

EXHIBIT

Form 442 Confirmation Number: EL859938

Form 442 File Number: 0499-EX-CN-2019

Date of Submission: June 15, 2019

Narrative Statement (Form 442, Item 7)

This application requests the use of ETSI Digital Mobile Radio (DMR) Tier II conventional radio technology in the General Mobile Radio Service (GMRS) at several land mobile repeater sites with associated mobile units.^{1,2} DMR emissions are not currently permitted in the GMRS and requires special authorization. Such regulatory impediments unnecessarily reduce our ability to put this spectrum to its highest and best use.

Two existing analog FM GMRS (Part 95) land mobile repeater stations will be temporarily replaced with models capable of narrowband digital operation to support a small number of digital subscriber units (e.g., vehicular and handheld radios). Both voice and data communications will be used. Data communications will consist of simple text messaging, and GPS messages embedded with voice transmissions. GPS will only be sent in conjunction with, and during voice messages.

Technical parameters are included on this application are for the vehicular stations with the greatest ERP. Handheld units will have much less ERP.

The objective of this effort is to further determine how modern narrowband digital systems might co-exist with traditional analog FM systems on shared channels in the GMRS in a metropolitan area. These findings could help establish whether digital operation would be in the public interest. During and after this experimental period, we will document any technical, operational and/or regulatory regime may promote co-existence, if any.

This program will further demonstrate that DMR will provide significantly greater bandwidth efficiency, greater repeater cost-sharing opportunities, and would likely encourage greater use of the GMRS radio spectrum, all while co-existing and protecting existing analog FM systems.

The proposed operation is similar to that previously authorized under an earlier Experimental Special Temporary Authorization (E/STA) granted on July 15, 2016, and subsequently extended on November 28, 2016.³ The E/STA expired on March 16th, 2017. Operation during this period was successful and showed that DMR could likely co-exist on these channels. This current application will effectively extend the experimental period to further validate our earlier conclusions.

This instant application differs from the E/STA due to use of embedded GPS signaling. GPS was not requested in the E/STA because at that time such data could only be conveyed separately from voice, and we were concerned it could result in channel congestion. The ETSI has since standardized a protocol for embedding GPS data in voice transmissions. One or more manufacturer listed in this application support this new protocol.

Please note that the NCGUG also filed a waiver request on May 19th, 2019 proposing similar operation as described herein, but with additional repeater sites and mobile units.⁴ This waiver remains pending at the Commission under the same FRN and organization name.

¹ European Telecommunications Standards Institute.

² DMR Tier II is defined in ETSI standards TS 102 361-1, TS 102 361-2, TS 102 361-3 and TR 102 398. It is used extensively in Part 90 Business/Industrial and some Public Safety services.

³ Callsign WK9XBL.

⁴ Filing Confirmation Number 25492.

Affected Rule Sections

The NCGUG specifically requests relaxation of the following and all other applicable rules to permit our proposed operation:

- §95.1761 (GMRS transmitter certification) does not explicitly permit transmitters certified under Part 90 to be operated in the GMRS. This Exhibit shows that the certification of the proposed equipment meets or exceeds the most critical technical parameters required under Part 95 for GMRS.
- §95.1771(b) (GMRS emission types) does not permit ETSI DMR Tier II emissions, and requires GMRS transmitters to have F3E or G3E voice capabilities. This request includes 7K60FXE, 7K60FXD, 7K60F7D, 7K60F7E and 7K60F7W designators, or those that permit ETSI Tier II DMR conventional operation. The proposed DMR radios are capable and certified for F3E.
- §95.1773(c) (GMRS authorized bandwidths) limits digital data transmissions to the 462 MHz main channels and interstitial channels in the 462 MHz and 467 MHz bands. We have proposed data operation on the 467 main channels to permit use of our repeaters.

Affected Technical Parameters

While the proposed equipment is only type-certified in Parts 22, 74, 80 and 90, it meets or exceeds all critical technical standards specified for GMRS in Part 95. These are summarized in Table 1 and Figure 1 below:

KEY TECHNICAL PARAMETERS	GMRS	PROPOSED
Frequency Tolerance, Mobile Relay (ppm)	2.5	1.5
Frequency Tolerance, Mobile (ppm)	5	1.5
Authorized Bandwidth (kHz)	20	7.6
Emission Types	A1D, F1D, G1D, H1D, J1D, R1D, A3E, F3E, G3E, H3E, J3E and R3E	FXE, FXD, F7E, F7D, and F7W
Peak Deviation (kHz)	±5	±1.944

