Robinson+Cole

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July 16, 2015

Melanie A. Bachman
Acting Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Facility Modification**
2577 Main Street, Glastonbury, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 80-foot level on the existing 130-foot tower at 2577 Main Street in Glastonbury, Connecticut (the "Property"). The tower is owned by SBA. The Council approved Cellco's shared use of this tower in 2014. Cellco now intends to modify its facility by replacing all of its existing antennas with six (6) model LNX-6514DS-VTM, 700/850 MHz antennas; three (3) model HBXX-6517DS-VTM, 1900 MHz antennas; and three (3) model HBXX-6517DS-VTM, 2100 MHz antennas, all at the same 80-foot level on the tower. Cellco also intends to replace three (3) existing remote radio heads ("RRHs") with three (3) newer model RRHs and install six (6) new RRHs. Included in Attachment 1 are specifications for Cellco's replacement antennas and RRHs.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Glastonbury's Town Manager Richard J. Johnson and St. Paul's Church, the owner of the Property.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing tower. The replacement antennas and RRHs will be located at the 80-foot level on the 130-foot tower.

2. The proposed modifications will not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundary.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. Far Field Approximation tables for each of Cellco's operating frequencies for the modified Glastonbury facility are included in Attachment 2. As indicated on these tables, Cellco's modified facility will operate well within the FCC standards for RF emissions.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The tower and its foundation can support Cellco's proposed modifications. (*See* Structural Analysis included in Attachment 3).

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Richard J. Johnson, Glastonbury Town Manager
St. Paul's Church
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

LNX-6514DS-VTM

Andrew® Antenna, 698–896 MHz, 65° horizontal beamwidth, RET compatible

- Great solution to maximize network coverage and capacity
- Excellent gain, VSWR, front-to-back ratio, and PIM specifications for robust network performance
- Ideal choice for site collocations and tough zoning restrictions
- Excellent solution for site sharing and maximizing capacity
- Fully compatible with Andrew remote electrical tilt system for greater OpEx savings
- The RF connectors are designed for IP67 rating and the radome for IP56 rating

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**
Gain, dBi	15.8	15.9
Beamwidth, Horizontal, degrees	65	64
Beamwidth, Vertical, degrees	12.4	11.2
Beam Tilt, degrees	0–10	0–10
USLS, dB	17	18
Front-to-Back Ratio at 180°, dB	32	30
CPR at Boresight, dB	23	23
CPR at Sector, dB	12	10
Isolation, dB	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153
Input Power per Port, maximum, watts	400	400
Polarization	±45°	±45°
Impedance	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	**698–806**	**806–896**
Gain by all Beam Tilts, average, dBi	15.6	15.7
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.5
Gain by Beam Tilt, average, dBi	0 ° | 15.7	0 ° | 15.9
	5 ° | 15.7	5 ° | 15.8
	10 ° | 15.3	10 ° | 15.3
Beamwidth, Horizontal Tolerance, degrees	±0.9	±1.4
Beamwidth, Vertical Tolerance, degrees	±0.8	±0.6
USLS, dB	18	20
Front-to-Back Total Power at 180° ± 30°, dB	25	23
CPR at Boresight, dB	25	24
CPR at Sector, dB	15	12

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol®
Band	Single band
Brand	DualPol® | Teletilt®

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Product Specifications

LNX-6514DS-VTM

Operating Frequency Band	698 – 896 MHz
Performance Note	Outdoor usage

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Aluminum
Radome Material	Fiberglass, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	2
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Dimensions

Depth	180.5 mm | 7.1 in
Length	1851.0 mm | 72.9 in
Width	301.0 mm | 11.9 in
Net Weight	14.2 kg | 31.3 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator	LNX-6514DS-A1M
RET System	Teletilt®

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

Included Products

DB380 — Pipe Mounting Kit for 2.4"-4.5" (60-115mm) OD round members on wide panel antennas. Includes 2 clamp sets and double nuts.

DB5083 — Downtilt Mounting Kit for 2.4"-4.5" (60 - 115 mm) OD round members. Includes a heavy-duty, galvanized steel downtilt mounting bracket assembly and associated hardware. This kit is compatible with the DB380 pipe mount kit for panel antennas that are equipped with two mounting brackets.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

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Product Specifications

COMMSCOPE®

POWERED BY ANDREW.

HBXX-6517DS-VTM

Andrew® Quad Port Antenna, 1710–2180 MHz, 65° horizontal beamwidth, RET compatible

- Superior azimuth tracking and pattern symmetry with excellent passive intermodulation suppression

Electrical Specifications

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain, dBi	19.0	19.1	19.2
Beamwidth, Horizontal, degrees	67	66	65
Beamwidth, Vertical, degrees	5.0	4.7	4.4
Beam Tilt, degrees	0–6	0–6	0–6
USLS, dB	18	18	18
Front-to-Back Ratio at 180°, dB	30	30	30
CPR at Boresight, dB	21	22	21
CPR at Sector, dB	10	11	9
Isolation, dB	30	30	30
VSWR | Return Loss, dB	1.4 | 15.6	1.4 | 15.6	1.4 | 15.6
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350
Polarization	±45°	±45°	±45°
Impedance	50 ohm	50 ohm	50 ohm

