Radio Frequency Emissions Compliance Report For AT&T Mobility

Site Name:	**Rancho Deep Cliff**	**Site Structure Type:**	**Monopine**
Address:	**22475 Rancho Deep Cliff Drive**	**Latitude:**	**37.3107556**
	Cupertino, CA 95014	**Longitude:**	**-122.0691361**
Report Date:	**October 21, 2021**	**Project:**	**Modification**

Compliance Statement

Based on information provided by AT&T Mobility and predictive modeling, the Rancho Deep Cliff installation proposed by AT&T Mobility will be compliant with Radiofrequency Radiation Exposure Limits of 47 C.F.R. §§ 1.1307(b)(3) and 1.1310. RF alerting signage at the base of the Monopine and restricting access to authorized climbers that have completed RF safety training is required for Occupational environment compliance. The proposed operation will not expose members of the General Public to hazardous levels of RF energy at ground level or in adjacent buildings.

Certification

I, David C. Cotton, Jr., am the reviewer and approver of this report and am fully aware of and familiar with 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, specifically in accordance with FCC's OET Bulletin 65. I have reviewed this Radio Frequency Exposure Assessment report and believe it to be both true and accurate to the best of my knowledge.

REGISTERED PROFESSIONAL ENGINEER
DAVID CHARLES COTTON, JR.
NO. 18838
2022-Mar-16
ELECTRICAL
STATE OF CALIFORNIA

David Charles Cotton, Jr.
Registered Professional Engineer (Electrical)
State of California, 18838

General Summary

The compliance framework is derived from the Federal Communications Commission (FCC) Rules and Regulations for preventing human exposure in excess of the applicable Maximum Permissible Exposure ("MPE") limits. At any location at this site, the power density resulting from each transmitter may be expressed as a percentage of the frequency-specific limits and added to determine if 100% of the exposure limit has been exceeded. The FCC Rules define two tiers of permissible exposure differentiated by the situation in which the exposure takes place and/or the status of the individuals who are subject to exposure. General Population / Uncontrolled exposure limits apply to those situations in which persons may not be aware of the presence of electromagnetic energy, where exposure is not employment-related, or where persons cannot exercise control over their exposure. Occupational / Controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment, have been made fully aware of the potential for exposure, and can exercise control over their exposure. Based on the criteria for these classifications, the FCC General Population limit is considered to be a level that is safe for continuous exposure time. The FCC General Population limit is 5 times more restrictive than the Occupational limits.

In situations where the predicted MPE exceeds the General Population threshold in an accessible area as a result of emissions from multiple transmitters, FCC licensees that contribute greater than 5% of the aggregate MPE share responsibility for mitigation.

7430 New Technology Way, Suite 150 Frederick, Maryland 21703 (703) 596-1022 Phone www.waterfordconsultants.com

Table 1: FCC Limits

Frequency (MHz)	*Limits for General Population/ Uncontrolled Exposure*		*Limits for Occupational/ Controlled Exposure*	
	Power Density (mW/cm^2)	**Averaging Time (minutes)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
30-300	0.2	30	1	6
300-1500	f/1500	30	f/300	6
1500-100,000	1.0	30	5.0	6

f=Frequency (MHz)

Based on the computational guidelines set forth in FCC OET Bulletin 65, Waterford Consultants, LLC has developed software to predict the overall Maximum Permissible Exposure possible at any location given the spatial orientation and operating parameters of multiple RF sources. The power density in the Far Field of an RF source is specified by OET-65 Equation 5 as follows:

$$S = \frac{EIRP}{4 \cdot \pi \cdot R^2} \ (\mathrm{mW/cm^2})$$

where EIRP is the Effective Radiated Power relative to an isotropic antenna and R is the distance between the antenna and point of study. Additionally, consideration is given to the manufacturers' horizontal and vertical antenna patterns as well as radiation reflection. At any location, the predicted power density in the Far Field is the spatial average of points within a 0 to 6-foot vertical profile that a person would occupy. Near field power density is based on OET-65 Equation 20 stated as

$$S = \left(\frac{180}{\theta_{BW}}\right) \cdot \frac{100 \cdot P_{in}}{\pi \cdot R \cdot h} \ (\mathrm{mW/cm^2})$$

where P_{in} is the power input to the antenna, θ_{BW} is the horizontal pattern beamwidth and h is the aperture length.

