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Supplementary Material for Experimental STA Application

Background - the Ephemerisle Floating Festival and the proposed radio service

The Ephemerisle Floating Festival is an annual waterborne gathering in the the Sacramento Delta area, near Mandeville Tip County Park. Interest has been expressed in an "event radio" station for the 2012 event (planned for June 6-10, 2012), for the purpose of transmitting audio material (such as announcements, music, and other information and entertainment programming of a similar nature) for reception throughout the festival area.

The present application seeks authorization to operate such a station, emitting low-power transmissions (compatible with standard portable broadcast receivers) in the FM broadcast band. The proposed station will be operated by the Licensee without compensation, as a community service for the Festival, and will accept material for transmission (including recordings, requests for announcements, and live performance feeds) from attendees at the event.

Prior related applications; summary of updates

1. Permission for unlicensed operation of the proposed station (via waiver of Section 15.239 field strength limits in the 88-108 MHz FM broadcast band) was originally requested (US Mail, D. Weinschenker to Secretary, FCC, dated July 15 2011; response denying request from C. Miller, US Mail dated August 1 2011, stating that waivers were "not routinely granted" for such unlicensed operation, and furthermore that the request did not specify a particular frequency on which operation was proposed.)

2. Application under Part 5, File no. 0794-EX-ST-2011, seeking temporary authorization for licensed operation on a specific frequency, was filed electronically and initially granted (call sign WF9XJE), then dismissed "without prejudice" (per Jan 20 2012 message from J.R. Burtle [FCC correspondence ref# 15987] stating that "the request does not propose any type of experimentation".)

The present application seeks to remedy this latter deficiency by providing a specific description of the proposed Experimental Program, and also includes Technical Notes which add information about the characteristics and operation of the transmitting equipment, in order to show that the proposed operation will be free of harmful interference to fixed broadcast stations or adjacent-band aviation services.

Additional changes with respect to the previous application include slight updates to the specification of the time and location (to better correspond with current plans for the event schedule and logistics), and a reduction of the requested authorized power from 1 watt to 10 mW, which is anticipated to be adequate to cover the signal strength range of experimental interest.

Apparent basis of eligibility for "Experimental" licensing under Part 5 rules

Section 5.3(h) provides for experimental work (including "development of engineering data") which is "not related to an existing or proposed service", while Section 5.3(i) makes a similar provision for experimentation "related to an existing or proposed service". "Event radio" operations such as the subject of the present application are not established by any of the provision of the present rules, but rulemaking proposals to that end (e.g., Proceedings RM-9246, RM-9682) have on occasion been filed. Since the requested authorization could thus be considered as "not related to an existing service" but "related to a proposed service", either or both of these rule sections may be applicable as a basis for eligibility.

In addition, the proposed experimental program may be considered to be a form of "field strength survey" (as provided for in Section 5.3(e)), albeit of an informal nature (i.e., based on qualitative reports of reception at various locations, rather than numerical measurements).

Program of Experimentation

Summary of experimental objectives

The experimental station will attempt to transmit a signal of sufficient strength to provide high-quality reception throughout the Festival area, which may include vessels anchored at distances up to 100 m from the point of transmission. The experimental work will seek to determine the actual power requirements to accomplish this, which will depend on such factors as the field strength required by the sensitivity of available receivers, and the actual signal propagation characteristics at the event site. As a preliminary estimate, a transmitted power of 0.2 mW would produce a calculated field strength of 1 mV/m (60 dBuV/m) at a distance of 100 m. (Note: all power levels stated in this document represent conducted power to the antenna; signal strength calculations assume an antenna gain of 2 dB, relative to an isotropic radiator, for radiation in the horizontal direction from a vertical dipole antenna.)

Experimental station equipment

The station equipment will include the 10mW transmitter assembly (described further in "Technical Notes" below), with a coaxial feedline connected to a vertical folded dipole antenna (mounted on the superstructure of one of the boats at the Festival).

In order to support test transmissions at a variety of power levels, the station will be provided with a set of fixed attenuators (3dB, 6dB, 10dB, 20dB, 30dB) for connection (in various combinations) between the transmitter output and the antenna feedline. This provides the station operator with the ability to choose from a selection of transmitted power settings over a 69 dB range, from 10mW down to 1.25 nW (+10 to -59 dBm), producing an estimated field strength (at 3 meters) ranging from 220 mV/m to 80 uV/m - the latter being significantly less than the 250 uV/m allowed by Section 15.239 for unlicensed operation in the FM broadcast band (for which the estimated power requirement would be approximately 12.5 nW (-49 dBm)).

Additional station apparatus will include audio equipment for managing the incoming signal feed; this will provide automatic level control and low-pass filtering, to ensure that the frequency response and amplitude of the modulating signal applied to the transmitter remain within the appropriate levels for the intended operating bandwidth.

Procedure and Observations

The experimental procedure will consist of operating the station at a variety of power settings while transmitting the proposed audio program material, and noting the reception characteristics at various locations in the festival area. Points to be observed will include the effect of the transmitted signal on reception of other broadcast frequencies, as well as the audibility of the experimental signal, in order to develop data regarding practical power levels and transmission distances which can be achieved without causing "overload" interference to reception of other stations on receivers near the transmitter location.

Technical Notes

The transmitter unit providing the signal source for the experiment includes a "Broadcast Warehouse 1 Watt PLL+" transmitter board (as listed in the application filing information), mounted in a shielded enclosure along with a cooling fan, a DC supply voltage regulator, and a fixed 20dB attenuator in the RF output connection. This installation prevents the unintended emission of direct radiation from the transmitter board circuitry, maintains the manufacturer's specified operating conditions of power supply voltage and output loading, and reduces the 1 Watt rated output of the base transmitter board to a 10 mW signal at the external terminal, providing a convenient connection point for the antenna feed (and any desired external attenuation).

The transmitter board specifications for signal quality include a figure of +/-200Hz for frequency stability, and reduction of harmonic and other spurious outputs by typical factors of 60dB and >85dB, respectively, relative to the carrier. In combination with the 20-dB attenuation, residual spurious outputs in the adjacent-band civil aviation frequencies (108-137 MHz) would thus be at a level of 105dB below 1 watt (-75 dBm), producing a radiated field strength of 12.5 uV/m (which may be compared, for example, to the 20 uV/m limit allowed for signal leakage in these frequencies from cable TV systems).

The transmitter board circuitry includes a crystal-controlled digital frequency selection circuit which permits the desired operating carrier frequency to be programmed via a group of rotary switches. This system will provide assurance that operation will take place on the intended frequency, which will be confirmed, before beginning transmissions, by direct measurement with a portable frequency counter.

The requested frequency of 95.3 MHz was selected to minimize "frequency crowding" and avoid harmful impact on same-channel or adjacent-channel stations: based on station listings on the FCC website, the nearest such stations are apparently KUIC on 95.3 MHz in Vacaville at an approximate distance of 60 km, KHOP on 95.1 MHz in Oakdale at a distance of about 90 km, and a proposed new station (Facility ID 185121, no call sign assigned) on 95.5 MHz in Westley at a distance of roughly 70 km.) The transmission from the experimental station, at its intended power and location, is not expected to interfere with any of these stations.

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