Electrical Specifications, BASTA*

Frequency Band, MHz	1710–1880	1850–1990	1920–2180
Gain by all Beam Tilts, average, dBi	18.5	18.6	18.8
Gain by all Beam Tilts Tolerance, dB	±0.4	±0.3	±0.4
Gain by Beam Tilt, average, dBi	0 ° | 18.4	0 ° | 18.4	0 ° | 18.7
	3 ° | 18.7	3 ° | 18.7	3 ° | 18.9
	6 ° | 18.4	6 ° | 18.5	6 ° | 18.6
Beamwidth, Horizontal Tolerance, degrees	±2.4	±1.7	±2.9
Beamwidth, Vertical Tolerance, degrees	±0.3	±0.3	±0.3
USLS, dB	18	19	19
Front-to-Back Total Power at 180° ± 30°, dB	25	26	26
CPR at Boresight, dB	22	23	22
CPR at Sector, dB	10	10	9

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

General Specifications

Antenna Brand	Andrew®
Antenna Type	DualPol® quad
Band	Single band
Brand	DualPol® | Teletilt®
Operating Frequency Band	1710 – 2180 MHz

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Product Specifications

HBXX-6517DS-VTM

Performance Note	Outdoor usage

Mechanical Specifications

Color	Light gray
Lightning Protection	dc Ground
Radiator Material	Low loss circuit board
Radome Material	PVC, UV resistant
RF Connector Interface	7-16 DIN Female
RF Connector Location	Bottom
RF Connector Quantity, total	4
Wind Loading, maximum	668.0 N @ 150 km/h 150.2 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h | 149.8 mph

Dimensions

Depth	166.0 mm | 6.5 in
Length	1903.0 mm | 74.9 in
Width	305.0 mm | 12.0 in
Net Weight	19.5 kg | 43.0 lb

Remote Electrical Tilt (RET) Information

Model with Factory Installed AISG 2.0 Actuator	HBXX-6517DS-A2M
RET System	Teletilt®

Regulatory Compliance/Certifications

Agency	Classification
RoHS 2011/65/EU	Compliant by Exemption
China RoHS SJ/T 11364-2006	Above Maximum Concentration Value (MCV)
ISO 9001:2008	Designed, manufactured and/or distributed under this quality management system

Included Products

600899A-2 — Downtilt Mounting Kit for 2.4 - 4.5 in (60 - 115 mm) OD round members. Kit contains one scissor top bracket set and one bottom bracket set.

* Footnotes

Performance Note	Severe environmental conditions may degrade optimum performance

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ALCATEL-LUCENT B13 RRH4X30-4R

Alcatel-Lucent B13 Remote Radio Head 4x30-4R is the newest addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering.

Supporting 2Tx/4Tx MIMO and 4-way Rx diversity, Alcatel-Lucent B13 RRH4x30-4R allows operators to have a compact radio solution to deploy LTE in the 700U band (700 MHz, 3GPP band 13), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.

The Alcatel-Lucent B13 RRH4x30-4R product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x60 W or 4x30 W RF output power. It supports also 4-way Rx diversity and up to 10MHz instantaneous bandwidth.

The Alcatel-Lucent B13 RRH4x30-4R is a near zero-footprint solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

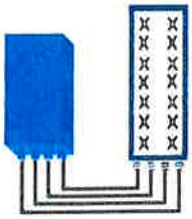
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 700 MHz band (700U, 3GPP band 13)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- 10MHz LTE carrier with 4Rx Diversity
- Convection-cooled (fan-less)
- Supports AISG 2.0 ALD devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in 700U band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through MIMO4
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall



4x30W with 4T4R
or
2x60W with 2T4R

Can be switched between modes via SW w/o site visit

Alcatel·Lucent

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2 dB typ. (<2.5 dB max) – 2 or 4 way Rx diversity
Sizes (HxWxD) in mm (in.) Volume in L Weight in kg (lb) (w/o mounting HW)	550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield) 38 (with solar shield) 26 (57.2) (with solar shield)
DC voltage range DC power consumption	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption 550W typical @100% RF load (in 2Tx or 4TX mode)
Environmental conditions Wind load (@150km/h or 93mph)	-40°C (-40°F) /+55°C (+131°F) IP65 Frontal:<200N / Lateral :<150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate7, 9.8 Gbps) SFP single mode dual fiber
AISG interfaces	1 AISG2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) – 4 RF Tx & 4 RF Rx monitor ports - 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

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PCS RF MODULES

RRH1900 2X60 - HW CHARACTERISTICS

LA6.0.1/13.3

	RRH2x60
RF Output Power	2x60W
Instantaneous Bandwidth	20MHz
Transmitter	2 TX
Receiver 1900 HW version 1900A HW version	2 Branch RX – LA6.0.1 4 Branch RX – LR13.3
Features	AISG 2.0 for RET/TMA
	Internal Smart Bias-T
Power	-48VDC
CPRI Ports	2 CPRI Rate 3 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX
Environmental	GR487 Compliance
RF Connectors	7/16 DIN (top mounted)

