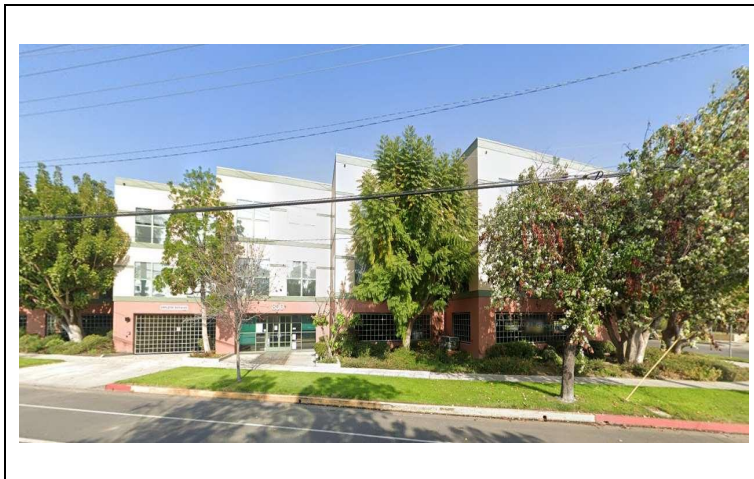


Radio Frequency – Electromagnetic Energy (RF-EME) Site Compliance Report

Site Number: LALAX04397B
800 South Main
BURBANK, CA 91506
34.165042, -118.312027



Prepared For:



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Reference Documents

CD: 10112797.SICKLES STREET.AE201.C-BAND.11.17.21

RFDS: NYC-NNJ_NYC_NYCMNYB115_2021-5G-NR-Radio_5G-NR-1SR-
CBAND_dp2443_2191A0YMH7_10112797_107271_02-08-2021_Preliminary-Approved_v1.00
(1)

Overview

Centerline Communications, LLC (“Centerline”) has been contracted to provide a Radio Frequency (RF) Analysis for the following Dish Wireless rooftop facility to determine whether the facility is in compliance with federal standards and regulations regarding RF emissions. This analysis includes theoretical emissions calculations which were performed assuming that all of the proposed radios operate uncombined in their RF paths to yield a worst-case scenario.

Statement of Compliance

Dish Wireless will be compliant with FCC regulations when the proposed mitigation items in this report are implemented. See Section 4 for specific instructions.

The MPE Levels are predicted to exceed the General Public limits for those walking on the Main Level. The maximum prediction onsite is 624.47% of the FCC's General Public limits on this level.

Dish’s proposed antennas at Alpha Sector may exceed the FCC’s General Public limits within approximately 8 feet from the antenna face on the Main Level. Modeling also indicates that the worst-case emitted power density may exceed the FCC’s occupational limit within approximately 1 feet of Dish’s proposed antennas on the Main Level.

Recommended control measures are outlined in Section 4.0 and within the Signage Diagram (attached); Dish Wireless should also provide procedures to shut down and lockout/tagout this wireless equipment in accordance with their own standard operating protocol. Non-telecom workers who will be working in areas of exceedance are required to contact Dish Wireless since only Dish has the ability to lockout/tagout the facility, or to authorize others to do so.

1.0 Introduction

Radio frequency waves are electromagnetic waves from the portion of the electromagnetic spectrum at frequencies lower than visible light and microwaves. The wavelengths of radio waves range from thousands of meters to around 30 centimeters. These wavelengths correspond to frequencies as low as 3 cycles per second (or hertz [Hz]) to as high as one gigahertz (one billion cycles per second).

Personal Communication (PCS) facilities used by Dish Wireless in this area will potentially operate within a frequency range of 600 to 5000 MHz. Facilities typically consist of: 1) electronic transceivers (the radios or cabinets) connected to wired telephone lines; and 2) antennas that send the wireless signals created by the transceivers to be received by individual subscriber units (PCS telephones). Transceivers are typically connected to antennas by coaxial cables.

