LAB #3 Energy History

Scenario: You have done well on your first assignment. However, there is no rest of the weary. Intelligence reports now say there is cellular phone network in this country. The admiral wants to know if that is so and if it is, how active is it, what frequencies they are on, etc., etc. You immediately sit down with your "sweet" E3238S and set to work setting up the Energy History Log (energy history is part of option AS8, Alarms)

Since we are dealing with two bands separated by spectrum we don't care about we will use directed search again. The set up process will be the same as in Lab #2: Set search parameters, format the display, set the threshold and signal detection. We will finish by working with the energy history log.

1.0 Set the search parameters

- Directed search type should still be enabled. If it is not, enable it.
- Recall the new search parameters from the menu bar by clicking on: Search, Setup.
- Highlight Band 4.
- Click on Modify Single Band.
- Click on Display (Band Database).
- Highlight Cellular Mobile (824 - 849 MHz).
- Click OK to close the Band database and transfer the parameters.
- Toggle the status to Active.
- Click on OK to close the Directed Search Band Setup menu.

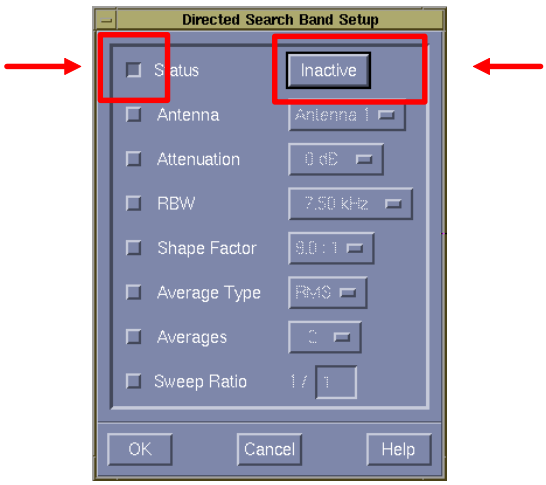
Band 4 should show parameters for the cellular Mobile band. Status should be active.

- Repeat the process for Band 5, selecting Cellular Base (869 - 894 MHz).

Band 5 should show parameters for the cellular base band. Status should be active.

- In the Directed Search Setup menu highlight bands 1, 2 and 3 together by clicking on band 1, pressing and holding the left mouse button and dragging the highlight down to band 3.
- Click on Modify Multiple Bands.

- In this Directed Search Band Setup menu click on the small square to the left of Status.



- Click on the Active, it should change to Inactive.
- Click OK to close this menu.

Bands 1-3 should show as inactive.

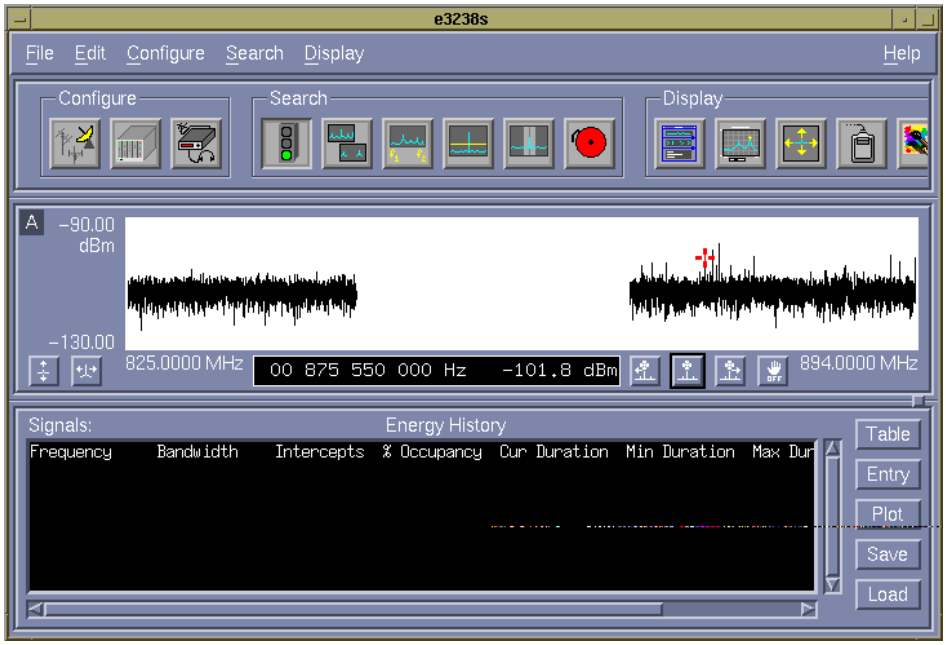
- In the Directed Search Setup menu highlight bands 4 and 5
- Click on Modify Multiple Bands.
- Click on the small square for Average Type.
- Click the Average Type button and select RMS from the list.
- Click on the small square for Averages
- Click on the Averages button and select 4 from the list.
- Click OK to close this menu.