** Not a Verizon Wireless deployed product

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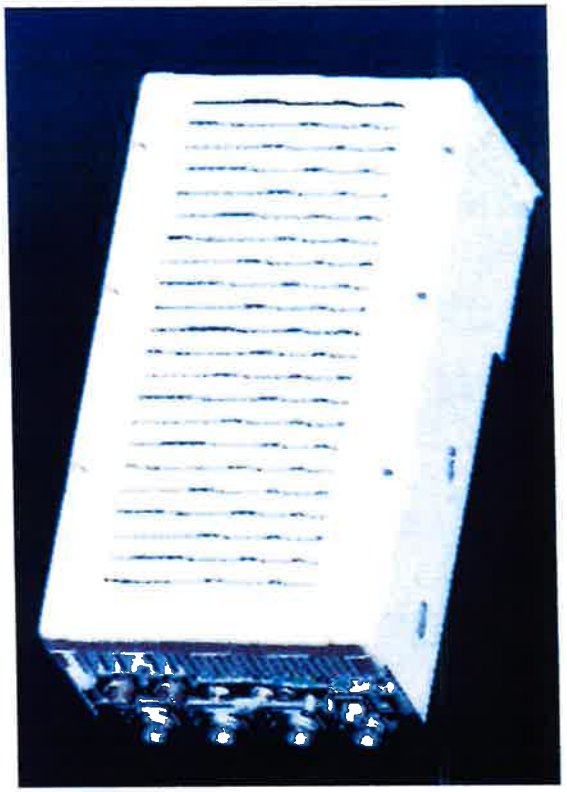
NEW PCS RF MODULES FOR VZW
RRH2X60 - HW CHARACTERISTICS

LR14.3

	RRH2x60
RF Output Power	2x60W (4x30W HW Ready)
Instantaneous Bandwidth	60MHz
Target Reliability (Annual Return Rate)	<2%
Receiver	4 Branch Rx
Features	AISG 2.0 for RET/TMA
Power	-48VDC
	Internal Smart Bias-T
CPRI Ports	2 CPRI Rate 5 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX, RX
Environmental	GR487 Compliance
RF Connectors	7/16 DIN (downward facing)
Dimensions	22"(h) x 12"(w)x 9.4" (d)**
Weight	55lb**



**- Includes solar shield but not mounting brackets (8 lbs.)

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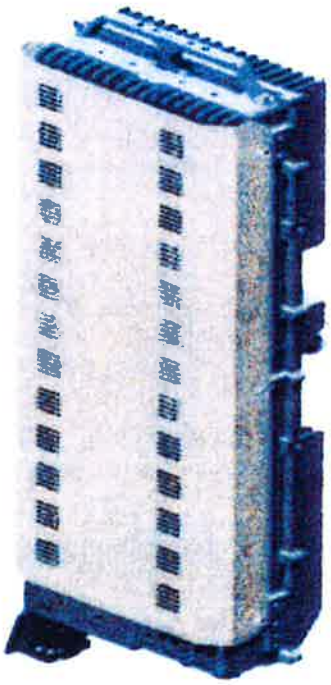
The Alcatel-Lucent RRH2x60-AWS is a high power, small form factor Remote Radio Head operating in the AWS frequency band (3GPP Band 4) for LTE technology. It is designed with an eco-efficient approach, providing operators with the means to achieve high quality and high capacity coverage with minimum site requirements and efficient operation.



A distributed Node B expands the deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of a Node B to be installed separately, within the same site or several kilometers apart.

The Alcatel-Lucent RRH2x60-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information.

The Alcatel-Lucent RRH2x60-AWS integrates all the latest technologies. This allows to offer best-in-class characteristics.

It delivers an outstanding 120 watts of total RF power thanks to its two transmit RF paths of 60 W each.

It is ideally suited to support multiple-input multiple-output (MIMO) 2x2 operation.

It includes four RF receivers to natively support 4-way uplink reception diversity. This improves the radio uplink coverage and this can be used to extend the cell radius commensurate with 2x2MIMO 2x60 W for the downlink.

It supports multiple discontinuous LTE carriers within an instantaneous bandwidth of 45 MHz corresponding to the entire AWS B4 spectrum.

The latest generation power amplifiers (PA) used in this product achieve high efficiency (>40%), resulting in improved power consumption figures.

The Alcatel-Lucent RRH2x60-AWS is designed to make available all the benefits of a distributed Node B, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX).

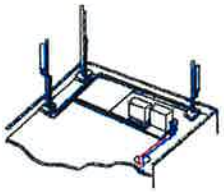
The Alcatel-Lucent RRH2x60-AWS is a very cost-effective solution to deploy LTE MIMO.

The RRH2x60-AWS includes a reversible mounting bracket which allows for ease of installation behind an antenna, or on a rooftop knee wall while providing easy access to the mid body RF connectors.

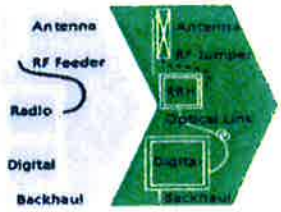
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

The Alcatel-Lucent RRH2x60-AWS is a zero-footprint solution and is convection cooled without fans for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts.

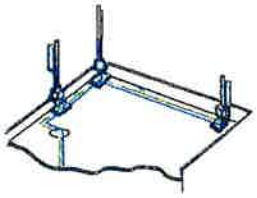
Installation can easily be done by a single person as the Alcatel-Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

- RRH2x60-AWS integrates two power amplifiers of 60W rating (at each antenna connector)
- Support multiple carriers over the entire 3GPP band 4
- RRH2x60-AWS is optimized for LTE operation
- RRH2x60-AWS is a very compact and lightweight product
- Advanced power management techniques are embedded to provide power savings, such as PA bias control
- MIMO LTE operation with only one single unit per sector
- Improved uplink coverage with built-in 4-way receive diversity capability
- RRH can be mounted close to the antenna, eliminating nearly all losses in RF cables and thus reducing power consumption by 50% compared to conventional solutions
- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and silent solutions, with minimum impact on the neighborhood, which ease the deployment
- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-Tees. Bias-Tees support AISG DC supply and signaling.

