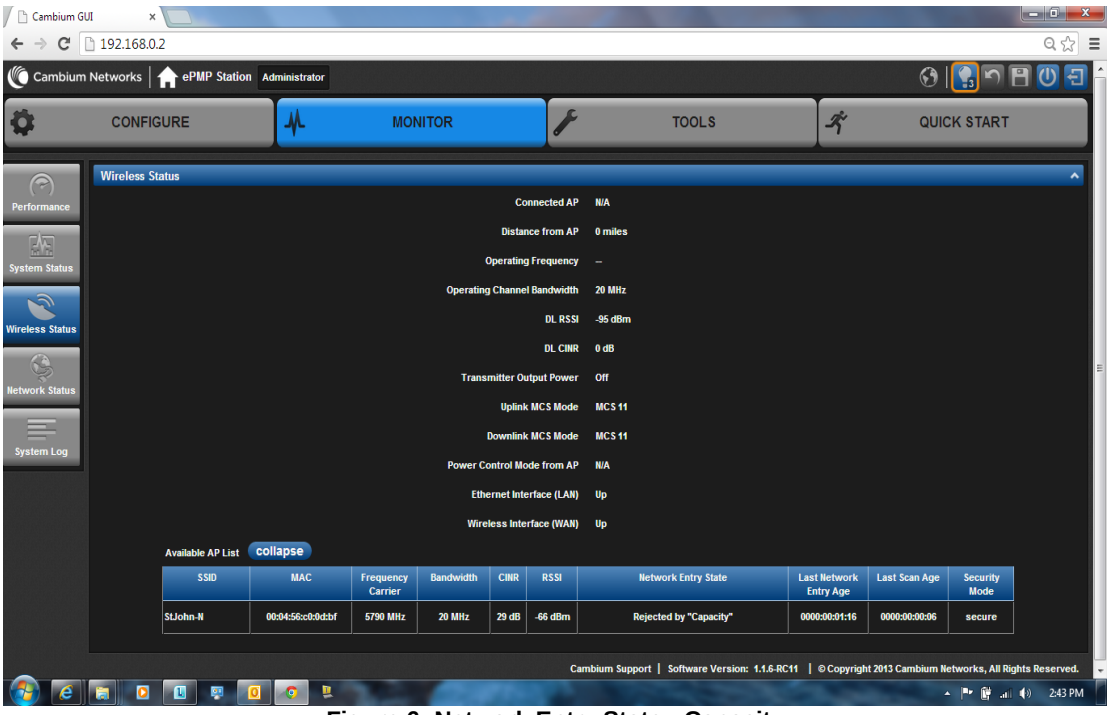

Figure 6: Network Entry State - Capacity

    - The number of stations allowed to register with an AP is controlled by the “STA Registration Limit” parameter which is accessible from the “Radio” page under “CONFIGURE”. Select the “Save Changes” button in the top right corner of the device GUI to apply your changes.

- The ePMP AP is not configured in “PTP Access” mode.
    - PTP or “Point-to-Point” mode only allows one station to be connected at any given time.
    - “PTP Access” mode is configurable from the “Radio” page under “CONFIGURE”.
        - If “PTP Access” mode is set to “Connect 1st STA”, only the first ePMP station to successfully connect to the AP will be allowed. All other ePMP stations will be rejected by the AP. If syslog is configured to display all messaging (configurable from the “System” page under “CONFIGURE”) on the ePMP station, an entry indicating that the station has been rejected by the AP with the reason “MAX

CAPACITY" will be logged. Also, "Network Entry State" in the "Available AP List" in the ePMP station shows "Rejected by Capacity" error.

- If "PTP Access" mode is set to "MAC Limited", only the ePMP station which MAC address is provisioned at the "PTP MAC Address" field will be allowed to successfully connect to the AP. All other ePMP stations will be rejected by the AP. If syslog is configured to display all messaging (configurable from the "System" page under "CONFIGURE") on the ePMP station, an entry indicating that the station has been rejected by the AP with the reason "PTP MODE (ACL POLICY)" will be logged. The "Network Entry State" in the "Available AP List" in the ePMP station will also show "Rejected by PTP only: ACL Policy" error.

