

Exhibit A - Coverage and interference map guidelines

The Region requires a propagation interference map using the Longley -Rice model for all applications. The region has qualified two programs that implement the model. One is Radio Soft ComStudy and the other is Spectrum E. For most applications, the interference map only needs to show two signal levels – 40 dBu coverage in the operating area and a 20 dBu co-channel interference level. It is important to use the 50% median values when setting up the calculations so that all results are consistent and conform to TSB-88 recommendations. These levels assume use of P25 modulation both Phase 1 and 2. Other modulation types will need use appropriate levels based on the TSB-88 tables or a TSB-88 methodology interference study. In no cases may contours be used in place of the matrix studies.

In cases where there is uncertainty as to protection to other co-channel users, an interference study can be done using actual transmitter locations and TSB-88 methodology. For questions, please contact the Region chair.

Operating area is considered as geographic boundary plus 3 miles. Transmitters should provide a minimum of 40dBu signal in required operating area for interference protection.

Please use similar colors for spectrum E signal level maps as used in the ComStudy examples below.

Preparation of ComStudy2.2 maps should utilize the following parameters:

For P25 Systems- Transmitter site information menu should use modulation type C4FM @ +/- 2.8KHz.

Recommended signal strength should be reduced below 40dBu beyond the three miles of the co-channel agency jurisdiction as quickly as possible by use of patterned and/or down tilted antennas.

The upper fields of the Field Strength Information menu should be set as shown below for new transmitter(s) with existing co-channel users..

Transmitter Information - 800 MHz

Sites Select Display Calculate Search ReDraw

800+ Field Strength Max Selected T Out

Parameters:		Min. FS [dBu]					
		0.0					

V	N	M	S	Call Sign	C	ST	City	Freq.	Emissions	ERP
☐	☐	☒	☒	Black Mt	1			769.30625		49
☐	☐	☒	☒	CAB	1			769.30625		49
☐	☐	☒	☒	Cowles Mt	1			769.30625		50
☐	☐	☒	☒	Encanto	1					

6 site(s), 6 selected

The upper fields of the Transmitter Information menu should be set as shown below for new transmitters where there are existing co-channel .

V	N	M	S	Call Sign	C	ST	City	Freq.	Emissions	ERP
☐	☐	☒	☒	Black Mt	1			769.30625		49!
☐	☐	☒	☒	CAB	1			769.30625		49!
☐	☐	☒	☒	Cowles Mt	1			769.30625		50!
☐	☐	☒	☒	Encanto	1					

GENERATING COVERAGE MAPS

Map size should be set to include areas of the co-channel agencies not just the applicants coverage area. Remember this is intended to show that no harmful interference to co-channel users..

USING TEMPLATES

ComStudy 2.2 provides a method to create coverage maps using predetermined parameters stored in a template. Templates to create the required maps are stored on the CAPRAD website. In the 700 MHz tab select PLANNING. On the left side of the screen select “Plan Documents”. Download the files “700MHz TSB-88 Interference.CST” and “700 MHz Field Strength.CST” and store on your hard drive in the folder CS20\data. Also download the .csv file for a Spectrum E template and fill out even if using ComStudy as this lets those reviewing the maps to more easily import into Spectrum E. Include the Planet files used for antenna patterns with the files attached to the application and sent to the co-channel users.

Select the appropriate template to set the map size parameters for signal strength calculations. Select the File pull down menu and cursor to templates - apply template. Select the appropriate template name. (Field Strength or TSB-88 interference

If your application is for licensing on channels with current users, you may need to use the TSB-88 method. Remember to select “V” for victim in the transmitter information menu for each site that the new site will protect in turn. Only select the new site and victim site to get correct results.

The template will set the map colors using the correct scale as shown below. Gradients will be off. (G box will be un-checked)

