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## ENGINEERING REPORT:

Application for License

Radio Station KFRN, Long Beach, CA  
1280 kHz, 0.43 kW D, 0.24 kW N, non-DA  
Facility ID 21005

Family Stations, Inc.

September, 2023

This engineering report provides data in support of an application for license for KFRN for the facilities specified in the outstanding construction permit BP-20221017AAD.

The facilities have been constructed in exact accordance with the requirements of the construction permit.

Condition 2 of the permit requires installation of equipment to prevent intermodulation or other spurious emissions, since the KFRN operation is diplexed into one of the towers of the directional operation of station KLTX. This equipment has been installed and adjusted, and the resulting measured conditions are shown in the attached "NRSC" measurement report prepared by Jeffrey Zimmer, the station's chief operator and licensee's regional technical supervisor.

The measured antenna impedance at J114, the summation point for the feed to tower 1 of the three KLTX towers, which is the tower employed for the KFRN nondirectional operation, is  $91.2 -j 276.6$  ohms. Thus the current for the day operation at this point is 2.17 Amperes, and for night operation is 1.61 Amperes. There is no metering installed at this point, however, since the Nautel transmitters provide correct vector calculation of their power value at their outputs as permitted by 73.51(1) of the Rules. The measured impedance at the transmitter outputs is  $50 \pm j 0$  ohms.

September 4, 2023



Benj. F. Dawson III, P.E.

## Calculated Intermodulation products

Possible Intermodulation products between KLTX 1390 kHz, and KFRN 1280 kHz were calculated and are shown below. These frequencies were examined during the proof measurements and any related signals that were detected are noted in Tables A & B of this report.

1.	1	x	1280	+	1	x	1390	=	2670
2.	1	x	1390	+	1	x	1280	=	2670
3.	1	x	1280	+	2	x	1390	=	4060
4.	1	x	1390	+	2	x	1280	=	3950
5.	2	x	1280	=				=	2560
6.	2	x	1280	+	1	x	1390	=	3950
7.	2	x	1280	-	1	x	1390	=	1170
8.	2	x	1390	=				=	2780
9.	2	x	1390	+	1	x	1280	=	4060
10.	2	x	1390	-	1	x	1280	=	1500
11.	3	x	1280	=				=	3840
12.	3	x	1280	-	1	x	1390	=	2450
13.	3	x	1390	=				=	4170
14.	3	x	1390	-	1	x	1280	=	2890
15.	3	x	1280	-	2	x	1390	=	1060
16.	3	x	1390	-	2	x	1280	=	1610

# TABLE A

## DAY MODE

Spurious and harmonic emissions observed between  
530 KHZ and 5000 kHz for operation of KLTX &  
KFRN

August 22, 2023

<b>Frequency</b>	<b>Relationship</b>	<b>Signal relative to Carrier</b>	<b>Minimum Attenuation required by 73.44</b>
1390 kHz	carrier (1.25 V/m)	0.0 dBc	-----
1450 kHz	Mix 1390 & 1330	-69.5 dBc	65 dBc
1500 kHz	Mix w/1280 KFRN	-87.1 dBc	80 dBc
2670 kHz	Mix w/ 1280 KFRN	-92.7 dBc	80 dBc
2780 kHz	2nd Harmonic	-84.7 dBc	80 dBc
3950 kHz	Mix w/ 1280 KFRN	-96.4 dBc	80 dBc
4170 kHz	3rd Harmonic	-92.7 dBc	80 dBc

NOTE: No other related signals were found.

## TABLE B NIGHT MODE

Spurious and harmonic emissions observed between  
530 KHZ and 5000 kHz for operation of KLTX &  
KFRN

August 22, 2023

<b>Frequency</b>	<b>relationship</b>	<b>Signal relative to Carrier</b>	<b>Minimum attenuation required by 73.44</b>
1390 kHz	carrier (990 mV/m)	0.0 dBc	-----
1450 kHz	Mix/w 1330 KWKW	-85.9 dBc	65 dBc
1500 kHz	Mix/w 1280 KFRN	-89.3 dBc	78 dBc
2670 kHz	Mix/w 1280 KFRN	-92.7 dBc	78 dBc
2780 kHz	2 <sup>nd</sup> Harmonic	-89.5 dBc	78 dBc
3850 kHz	Spurious Signal	-97.0 dBc	78 dBc
4060 kHz	Mix/w 1280 KFRN	-96.9 dBc	78 dBc
3950 kHz	Mix/w 1280 KFRN	-95.3 dBc	78 dBc
4170 kHz	3 <sup>rd</sup> Harmonic	-88.8 dBc	78 dBc

NOTE: No other related signals were found.

Equipment Performance Measurements for KFRN 1280 AM  
August 29, 2023

**Harmonic Measurement – Day**

<b>Order</b>	<b>Frequency</b>	<b>Measured Field Strength</b>	<b>Measured/Reference</b>	<b>Required</b>
Fund.	1280 kHz	254 mV/m	0 dB	N/A
2 <sup>nd</sup>	2560	11.0 uV/m	-84.1 dBc	-69.3 dBc
3 <sup>rd</sup>	3840	10.5 uV/m	-84.5 dBc	-69.3 dBc

**Harmonic Measurement – Night**

<b>Order</b>	<b>Frequency</b>	<b>Measured Field Strength</b>	<b>Measured/Reference</b>	<b>Required</b>
Fund.	1280 kHz	164 mV/m	0 dB	N/A
2 <sup>nd</sup>	2560	10.6 uV/m	-74.2 dBc	-66.8 dBc
3 <sup>rd</sup>	3840	9.9 uV/m	-74.9 dBc	-66.8 dBc