Because of the short wavelength of PCS services, the antennas require line-of-site paths for good propagation and are typically installed a distance above ground level. Antennas are constructed to concentrate energy towards the horizon, with as little energy as possible scattered towards the ground or the sky. This design, combined with the low power of PCS facilities, generally results in no possibility for exposure to approach Maximum Permissible Exposure (MPE) levels, with the exception of in areas in the immediate vicinity of the antennas.

MPE limits do not represent levels where a health risk exists, since they are designed to provide a substantial margin of safety. These limits apply for continuous exposures and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size or health.

2.0 Site Description

The facility is located on a Rooftop in BURBANK, California.

The **proposed antenna configuration** for Dish Wireless and any other known wireless carriers at this facility are shown on the following page on the following page in the **Site Antenna Data Table**.

For all other carrier systems on this facility, exact equipment was used if available. In instances where other carrier system equipment was not available, standard radio configurations for these systems were utilized based upon prior experience with these systems on facilities in this area.

Site Antenna Data Table

Ant Num	Carrier	Freq	Power Input (Watts)	ERP	Antenna Make	Antenna Model	Z Value (ft)*	Gain (dBd)	Az (°)	Horizontal BW
1	Dish	NR600	120	1459.42	CCI	OPA65R-TE6C	42	11.35	0.00	72.00
1	Dish	NR1900	160	5237.45	CCI	OPA65R-TE6C	42	15.65	0.00	63.00
1	Dish	NR2100	160	5118.23	CCI	OPA65R-TE6C	42	15.55	0.00	53.00
2	Dish	NR600	120	1459.42	CCI	OPA65R-TE6C	42	11.35	120.00	72.00
2	Dish	NR1900	160	5237.45	CCI	OPA65R-TE6C	42	15.65	120.00	63.00
2	Dish	NR2100	160	5118.23	CCI	OPA65R-TE6C	42	15.55	120.00	53.00
3	Dish	NR600	120	1923.89	CELLMAX	CX12044x	42	12.55	240.00	71.00
3	Dish	NR1900	160	7746.76	CELLMAX	CX12044x	42	17.35	240.00	64.00
3	Dish	NR2100	160	8494.15	CELLMAX	CX12044x	42	17.75	240.00	67.00

*Z-Value is the distance from the centerline to the ground level.

3.0 Calculation Methodology & Data

Centerline has performed theoretical calculations on all transmission equipment located on this facility. All calculations have been performed using the RoofMaster® software from Waterford Consultants LLC. This software performs calculations using a cylindrical model for very conservative power density predictions within the near-field of the antenna where the antenna pattern has not truly formed yet. Within this area power density values tend to decrease based upon an inverse distance function. At the point where it is appropriate for modeling to change from near-field calculations to far-field calculations the power decreases inversely with the square of the distance. This modeling technique is accurate with low antenna centerlines, such as rooftops, where persons can get close to the antennas and pass through fields in close proximity.

The below calculation in Figure 1 shows the theoretical distribution of power over an imaginary cylinder with equal power distribution in all directions.

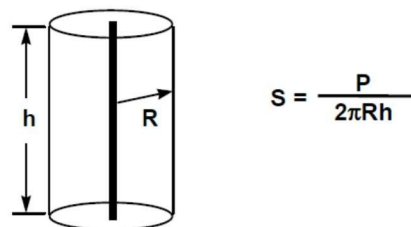


Figure 1: Distribution of power over an imaginary cylinder in all directions

This model can be modified for directional antennas to show directionality of power distribution. This formula will tend to be conservative as it assumes that all power is focused between the 3 dB power roll off points as shown in Figure 2.

