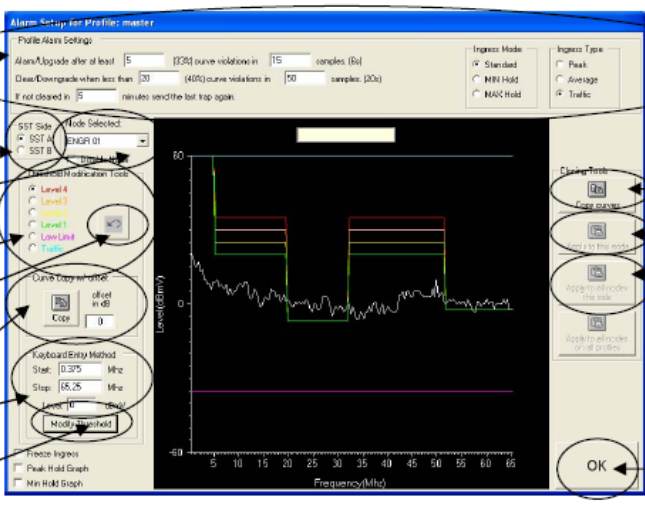


## 9581 SST Thresholds

Return path monitoring is essential as a means to keep a watch on the return spectrum for transient interference, noise, common path distortion (CPD), laser clipping, and other problems. The system can be used to prepare a node for new services that rely return path integrity, certify the node after hardening for carriage of new services, and then as a watch guard to provide alerts and indicate nodes that need attention. Vigilant attention to the return path spectrum, enabled by monitoring, improves network reliability and shortens troubleshooting time.

This Application Note shows how to tailor the Trilithic 9581 thresholds to meet the needs of your system. There are several methods and setup options. A first step is to determine a system specification for C/N (i.e. 20dB C/N from 0 – 18 MHz, 40dB C/N from 18 – 42 MHz, etc.) and/or a failing point for your system (i.e. 10dB C/N). These specifications may start fairly loose to catch the worst problems, and then tighten up as the node is hardened and performance improves.

### Overview of the alarm setup screen



The screenshot shows the 'Alarm Setup Profile: master' interface. It features a central graph of Level (dBm) vs. Frequency (MHz) with several horizontal threshold lines. The interface is annotated with callouts:

- Profile Settings:** Points to the top section containing 'Alarm Upgrade after at least' (5), '(225) curve violations in' (15 samples (6s)), 'Clear/Downgrade when less than' (30), '(400) curve violations in' (50 samples (30s)), and 'If not cleared in' (5 minutes send the last trap again).
- SST Side:** Points to the 'SST Side' dropdown menu, currently set to 'ENGR01'.
- Node Selected:** Points to the 'Threshold Modification Tools' section, which includes radio buttons for 'Level 4', 'Level 3', 'Level 2', 'Level 1', 'Low Line', and 'Trap'.
- Alarm Threshold Levels:** Points to the 'Curve Copy Offset' section, showing 'Offset in dB' set to 0.
- Undo:** Points to the 'Copy' button.
- Curve Copy w/ offset:** Points to the 'Keyboard Entry Method' section, which includes 'Start' (0.375 MHz), 'Stop' (65.25 MHz), and 'Level' (10 dBm).
- Keyboard Entry Method:** Points to the 'Modify threshold' button.
- Copy Curves:** Points to the 'Copy Curves' button on the right-hand side.
- Apply to this node:** Points to the 'Apply to this node' button.
- Apply to all nodes this side:** Points to the 'Apply to all nodes this side' button.
- OK:** Points to the 'OK' button at the bottom right.

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There are various alarm thresholds for consideration:

- **Level 1 through 4:** Each of the threshold levels, 1 through 4, correlates to a trace violation alarm stage 1 through 4.
- **Low Limit:** The Low Limit threshold is drawn underneath the noise floor. If the noise floor were to drop below the threshold, the alert would indicate a possible fiber cut or other anomaly that caused the noise floor to drop.
- **Traffic:** Through digital signal processing (DSP) the Trilithic 9581 SST can be configured to take up to 120 time domain return spectrum snapshots per second of the node and through fast Fourier transform convert these snapshots to the frequency domain. Because of this, it is possible to select for viewing only the snapshots which do not contain TDMA service carriers by drawing the Traffic threshold about 5 dB below the level of these “legitimate” system carriers. The result is that only the noise (and interference) spectrum below the carrier is displayed.