Specifications listed are hardware capabilities. Some capabilities depend on support in a specific software release or future release.

Dimensions and weights

- HxWxD : 510x285x186mm (27 l with solar shield)
- Weight : 20 kg (44 lbs)

Electrical Data

- Power Supply : -48V DC (-40.5 to -57V)
- Power Consumption (ETSI average traffic load reference) : 250W @2x60W

RF Characteristics

- Frequency band: 1710-1755, UL / 2110-2155 MHz, DL (3GPP band 4)
- Output power: 2x60W at antenna connectors
- Technology supported: LTE
- Instantaneous bandwidth: 45 MHz
- Rx diversity: 2-way and 4-way uplink reception
- Typical sensitivity without Rx diversity: -105 dBm for LTE

Connectivity

- Two CPRI optical ports for daisychaining and up to six RRHs per fiber
- Type of optical fiber: Single-Mode (SM) and Multi-Mode (MM) SFPs
- Optical fiber length: up to 500m using MM fiber, up to 20km using SM fiber
- TMA/RETA : AISG 2.0 (RS485 connector and internal Bias-Tee)
- Six external alarms
- Surge protection for all external ports (DC and RF)

Environmental specifications

- Operating temperature: -40°C to 55°C including solar load
- Operating relative humidity: 8% to 100%
- Environmental Conditions : ETS 300 019-1-4 class 4.1E
- Ingress Protection : IEC 60529 IP65
- Acoustic Noise : Noiseless (natural convection cooling)

Safety and Regulatory Data

- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089, GR 3108, OET-65
- Safety : IEC60950-1, EN 60825-1, UL, ANSI/NFPA 70, CAN/CSA-C22.2
- Regulatory : FCC Part 15 Class B, CE Mark – European Directive : 2002/95/EC (ROHS); 2002/96/EC (WEEE); 1999/5/EC (R&TTE)
- Health : EN 50385

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AT THE SPEED OF IDEAS™

ATTACHMENT 2

Far Field Approximation
with downtilt variation

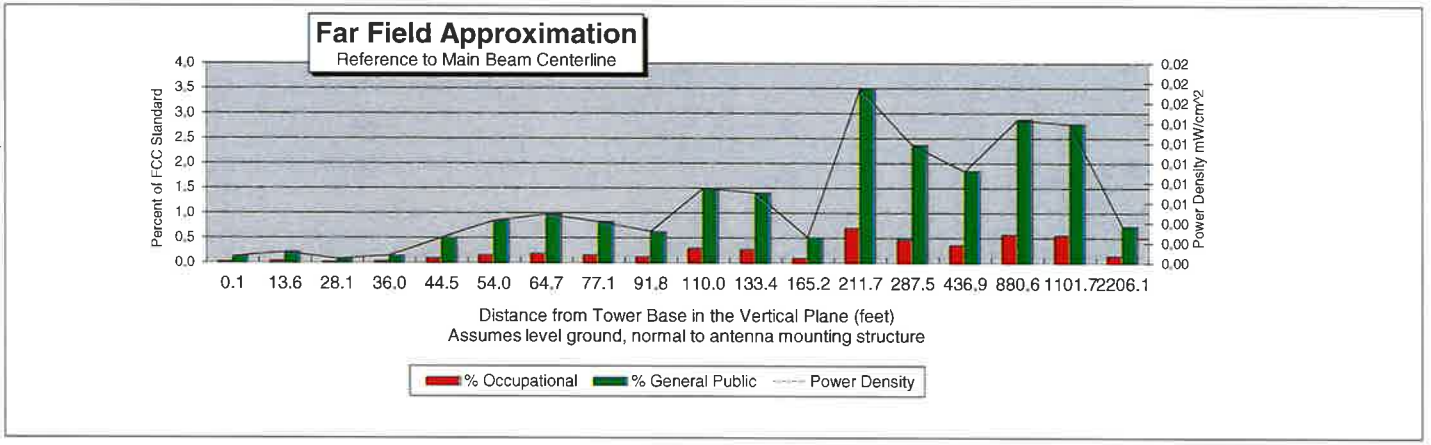
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Glastonbury W, CT
Site #:	
Date:	07/02/15
Name:	Mark Brauer
File Name:	Glastonbury W, CT - FF Power

Operating Freq. (MHz)	746.0
Antenna Height (ft):	80.0
Antenna Gain (dBi):	15.9
Antenna Size (in.):	72.0
Downtilt (degrees):	0.0
Feedline Loss (dB):	0.0
ERP (w):	2100.0
Number of Channels	1



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0
Solve for r, dx to antenna	77.0	78.2	82.0	85.0	88.9	94.0	100.6	108.9	119.8	134.3	154.1	182.3	225.2	297.7	443.6	883.9	1104.4	2207.5
Distance from Antenna Structure Base in Horizontal plane	0.1	13.6	28.1	36.0	44.5	54.0	64.7	77.1	91.8	110.0	133.4	165.2	211.7	287.5	436.9	880.6	1101.7	2206.1
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.02	0.01	0.01	0.01	0.01	0.00
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.1	0.3	0.3	0.1	0.7	0.5	0.4	0.6	0.6	0.1
Percent of General Population Standard	0.1	0.2	0.1	0.1	0.5	0.8	1.0	0.8	0.6	1.5	1.4	0.5	3.5	2.4	1.8	2.9	2.8	0.7

Antenna Type LNX-6514DS
Max% 3.50%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Po
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

