Report on Test Measurements

Occupied Bandwidth – Analog Voice, Digitized Voice and Data Frequency Modulation, 12.5 kHz Channel Spacing
The exhibits in this section show occupied bandwidth plots for analog voice modulation. Data is shown with the modulating audio tone itself, the tone plus Private Line (PL) sub-audible tone signaling, and tone plus Digital Private Line (DPL) sub-audible signaling.
There is also an exhibit showing the occupied bandwidth plot for digitized voice or data modulation. The signaling utilized is 4-level frequency shift keying of the carrier frequency.

The occupied bandwidth charts reference the following setup and specification requirements.

Modulation Type:	Analog Voice	Digitized Voice, Data
Emission Designator:	11K0F3E	7K60FXE, 7K60FXD
		7K60F7E, 7K60F7D, 7K60F7W
Channelization:	12.5 kHz	12.5 kHz
Deviation Limit:	±5.0 kHz Max	
Power Setting:	75 Watts	75 Watts

Specification Requirement § 90.210(i) Emission Limits (Analog Voice):
Emission *Mask I.* For transmitters that are equipped with an audio low pass filter, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 6.8 kHz, but no more than 9.0 kHz: *At least 25 dB;*

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 9.0 kHz, but no more than 15 kHz: *At least 35 dB;*

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency of more than 15 kHz: *At least 43 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.*

Specification Requirement § 90.210(j) Emission Limits (Digitized Voice / Data):
Emission *Mask J.* For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 2.5 kHz, but no more than 6.25 kHz: *At least 53 log (f_d/2.5) dB;*

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 6.25 kHz, but no more than 9.5 kHz: *At least 103 log (f_d/3.9) dB;*

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 9.5 kHz: *At least 157 log (f_d/5.3) dB, or 50 + 10 log (P) dB, or 70 dB, whichever is the lesser attenuation.*

Necessary Bandwidth Calculation (Analog Emission):
The necessary bandwidth of the modulation signal per the formulas defined in 47 CFR 2.202 (b) is as follows:

Max Mod Freq, M	Max Deviation, D	2*(M+D)	Nec BW
3 kHz	2.5 kHz	11 kHz	11K0

Necessary Bandwidth Calculation (Digital Emission): An occupied bandwidth of 7.60 kHz was measured for this emission, per 2.202 paragraph (a) of the Rules and Regulations, as that bandwidth which contains 99% of the power in the transmitted signal. For this system, the necessary bandwidth has been chosen to be the same as the occupied bandwidth, thereby per paragraph (b) (2), the necessary bandwidth is 7K60.

EXHIBIT E1-4
(Permissive Change)

Report on Test Measurements

Occupied Bandwidth –12.5 kHz Channel Spacing (continued)

Measurement Procedure and Instrument Settings:
Emission Measurement Analyzer Settings:

Horizontal:	12.5 kHz per Division	Resolution Bandwidth:	300 Hz
Vertical:	10 dB per Division	Video Bandwidth:	10 kHz
Sweep Time:	72 Seconds (<2000 Hz / Second)	Span:	125 kHz
Detector Mode:	Peak		

Test Procedure (Analog Voice):
1) Key the station with no modulation to obtain the unmodulated carrier reference level on the analyzer. Use the analyzer controls to set this reference to a full-scale reference line. Store this analyzer trace in trace A.
2) Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation.
3) Allow the analyzer to sweep, and record the resultant emission levels in trace B.
4) Plot the resulting analyzer trace. The occupied bandwidth mask is then added along with additional labeling as appropriate.

Test Procedure (Digitized Voice or Data):
1) Adjust the spectrum analyzer per the values specified in the Emission Measurement Analyzer Settings.
2) Modulate the transmitter with the appropriate signaling pattern, (pseudorandom data) and key the transmitter at the full power rating. Use the analyzer controls to set this signal to the full-scale reference line. Allow the analyzer to sweep fully and store the sweep.
3) Use the band power marker function of the spectrum analyzer to measure the power of the carrier in a 12.5 kHz bandwidth.
4) Use the carrier power value from the previous step to generate the emission mask limit.
5) Plot the resulting analyzer trace and the emission mask limit, add text and labeling as appropriate.

EXHIBIT	DESCRIPTION
E1-4.4	Carrier with 2500 Hz Audio Tone, 12.5 kHz Channels
E1-4.5	Carrier with 2500 Hz Audio Tone and Private Line (PL) Signaling, 12.5 kHz Channels
E1-4.6	Carrier with 2500 Hz Audio Tone and Digital Private Line (DPL) Signaling, 12.5 kHz Channels
E1-4.7	Carrier with Digitized Voice / Data, 12.5 kHz Channels

Report on Test Measurements

Occupied Bandwidth – Carrier with Digitized Voice / Data, 12.5 kHz Channels

Occupied Bandwidth - 4-Level FSK - 7K60FXD, 7K60FXE, 7K60F7D, 7K60F7E, 7K60F7W - 75 Watts

REF 48.8 dBm　　　　　　ATTEN 20 dB

10 dB/
Peak

LOG PAGE: _____ DATE: 8/12/10
NAME: Ted Lietz

SIGNATURE: _____

Transmit Signal - 75 W

90.210 J-Mask - 75 W

CENTER 938.01250 MHz　　　　　　　　　　　　　　　　SPAN 125 kHz
RES BW 300 Hz　　　　　　　VID BW 10 kHz　　　　　　SWP 72 sec

**EXHIBIT E1-4.7
(Permissive Change)**