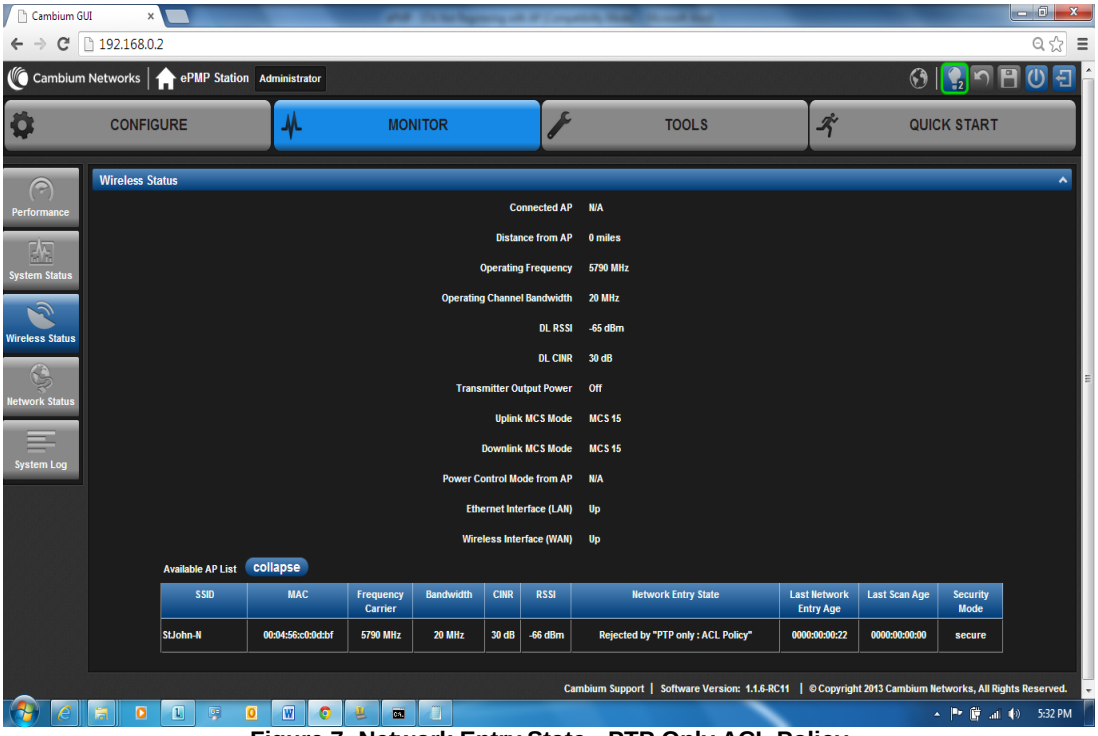

Figure 7: Network Entry State - PTP Only ACL Policy

- The ePMP station is not blacklisted.
  - An ePMP station may get blacklisted at the AP if it exceeds the maximum number of network entry attempts without a successful connection.
  - If syslog is configured to display all messaging (configurable from the "System" page under "CONFIGURE") on the ePMP station, an entry will be logged indicating the AP has rejected the registration with the reason "STA IN BLACKLIST".
  - The "Network Entry State" in the "Available AP List" in the ePMP station will also show "Rejected by STA in the Black List" error.

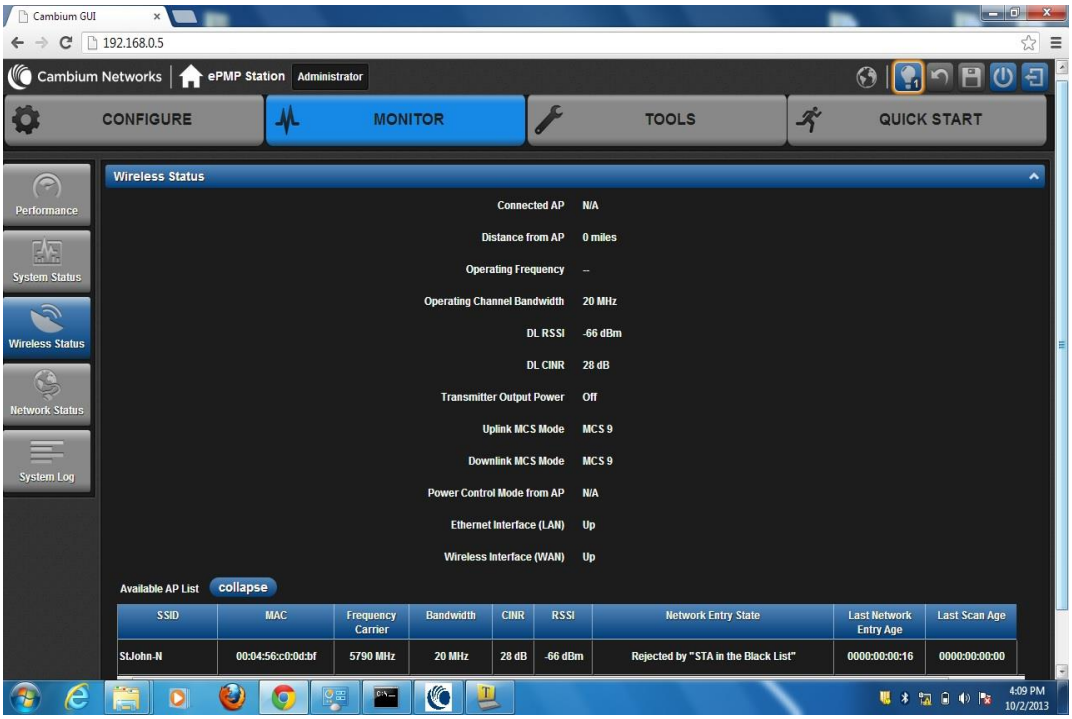

Figure 8: Network Entry State - STA in the Black List

- The default blacklisting timeout is 30 minutes. After this timeout, the ePMP station is removed from the AP's blacklist.