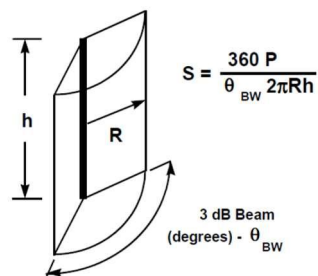
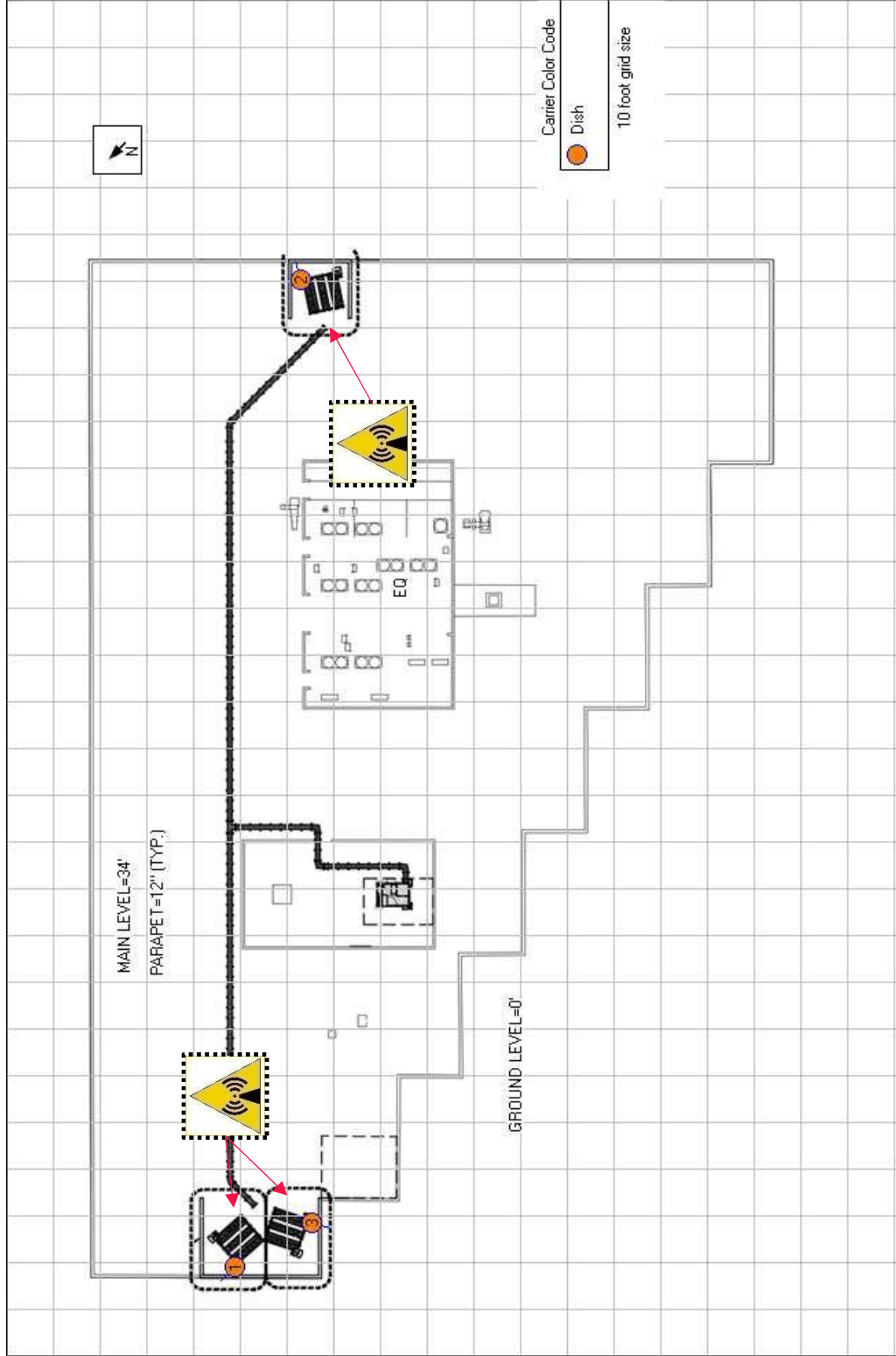


Figure 2: Distribution of power over an imaginary cylinder in all directions inside the half power roll off points (HBW)

4.0 Mitigation Recommendation



All Access Points



Existing Item

Proposed Item

Signage Count		Signage Diagram	
	1		1
	0		0
	3		0
	0		1
		Signage for: LALAX04397B	

4.1 Compliance Summary

Dish Wireless will be compliant when the following is implemented.