Bands 4-5 should show status active, Avg. Type RMS, # Avg. 4 in the Directed Search Setup Menu.

- Click on OK to close the Directed Search Setup menu and apply the parameters

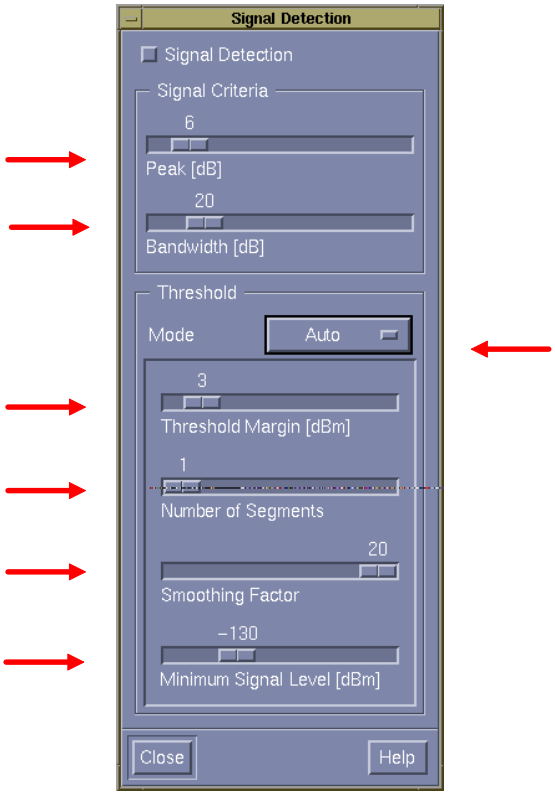
2.0 Format the display

- Format the display from the menu bar by clicking on: Display, Layout.
- Set pane 1 to Toolbar.
- Set pane 2 to Trace A.
- Set pane 3 to Energy History.
- Set all the other panes Off.
- Click OK to close this menu.
- Size the Energy History Log with the pane scaling square so that it takes up about half the display.
- Autoscale the trace (amplitude and frequency)
- Activate the Energy History Grid Type and Marker from the menu bar by clicking on: Display, Trace.
- Click on Trace A,
- Click on Energy History.
- Click on Marker On.
- Click on Close to close this menu.



3.0 Select threshold and signal detection:

- Turn signal detection off from the menu bar by clicking on: Search, Signal Detection
- Click the Signal Detection button. This toggles signal detection off and keeps the Energy History Log from filling up with garbage until the threshold is set up.
- Clear the Energy History Log from the menu bar by clicking on: Edit, Clear Energy History, Yes.
- Click the Threshold Mode button.
- Select Auto from the list.
- Set the Threshold Margin to 6 dBm,
- Set the Number of Segments to 1
- Set Smoothing factor to 20.
- Set the Minimum Signal Level to -130 dBm.
- Set Peak to 6 dB
- Set Bandwidth to 20 dB.



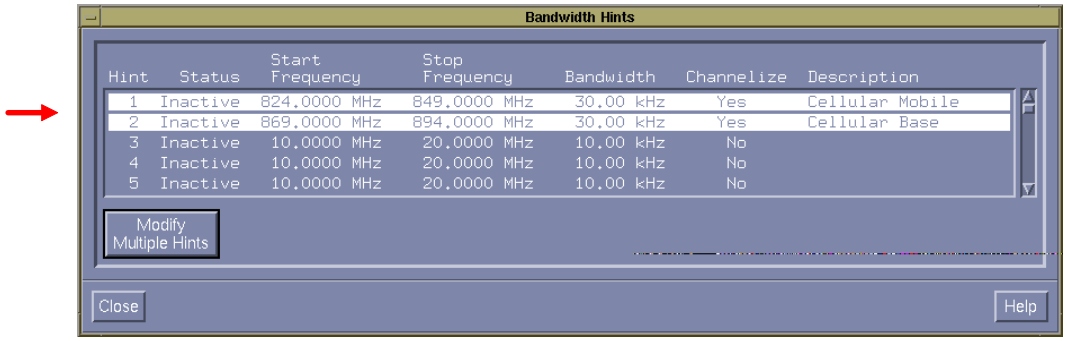
- Click on Close to close this menu.

Since the channel bandwidths are known we will enable bandwidth hints to enhance the results of our frequency monitoring.

- To enable Bandwidth hints from the menu bar click on: Search, Bandwidth Hints.
- Highlight the Cellular Mobile and Cellular Base entries.
- Click on Modify Multiple Hints.
- Click in the small Status square
- Toggle status to Active.
- Click on OK to close this menu.