Table 1 – Comparison of Key Technical Parameters

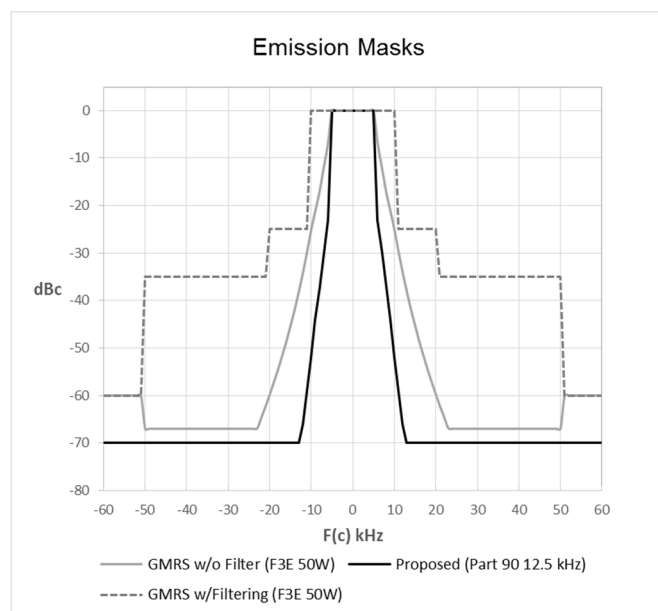


Figure 1 – Current GMRS and Proposed Emission Masks

Station Configurations

Repeater Station #1 would operate from a relatively high-elevation tower site that covers a combination of suburban and metropolitan areas (San Jose, Oakland and San Francisco, California). Repeater Station #2 would operate from a two-story residential structure and cover a local suburban area. The specific details are shown in Table 2 below.

Parameter	STATION #1	STATION #2
Frequency Pair	462/467.600	462/467.700
Latitude (NAD83)	37.620186	37.671
Longitude (NAD83)	-121.922178	-121.900278
Elevation, AMSL (ft.)	2,200	325
Antenna Height AGL (ft.)	30	30
Antenna Height, AAT (ft.)	1,588	-377
ERPd (watts)	100	100
Coverage (mobile; sq. mi.)	6,000	338
Population Covered (mobile)	4.5M	302,000

Table 2 – Current GMRS and Proposed Emission Masks

Both repeaters will be configured to transmit the experimental callsign in Morse code consistent with GMRS rules. Each would be capable of Level 1 Monitoring (uplink-based transmitter lock-out) using an adjustable signal strength threshold if this becomes necessary to reduce interference to users of other co-channel repeater systems.⁵

Evaluation Approach

Should destructive interference occur to users of another GMRS system from the proposed use, we will promptly disable the offending transmitter until the cause is determined. While there is no specific interference criteria defined in the GMRS, our goal would be to minimize destructive interference to make the most effective use of the facilities.⁶ However, for the purposes of this effort, we will assume a 17 dB carrier-to-interference ratio as a destructive interference threshold to incumbent users of wideband analog FM systems.⁷

We will consider the following modifications individually, or in combination should destructive interference occur:

- Radiated power
- Antenna pattern modification
- Antenna height
- Area of operation and/or hours of operation
- Activating Level 1 Monitoring
- Changes in usage/duty-cycles

A frequency change would also be considered should other methods be ineffective.

With regard to interference to the proposed digital stations from other analog FM systems, we will assume a C/I ratio of 14.3 dB for ETSI DMR technology, consistent with TIA TSB-88.1-C.

⁵ The definition of Level 1 Monitoring is described in document titled "Private Land Mobile Radio – Monitoring Levels for Non-Exempt Trunked Systems on Channels Between 150-512 MHz", DA 01-2852, December 7, 2001. Level 1 Monitoring can also be applied to conventional systems such as that proposed.

⁶ See §95.7 (Channel sharing).

⁷ This C/I ratio is recommended per TIA TSB-88.1-C, Annex A, Table A.1, to maintain a Delivered Audio Quality (DAQ) of 3.0 to incumbent systems.

Service Coverage Areas

Figure 1 and 2 below show predicted vehicular coverage from the proposed sites.