Some antennas employ beamforming technology where RF energy allocated to each customer device is dynamically directed toward their location. In the analysis presented herein, predicted exposure levels are based on a statistical distribution of all beams being spread in different directions during the 6-minute averaging time. This statistical approach equates to a "power reduction factor" and conservatively utilizes the lowest 95th percentile value {b-IEC TR 62669}. With a technology duty cycle of 0.75 for Time Division Duplexing associated with downlink transmissions, the actual maximum power (averaged over 6 minutes) is therefore 25% of the maximum power. These results are supported by carriers as well as equipment manufacturer measurement testing.

7430 New Technology Way, Suite 150 Frederick, Maryland 21703 (703) 596-1022 Phone www.waterfordconsultants.com

Analysis

The antennas will be mounted on a 70' Monopine with centerlines 47' above ground level. Proposed antenna operating parameters are listed in Appendix A. Other appurtenances such as GPS antennas, RRUs and hybrid cable below the antennas are not sources of RF emissions. Panel antennas have been installed at this site by other wireless operators. Operating parameters for these antennas considered in this analysis are also listed in Appendix A.

Power density decreases significantly with distance from any antenna. The panel-type antennas to be employed at this site are highly directional by design and the orientation in azimuth and mounting elevation, as documented, serves to reduce the potential to exceed MPE limits at any location other than directly in front of the antennas. For accessible areas at ground level, the maximum predicted power density level resulting from all AT&T Mobility operations is 12.3244% of the FCC General Population limits. Based on the operating parameters in Appendix A, the cumulative power density level at this location from all antennas is 12.3993% of the FCC General Population limits. Incident at adjacent buildings depicted in Figure 1, the maximum predicted power density level resulting from all AT&T Mobility operations is 50.2717% of the FCC General Population limits. Based on the operating parameters in Appendix A, the cumulative power density level at this location from all antennas is 50.433% of the FCC General Population limits. The proposed operation will not expose members of the General Public to hazardous levels of RF energy at ground level or in adjacent buildings.

Waterford Consultants, LLC recommends posting RF alerting signage with contact information (Caution 2B) at the base of the Monopine to inform authorized climbers of potential conditions near the antennas. These recommendations are depicted in Figure 2.