Hints 1 and 2 status should show active

- Click Close to close this menu



- Turn signal detection on from the menu bar by clicking on: Search, Signal Detection.
- Click the Signal Detection button.

The Energy History Log should start filling and the trace should have vertical lines showing where the hits occurred. If they do not reduce the Peak Signal Criteria and/or Threshold Margin.

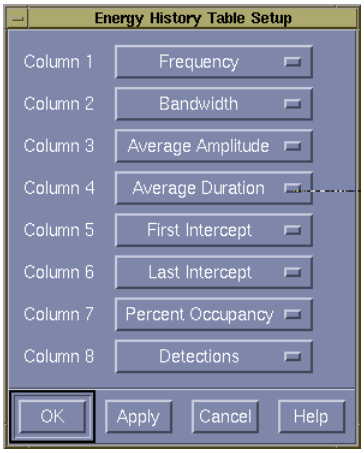
- Click on Close to close this menu.

4.0 The Energy History Log

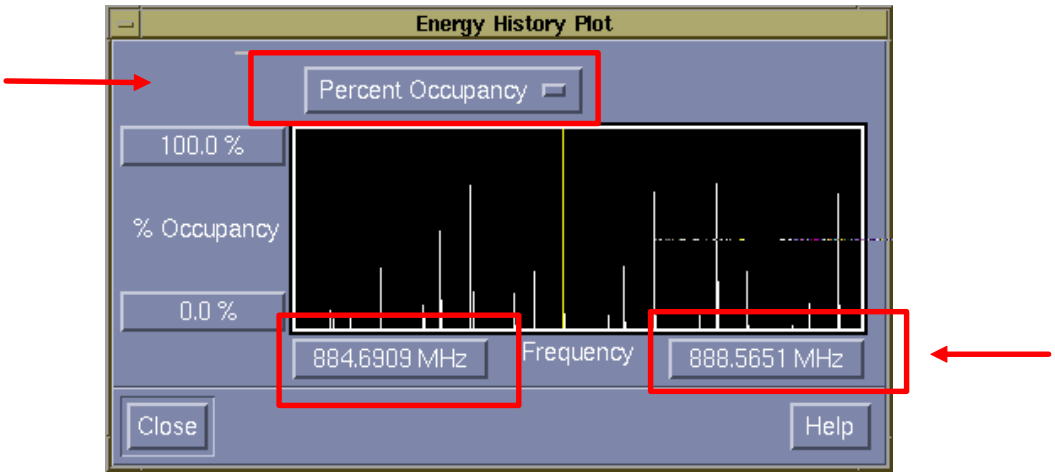
Now that you have the log you need to set it to show the data you need. Given the scenario, you first need to sort signals from noise, then you want to prioritize the signals so that others can begin trying to listen in.

- In the Energy History Log click on Table to select the data displayed in the log.
- In the Energy History Table Setup menu click on the column 1 button
- Select Frequency from the list
- Repeat the process making assignments as shown below, then click OK to close the menu:

column 1 Frequency,
column 2 Bandwidth,
column 3 Maximum Amplitude,
column 4 Maximum Duration,
column 5 First intercept,
column 6 Last intercept,
column 7 Percent Occupancy
column 8 Detections



- To see a plot of the Percent Occupancy click Plot in the Energy History Log.
- In the plot window click the top most button and select Percent Occupancy from the list.



- To lock the markers to the table and the plot click on either the left or right horizontal scale button.
- Select Synchronize to Trace A.
- Click OK to close menu and apply the selection.

- Click on one of the rows in the Energy History Table. The row is highlighted, its place in the plot is highlighted and the marker in Trace A automatically goes to the signal location.

- In the Energy History Log click on Entry. This displays all 19 of the parameters of the highlighted row.

You now have all the data you Admiral wants. Its Miller Time!

Questions

1. What frequency has the highest percent occupancy? _____

2. What frequency has the highest activity (i.e. detections)? _____

E3238S Features shown in Lab #3

- Energy history log activation
- Bandwidth Hints activation
- Energy history table
- Energy history plot
- Synchronized markers in Energy history
- Directed Search
- Clearing Logs
- Using the Auto threshold

OPTIONAL EXERCISE

Some of the radios we are using in the labs have large turn on and turn off frequency transients. These cause frequency deviations that in turn make it hard to determine the center frequency of the signal. The spectrogram display type can help with this problem.

- To activate the spectrogram display type click and hold the right mouse button on the border of trace c pane. Move the cursor to Trace Type and select spectrogram.

  With small panes the hot spot can be hard to find. You can use the display menu to activate spectrogram if the hot spot does not work.

Have the instructor key the radio and watch for the signal.