

# **FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT**

**Prepared for  
RCN License Subsidiary, Inc.  
HENDERSON, NV  
Satellite Earth Station**

**Prepared By:  
COMSEARCH  
19700 Janelia Farm Boulevard  
Ashburn, VA 20147  
October 15, 2018**

## TABLE OF CONTENTS

1. CONCLUSIONS .....	3
2. SUMMARY OF RESULTS .....	4
3. SUPPLEMENTAL SHOWING .....	5
4. EARTH STATION COORDINATION DATA .....	6
5. CERTIFICATION .....	10

## 1. CONCLUSIONS

An interference study considering all existing, proposed and prior coordinated microwave facilities within the coordination contours of the proposed earth station demonstrates that this site will operate satisfactorily with the common carrier microwave environment. Further, there will be no restrictions of its operation due to interference considerations.

## 2. SUMMARY OF RESULTS

A number of great circle interference cases were identified during the interference study of the proposed earth station. Each of the cases, which exceeded the interference objective on a line-of-sight basis, was profiled and the propagation losses estimated using NBS TN101 (Revised) techniques. The losses were found to be sufficient to reduce the signal levels to acceptable magnitudes in every case.

The following companies reported potential great circle interference conflicts that did not meet the objectives on a line-of-sight basis. When over-the-horizon losses are considered on the interfering paths, sufficient blockage exists to negate harmful interference from occurring with the proposed transmit-receive earth station.

### Company

Clark County  
Whittrio  
Calvary Chapel

No other carriers reported potential interference cases.

### 3. SUPPLEMENTAL SHOWING

Pursuant to Part 25.203(c) of the FCC Rules and Regulations, the satellite earth station proposed in this application was coordinated by Comsearch using computer techniques and in accordance with Part 25 of the FCC Rules and Regulations.

A minor change for this earth station was sent to the below listed carriers with a letter dated 10/15/2018.

#### Company

AT&T Mobility Spectrum LLC - Arizona  
AT&T Mobility Spectrum LLC - Nevada  
Arizona Nevada Tower Corp  
Arizona Public Service Company (APS)  
Arizona, State Of  
Calvary Chapel of Costa Mesa  
Central Telephone Company  
Central Telephone Company of Nevada  
Citizens Telecommunications of CA Inc.  
Citizens Utilities Rural Company, Inc.  
City of Los Angeles Dept Water & Power  
City of North Las Vegas  
Clark, County of  
Commnet Four Corners, LLC  
Global Telecom & Technology Americas, In  
LasVegas.Net  
Los Angeles SMSA Ltd. Partnership  
Nevada Power Company dba NV Energy-South  
New Cingular Wireless PCS LLC - AZ  
New Cingular Wireless PCS - Los Angeles  
New Cingular Wireless PCS LLC- Las Vegas  
New Cingular Wireless PCS LLC-Reno, NV  
Nye, County of  
Olympic Wireless, LLC  
Pacific Bell Tel Com dba AT&T California  
Ponderosa Telephone Company  
San Bernardino County of California  
Southern California Edison Company  
Southern Nevada Area Communications Cncl  
Sprint Telephony PCS, L.P.  
State of Nevada, Enterprise IT Services  
T-Mobile License LLC  
Telemundo Las Vegas License LLC  
Transworld Network Corp  
VegasWiFi Communications LLC  
Verizon Wireless - Arizona, Nevada  
Verizon Wireless(VAW) LLC-AZ/CO/NM/NV/UT  
Wecom, Inc.  
Whittrio Inc

## **4. EARTH STATION COORDINATION DATA**

This section presents the data pertinent to frequency coordination of the proposed earth station that was circulated to all carriers within its coordination contours.

**COMSEARCH**  
**Earth Station Data Sheet**  
 19700 Janelia Farm Boulevard, Ashburn, VA 20147  
 (703)726-5500 <http://www.comsearch.com>

Date: 10/15/2018  
 Job Number: 181015COMSTC06

**Administrative Information**

Licensee Code RCNJVZ  
 Licensee Name RCN License Subsidiary, Inc.

