NON-IONIZING ELECTROMAGNETIC EXPOSURE ANALYSIS
&
ENGINEERING CERTIFICATION

SITE NUMBER: SN2975

SITE NAME: SMOKEY POINT NORTH

SITE ADDRESS: 17306 Smokey Point Dr
Arlington, WA 98223

DATE: March 20, 2022

PREPARED BY:

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PROJECT

The proposed AT&T project consists of a WCF (Wireless Communications Facility) located at 17306 Smokey Point Dr, Arlington, WA 98223, Snohomish County tax parcel 00645300000700. The planned improvements include (9) panel antennas on a 130' AGL steel monopole with supporting BTS (Base Transmission System) radio equipment located near the base of the monopole.

EQUIPMENT

Type of Service: LTE 700, 5G 850, LTE 1900, LTE AWS, LTE WCS, 5G C Band

Antennas: CMA-UBTULBULBHH/6517/17/21/21, Nokia AEQK & AEQU

Sectors: (3) (X = 90°, Y = 230°, Z = 350°)

Antenna Rad Center: 126' AGL

CALCULATIONS

Calculations for RF power densities near ground level are based on the "**Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields OET Bulletin 65"** Edition 97-01, August 1997 issued by the Federal Communications Commission Office of Engineering & Technology.

Section 2 of **OET Bulletin 65** demonstrates that "for a truly worst-case prediction of power density at or near the surface, such as at ground-level or on a rooftop, 100% reflection of incoming radiation can be assumed, resulting in a potential doubling of predicted field strength and a four-fold increase in (far field equivalent) power density", therefore the following equation is used:

$$S = EIRP/\pi R^2$$

Where S = power density (mW/cm^2), EIRP = equivalent isotropically radiated power and R = distance to the center of the radiation antenna (cm)

The calculations show that the maximum MPE at ground level (6' above AGL) at the base of the monopole and the power density is 0.003913 mW/cm^2 with an assumed worst-case power level of 10,000 watts ERP for the lowest antenna array. This is 0.8378% of the MPE limit for the general population/uncontrolled exposure of 0.467 mW/cm^2 as referenced in **Table I OET Bulletin 65 Appendix A** for the lowest frequency range.

ENVIRONMENTAL EVALUATION

Routine environmental evaluation is required if the PCS broadband facility is less than 10 m (32.81 feet) AGL and has a total power of all channels in any given sector greater than 2,000W ERP as referenced in "**Table 2 Transmitters, Facilities and Operations Subject to Routine Environmental Evaluation" of Bulletin 65.** As the proposed antennas' lowest point above ground level 37.2 m (122 feet), the WCF is categorically exempt from requirement for routine environmental processing.

FCC COMPLIANCE

The general population/uncontrolled exposure near the monopole, including persons at ground level, surrounding properties, inside and on existing structures will have RF exposure much lower than the "worst case" scenario, which is a small fraction of the MPE limit.

Only trained persons will be allowed to climb the monopole for maintenance operations. AT&T and/or its contractors will provide training to make the employees fully aware of the potential for RF exposure occupational training and they can exercise control over their exposure that is within the occupational/controlled limits.

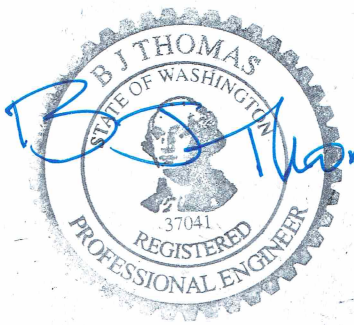
CONCLUSIONS

Based on calculations, the proposed WCF will comply with current FCC and county guidelines for human exposure to radiofrequency electromagnetic fields.

All representations contained herein are true to the best of my knowledge.

EXHIBITS

- MPE Calculations
- Antenna Spec Sheets
- WCF Location Map



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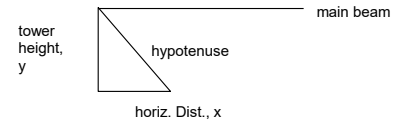
SN2975 SMOKEY POINT NORTH
MPE Calculations

Effective tower height assumes a person 6 ft tall.