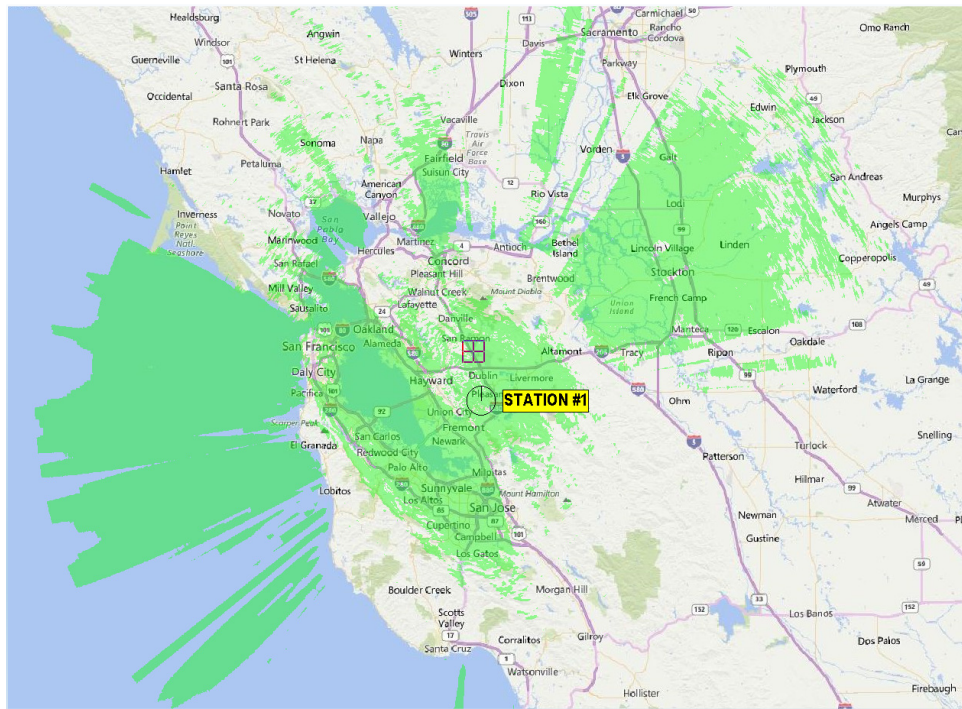


Figure 2 – Predicted Vehicular Coverage from Station #1 (GREEN)

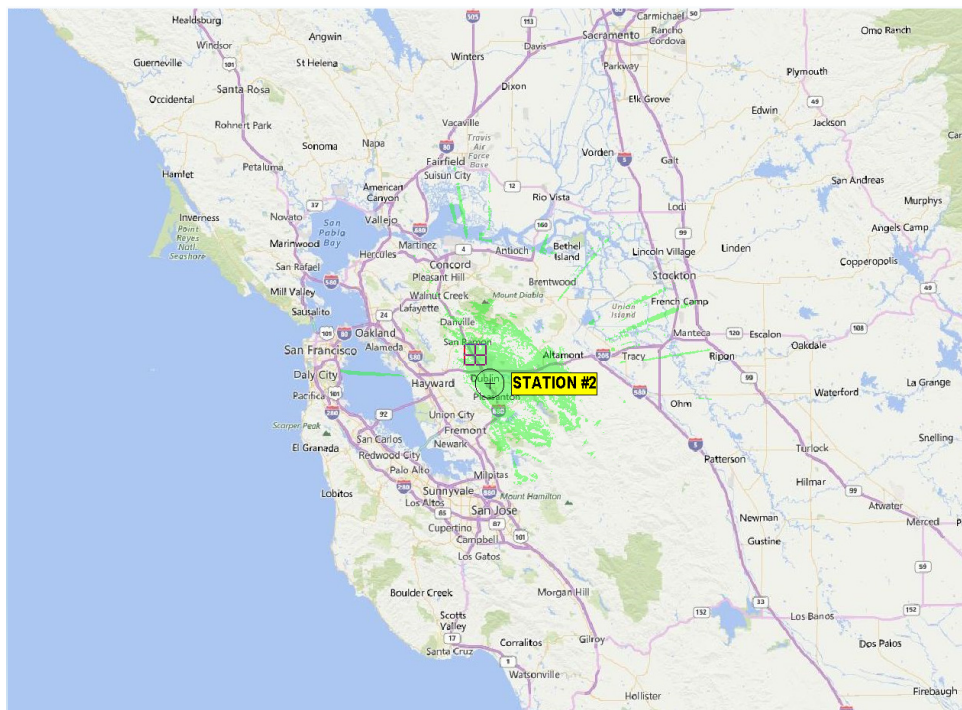


Figure 3 – Predicted Vehicular Coverage from Station #2 (GREEN)

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