**Site Information**

**HENDERSON, NV**

Latitude (NAD 83) 35° 57' 39.9" N  
 Longitude (NAD 83) 115° 9' 59.1" W  
 Climate Zone A  
 Rain Zone 5  
 Ground Elevation (AMSL) 757.2 m / 2484.3 ft

**Link Information**

Satellite Type Geostationary  
 Mode TR - Transmit-Receive  
 Modulation Digital  
 Satellite Arc 45° W to 139° West Longitude  
 Azimuth Range 102.0° to 217.0°  
 Corresponding Elevation Angles 7.3° / 41.2°  
 Antenna Centerline (AGL) 7.0 m / 23.0 ft

**Antenna Information**

**Receive - A40937**

**Transmit - A60937**

Manufacturer	ANDREW CORPORATION	ANDREW CORPORATION
Model	ES93	ES93
Gain / Diameter	50.5 dBi / 9.3 m	54.0 dBi / 9.3 m
3-dB / 15-dB Beamwidth	1.02° / 2.00°	1.02° / 2.00°

Max Available RF Power	(dBW/4 kHz) (dBW/MHz)	51K2G7W - 36M0G7W			
		-14.0	-14.0	10.0	10.0
Maximum EIRP	(dBW/4 kHz) (dBW/MHz) (dBW)	40.0	40.0		
		64.0	64.0		
		51.07	79.54		
Interference Objectives:	Long Term	-156.0 dBW/MHz	20%	-154.0 dBW/4 kHz	20%
	Short Term	-146.0 dBW/MHz	0.01%	-131.0 dBW/4 kHz	0.0025%

**Frequency Information**

**Receive 4.0 GHz**

**Transmit 6.1 GHz**

Emission / Frequency Range (MHz) 51K2G7W - 36M0G7W / 3700.0 - 4200.0 51K2G7W - 36M0G7W / 5925.0 - 6425.0

Max Great Circle Coordination Distance	528.0 km / 328.0 mi	220.9 km / 137.2 mi
Precipitation Scatter Contour Radius	441.8 km / 274.5 mi	100.0 km / 62.1 mi

# COMSEARCH

## Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147  
(703)726-5500 <http://www.comsearch.com>

### Coordination Values

### HENDERSON, NV

Licensee Name RCN License Subsidiary, Inc.  
Latitude (NAD 83) 35° 57' 39.9" N  
Longitude (NAD 83) 115° 9' 59.1" W  
Ground Elevation (AMSL) 757.2 m / 2484.3 ft  
Antenna Centerline (AGL) 7.0 m / 23.0 ft  
Antenna Model Andrew Corporation ES93  
Antenna Mode Receive 4.0 GHz Transmit 6.1 GHz  
Interference Objectives: Long Term -156.0 dBW/MHz 20% -154.0 dBW/4 kHz 20%  
Short Term -146.0 dBW/MHz 0.01% -131.0 dBW/4 kHz 0.0025%  
Max Available RF Power -14.0 (dBW/4 kHz)

