TECHNICAL EXHIBIT
EXPERIMENTAL FCC LICENSE APPLICATION
COGNITIVE DATA DISPATCH, LLC

Cognitive Data Dispatch, LLC (a domestic limited liability company) ("CDD") is seeking an FCC Experimental License to transmit data within the High Frequency ("HF") band between 2 MHz and 15 MHz. This Exhibit describes the program of research and experimentation proposed, including: description of equipment and theory of operation; the specific objectives sought to be accomplished; and how the program of experimentation has a reasonable promise of contribution to the development, extension, expansion or utilization of the radio art and/or is along lines not already investigated.

The objective of these experiments is to explore the possibility of a cognitive type of radio architecture in transmitting very brief time duration data transmissions over a HF radio channel. Authorizing this experimental license should yield operational and technical data useful for other innovative technological deployments and capture of underutilized spectrum. CDD is seeking authority to transmit data in a point-to-point mode using a minimal spectral footprint (utilizing a channel for less than 10 milliseconds at a time, not to exceed 250 milliseconds of total occupation during any 24 hour period) on pre-coordinated HF frequencies using fixed transmit and receive locations. These extremely brief time duty duration transmissions will ensure no harmful interference will occur to any licensed users of these channels. As part of the channel selection process, CDD transmissions will employ cognitive radio features to ensure the optimum transmission channel and minimal opportunity for interference. CDD's operations should add value to the understanding and uses of cognitive radio so that the FCC may consider policies to optimize spectrum efficiency and usage.

The requested frequencies and transmission operational parameters are those permitted under Section 90.266 of the Commission's Rules, *Long Distance*

Communications on Frequencies below 25 MHz. Specifically, the frequencies are those identified both in the FCC Public Notice "2-25 MHz HF Frequency Bands Available for Part 90 Long Distance Communications," and within Section 2.106 Table of Frequency Allocations (US Footnote #22).[1] These frequencies are identified as not requiring coordination with the Federal Government. Furthermore, the requested frequencies will be used in accordance with the specified geographic, time-of-time and type-of-use limitations.

Tabulated below are the requested proposed technical parameters:

Transmitter Site Locations:	Transmitter Site #1 4009 Miller Road, Kingsville, MD 39-25-45.2N, 76-27-0.2W ASR: 1027387 Antenna Radiation Centers: 136 m and 76 m AGL Transmit Antenna Azimuth Orientation: 290° True Transmit Antenna Vertical Plane Orientation: 8 to 9° Transmitter Site #2 39 West 191 Water Road, Elgin, IL 42-01-11.7N, 88-22-52.9W ASR: 1004381 Antenna Radiation Centers: 96 m and 61 m AGL Transmit Antenna Orientation: 102° True Transmit Antenna Vertical Plane Orientation: 6 to 7°
Requested Frequencies (carrier, or center frequency) in kHz:	2289.0 / 2292.0 / 2395.0 / 2398.0 / 3170.0/4538.6*/ 4548.6* / 4575.0 / 4610.5 / 4613.5 / 4634.5 / 4637.5 / 4647.0 / 5046.6 / 5052.6 / 5055.6 / 5067.6/ 5074.6 / 5099.1/ 5102.1/5313.6/ 6800.1*/ 6803.1/ 6858.1* / 6885.1* / 6888.1* / 7480.1 / 7483.1 / 7486.1 / 7549.1** / 7552.1 / 7697.1 * Nighttime use only (two hours prior to local sunset till two hours after local sunrise) ** Daytime use only (two hours after local sunrise till two hours before local sunet)
Maximum Transmit Power:	1 kW
Transmitter:	Etus USRP N200 Software Defined Radio
Transmitting Antenna:	M2, Inc 80M3LLC Yagi – 6.3 dBi Gain (9.9° HPB) M2, Inc 40M3FS Yagi – 6.0 dBi Gain (8.1° HPB)
Maximum Occupied Bandwidth:	2.8 kHz
Maximum Transmit Time Duration (Duty):	10 milliseconds at a time, not to exceed 250 milliseconds of total occupation during any 24 hour period on any one authorized channel

Table 1. Proposed Experimental Transmission Parameters.