Access	<ul style="list-style-type: none"> In order to alert people accessing the rooftop, a Guidelines sign and an NOC Information sign are recommended for installation at each access point to the rooftop.
Alpha Sector	<ul style="list-style-type: none"> Install (1) Caution sign behind the antenna at Alpha.
Beta Sector	<ul style="list-style-type: none"> Install (1) Caution sign behind the antenna at Beta.
Gamma Sector	<ul style="list-style-type: none"> Install (1) Caution sign behind the antenna at Gamma.
Notes:	<ul style="list-style-type: none"> Barriers are not recommended for installation because areas of exceeding MPE limits are inaccessible or within 6' of an unprotected roof edge.

5.0 Summary and Conclusions

Maximum Predicted MPE Level on Site:	% of MPE Limit:	Location:
Accessible General Population MPE Limits:	624.47	Main Level
Accessible Occupational MPE Limits:	124.89	

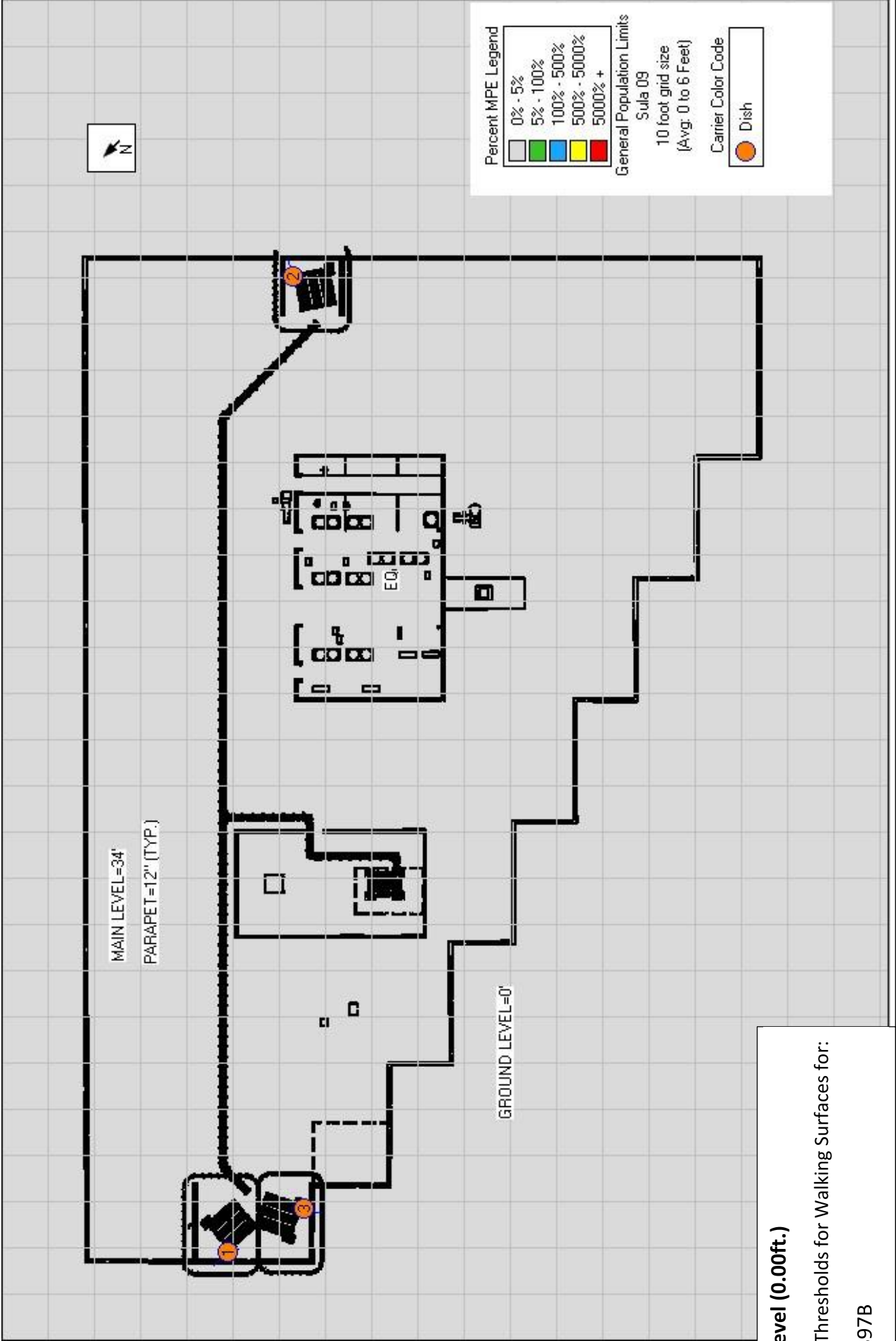
Ground Level Assessment:	% of MPE Limit:
Ground Level General Population MPE Limits:	0.48%
Ground Level Occupational MPE Limits:	0.10%