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 4.0 GHz		Transmit 6.1 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	101.86	-10.00	285.28	-11.00	130.16
5	0.00	96.90	-10.00	285.28	-11.00	130.16
10	0.00	91.95	-10.00	285.28	-11.00	130.16
15	0.00	86.99	-10.00	285.28	-11.00	130.16
20	0.00	82.03	-10.00	285.28	-11.00	130.16
25	0.00	77.07	-10.00	285.28	-11.00	130.16
30	0.00	72.11	-10.00	285.28	-11.00	130.16
35	0.00	67.16	-10.00	285.28	-11.00	130.16
40	0.00	62.21	-10.00	285.28	-10.37	131.85
45	0.00	57.26	-10.00	285.28	-10.00	132.84
50	0.00	52.32	-10.00	285.28	-10.00	132.84
55	0.00	47.39	-10.00	285.28	-10.00	132.84
60	0.00	42.48	-9.00	291.72	-10.00	132.84
65	0.21	37.54	-9.00	290.94	-10.00	132.34
70	0.00	32.70	-9.00	291.72	-10.00	132.84
75	0.28	27.80	-9.00	281.49	-9.98	126.25
80	0.44	22.96	-8.98	262.32	-9.30	115.11
85	0.61	18.20	-7.06	260.47	-8.40	108.01
90	0.78	13.61	-4.61	264.94	-6.73	104.76
95	0.90	9.45	1.44	299.20	-2.50	110.79
100	1.04	6.57	6.00	527.96	7.00	220.87
105	1.20	6.82	6.00	343.35	7.00	138.42
110	1.22	10.07	0.64	277.77	-2.50	100.67
115	1.13	14.02	-5.00	243.53	-7.00	100.00
120	1.26	17.75	-6.75	228.92	-8.23	100.00
125	1.05	21.63	-8.38	227.26	-9.16	100.00
130	1.09	25.23	-9.00	222.51	-9.55	100.00
135	0.99	28.80	-9.00	225.91	-10.00	100.00
140	1.05	32.10	-9.00	223.83	-10.00	100.00
145	1.33	35.03	-9.00	215.28	-10.00	100.00
150	1.67	37.65	-9.00	205.48	-10.00	100.00
155	2.53	39.51	-9.00	187.29	-10.00	100.00
160	2.57	41.64	-9.00	186.29	-10.00	100.00
165	2.89	43.09	-9.00	179.06	-10.00	100.00
170	1.86	45.34	-10.00	198.37	-10.00	100.00
175	1.49	46.50	-10.00	205.90	-10.00	100.00
180	1.68	46.58	-10.00	203.16	-10.00	100.00
185	1.83	46.17	-10.00	199.24	-10.00	100.00



# COMSEARCH

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<b>Coordination Values</b>	<b>HENDERSON, NV</b>		
Licensee Name	RCN License Subsidiary, Inc.		
Latitude (NAD 83)	35° 57' 39.9" N		
Longitude (NAD 83)	115° 9' 59.1" W		
Ground Elevation (AMSL)	757.2 m / 2484.3 ft		
Antenna Centerline (AGL)	7.0 m / 23.0 ft		
Antenna Model	Andrew Corporation ES93		
Antenna Mode	Receive 4.0 GHz		Transmit 6.1 GHz
Interference Objectives:	Long Term	-156.0 dBW/MHz    20%	-154.0 dBW/4 kHz    20%
	Short Term	-146.0 dBW/MHz    0.01%	-131.0 dBW/4 kHz    0.0025%
Max Available RF Power	-14.0 (dBW/4 kHz)		

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 4.0 GHz		Transmit 6.1 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
190	2.13	45.08	-10.00	191.51	-10.00	100.00
195	2.23	43.70	-9.00	194.12	-10.00	100.00
200	2.05	42.15	-9.00	198.04	-10.00	100.00
205	1.89	40.84	-9.00	202.06	-10.00	100.00
210	1.10	40.63	-9.00	222.08	-10.00	100.00
215	1.01	40.26	-9.00	225.07	-10.00	100.00
220	1.18	40.15	-9.00	219.78	-10.00	100.00
225	1.58	40.33	-9.00	208.01	-10.00	100.00
230	1.75	41.25	-9.00	205.83	-10.00	100.00
235	2.91	41.76	-9.00	178.55	-10.00	100.00
240	4.64	42.37	-9.00	142.70	-10.00	100.00
245	5.34	44.36	-9.36	134.06	-10.00	100.00
250	4.73	47.64	-10.00	137.19	-10.00	100.00
255	4.52	50.86	-10.00	140.17	-10.00	100.00
260	4.36	54.23	-10.00	142.44	-10.00	100.00
265	3.25	58.21	-10.00	163.90	-10.00	100.00
270	2.98	61.83	-10.00	171.86	-10.31	100.00
275	2.91	65.47	-10.00	173.66	-11.00	100.00
280	2.23	69.38	-10.00	189.22	-11.00	100.00
285	1.30	73.34	-10.00	211.27	-11.00	100.00
290	0.87	77.17	-10.00	227.22	-11.00	100.00
295	0.95	80.91	-10.00	222.80	-11.00	100.00
300	0.00	84.78	-10.00	285.28	-11.00	130.16
305	0.00	88.53	-10.00	285.28	-11.00	130.16
310	0.36	92.31	-10.00	265.51	-11.00	117.02
315	0.00	96.04	-10.00	285.28	-11.00	130.16
320	0.00	99.78	-10.00	285.28	-11.00	130.16
325	0.00	103.47	-10.00	285.28	-11.00	130.16
330	0.00	107.12	-10.00	285.28	-11.00	130.16
335	0.00	110.71	-11.71	274.64	-11.57	128.65
340	0.00	114.21	-14.21	259.91	-14.37	121.28
345	0.00	116.72	-15.00	255.48	-15.00	119.65
350	0.00	111.77	-12.39	270.56	-12.42	126.40
355	0.00	106.82	-10.00	285.28	-11.00	130.16