The applicant is also performing electromagnetic method-of-moments modeling of possible transmitting antenna configurations. The purpose of this is to determine a

[1] The noted FCC Public Notice is included herein as the Appendix.

configuration that will maximize the radiation toward the desired receiver location while minimizing radiation in the other directions. It is predicted the desired vertical plane angle to maximize transmission from Transmitter Location #1 to #2 is between 8 to 9 degrees above the horizontal plane and from Transmitter Location #2 to #1 is between 6 to 7 degrees above the horizontal plane.

Below is an example of the antenna modeling:

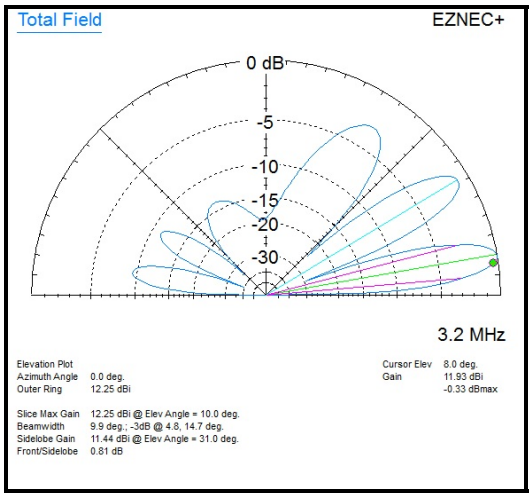

Figure 1. Predicted Vertical Plane Radiation Pattern at 3.2 MHz

The proposed Kingsville, Maryland transmitter site is located 43 kilometers from the nearest FCC monitoring station located at Laurel, Maryland. No interference to this FCC monitoring station is expected.

Radiofrequency Electromagnetic Field Exposure

No ground level radiofrequency electromagnetic field exposure in excess of the Commission's standard is predicted from these proposed transmissions. All the transmitting antennas will be mounted on a tower above ground level. The minimum height above ground level of a transmit antenna will be 61 meters (200 feet) above ground level. The "worst-case" permitted General Population/Uncontrolled Exposure power density at the highest requested operating frequency is 2.8 mW/cm^2. The greatest

predicted power density at ground level from these facilities is 0.01 mW/cm^2. This is less than one percent of the maximum permitted value.

Allocation Study

Due to very brief time duration of the transmissions, no interference is predicted to any current licensed users. In any event, an allocation analysis was completed. This was accomplished by reviewing all the licensees that have specific licensed frequencies that correspond with the herein requested experimental frequencies.[2] This tabulation is provided below.

Center Frequency or Channel (kHz)	Current Licensee
2398.0	KCZ773 – WesternGeco Nationwide Operations KLT636 – Shell Communications Nationwide Operations WNKN301 – Platform Marine Service Victoria, Texas & Gulf of Mexico WPWI993 – Tidewater Marine St. Mary, LA and Gulf of Mexico/Pacific
3170.0	WNSE878 – Morgan Corporation Operations Mostly in SC, GA, NC & TN KNNP491 – American Red Cross Washington, DC Operation WQJC369 – American Red Cross Austin, Texas Operation WQJI233 – American Red Cross Berryville, VA and Nationwide Operation
4538.6	WLO – Shipcom, LCC Mobile, AL Operations
4634.5	KNHQ292 – Salmon River Lodge Shoup, Idaho KNIED355 – Salmon Air Salmon, ID WNXY491 – Ray Arnold Cascade, ID WSJ358 – Jack Badley Warren, ID WSJ367 – Lester West Dixie, ID WSJ373 -- Allison Rach Ministry

[2] The Commission's ULS database was searched, reviewing both the carrier frequency and assigned frequency for each channel. There are many licenses that are authorized for a span of frequencies, which may include the channels being herein requested. However, it is unknown the actual operational channel(s) for those licensees and since they are authorized over a span of frequencies, those licensees are likely to have flexibility to shift channels.