Sector A: Transmitting over Main Level	% of MPE Limit:	*Distance from Antenna:
Accessible General Population MPE Limits:	624.47%	8'
Accessible Occupational MPE Limits:	124.89%	1'

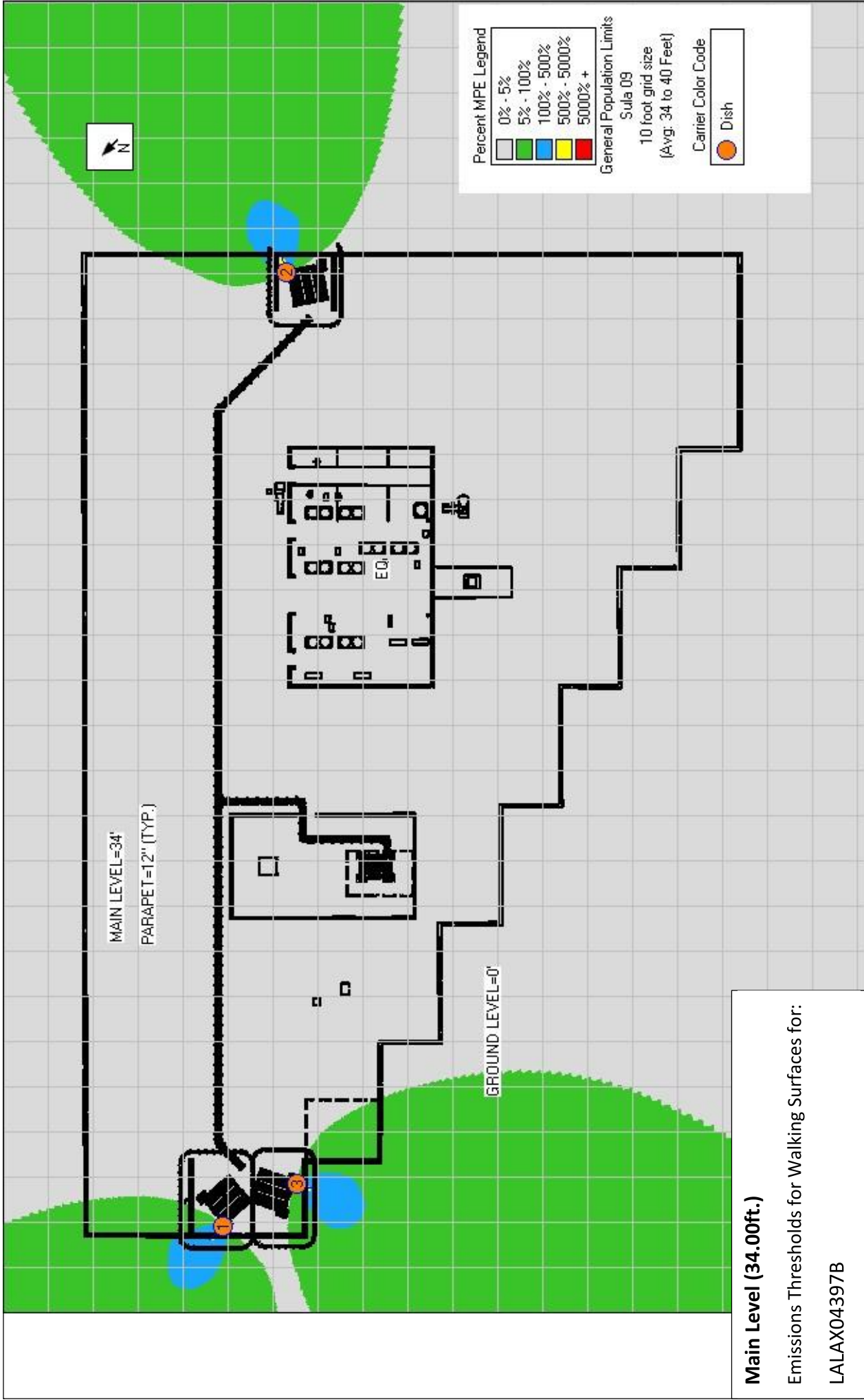
Sector B: Transmitting over Main Level	% of MPE Limit:	*Distance from Antenna:
Accessible General Population MPE Limits:	620.31%	5'
Accessible Occupational MPE Limits:	124.06%	1'