#	S	G	Clr	Level [dBu]
1	☒	☐	☐	19.00
2	☐	☐	☐	10.00
3	☒	☐	☐	20.00
4	☒	☐	☐	40.00
5	☐	☐	☐	50.00

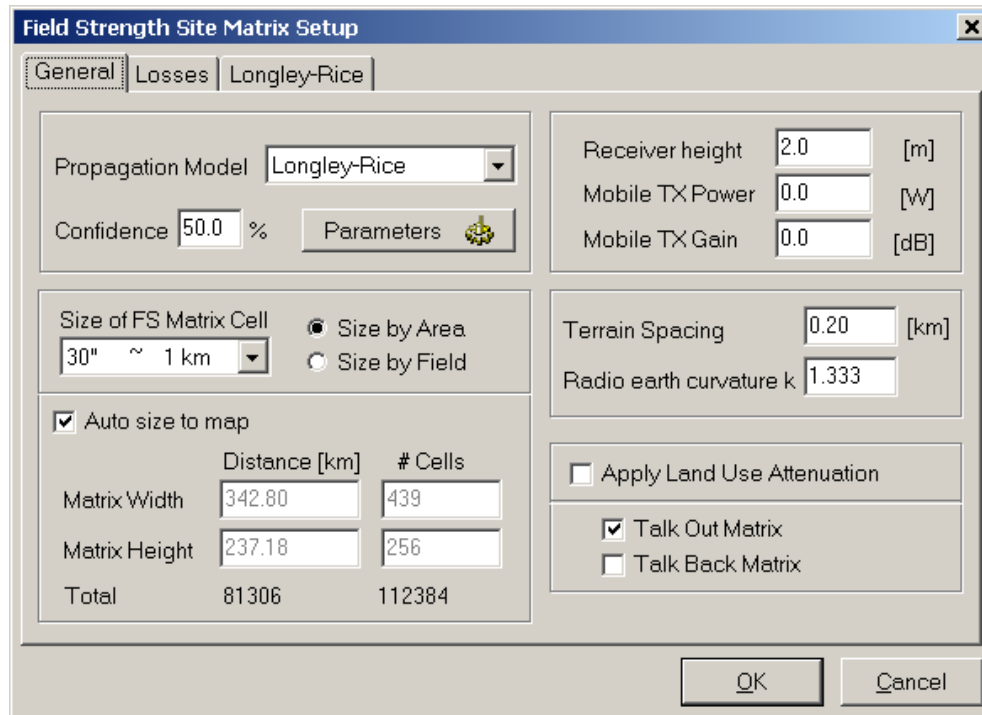
☐ Auto Scale

Defaults Apply

Min: -128.00 Max: 126.00

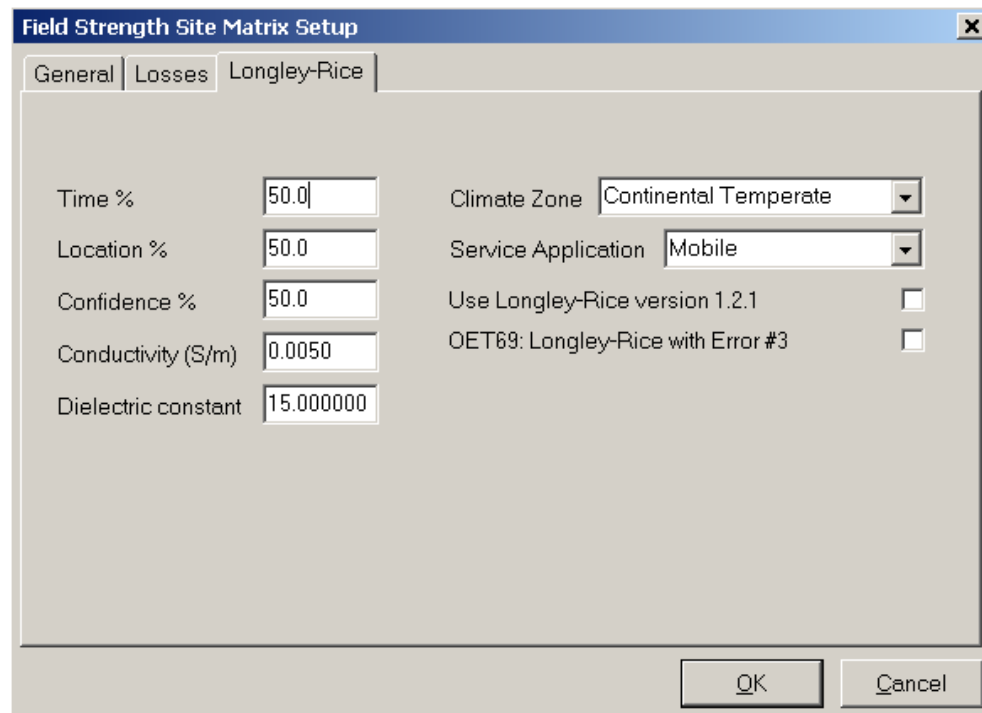
The template will also prepare the map for printing. To prepare for printing, Go to “File”, “Page Setup”, and add your Agency Name in the header and the Site Name and Coordinates in the text above the map. (See sample map on last page)

Calculate site matrix of new transmitter(s) using parameters shown below. Lower left box will differ but needs to be appropriate for calculation of the large area.