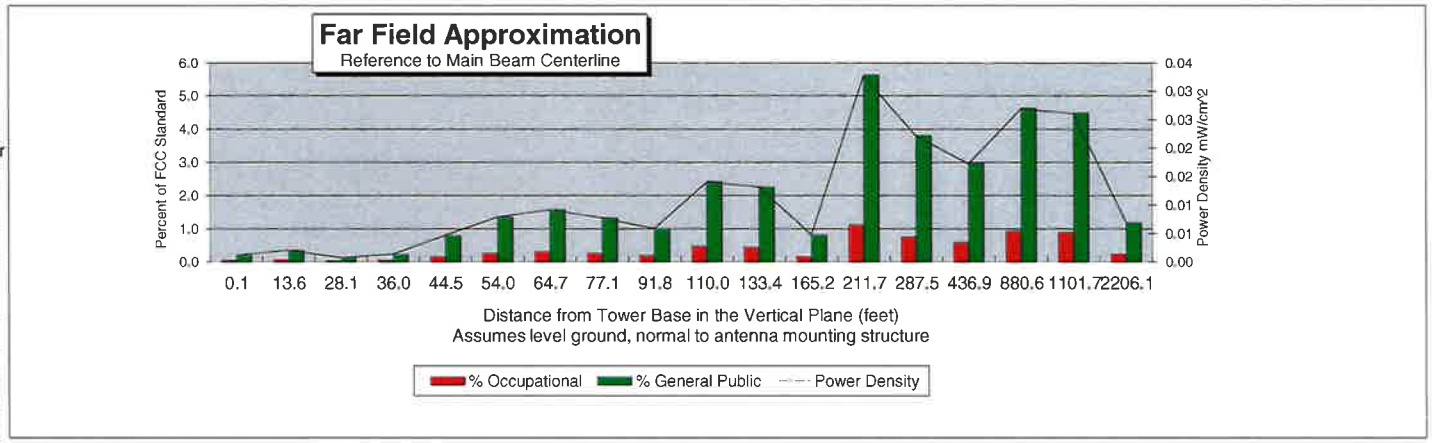
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Glastonbury W, CT
Site #:	
Date:	07/02/15
Name:	Mark Brauer
File Name:	Glastonbury W, CT - FF Power

Operating Freq. (MHz)	**869.0**
Antenna Height (ft):	**80.0**
Antenna Gain (dBi):	**16.0**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
ERP (w):	**3852.0**
Number of Channels	**9**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	77.0	78.2	82.0	85.0	88.9	94.0	100.6	108.9	119.8	134.3	154.1	182.3	225.2	297.7	443.6	883.9	1104.4	2207.5	
Distance from Antenna Structure Base in Horizontal plane	0.1	13.6	28.1	36.0	44.5	54.0	64.7	77.1	91.8	110.0	133.4	165.2	211.7	287.5	436.9	880.6	1101.7	2206.1	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.03	0.02	0.02	0.03	0.03	0.01	
Percent of Occupational Standard	0.0	0.1	0.0	0.0	0.2	0.3	0.3	0.3	0.2	0.5	0.5	0.2	1.1	0.8	0.6	0.9	0.9	0.2	
Percent of General Population Standard	0.2	0.3	0.1	0.2	0.8	1.4	1.6	1.3	1.0	2.4	2.3	0.8	5.6	3.8	3.0	4.6	4.5	1.2	

Antenna Type LNX-6514DS
Max% 5.63%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Po
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

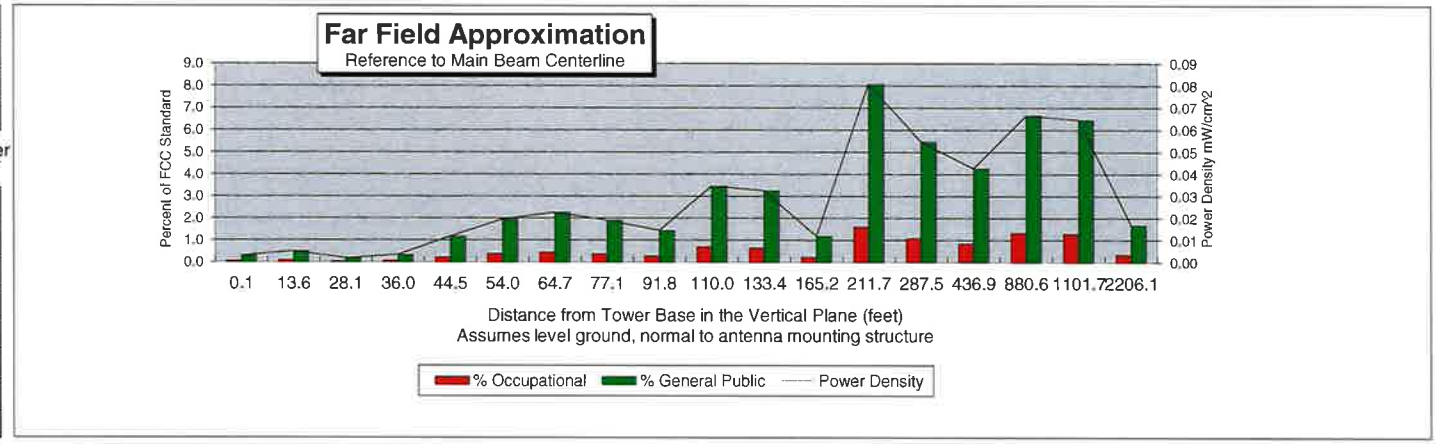
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Glastonbury W, CT
Site #:	
Date:	07/02/15
Name:	Mark Brauer
File Name:	Glastonbury W, CT - FF Power

