Revised Exhibit 1 – Narrative Description

Introduction

This exhibit is provided in support of the modification application ("Application") submitted by Toggle Communications LLC ("Applicant") relating to its existing experimental license, FCC Call Sign WI2XAJ (the "License"). Applicant seeks to modify its existing License [redacted] Grant of the Application will support Applicant's efforts to conduct tests and experimentations in technical radio research, as permitted under the FCC's rules regarding conventional Experimental Radio Service licenses.[1]

Purpose

The Applicant intends to determine the feasibility [redacted] for transmission of short messages in the high-frequency ("HF") radio band between 5 MHz and 25 MHz.

The proposed system would [redacted] which could be used for [redacted]

Results from experiments conducted to date have allowed Applicant to extend and refine its proprietary technology. Applicant is [redacted]

Experimental Specifics

The proposed experimentations will explore potential high-frequency long-distance data communications. The proposed communications system will use [redacted] with channels of up to 24 kHz [redacted] and [redacted]

Applicant's research will explore the feasibility of delivering high data rates for short messages that [redacted] For example [redacted] If these experiments prove successful, Applicant could approach a spectral efficiency improvement of [redacted] present-day capabilities.[7]

Under the experimental application, Applicant's transmission system will [redacted] The proposed system will:

- be used for [redacted]
- have spectrum efficiency [redacted]

- have a [redacted] and
- have a maximum channel occupancy time of [redacted]

Need for Modification of the License

Applicant seeks to modify its current experimental radio service authorization to [redacted]

Applicant's current license authorizes operations from 1715 E. Madison Street in Seattle, Washington. [redacted] from the current location.

Locations
Applicant seeks authority to conduct its experimental operations at the locations specified in the Form 442 and the attached Exhibits 3 through 5 to this Application.

Spectrum Bands
Applicant is currently authorized to operate over transmit frequencies 5.060 – 5.450, 6.795 – 7.000, 9.040 – 9.400, 10.150 – 11.175, 12.100 – 12.230, 14.350 – 14.990, and 15.800 – 16.360 MHz and requests continued authorization to operate over these frequencies.

Antennas
Applicant's proposed antenna arrangement is described below and shown in the attached Exhibits 5 and 8.

Power Levels
Applicant seeks authority to operate at transmitter power levels up to a maximum of 6000 Watts. [redacted]

General Operations and Technical Parameters

Transmitter

Seattle
Transmit power: [redacted] 6000 Watts
Transmitter models: Ettus Research USRP N210 and USRP X310
Transmit frequencies: 5.060 – 5.450, 6.795 – 7.000, 9.040 – 9.400, 10.150 – 11.175, and 12.100 – 12.230 MHz

Transmit bandwidth: 24 kHz
Channel occupation time: [redacted]
Duty Cycle: [redacted]

New York
Transmit power: [redacted] 6000 Watts
Transmitter model: Ettus Research USRP N210
Transmit frequencies: 6.795 – 7.000, 9.040 – 9.400, 10.150 – 11.175, 14.350 – 14.990, and 15.800 – 16.360
Transmit bandwidth: 24 kHz
Channel occupation time: [redacted]
Duty Cycle: [redacted]

Illinois
Transmit power: [redacted] 6000 Watts
Transmitter models: Ettus Research USRP N210 and USRP X310
Transmit frequencies: 5.060 – 5.450, 6.795 – 7.000, 9.040 – 9.400, 10.150 – 11.175, 12.100 – 12.230, and 14.350 – 14.990 MHz
Transmit bandwidth: 24 kHz
Channel occupation time: [redacted]
Duty Cycle: [redacted]

Emission/Modulation Type
The proposed system is [redacted]

Antennas

Seattle
M2 Model No.: 6-10LP5; Gain: 10.5 dBi
Feedline: Coaxial, LMR-600, 200 ft.

New York
M2 Model No.: 6-10LP5; Gain: 10.5 dBi
M2 Model No.: 7&10-30LP8; Gain: 10.5 dBi
Feedline: Coaxial, LMR-600, 200 ft.

Illinois
[redacted] M2 Antennas; Model No.: 14.6-6-125[redacted] 18.0 dBi
M2 Model No.: 6-10LP5; Gain: 10.5 dBi
Feedline: Coaxial, LMR-600, 200 ft.

[redacted]

[redacted] Antenna vertical profile sketches are provided as Exhibits 3 through 5 to this Application. Azimuth and elevation antenna patterns are provided as Exhibits 6 through 8 to this Application.

Antenna support structure

Vertical profile sketches of the antennas and their support structures are provided as Exhibits 3 through 5 to this Application.

ERP Calculation

Seattle

ERP (All Bands): [redacted] = 36kW

New York

ERP (All Bands) = [redacted] = 36kW

Illinois

ERP (5-12 MHz) = [redacted] = 36kW

ERP (14.350-14.990MHz): [redacted] = 200kW

Other Operational Issues

Experiment Duration

[redacted] a 24-month experimental license is requested.

Interference Avoidance

Applicant will employ a "listen-before-send" system for dynamic channel selection [redacted]

Due to [redacted] the "listen-before-send" channel selection strategy, Applicant does not expect its proposed operations to interfere with any existing licensees.

Protection of FCC Monitoring Stations

There are no FCC Monitoring Stations described in 47 C.F.R. § 5.85 and listed in 47 C.F.R. 0.121(b) within 80 kilometers of the proposed transmit locations.

RF Exposure

Applicant does not expect ground level RF field exposure in excess of 47 C.F.R. § 1.1310, due to [redacted]

Station Identification Waiver

One of Applicant's primary research goals is [redacted] Applicant requests that the FCC maintain its existing waiver of the "station identification" provisions of 47 C.F.R. § 5.115.

Stop buzzer contact

Stop buzzer contact information is provided as Exhibit 2 to this Application.

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[1] *See* 47 C.F.R. § 5.3.

[2] [redacted]