The 'Field Strength Site Matrix Setup' dialog box, General tab, contains the following settings:

- Propagation Model: Longley-Rice (dropdown)
- Confidence: 50.0 %
- Parameters: (button with gear icon)
- Receiver height: 2.0 [m]
- Mobile TX Power: 0.0 [W]
- Mobile TX Gain: 0.0 [dB]
- Size of FS Matrix Cell: 30" ~ 1 km (dropdown)
- Size by Area (selected radio button)
- Size by Field (radio button)
- Auto size to map (checked checkbox)
- Matrix Width: 342.80
- Distance [km]: 439
- Matrix Height: 237.18
- # Cells: 256
- Total: 81306
- 112384
- Terrain Spacing: 0.20 [km]
- Radio earth curvature k: 1.333
- Apply Land Use Attenuation (unchecked checkbox)
- Talk Out Matrix (checked checkbox)
- Talk Back Matrix (unchecked checkbox)
- OK (button)
- Cancel (button)



The 'Field Strength Site Matrix Setup' dialog box, Longley-Rice tab, contains the following settings:

- Time %: 50.0
- Location %: 50.0
- Confidence %: 50.0
- Conductivity (S/m): 0.0050
- Dielectric constant: 15.000000
- Climate Zone: Continental Temperate (dropdown)
- Service Application: Mobile (dropdown)
- Use Longley-Rice version 1.2.1 (unchecked checkbox)
- OET69: Longley-Rice with Error #3 (unchecked checkbox)
- OK (button)
- Cancel (button)

After calculations are completed, print map into portable document format (pdf) for attachment to application.

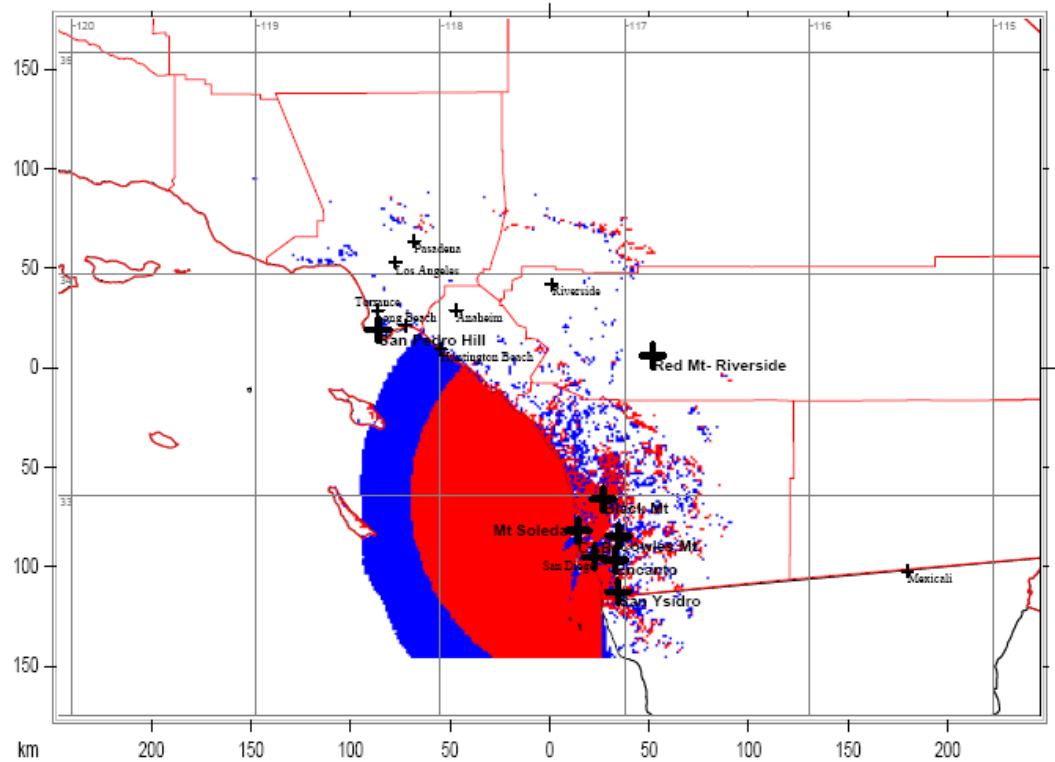
Sample of completed ComStudy Field Strength map