## 5. CERTIFICATION

I HEREBY CERTIFY THAT I AM THE TECHNICALLY QUALIFIED PERSON RESPONSIBLE FOR THE PREPARATION OF THE FREQUENCY COORDINATION DATA CONTAINED IN THIS APPLICATION, THAT I AM FAMILIAR WITH PARTS 101 AND 25 OF THE FCC RULES AND REGULATIONS, THAT I HAVE EITHER PREPARED OR REVIEWED THE FREQUENCY COORDINATION DATA SUBMITTED WITH THIS APPLICATION, AND THAT IT IS COMPLETE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.



Timothy O. Crutcher  
Frequency Planner  
COMSEARCH  
19700 Janelia Farm Boulevard  
Ashburn, VA 20147

DATED: October 15, 2018

# FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

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## 1. CONCLUSIONS

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## 2. SUMMARY OF RESULTS

A number of great circle interference cases were identified during the interference study of the proposed earth station. Each of the cases, which exceeded the interference objective on a line-of-sight basis, was profiled and the propagation losses estimated using NBS TN101 (Revised) techniques. The losses were found to be sufficient to reduce the signal levels to acceptable magnitudes in every case.

The following companies reported potential great circle interference conflicts that did not meet the objectives on a line-of-sight basis. When over-the-horizon losses are considered on the interfering paths, sufficient blockage exists to negate harmful interference from occurring with the proposed transmit-receive earth station.

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Whittrio  
Calvary Chapel

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AT&T Mobility Spectrum LLC - Nevada  
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Arizona Public Service Company (APS)  
Arizona, State Of  
Calvary Chapel of Costa Mesa  
Central Telephone Company  
Central Telephone Company of Nevada  
Citizens Telecommunications of CA Inc.  
Citizens Utilities Rural Company, Inc.  
City of Los Angeles Dept Water & Power  
City of North Las Vegas  
Clark, County of  
Commnet Four Corners, LLC  
Global Telecom & Technology Americas, In  
LasVegas.Net  
Los Angeles SMSA Ltd. Partnership  
Nevada Power Company dba NV Energy-South  
New Cingular Wireless PCS LLC - AZ  
New Cingular Wireless PCS - Los Angeles  
New Cingular Wireless PCS LLC- Las Vegas  
New Cingular Wireless PCS LLC-Reno, NV  
Nye, County of  
Olympic Wireless, LLC  
Pacific Bell Tel Com dba AT&T California  
Ponderosa Telephone Company  
San Bernardino County of California  
Southern California Edison Company  
Southern Nevada Area Communications Cncl  
Sprint Telephony PCS, L.P.  
State of Nevada, Enterprise IT Services  
T-Mobile License LLC  
Telemundo Las Vegas License LLC  
Transworld Network Corp  
VegasWiFi Communications LLC  
Verizon Wireless - Arizona, Nevada  
Verizon Wireless(VAW) LLC-AZ/CO/NM/NV/UT  
Wecom, Inc.  
Whittrio Inc

## **4. EARTH STATION COORDINATION DATA**

This section presents the data pertinent to frequency coordination of the proposed earth station that was circulated to all carriers within its coordination contours.



# COMSEARCH

## Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147  
(703)726-5500 <http://www.comsearch.com>

Date: 10/15/2018  
Job Number: 181015COMSTC06

### Administrative Information

Licensee Code RCNJVZ  
Licensee Name RCN License Subsidiary, Inc.