### To setup alarms:

1. Select the SST Side. (The 16 (9581 SST R4) inputs are grouped with 8 inputs for SSTA and 8 inputs for SSTB.)
2. Choose the appropriate node from the “Node Selected” pull down list. The current trace and alarm threshold curve levels will appear on the large black screen.
3. To modify an alarm threshold curve level, start by selecting the appropriate level from beneath the “Threshold Modification Tools” heading.
4. To set your desired start and stop frequencies, you can:
  - a. Click on the alarm threshold level with your mouse and physically move it, or
  - b. Enter it manually under the “Keyboard Entry Method” heading, or
  - c. Model an alarm threshold curve after a currently existing curve by typing an offset number in the “offset” field and in dB number field and then pressing “Curve Copy” w/ offset
5. Click “Modify Threshold”. The alarm threshold curve change will be seen the next time the screen updates.

To undo the last change made to a threshold curve, click the “Undo” button

To copy alarm threshold curves to additional nodes of this 9581 SST R4, press the “Copy Curves” button under “Cloning Tools,” select a new node and click the “Apply to this node” button.

To copy the alarm threshold curves to an entire side of the 9581 SST R4, select the SST Side and press the “Apply to all nodes this side” button.

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## Detection Modes

There are two methods of detecting threshold curve violations: Peak Detection, and Traffic Detection

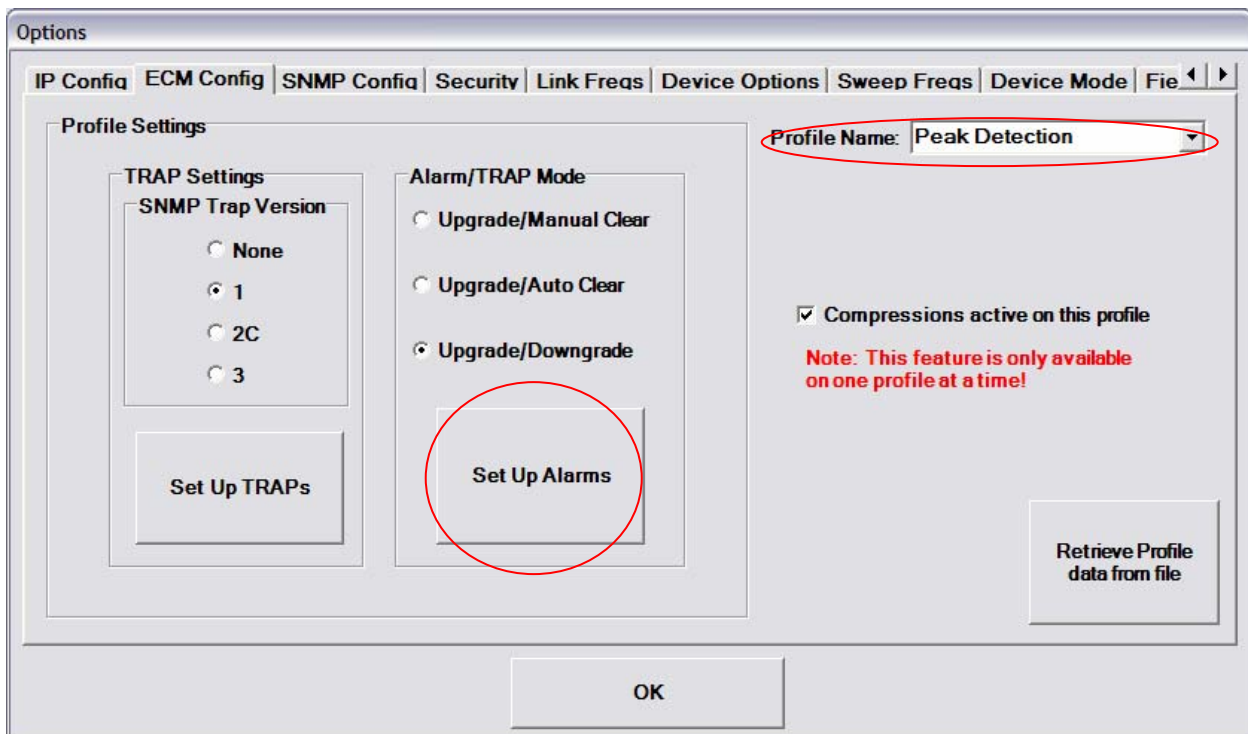
- Peak Detection is ideal for a system with a primary concern for carrier amplitude ranging, and the detection/prevention of laser clipping
- Traffic Detection is ideal for a system with a primary concern for ingress/noise under carriers, and the detection/prevention of service disruption.

## Simultaneous Peak and Traffic Detection

Most systems are concerned about both laser clipping and service disruption due to noise and ingress, and will set up Peak and Traffic Detection to run simultaneously using “Profiles.”

## Setup Peak Detection Thresholds

First, select the “Profile Name” to use for Peak Detection thresholds (in this example the first Profile Name is “Peak Detection”) and select “Set Up Alarms.”