Operating Freq. (MHz)	**1970.0**
Antenna Height (ft):	**80.0**
Antenna Gain (dBi):	**18.5**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
ERP (w):	**5296.0**
Number of Channels	**11**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	77.0	78.2	82.0	85.0	88.9	94.0	100.6	108.9	119.8	134.3	154.1	182.3	225.2	297.7	443.6	883.9	1104.4	2207.5	
Distance from Antenna Structure Base in Horizontal plane	0.1	13.6	28.1	36.0	44.5	54.0	64.7	77.1	91.8	110.0	133.4	165.2	211.7	287.5	436.9	880.6	1101.7	2206.1	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.02	0.01	0.03	0.03	0.01	0.08	0.05	0.04	0.07	0.06	0.02	
Percent of Occupational Standard	0.1	0.1	0.0	0.1	0.2	0.4	0.4	0.4	0.3	0.7	0.6	0.2	1.6	1.1	0.9	1.3	1.3	0.3	
Percent of General Population Standard	0.3	0.5	0.2	0.3	1.2	1.9	2.2	1.9	1.4	3.5	3.2	1.2	8.1	5.5	4.3	6.6	6.4	1.7	

Antenna Type HBXX-6517DS
Max% 8.07%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Po
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

Far Field Approximation
with downtilt variation

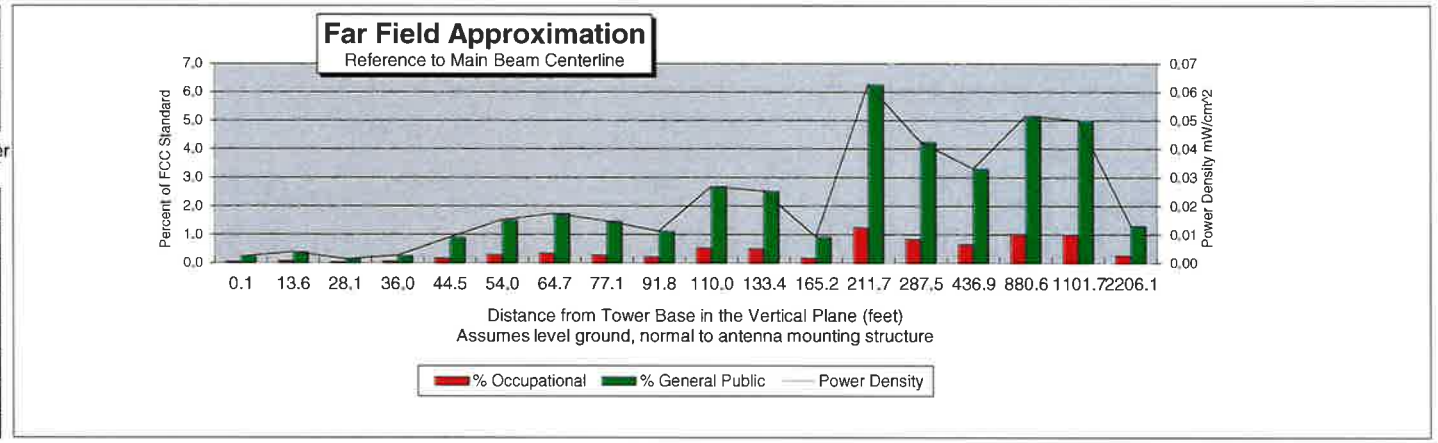
Estimated Radiated Emission

Single Emitter Far Field Model

Dipole / Wire/ Yagi Antenna Types

Location:	Glastonbury W, CT
Site #:	
Date:	07/02/15
Name:	Mark Brauer
File Name:	Glastonbury W, CT - FF Power

Operating Freq. (MHz)	**2145.0**
Antenna Height (ft):	**80.0**
Antenna Gain (dBi):	**19.2**
Antenna Size (in.):	**72.0**
Downtilt (degrees):	**0.0**
Feedline Loss (dB):	**0.0**
ERP (w):	**3500.0**
Number of Channels	**1**



Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0	
Solve for r, dx to antenna	77.0	78.2	82.0	85.0	88.9	94.0	100.6	108.9	119.8	134.3	154.1	182.3	225.2	297.7	443.6	883.9	1104.4	2207.5	
Distance from Antenna Structure Base in Horizontal plane	0.1	13.6	28.1	36.0	44.5	54.0	64.7	77.1	91.8	110.0	133.4	165.2	211.7	287.5	436.9	880.6	1101.7	2206.1	
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dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.01	0.01	0.03	0.03	0.01	0.06	0.04	0.03	0.05	0.05	0.01	
Percent of Occupational Standard	0.0	0.1	0.0	0.1	0.2	0.3	0.3	0.3	0.2	0.5	0.5	0.2	1.3	0.8	0.7	1.0	1.0	0.3	
Percent of General Population Standard	0.2	0.4	0.1	0.3	0.9	1.5	1.7	1.5	1.1	2.7	2.5	0.9	6.3	4.2	3.3	5.2	5.0	1.3	

Antenna Type HBXX-6517DS
Max% 6.27%

Instructions:

1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to ba saved as.
2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located here where power measurements are made.
3) Enter Antenna Height (in feet to bottom of antenna), Antenna Gain (expressed as dBi, add 2.17 to dBd to obtain dBi), Antenna Size (vertical size in inches), Downtilt (in Degrees, enter zero if none), Feedline loss from J4 to Antenna, and J4 Po
4) From manufacturer's plots, or data sheet, input Angle from mainbeam and dB below mainbeam centerline.
5) Enter Reflection coefficient (2.56 would be typical, 1 for free space)
6) Spreadsheet calculates actual power density, then relates as Occupational or General Population percentage of FCC Standard.
7) An odd distance may be entered in the rightmost column of the lower table.