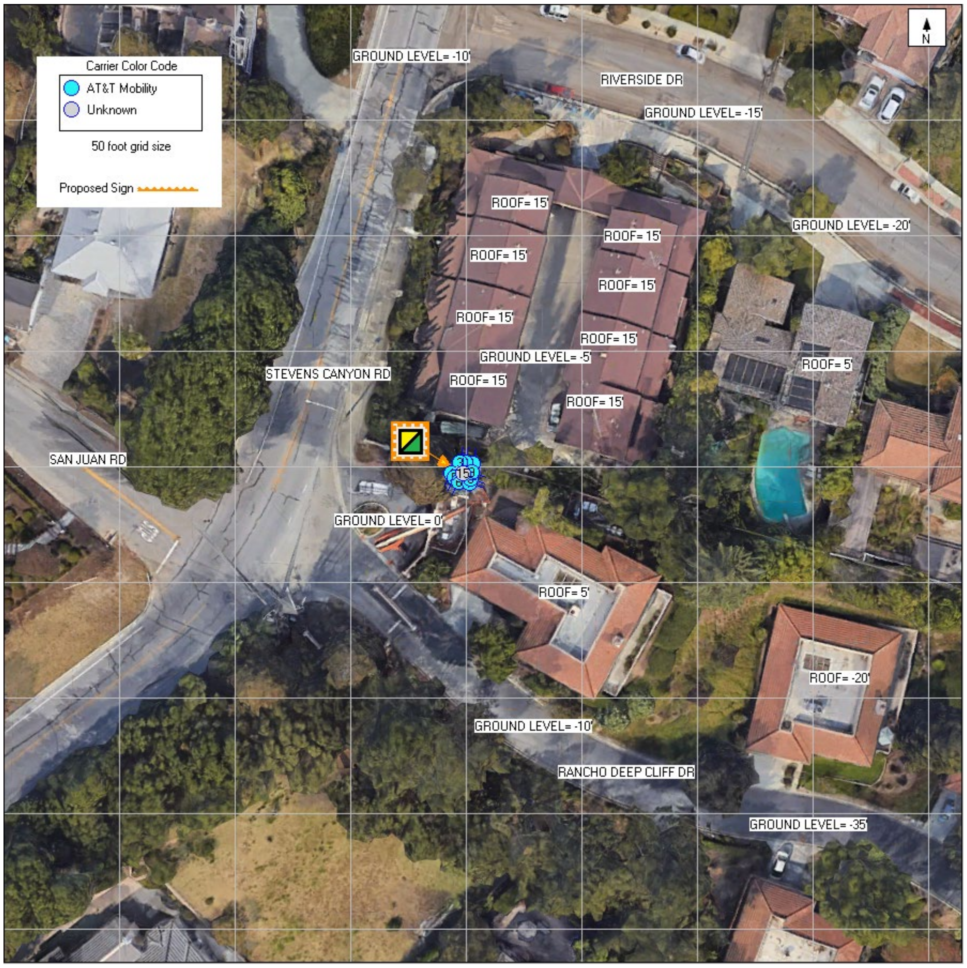

Figure 2: Mitigation Recommendations

Caution 2B

Caution 2B sign required on the base of the monopole at the access.