Sector C: Transmitting over Main Level	% of MPE Limit:	*Distance from Antenna:
Accessible General Population MPE Limits:	612.89%	4'
Accessible Occupational MPE Limits:	122.58%	1'

**Distance from Antenna is the distance in feet that the MPE limits are exceeded from the front face of the antenna, outward across an accessible area.*



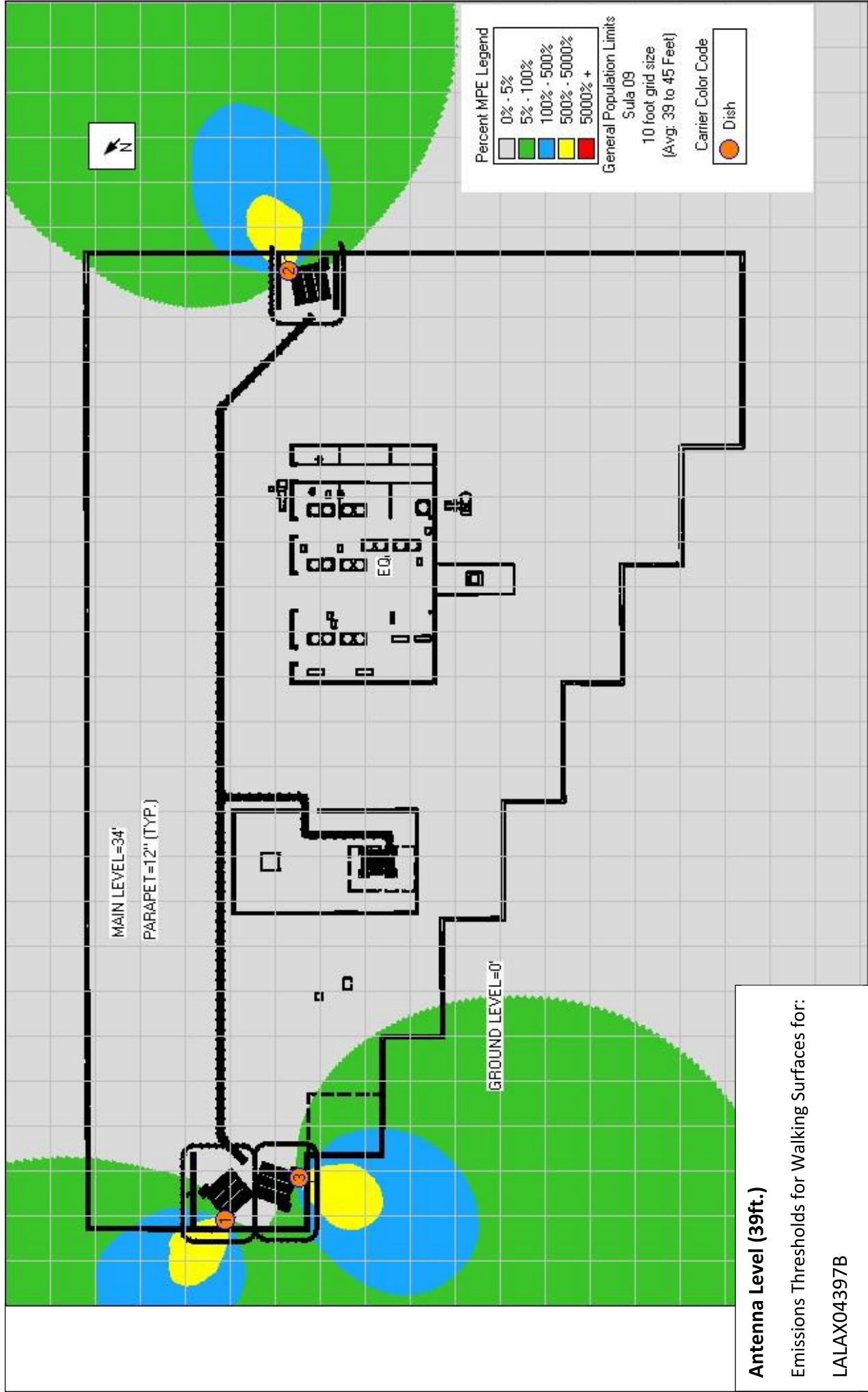
Ground Level (0.00ft.)
Emissions Thresholds for Walking Surfaces for:
LALAX04397B