126	height (ft)

3.91E-03	
0.003913	max power density in mW/cm^2
0.8378%	percentage of standard



Note: 0.467 mW/cm^2 is 100% of allowable standard for lowest frequency

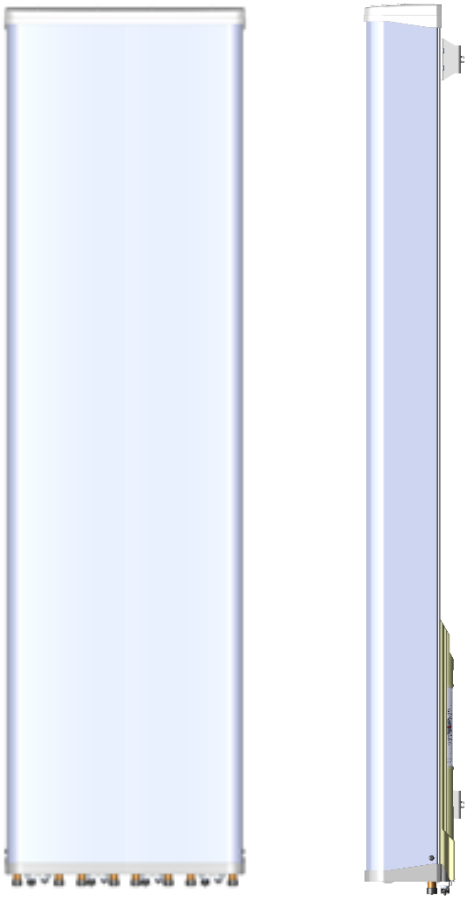
radiation center (feet), y	effective tower height (feet), y	minor lobe angle	dB below main lobe	horiz. dist. x	hypotenuse length (feet)	hypotenuse length (km)	hypotenuse length (cm)	ERP main lobe (watts)	ERP main lobe (dBm)	minor lobe ERP (dBm)	minor lobe EIRP (dBm)	minor lobe EIRP (mW)	Power at point x at ground level mW/cm^2
126	120	90	20	0.000	120.000	0.037	3657.600	10000	70.00	50.00	52.16	164437.17	**3.91E-03**
											TOTAL		**3.91E-03**

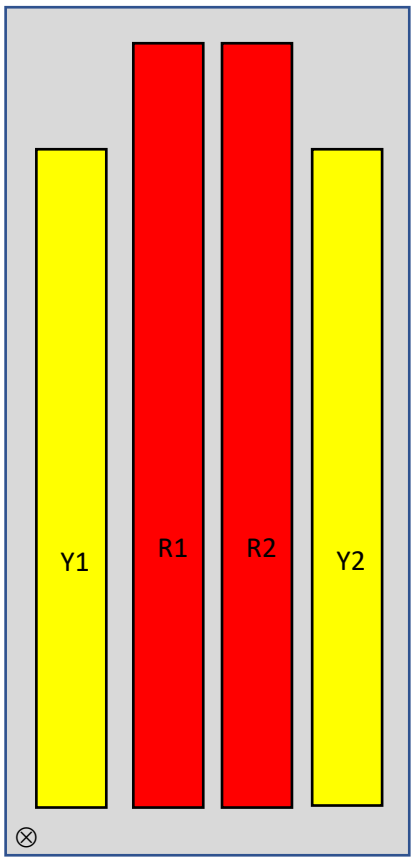
Antenna Type

12047v

CMA-UBTULBULBHH/6517/17/21/21

8-port antenna	unit	R1	R2	Y1	Y2
Frequency range	MHz	698 - 894	698 - 894	1695 - 2690	1695 - 2690
Polarization		x	x	x	x
HBW	°	65	65	65	65
Gain	dBi	17	17	21	21
EDT range	°	2 - 10	2 - 10	1 - 10	1 - 10





