INSTRUCTIONS FOR USING THE RSSI TOOL FOR DURAFON-SIP

1. **"RSSI"** stands for receive signal strength indicator. Usually for a phone (DuraFon as well) this is in the form of several bars. The problem is this is simply not adequate for performing a real site survey. Industry standard for measuring signals are in negative dBm. You do not need an admin handset for this test. All handsets can do this.

2. **Handset to Base signal testing:**
   a. Press MENU # # # # *, then press "select" to choose "BER test". Now press "select" again and choose HS to BS. Use the arrow up/down key to change the screen to RSSI. "Peer" is the signal of the base to the handset and "Self" is the signal of the handset to the base.

3. **Handset to handset signal testing (do a separate test if 2-way intercom or broadcast is used):**
   a. Note: 2-way intercom and broadcast operations do not use the base station. This means range testing for these modes need to be done as well unless these modes of operation are not used.

   b. First note which 2-digit handset ID you have. Next, press MENU # # # # *, then press "select" to choose "BER test". Use the arrow up/down key to choose HS to HS. The handset will now show "HS BER ready". Now grab another handset and 2-way call it. It will automatically answer – putting it in test mode. Use the arrow up/down to change the screen to RSSI. "Peer" is the signal is what your handset is receiving the other handset at and "Self" is the signal that the other handset is seeing of you.

Note: Frequency deviation should not exceed 3000Hz or 3kHz. Any more may mean there is a hardware problem.

RSSI and –dBm:
The highest reading is around -35dBm and won't typically read any stronger even if very close. It is typical to maintain a signal of -55dBm or better for about the first 100 feet from the base station antenna.

The weakest signal that can be received is -110dBm. If you go beyond this, you will lose the link between the handset and base. Note this is not the signal you want to set as your minimum signal for coverage! If you do lose the link between handset and base, exit the menu, and go back to the original steps. 20 to 30dB of signal margin is required to maintain a reliable link and to compensate for varying conditions. This means the signal should be -80dBm or better (better meaning less negative). A -65dBm signal is stronger than a -80dBm signal because it is less negative. If you have any trouble with this, see the Wiki link below on "dBm".

Signal >-80dBm = no dropped calls, no noticeable degradation in voice quality.
Signal -81dBm to -90dBm = low to medium risk of dropped calls and slight reduction in voice quality.
Signal -91dBm to -100dBm = real risk of random dropped calls and noticeable voice quality reduction.
Signal <-101dBm = terrible voice quality and dropped calls.
Signal <-110dBm = no link at all.

This assumes little to no interference in the 902-928MHz band. If you have severe interference, you will see poor performance even though RSSI is strong. It is the signal to noise radio (margin) that matters. Where there is interference, even greater SNR (signal to noise ratios) will be required. If you think there is a possibility of interference, you may want to verify with a spectrum analyzer.

DOING THE SIGNAL TEST: Use a building blueprint or map and denote the base station location and signal strength readings at various locations.

TESTING WITH STUBBY HANDSET ANTENNA VERSUS LONG HANDSET ANTENNA:
Do your testing with the antenna that will be actually used. There is a 2 dB difference between the long and short antenna but a 5 to 8 dB difference when in actual use. This is because the long antenna extends beyond the person's head so signal attenuation is not as bad (you are testing while having the phone in front of you vs. next to your ear that is real world use).

Do not have any other handsets or bases in use during site survey testing.

If changes are made such as moving a base station antenna, do them one at a time and redo the entire site survey over again. Do not do multiple changes at the same time as this will not allow you to know which of changes helped (or made worse).

Good sources for additional learning: http://en.wikipedia.org/wiki/DBm http://en.wikipedia.org/wiki/Rssi
http://en.wikipedia.org/wiki/Wireless_site_survey http://www.wireless-nets.com/resources/tutorials/conduct_wireless_site_survey.html

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