Main Level (34.00ft.)

Emissions Thresholds for Walking Surfaces for:

LALAX04397B



6.0 Proprietary Statement

This report was prepared for the use of Dish Wireless to meet requirements specified in Dish Wireless' corporate RF safety guidelines. It was performed in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same locale under like circumstances. The conclusions provided by Centerline Communications, LLC are based solely on the information provided by Dish Wireless and all observations in this report are valid on the date of the investigation. Any additional information that becomes available concerning the site should be provided to Centerline Communications, LLC so that our conclusions may be revised and modified, if necessary. This report has been prepared in accordance with Standard Conditions for Engagement and authorized proposal, both of which are integral parts of this report. No other warranty, expressed or implied, is made.

Appendix A: FCC Guidelines

All power density values used in this report were analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The number of $\mu\text{W}/\text{cm}^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

APPENDIX B: FCC Emissions Threshold Limits

The Federal Communications Commission (FCC) has established safety guidelines relating to RF exposure from cell sites. The FCC developed those standards, known as Maximum Permissible Exposure (MPE) limits, in consultation with numerous other federal agencies, including the Environmental Protection Agency, the Food and Drug Administration, and the Occupational Safety and Health Administration. The standards were developed by expert scientists and engineers after extensive reviews of the scientific literature related to RF biological effects. The FCC explains that its standards “incorporate prudent margins of safety.” The following represents explanations of the most applicable information:

Two Classifications for Exposure Limits

<p><u>Occupational</u> – Applies to situations in which persons are “exposed as a consequence of their <i>employment</i>” and are “<i>fully aware</i> of the potential for exposure and can <i>exercise control</i> over their exposure”.</p>	<p><u>General Population</u> – Applies to situations in which persons are “exposed as a consequence of their employment <i>may not be made fully aware</i> of the potential for exposure or <i>cannot exercise control</i> over their exposure”. Generally speaking, those without significant and documented RF Safety & Awareness training would be in the General Population classification.</p>
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Environment Classification