### Site Information HENDERSON, NV

Latitude (NAD 83) 35° 57' 39.9" N  
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Ground Elevation (AMSL) 757.2 m / 2484.3 ft

### Link Information

Satellite Type Geostationary  
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Modulation Digital  
Satellite Arc 45° W to 139° West Longitude  
Azimuth Range 102.0° to 217.0°  
Corresponding Elevation Angles 7.3° / 41.2°  
Antenna Centerline (AGL) 7.0 m / 23.0 ft

### Antenna Information

	Receive - A40937	Transmit - A60937
Manufacturer	ANDREW CORPORATION	ANDREW CORPORATION
Model	ES93	ES93
Gain / Diameter	50.5 dBi / 9.3 m	54.0 dBi / 9.3 m
3-dB / 15-dB Beamwidth	1.02° / 2.00°	1.02° / 2.00°
		51K2G7W - 36M0G7W
Max Available RF Power (dBW/4 kHz)		-14.0 -14.0
(dBW/MHz)		10.0 10.0
Maximum EIRP (dBW/4 kHz)		40.0 40.0
(dBW/MHz)		64.0 64.0
(dBW)		51.07 79.54
Interference Objectives: Long Term	-156.0 dBW/MHz 20%	-154.0 dBW/4 kHz 20%
Short Term	-146.0 dBW/MHz 0.01%	-131.0 dBW/4 kHz 0.0025%

### Frequency Information

	Receive 4.0 GHz	Transmit 6.1 GHz
Emission / Frequency Range (MHz)	51K2G7W - 36M0G7W / 3700.0 - 4200.0	51K2G7W - 36M0G7W / 5925.0 - 5985 51K2G7W - 36M0G7W / 6105 - 6425.0
Max Great Circle Coordination Distance	528.0 km / 328.0 mi	220.9 km / 137.2 mi
Precipitation Scatter Contour Radius	441.8 km / 274.5 mi	100.0 km / 62.1 mi

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Antenna Model	Andrew Corporation ES93				
Antenna Mode	Receive 4.0 GHz		Transmit 6.1 GHz		
Interference Objectives:	Long Term	-156.0 dBW/MHz	20%	-154.0 dBW/4 kHz	20%
	Short Term	-146.0 dBW/MHz	0.01%	-131.0 dBW/4 kHz	0.0025%
Max Available RF Power			-14.0 (dBW/4 kHz)		

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 4.0 GHz		Transmit 6.1 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	101.86	-10.00	285.28	-11.00	130.16
5	0.00	96.90	-10.00	285.28	-11.00	130.16
10	0.00	91.95	-10.00	285.28	-11.00	130.16
15	0.00	86.99	-10.00	285.28	-11.00	130.16
20	0.00	82.03	-10.00	285.28	-11.00	130.16
25	0.00	77.07	-10.00	285.28	-11.00	130.16
30	0.00	72.11	-10.00	285.28	-11.00	130.16
35	0.00	67.16	-10.00	285.28	-11.00	130.16
40	0.00	62.21	-10.00	285.28	-10.37	131.85
45	0.00	57.26	-10.00	285.28	-10.00	132.84
50	0.00	52.32	-10.00	285.28	-10.00	132.84
55	0.00	47.39	-10.00	285.28	-10.00	132.84
60	0.00	42.48	-9.00	291.72	-10.00	132.84
65	0.21	37.54	-9.00	290.94	-10.00	132.34
70	0.00	32.70	-9.00	291.72	-10.00	132.84
75	0.28	27.80	-9.00	281.49	-9.98	126.25
80	0.44	22.96	-8.98	262.32	-9.30	115.11
85	0.61	18.20	-7.06	260.47	-8.40	108.01
90	0.78	13.61	-4.61	264.94	-6.73	104.76
95	0.90	9.45	1.44	299.20	-2.50	110.79
100	1.04	6.57	6.00	527.96	7.00	220.87
105	1.20	6.82	6.00	343.35	7.00	138.42
110	1.22	10.07	0.64	277.77	-2.50	100.67
115	1.13	14.02	-5.00	243.53	-7.00	100.00
120	1.26	17.75	-6.75	228.92	-8.23	100.00
125	1.05	21.63	-8.38	227.26	-9.16	100.00
130	1.09	25.23	-9.00	222.51	-9.55	100.00
135	0.99	28.80	-9.00	225.91	-10.00	100.00
140	1.05	32.10	-9.00	223.83	-10.00	100.00
145	1.33	35.03	-9.00	215.28	-10.00	100.00
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155	2.53	39.51	-9.00	187.29	-10.00	100.00
160	2.57	41.64	-9.00	186.29	-10.00	100.00
165	2.89	43.09	-9.00	179.06	-10.00	100.00
170	1.86	45.34	-10.00	198.37	-10.00	100.00
175	1.49	46.50	-10.00	205.90	-10.00	100.00
180	1.68	46.58	-10.00	203.16	-10.00	100.00
185	1.83	46.17	-10.00	199.24	-10.00	100.00