ComStudy

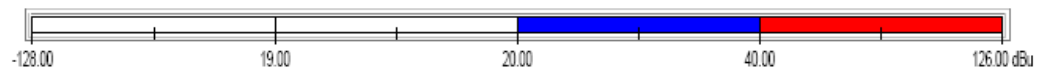
Agency Name

Wednesday, September 23, 2009

Site Name and Coordinates



Longley Rice Median 50%; Max FS; T out



County Borders State Borders Lat/Lon Grid

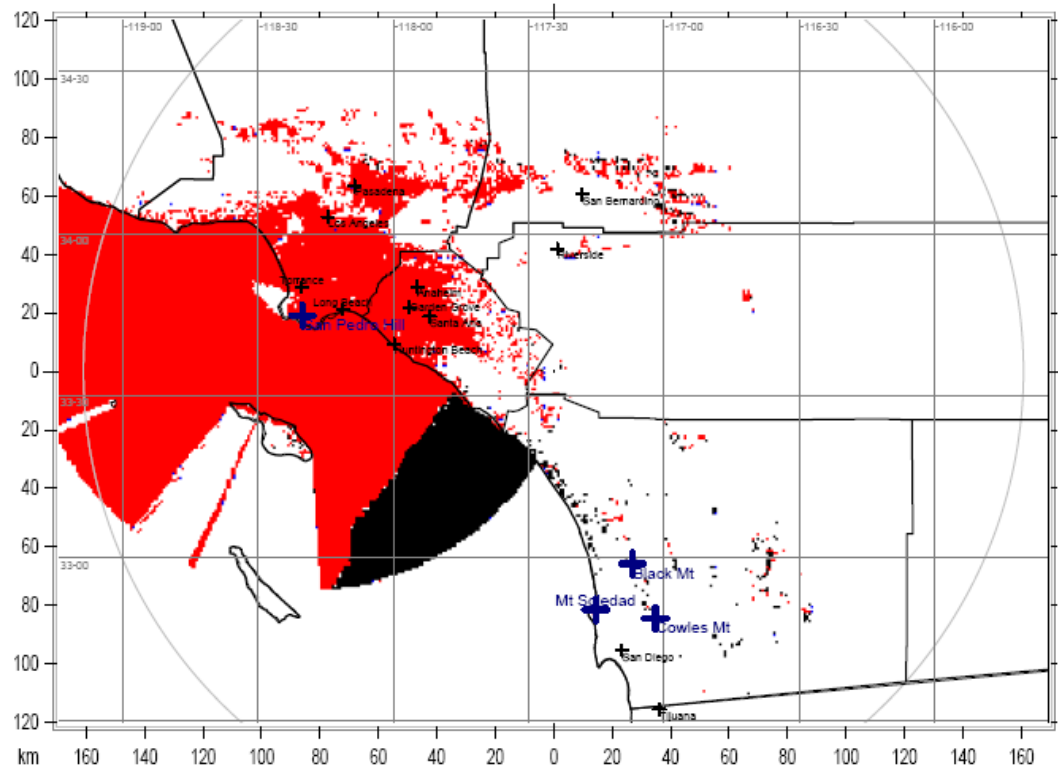
Sample of completed ComStudy TSB-88 interference map

ComStudy

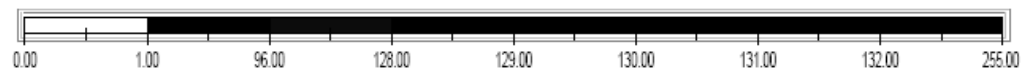
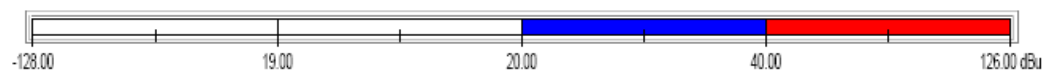
Agency Name

Wednesday, September 23, 2009

Site Name and Coordinates



Longley Rice Median 50%; TSB-88 Interference T out



Country Borders State Borders Lat/Lon Grid

Spectrum E Study Parameters

Select the Network tab. Then select the object with the new proposed site parameters. Then in the left main menu select “Run ITM Path Loss Matrix”. A new pop-up screen will appear. Set the options in that pop-up as shown below:

Longley-Rice ITM v.1.3 Parameters

Rx Antenna Height:	2.0	m
Calculation Distance:	150	km
Confidence:	50	%
Reliability:	50	%
Ground Type:	Average Ground ▼	
Radio Climate:	Continental Temperate ▼	
Clutter Attenuation:	None ▼	
Clutter Resolution:	Standard ▼	
Profile Sampling:	1000	points
Apply To:	Selected Objects ▼	

Run

Close

Run that study. Next select the proposed new site again and then in the left main menu select “dBu Talk Out Power Received”. This brings up another pop-up as shown below. Set the parameters as shown in the screen shot.