Product architecture

CMA-UBTULBULBHH/6517/17/21/21

Electrical Parameters R1 and R2:

Parameter (Radiation)			
Frequency band	**MHz**	**698 - 798**	**824 - 894**
Gain	dBi	17.3	17.7
Azimuth Parameters			
Azimuth (3dB) Beam Width	°	65	62
Azimuth Beam Squint	°	7	7
Front to Back Ratio (total power)	dB	>25	>25
Cross-Polar Discrimination (0°)	dB	>20	>20
Sector Power Ratio	%	7	7
Elevation Parameters			
Elevation (3 dB) Beam Width	°	9	8
Electrical Downtilt Range	°	2 - 10	2 – 10
First upper Sidelobe suppression	dB	>16	>16
First Nullfill Below Horizon	dB	-	-

Parameter (ports)		
Frequency band	**MHz**	**698 - 894**
Impedance	Ω	50
VSWR/Return Loss	_/dB	1.5 / 14
Intra Array Isolation	dB	28
Inter Array Isolation	dB	28
Passive Intermodulation @ 2x43 dBm CW	dBc	-158
Maximum Input Power per port	W	500
Antenna Insertion Loss	dB	0.4

CMA-UBTULBULBHH/6517/17/21/21

Electrical Parameters Y1 and Y2:

Parameter (Radiation)					
Frequency band	**MHz**	**1710 - 1880**	**1850 - 1990**	**1920 - 2170**	**2490 - 2690**
Gain	dBi	196	19.6	19.9	21.4
Azimuth Parameters					
Azimuth (3dB) Beam Width	°	64	66	67	52
Azimuth Beam Squint**	°	6	6	6	5
Front to Back Ratio (total power)	dB	>25	>25	>25	>25
Cross-Polar Discrimination (0°)	dB	17	22	22	21
Sector Power Ratio	%	3.2	3.3	3.3	3.3
Elevation Parameters					
Elevation (3 dB) Beam Width	°	4.9	4.6	4.4	3.4
Electrical Downtilt Range	°	1 – 10	1 – 10	1 – 10	1 – 10
First upper Sidelobe suppression	dB	15	16	16	14
First Nullfill Below Horizon	dB	>-24	>-21	-20	-16

Parameter (ports)					
Frequency band	**MHz**	**1710 - 1880**	**1850 - 1990**	**1920 - 2170**	**2490 - 2690**
Impedance	Ω	50			
VSWR/Return Loss	_/dB	1.5 / 14			
Intra Array Isolation	dB	28	28	28	28
Inter Array Isolation	dB	28	28	28	28
Passive Intermodulation @ 2x43 dBm CW	dBc	-160			
Maximum Input Power per port	W	500			
Antenna Insertion Loss	dB	0.5	0.5	0.6	0.8

CMA-UBTULBULBHH/6517/17/21/21

Mechanical parameters

Mechanical specification:	
Connectors	8 x 4.3 -10 female
Connector position	Bottom
Lightning protection	DC grounded
Height mm (inch)	2450 (96.5)
Width mm (inch)	690 (27.2)
Depth mm (inch)	196 (7.7)
Antenna weight kg (lb)	51 (112)
Wind load at 42 m/s (94 mph)	
Frontal N (lbf)	1615 (363)
Lateral N (lbf)	321 (72)
Survival wind speed m/s (mph)	67
EPA m^2 ($inch^2$)	1.45 (2249)
Colour radome	Light Grey, RAL 7035
Radome material	ASA
Mounting hardware:	
Mounting bracket	2
Bracket weight (complete) kg (lb)	7 (15)
Pole diameter mm (inch)	45 (1.8) - 120 (4.7)
Mechanical tilt range º	0 - 5

RET info:

The RET actuator is AISG compatible and signals Single-Antenna RET Device type 0x01 (hex) in AISG protocol layer 2 as described in 3GPP TS25.462 (a.k.a. TYPE 1).