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Max Available RF Power			-14.0 (dBW/4 kHz)

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Receive 4.0 GHz		Transmit 6.1 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)	Horizon Gain (dBi)	Coordination Distance (km)
190	2.13	45.08	-10.00	191.51	-10.00	100.00
195	2.23	43.70	-9.00	194.12	-10.00	100.00
200	2.05	42.15	-9.00	198.04	-10.00	100.00
205	1.89	40.84	-9.00	202.06	-10.00	100.00
210	1.10	40.63	-9.00	222.08	-10.00	100.00
215	1.01	40.26	-9.00	225.07	-10.00	100.00
220	1.18	40.15	-9.00	219.78	-10.00	100.00
225	1.58	40.33	-9.00	208.01	-10.00	100.00
230	1.75	41.25	-9.00	205.83	-10.00	100.00
235	2.91	41.76	-9.00	178.55	-10.00	100.00
240	4.64	42.37	-9.00	142.70	-10.00	100.00
245	5.34	44.36	-9.36	134.06	-10.00	100.00
250	4.73	47.64	-10.00	137.19	-10.00	100.00
255	4.52	50.86	-10.00	140.17	-10.00	100.00
260	4.36	54.23	-10.00	142.44	-10.00	100.00
265	3.25	58.21	-10.00	163.90	-10.00	100.00
270	2.98	61.83	-10.00	171.86	-10.31	100.00
275	2.91	65.47	-10.00	173.66	-11.00	100.00
280	2.23	69.38	-10.00	189.22	-11.00	100.00
285	1.30	73.34	-10.00	211.27	-11.00	100.00
290	0.87	77.17	-10.00	227.22	-11.00	100.00
295	0.95	80.91	-10.00	222.80	-11.00	100.00
300	0.00	84.78	-10.00	285.28	-11.00	130.16
305	0.00	88.53	-10.00	285.28	-11.00	130.16
310	0.36	92.31	-10.00	265.51	-11.00	117.02
315	0.00	96.04	-10.00	285.28	-11.00	130.16
320	0.00	99.78	-10.00	285.28	-11.00	130.16
325	0.00	103.47	-10.00	285.28	-11.00	130.16
330	0.00	107.12	-10.00	285.28	-11.00	130.16
335	0.00	110.71	-11.71	274.64	-11.57	128.65
340	0.00	114.21	-14.21	259.91	-14.37	121.28
345	0.00	116.72	-15.00	255.48	-15.00	119.65
350	0.00	111.77	-12.39	270.56	-12.42	126.40
355	0.00	106.82	-10.00	285.28	-11.00	130.16

## 5. CERTIFICATION

I HEREBY CERTIFY THAT I AM THE TECHNICALLY QUALIFIED PERSON RESPONSIBLE FOR THE PREPARATION OF THE FREQUENCY COORDINATION DATA CONTAINED IN THIS APPLICATION, THAT I AM FAMILIAR WITH PARTS 101 AND 25 OF THE FCC RULES AND REGULATIONS, THAT I HAVE EITHER PREPARED OR REVIEWED THE FREQUENCY COORDINATION DATA SUBMITTED WITH THIS APPLICATION, AND THAT IT IS COMPLETE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.



Timothy O. Crutcher  
Frequency Planner  
COMSEARCH  
19700 Janelia Farm Boulevard  
Ashburn, VA 20147

DATED: October 15, 2018