Center Frequency or Channel (kHz)	Current Licensee
	Cascade, ID
4637.5	KCZ773 – WesternGeco Nationwide Operations KLT636 – Shell Communications Nationwide Operations WNKN301 – Platform Marine Service Victoria, Texas & Gulf of Mexico WPWI993 – Tidewater Marine St. Mary, LA and Gulf of Mexico/Pacific KNHQ292 – Salmon River Lodge Shoup, Idaho KNIED355 – Salmon Air Salmon, ID KOG350 – Flying Resort Ranches Idaho Operations KOI811 – Middle Fork Lodge Bose, Idaho KYL989 – Jack Walker US Operations WNNJ538 – Gary Sparks Oregon Operations
5052.6	WNSE878 – Morgan Corporation Operations Mostly in SC, GA, NC & TN
5067.6	WNSE878 – Morgan Corporation Operations Mostly in SC, GA, NC & TN
5102.1	WNSE878 – Morgan Corporation Operations Mostly in SC, GA, NC & TN
6803.1	WNSE878 – Morgan Corporation Operations Mostly in SC, GA, NC & TN
6858.1	KNNP491 – American Red Cross Washington, DC Operation WQJC369 – American Red Cross Austin, Texas Operation WQJI233 – American Red Cross Berryville, VA and Nationwide Operation
7480.1	WNSE878 – Morgan Corporation Operations Mostly in SC, GA, NC & TN
7483.1	WNSE878 – Morgan Corporation Operations Mostly in SC, GA, NC & TN
7549.1	KNNP491 – American Red Cross Washington, DC Operation WQJC369 – American Red Cross Austin, Texas Operation WQJI233 – American Red Cross Berryville, VA and Nationwide Operation
7552.1	WNSE878 – Morgan Corporation Operations Mostly in SC, GA, NC & TN
7697.1	WNSE878 – Morgan Corporation Operations Mostly in SC, GA, NC & TN KNNP491 – American Red Cross Washington, DC Operation WQJC369 – American Red Cross Austin, Texas Operation WQJI233 – American Red Cross

Center Frequency or Channel (kHz)	Current Licensee
	Berryville, VA and Nationwide Operation

Table 2. Licenses on Specific Requested Channels.

As can be seen from the above table, there are few licensees that have specific authorizations on the herein requested frequencies. Due to the brief time duration of the transmissions, no harmful interference is expected to these licensees, or the other licensees that have authorization over a frequency band containing these frequencies. Also due to the brief time duration of the transmissions, it is requested that the experimental authority for CDD specifically exempt the transmissions from the station identification provisions of 47 C.F.R. 5.115.

If there are any technical questions with the proposed application, please contact the undersigned.

Charles Cooper, P.E.

du Treil, Lundin & Rackley, Inc.
201 Fletcher Avenue
Sarasota, Florida 32437
941.329.6000
CHARLES@DLR.COM

August 31, 2011

APPENDIX

FCC PUBLIC NOTICE
2-25 MHZ HF FREQUENCY BANDS AVAILABLE FOR PART 90 LONG DISTANCE COMMUNICATIONS

PUBLIC NOTICE

FEDERAL COMMUNICATIONS COMMISSION
1919 M STREET N.W.
WASHINGTON, D.C. 20554

4126

News media information 202/632-5050. Recorded listing of releases and texts 202/632-0002.

August 12, 1988

C O R R E C T E D *

2-25 MHZ HF FREQUENCY BANDS AVAILABLE FOR PART 90 LONG DISTANCE COMMUNICATIONS

On August 15, 1983, certain high frequency (HF) bands were made available to eligibles in the Power, Telephone Maintenance, Petroleum, and Special Industrial Radio Services and were listed in Public Notice No. 1901, dated January 17, 1984. Changes to the Table of Frequency Allocations made by the 1979 World Administrative Radio Conference require minor changes in the HF bands available to eligible Part 90 users for long distance communications as permitted under Section 90.266 of the Commission's Rules. This Notice incorporates these changes and supersedes Public Notice No. 1901, dated January 17, 1984.