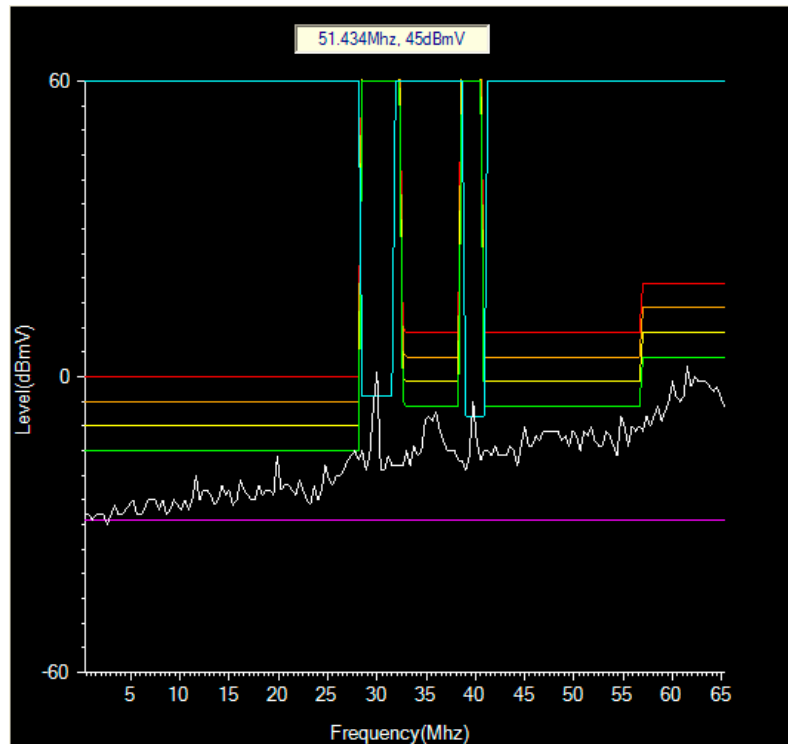
The screenshot shows the 'Options' dialog box with the 'Device Options' tab selected. The 'Profile Name' dropdown menu is set to 'Peak Detection'. The 'Alarm/TRAP Mode' section has 'Upgrade/Downgrade' selected. The 'Set Up Alarms' button is circled in red. The 'Compressions active on this profile' checkbox is checked. A note states: 'Note: This feature is only available on one profile at a time!'. The 'Set Up TRAPs' button is also visible.

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Begin by selecting Peak in the upper-right box marked Ingress Type. Determine where you would like to place the thresholds (1 through 4, Low Limit, and Traffic), being sure to notch around carriers so they do not violate any thresholds. In this example note that we start by placing the Level 1 threshold at 8 dBmV and offset 2 through 4 by 5 dB. Also, note that our Traffic threshold has been drawn below the carrier designed peak level to "eliminate" them when we want to see the noise underneath them in Viewer II. Click "OK" when finished and save to the SST.