Downlink Field Strength Map

Save Prediction As:

Prediction Type:

Composite ▼

Terrain Resolution:

auto ▼

Apply To:

Selected Objects ▼

Run

Close

Run this pop-up.

This will generate the field strength values from the the ITM calculations. Select the site parameters. Select from the main left menu “Map Selected Object”. Then select the Map tab.

You should see a map similar to the below screen shot. However, the color palattes may not be correct. If so click on the left bottom color palette to bring up the palette pop-up. You can then (assuming you have created a palette for the 700 MHz values) select the 700 MHz palette, then set it to default and click on “Update”.

Palettes

Select Palette: Region 5 700 Values ▼

Region 5 700 Values (type: dbu)

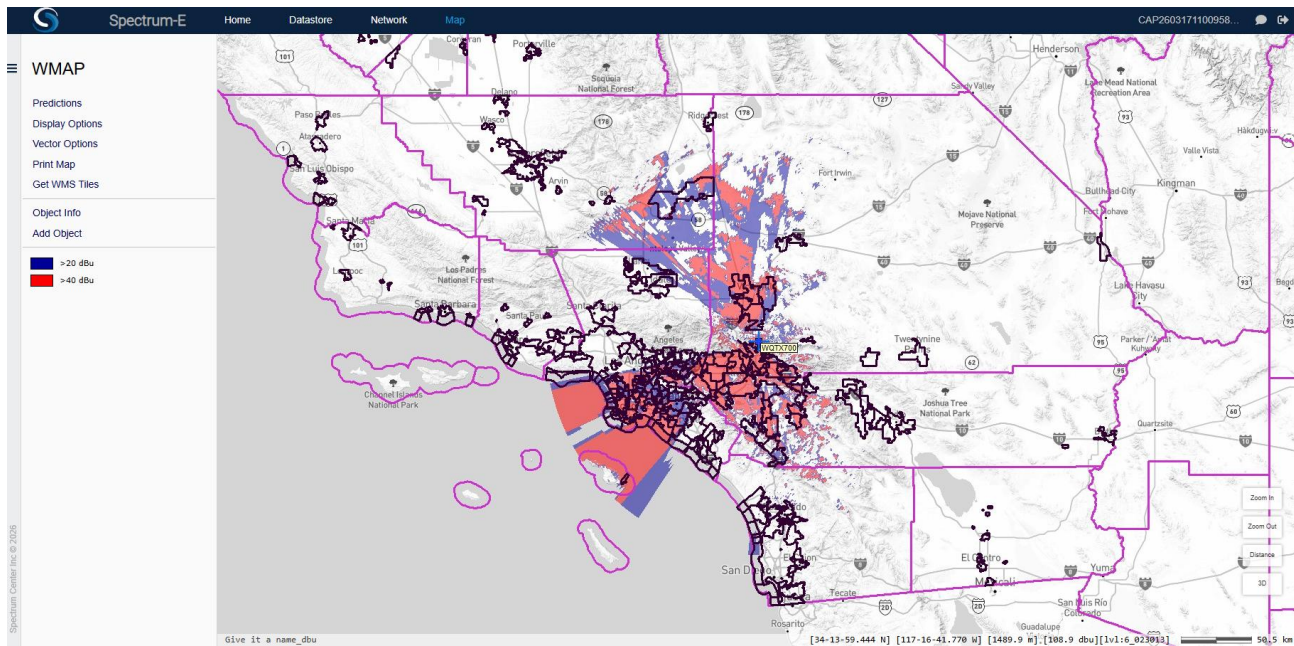
Set palette as default: ☒

Color	Value	Label
	20	>20 dBu
	40	>40 dBu

Update

Delete

You should then see a map similar to the screen shot below. You will need to zoom out far enough so the other co-channel agencies boundries are included in the map.



You can then go back to the network tab and select the site object and run “Generate Report”. Select contour report (there is no specific report for matrix studies). Fill in the info in the pop-up screen.

Reports

Report: FCC Contour Report ▼

PDF Title: 700 MHz Matrix Interference Report

PDF Body Text: Type any comments here.

Run Close

Click on “Run” and then save the report as a PDF file. Send out to all co-channel users.