The following frequency bands are available for use under Section 90.266 of the Rules. Applicants shall indicate on Form 574 the frequency band(s) desired and the specific frequencies in each band needed to fulfill their communications requirements. Authorizations granted by the Commission for frequencies in these bands will indicate just the frequency bands, and will state that only frequencies listed by Public Notice may be used.

kHz	kHz
2107-2170	4750-4995
2194-2495	5005-5450
2505-2850	5730-5950
3155-3400	6765-7000
4438-4650	7300-8100

In the above bands, licensees operating under the provisions of Section 90.266 of the Rules may use only the frequencies listed in the attached Table in accordance with the geographic, time-of-day, and type-of-use limitations indicated. These frequencies do not require coordination with the Federal Government. All other frequencies in these bands will require such coordination.

* The Table (attached) is corrected, "Geographic Restriction".

Additionally, frequencies in the following bands are also available for use by qualified Part 90 users for operations under Section 90.266. Applications for frequencies in these bands should indicate the specific frequencies desired since all frequencies in these bands require coordination with the Federal Government.

kHz	kHz
9040-9500	17410-17550
9900-9995	18030-18068
10150-11175	18168-18780
11400-11650	18900-19680
12050-12230	19800-19990
13410-13600	20010-21000
13800-14000	21850-21924
14350-14990	22855-23200
15600-16360	23350-24890

The transmitter power for operation under Section 90.266 of the Rules is limited to 1 kilowatt peak envelope power.

Table

Frequency (kHz) Carrier	Assigned	Time of day	Geographic restriction	Class of station
2289.0	2290.4	-	USIA	Fixed, base, or mobile
2292.0	2293.4	-	do	do
2395.0	2396.4	-	do	do
2398.0	2399.4	-	do	do
3170.0	3171.4	-	do	do
4538.6	4540.0	Night only	do	do
4548.6	4550.0	do	do	do
4575.0	4576.4	-	do	do
4610.5	4611.9	-	do	do
4613.5	4614.9	-	do	do
4634.5	4635.9	-	do	do
4637.5	4638.9	-	do	do
4647.0	4648.4	-	do	do
5046.6	5048.0	-	E of 108° W Long	Fixed, Itinerant fixed
5052.6	5054.0	-	do	do
5055.6	5057.0	-	do	do
5061.6	5063.0	-	W of 90° W Long	do
5067.6	5069.0	-	USIA	do
5074.6	5076.0	-	E of 108° W Long	do
5099.1	5100.5	-	USIA	do
5102.1	5103.5	-	do	do
5313.6	5315.0	-	do	do
6800.1	6801.5	Night only	do	do
6803.1	6804.5	-	do	do
6806.1	6807.5	-	W of 90° W Long	do
6855.1	6856.5	Night only	W of Mississippi River	do
6858.1	6859.5	do	USIA	do
6861.1	6862.5	-	W of 90° W Long	do
6885.1	6886.5	Night only	USIA	do
6888.1	6889.5	do	do	do
7480.1	7481.5	-	do	do
7483.1	7484.5	-	do	do
7486.1	7487.5	-	E of 108° W Long	do
7549.1	7550.5	Day only	USIA	do
7552.1	7553.5	-	do	do
7555.1	7556.5	-	W of 90° W Long	do
7558.1	7559.5	-	do	do
7559.1	7560.5	-	do	do
7562.1	7563.5	-	do	do
7697.1	7698.5	-	USIA	do

USIA- United States and Insular Areas
Night- 2 hours prior to local sunset till 2 hours after local sunrise
Day- 2 hours after local sunrise till 2 hours before local sunset
do- Ditto