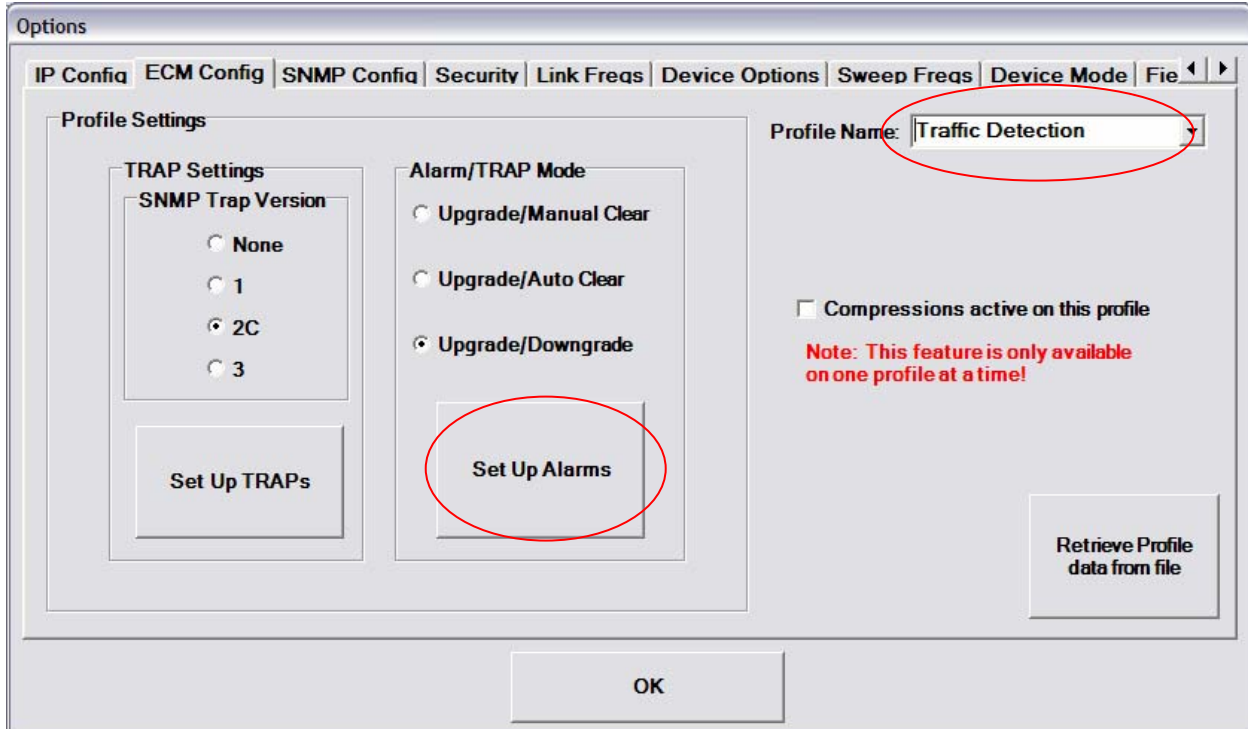


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## Setup Traffic Detection Thresholds

First, select the Profile Name you wish to use for your Traffic Detection thresholds (in this example the first Profile Name is "Traffic Detection") and select "Set Up Alarms."



The screenshot shows the 'Options' dialog box with the following configuration:

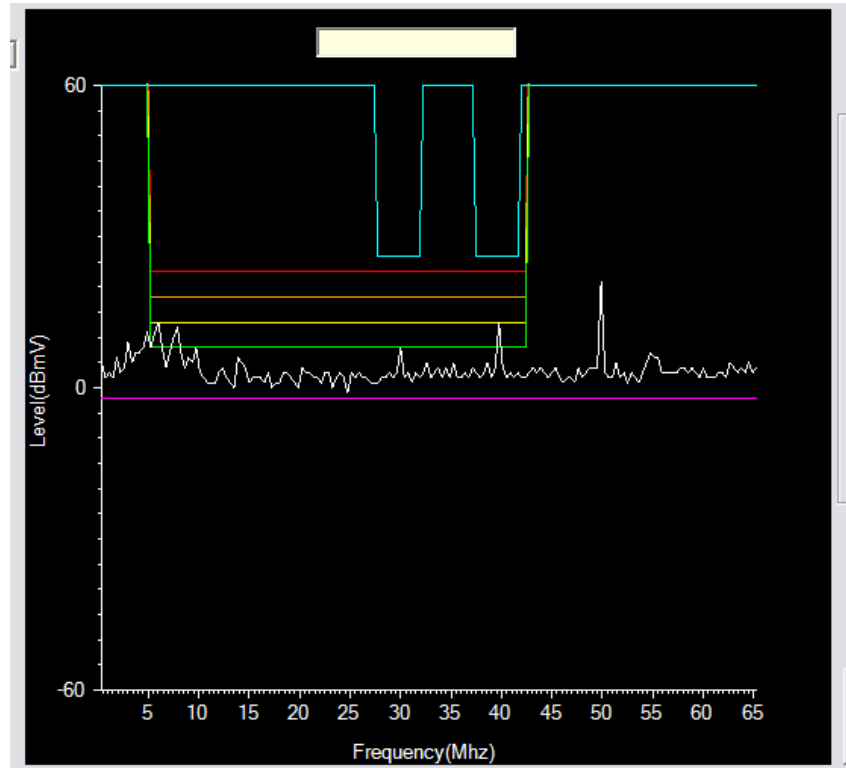
- Profile Name: Traffic Detection
- SNMP Trap Version: 2C
- Alarm/TRAP Mode: Upgrade/Downgrade
- Compressions active on this profile:

Buttons: Set Up TRAPs, Set Up Alarms, Retrieve Profile data from file, OK

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Begin by selecting "Traffic" in the upper-right box marked "Ingress Type." Determine where to place the thresholds (1 through 4, Low Limit, and Traffic). **Do not** notch around the carriers because the ingress type in this scenario is "Traffic" which will "eliminate" the "legitimate" carriers before they cross any thresholds, thus only activating an alarm when the ingress under the carrier violates the configured thresholds. In this example notice that the Level 1 threshold is at 8 dBmV and 2 through 4 are offset by 5 dB. Also, notice that our Traffic threshold has been drawn into the carriers to "eliminate" them to see the noise underneath them in Viewer II. Click "OK" when finished and save to the SST.



This Application Note has described the optimal limit configuration procedure in order to monitor for return signal levels that are too high (potential laser clipping) and for ingress and noise levels which are too high or potentially interfering with services using the return spectrum.

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