<p><u>Controlled</u> – Applies to environments that are restricted or “controlled” in order to prevent access from members of the General Population classification.</p>	<p><u>Uncontrolled</u> – Applies to environments that are unrestricted or “uncontrolled” that allow access from members of the General Population classification.</p>
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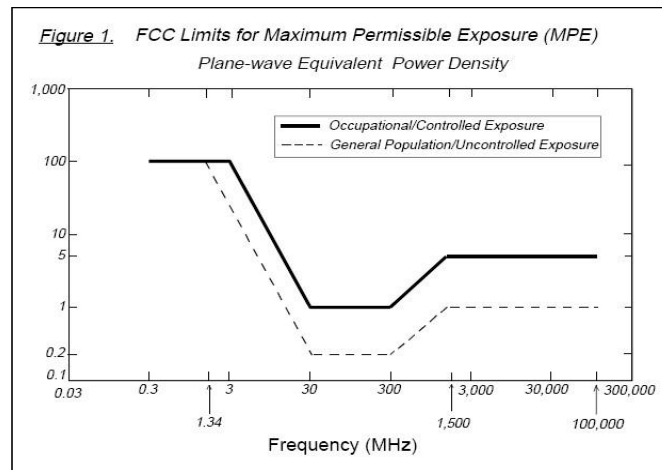
Table 1 and Figure 1 (on the following page), which are included within the FCC’s OET Bulletin 65, summarize the MPE limits for RF emissions. These limits are designed to provide a substantial margin of safety. They vary by frequency to take into account the different types of equipment that may be in operation at a particular facility and are “time-averaged” limits to reflect different durations resulting from controlled and uncontrolled exposures.

The FCC’s MPEs are measured in terms of power (mW) over a unit surface area (cm²). Known as the power density, the FCC has established an occupational MPE of 5 milliwatts per square centimeter (mW/cm²) and an uncontrolled MPE of 1 mW/cm² for equipment operating in the 1900 MHz frequency range. For the Dish Wireless equipment operating at 600 MHz or 850 MHz, the FCC’s occupational MPE is 2.83 mW/cm² and an uncontrolled MPE of 0.57 mW/cm². For the Dish Wireless equipment operating at 1900 MHz, the FCC’s occupational MPE is 5.0 mW/cm² and an uncontrolled MPE limit of 1.0 mW/cm². These limits are considered protective of these populations.





Table 1: Limits for Maximum Permissible Exposure (MPE)				
(A) Limits for Occupational/Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time [E] ² , [H] ² , or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f ²)*	6
30-300	61.4	0.163	1.0	6
300-1,500	--	--	f/300	6
1,500-100,000	--	--	5	6
(B) Limits for General Public/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time [E] ² , [H] ² , or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1,500	--	--	f/1,500	30
1,500-100,000	--	--	1.0	30

f = Frequency in (MHz)

* Plane-wave equivalent power density



APPENDIX C: RF Signage Description Table

Sign	Description
	<p style="text-align: center;">RF Guideline Sign</p> <p>Gives guidelines on how to proceed in areas that may exceed either the FCC’s General Population or Occupational emissions limits.</p>
	<p style="text-align: center;">Blue Notice Sign</p> <p>Used to inform individuals that they are entering an area that may exceed the FCC’s General Population limits. Must be placed anywhere the public can get within 30 feet vertically or horizontally of an antenna.</p>
	<p style="text-align: center;">Yellow Caution Sign</p> <p>Used to inform individuals that they are entering an area that may exceed the either the FCC’s General Population or Occupational Emissions limits. It must be placed so it is visible from all approachable sides. It must also be just outside of the area predicted to exceed the MPE limits so it can be read without standing within the affected area.</p>
	<p style="text-align: center;">Orange Warning Sign (Previously Red)</p> <p>Used to inform individuals that they are entering an area that may exceed 5x the FCC’s Occupational emissions limit. It must be placed so it is visible from all approachable sides. It must also be just outside of the area predicted to exceed the MPE limits so it can be read without standing within the affected area.</p>

APPENDIX D: Certifications

I, Dane Folie, preparer of this report certify that I am fully trained and aware of the Rules and Regulations of both the Federal Communications Commissions (FCC) and the Occupational Safety and Health Administration (OSHA) with regard to Human Exposure to Radio Frequency Radiation. I have been trained in the procedures and requirements outlined in Dish Wireless's FCC Regulatory Compliance Manual.

Dane Folie

Dane Folie

1/17/2022

I, Yasir Alqadhili, reviewer and approver of this report certify that I am fully trained and aware of the Rules and Regulations of both the Federal Communications Commissions (FCC) and the Occupational Safety and Health Administration (OSHA) with regard to Human Exposure to Radio Frequency Radiation. I have been trained in the procedures and requirements outlined in Dish Wireless's FCC Regulatory Compliance Manual.

Yasir Alqadhili

Yasir Alqadhili

1/17/2022