One RET actuator per antenna columns, with individual AISG connectors in and out. The antenna columns are R1, R2, Y1 and Y2.

CellMax actuator type CMA-RET-02

RET spare part order number: 110086.

Packing data	
Box size mm (inch)	
Box weight kg (lb)	
Pallet type	
Maximum number of boxes per pallet	

Ordering information:

Product number	**Product description**

AEQK AirScale MAA 64T64R 192AE n77 200W

Technical datasheet

Product Specifications	
Standard	3GPP/FCC NR compliant, TDD
Band / Frequency range	3700~3980MHz
Supported RAT	5G
Max. supported modulation	256QAM
Number of TX/RX paths	64T / 64R
MIMO streams	16
Instantaneous bandwidth IBW	200MHz
Occupied bandwidth OBW	100MHz+100MHz for 32TRX + 32TRX split mode
Total average EIRP	77dBm
Max. output power per TRX	3.125 W / TRX (200 W total) - SW settable up to 13 dB down
Dimensions / Volume	750 x 450 x 240 mm (H x W x D)
Weight	45kg w/o bracket
Supply voltage / Connector type	DC -40.5 V... -57V / 2 pole connector
Power consumption	727 W (75% DL duty cycle, ETSI Average)
Optical ports	2xSFP28, 10/25GE eCPRI
Other interfaces / Connector type	LMI / HDMI, RF monitor port / SMA, Control AISG, External Alarms / MDR26, status LEDs
Operational temperature range	-40degC to +55C
Cooling	Natural convection cooling
Installation options / mechanical tilt	Pole, wall, with vertical adjustment of ±15° (thermally limited)
Ingress / Surge protection	IP65/Class II 20KA

AirScale High Power MAA benefits

- 5G Adaptive Antenna System for optimized capacity and coverage
- Digital beamforming for multi-user MIMO
- Connectivity with AirScale BBU (via eCPRI)
- Beamforming capable 64T64R with total 200W output power
- 32TRX + 32TRX split mode support

AEQK 475589A

NOKIA

AEQU AirScale MAA 64T64R 192AE n77 200W

Technical data (Preliminary)

Product Specifications	
Standard	3GPP/FCC, TDD
Supported RAT by HW	5G
Band / Frequency range	3450 - 3550 MHz
Max. supported modulation	256 QAM
Number of TX/RX paths	64T / 64R
MIMO streams	16
Instantaneous bandwidth IBW	100 MHz
Occupied bandwidth OBW	100 MHz
Total average EIRP	77.5dBm
Max. output power per TRX	3.125 W / TRX (200W total)
Dimensions / Volume	750 x 450 x 240 mm (H x W x D) / 71.7 L
Weight	45kg w/o bracket
Supply voltage / Connector type	DC -40.5 V... -57V / 2 pole connector
Power consumption	730 W (75% DL duty cycle, ETSI 24h average load)
Optical ports	2 x SFP28, 10/25GE eCPRI
Other interfaces / Connector type	AISG / RS-485, EAC (6 alarms + 1 control) / MDR26, RF Monitor Port/SMA, 4 status LEDs
Operational temperature range	-40 °C ... +55 °C
Cooling	Natural convection cooling
Installation options	Pole / Wall, ± 15° mechanical vertical tilt
Ingress / Surge protection	IP65 / Class II 20 kA

AirScale High Power Wide Band MAA benefits

- 5G Adaptive Antenna System for optimized capacity and coverage
- Beamforming capable 64T64R with total 200W output power

AEQU 476085A

NOKIA


SN2975
SMOKEY POINT NORTH
LAT 48.152944 LONG -122.187111
Smokey Point Motor Inn
Olympia Pizza & Pasta Italian
Pizza · $$
Smokey Point Dr
KeyBank
ReMyx'd
Smokey Point Dr
Taco T
531
531
Bank of America (with Drive-thru ATM)
AutoZone Auto Parts
Auto parts store