Appendix A: Operating Parameters Considered in this Analysis

Antenna #:	Carrier:	Manufacturer	Pattern:	Band (MHz):	Mech Az (deg):	Mech DT (deg):	H BW (deg):	Length (ft):	TPO (W):	Channels:	Loss (dB):	Gain (dBd):	ERP (W):	EIRP (W):	Rad Center (ft):
1	AT&T	COMMSCOPE	NNHH-65B-R4 02DT	700	10	0	66	6	40	4	0	11.5	2260	3708	47
1	AT&T	COMMSCOPE	NNHH-65B-R4 02DT	850	10	0	64	6	40	4	0	12.59	2905	4766	47
1	AT&T	COMMSCOPE	NNHH-65B-R4 02DT	1900	10	0	61	6	40	4	0	14.48	4489	7364	47
2	AT&T	COMMSCOPE	NNH4-65B-R6H4 02DT	700	10	0	71	6	40	4	0	11.45	2234	3665	47
2	AT&T	COMMSCOPE	NNH4-65B-R6H4 02DT	850	10	0	65	6	40	2	0	12.35	1374	2255	47
2	AT&T	COMMSCOPE	NNH4-65B-R6H4 02DT	2100	10	0	65	6	40	4	0	14.98	5036	8263	47
2	AT&T	COMMSCOPE	NNH4-65B-R6H4 02DT	2300	10	0	58	6	25	4	0	15.71	3724	6109	47
3	AT&T	ERICSSON	SON_AIR6449 NR TB 3700 AT&T	3700	10	0	11	2.8	108.4	1	0	23.55	24549	40274	47
4	AT&T	COMMSCOPE	NNHH-65B-R4 02DT	700	210	0	66	6	40	4	0	11.5	2260	3708	47
4	AT&T	COMMSCOPE	NNHH-65B-R4 02DT	850	210	0	64	6	40	4	0	12.59	2905	4766	47
4	AT&T	COMMSCOPE	NNHH-65B-R4 02DT	1900	210	0	61	6	40	4	0	14.48	4489	7364	47
5	AT&T	COMMSCOPE	NNH4-65B-R6H4 02DT	700	210	0	71	6	40	4	0	11.45	2234	3665	47
5	AT&T	COMMSCOPE	NNH4-65B-R6H4 02DT	850	210	0	65	6	40	2	0	12.35	1374	2255	47
5	AT&T	COMMSCOPE	NNH4-65B-R6H4 02DT	2100	210	0	65	6	40	4	0	14.98	5036	8263	47
5	AT&T	COMMSCOPE	NNH4-65B-R6H4 02DT	2300	210	0	58	6	25	4	0	15.71	3724	6109	47
6	AT&T	ERICSSON	SON_AIR6449 NR TB 3700 AT&T	3700	210	0	11	2.8	108.4	1	0	23.55	24549	40274	47
7	AT&T	COMMSCOPE	NNHH-65B-R4 02DT	700	110	0	66	6	40	4	0	11.5	2260	3708	47
7	AT&T	COMMSCOPE	NNHH-65B-R4 02DT	850	110	0	64	6	40	4	0	12.59	2905	4766	47
7	AT&T	COMMSCOPE	NNHH-65B-R4 02DT	1900	110	0	61	6	40	4	0	14.48	4489	7364	47
8	AT&T	COMMSCOPE	NNH4-65B-R6H4 02DT	700	110	0	71	6	40	4	0	11.45	2234	3665	47
8	AT&T	COMMSCOPE	NNH4-65B-R6H4 02DT	850	110	0	65	6	60	2	0	12.35	2061	3382	47
8	AT&T	COMMSCOPE	NNH4-65B-R6H4 02DT	2100	110	0	65	6	40	4	0	14.98	5036	8263	47
8	AT&T	COMMSCOPE	NNH4-65B-R6H4 02DT	2300	110	0	58	6	25	4	0	15.71	3724	6109	47
9	AT&T	ERICSSON	SON_AIR6449 NR TB 3700 AT&T	3700	110	0	11	2.8	108.4	1	0	23.55	24549	40274	47
10	Unknown	RFS	APXV9ERR18-C-02DT	850	0	0	80	6	25	4	0	11.9	1531	2512	62
10	Unknown	RFS	APXV9ERR18-C-00DT	1900	0	0	80	6	45	4	0	14.6	5132	8419	62

7430 New Technology Way, Suite 150 Frederick, Maryland 21703 (703) 596-1022 Phone www.waterfordconsultants.com

Antenna #:	Carrier:	Manufacturer	Pattern:	Band (MHz):	Mech Az (deg):	Mech DT (deg):	H BW (deg):	Length (ft):	TPO (W):	Channels:	Loss (dB):	Gain (dBd):	ERP (W):	EIRP (W):	Rad Center (ft):
11	Unknown	RFS	APXVTM14 ALU-I20 00DT	2500	0	0	65	4.7	20	8	0	15.9	6153	10095	62
12	Unknown	RFS	APXV9ERR18-C-02DT	850	120	0	80	6	25	4	0	11.9	1531	2512	62
12	Unknown	RFS	APXV9ERR18-C-00DT	1900	120	0	80	6	45	4	0	14.6	5132	8419	62
13	Unknown	RFS	APXVTM14 ALU-I20 00DT	2500	120	0	65	4.7	20	8	0	15.9	6153	10095	62
14	Unknown	RFS	APXV9ERR18-C-02DT	850	240	0	80	6	25	4	0	11.9	1531	2512	62
14	Unknown	RFS	APXV9ERR18-C-00DT	1900	240	0	80	6	45	4	0	14.6	5132	8419	62
15	Unknown	RFS	APXVTM14 ALU-I20 00DT	2500	240	0	65	4.7	20	8	0	15.9	6153	10095	62

Notes: Table depicts recommended operating parameters for AT&T Mobility proposed operations. Co-located antenna parameters based on industry standards.

7430 New Technology Way, Suite 150   Frederick, Maryland 21703 (703) 596-1022 Phone   www.waterfordconsultants.com