ATTACHMENT 3

FDH VELOCITEL

ENGINEERING INNOVATION

Velocitel, Inc., d.b.a. FDH Velocitel, 6521 Meridien Drive Raleigh, NC 27616, Ph. 919.755.1012

Structural Analysis for SBA Network Services, Inc.

130' Self-Support Tower

SBA Site Name: Glastonbury-Main St
SBA Site ID: CT46126-A-06
Verizon Site ID: 188863

FDH Velocitel Project Number 15BRLU1400

Analysis Results

Tower Components	89.1 %	Sufficient
Foundation	81.2 %	Sufficient

Prepared By:

Kelsey L Sargent

Kelsey Sargent
Project Engineer

Reviewed By:

Christopher M. Murphy

Christopher M. Murphy
President
CT PE License No. 25842

6/10/2015

Velocitel, Inc., d.b.a. FDH Velocitel
6521 Meridien Drive
Raleigh, NC 27616
(919) 755-1012
info@fdh-inc.com

June 10, 2015

Prepared pursuant to TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures & 2005 Connecticut Building Code

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EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Velocitel performed a structural analysis of the existing self-supported tower located in Glastonbury, CT to determine whether the tower is structurally adequate to support both the existing and proposed loads pursuant to the *Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, TIA/EIA-222-F* and the *2005 Connecticut Building Code (CTBC)*. Information pertaining to the existing/proposed antenna loading, current tower geometry, the member sizes, geotechnical data, and foundation dimensions was obtained from:

- Fred A. Nudd Corporation (Project No. 6893) Design of 130' Lattice Tower dated September 12, 1999
- Vertical Solutions, Inc. (Site No. CT46126-A) Modification Drawings for a 130' Self-Support Tower dated December 6, 2012
- Tectonic Engineering Consultants, P.C. (W.O. No. 1170.C057) Boring Logs and Results of Laboratory Testing dated August 26, 1999
- FDH Engineering, Inc. (Project No. 1338401400) Modification Drawings for a 130' Self-Support Tower dated June 17, 2013
- FDH Engineering, Inc. (Project No. 13SB5C1400) Modification Drawings for a 130' Self-Support Tower dated September 10, 2013
- FDH, Inc. (Job No. 1304001700) Modification Inspection Report dated November 1, 2013
- FDH, Inc. (Job No. 1305911700) Modification Inspection Report dated February 25, 2014
- SBA Network Services, Inc.

The *basic design wind speed* per the *TIA/EIA-222-F* standards and the *2005 CTBC* is 80 mph without ice and 38 mph with 1" radial ice. Ice is considered to increase in thickness with height.

Conclusions

With the existing and proposed antennas from Verizon in place at 80 ft, the tower meets the requirements of the *TIA/EIA-222-F* standards and the *2005 CTBC* provided the **Recommendations** listed below are satisfied. Furthermore, provided the foundation was constructed per the original design drawings (see Fred A. Nudd Corporation Project No. 6893), and using the given geotechnical data (see Tectonic Engineering Consultants, P.C. W.O. No. 1170.C057), the foundation should have the necessary capacity to support both the proposed and existing loading. For a more detailed description of the analysis of the tower, see the **Results** section of this report.

Our structural analysis has been performed assuming all information provided to FDH Velocitel is accurate (i.e., the steel data, tower layout, existing antenna loading, and proposed antenna loading) and that the tower has been properly erected and maintained per the original design drawings.

Recommendations

To ensure the requirements of the *TIA/EIA-222-F* standards and the *2005 CTBC* are met with the existing and proposed loading in place, we have the following recommendations:

1. Feed lines must be installed double stacked as shown in the Feed Line Plan in **Figure 1** (see **Appendix**).
2. RRU/RRH Stipulation: The proposed equipment may be installed in any arrangement as determined by the client.

APPURTENANCE LISTING

The proposed and existing antennas with their corresponding cables/coax lines are shown in **Table 1**. *If the actual layout determined in the field deviates from the layout, FDH Velocitel should be contacted to perform a revised analysis.*

Table 1 - Appurtenance Loading

Existing Loading:

Antenna Elevation (ft)	Description	Feed Lines	Carrier	Mount Elevation (ft)	Mount Type
128	(2) Argus technologies LLPX310R (1) Kathrein 840 10054 (3) 24"x14"x9" TMAs (1) Motorola TIMING 2000	(6) 5/16" (4) 1/2"	Sprint/ Clearwire	128 [1]	(3) T-Frames
124	(3) IDU Modem (3) Andrew VHLP2.5				
120	(3) RFS APXVTM14-CI20 (3) Alcatel Lucent TD-RRH8x20-25	(1) 1-1/4"	Sprint	118.5	(3) T-Arms
118.5	(2) RFS APXVSPP18-C-A20 (1) Powerwave P40-16-XLPP-RR-A (3) Alcatel Lucent 1900 MHz RRUs (3) Alcatel Lucent 800 MHz RRUs (4) RFS ACU-A20-N RETs (3) Alcatel Lucent 800 MHz Filters	(3) 1-1/4"			
110	(6) Allgon 7700.00 (2) KMW AM-X-CD-16-65-00T-RET (1) Andrew SBNH-1D6565C (6) Powerwave LGP13519 (6) Powerwave LGP21401 (6) Ericsson RRUS-11 1900MHz (1) Raycap DC6-48-60-18-8F	(12) 1-1/4" (1) 3/8"	AT&T	110 [2]	(3) T-Frames
93	(3) Ericsson AIR 21 B2A/B4P (3) Ericsson AIR 21 B4A/B2P (3) Ericsson KRY 112 144/1 TMAs	(12) 1-5/8" (1) 1-5/8" Fiber	T-Mobile	93	(3) T-Frames
80	(6) Antel BXA-70063/6CF-EDIN-X (6) Antel BXA-171063/12CF (3) Alcatel Lucent RRH2x40-07U (3) Alcatel Lucent RRH2X40-AWS (1) RFS DB-T1-6Z-8AB-0Z	(2) 1-5/8" Hybrid	Verizon	80	(3) T-Frames (C_AA_A = 18.81 ft^2 each)
55.5	(1) GPS	(1) 1/2"	---	55.5	(1) Standoff
50.5	(2) GPS	(2) 1/2"	---	50.5	(2) Standoffs

1. Sprint/Clearwire has (6) 5/16" and (2) 1/2" coax installed inside (2) 2" conduits.
2. AT&T has (1) 3/8" coax installed inside (1) 3" conduit.

Proposed Carrier Final Loading:

Antenna Elevation (ft)	Description	Feed Lines	Carrier	Mount Elevation (ft)	Mount Type
80	(6) Andrew LNX-6514DS-A1M (6) Andrew HBXX-6517DS-A2M (3) Alcatel Lucent RRH2x60-700 (3) Alcatel Lucent RRH2x60-AWS (3) Alcatel Lucent RRH2X60-PCS (2) RFS DB-T1-6Z-8AB-0Z	(2) 1-5/8" Hybrid	Verizon	80	(3) T-Frames (C_AA_A = 18.81 ft^2 each)

RESULTS

The following yield strength of steel for individual members was used for analysis:

Table 2 - Material Strength

Member Type	Yield Strength
Legs	45, 50, & 54 ksi
Bracing	36 ksi
Anchor Rods	60 ksi

Table 3 displays the summary of the ratio (as a percentage) of force in the member to their capacities. Values greater than 100% indicate locations where the maximum force in the member exceeds its capacity. *Note: Capacities up to 100% are considered acceptable.* **Table 4** displays the maximum foundation reactions. **Table 5** displays the maximum antennas rotations at service wind speeds (dishes only).

If the assumptions outlined in this report differ from actual field conditions, FDH Velocitel should be contacted to perform a revised analysis. Furthermore, as no information pertaining to the allowable twist and sway requirements for the existing or proposed appurtenances was provided, deflection and rotation were not taken into consideration when performing this analysis.

See the **Appendix** for detailed modeling information.

Table 3 - Summary of Working Percentage of Structural Components

Section No.	Elevation (ft)	Component Type	Size	% Capacity*	Pass Fail
T1	130 - 120	Leg	1 1/2	15.2	Pass
		Diagonal	1/2	52.7	Pass
		Horizontal	L1 1/4x1 1/4x3/16	4.0	Pass
		Top Girt	L1 1/4x1 1/4x3/16	0.4	Pass
T2	120 - 117.143	Leg	2	15.8	Pass
		Diagonal	3/4	24.2	Pass
		Top Girt	L1 1/4x1 1/4x3/16	1.1	Pass
		Bottom Girt	L1 1/4x1 1/4x3/16	3.1	Pass
T3	117.143 - 114.286	Leg	2	19.2	Pass
		Diagonal	3/4	36.7	Pass
		Top Girt	L1 1/4x1 1/4x3/16	0.9	Pass
T4	114.286 - 111.429	Leg	2	27.0	Pass
		Diagonal	3/4	33.9	Pass
		Top Girt	L1 1/4x1 1/4x3/16	10.4	Pass
T5	111.429 - 108.571	Leg	2	36.1	Pass
		Diagonal	3/4	44.4	Pass
		Top Girt	L1 1/4x1 1/4x3/16	8.1	Pass
T6	108.571 - 105.714	Leg	2	46.8	Pass
		Diagonal	3/4	57.5	Pass
		Top Girt	L1 1/4x1 1/4x3/16	12.2	Pass
T7	105.714 - 102.857	Leg	2	58.6	Pass
		Diagonal	3/4	58.2	Pass
		Top Girt	L1 1/4x1 1/4x3/16	20.8	Pass
T8	102.857 - 100	Leg	2	57.6	Pass
		Diagonal	3/4	67.9	Pass
		Secondary Horizontal	L2x2x1/8	8.6 21.5 (b)	Pass
		Top Girt	L1 1/4x1 1/4x3/16	24.6	Pass

Section No.	Elevation (ft)	Component Type	Size	% Capacity*	Pass Fail
		Bottom Girt	L1 1/4x1 1/4x3/16	20.1	Pass
T9	100 - 96	Leg	P4x.237 (4.50 OD)	54.7	Pass
		Diagonal	L1 1/2x1 1/2x3/16	33.6 64.6 (b)	Pass
T10	96 - 92	Leg	P4x.237 (4.50 OD)	63.3	Pass
		Diagonal	L2x2x1/4	17.6 46.8 (b)	Pass
T11	92 - 88	Leg	P4x.237 (4.50 OD)	65.3	Pass
		Diagonal	2L1 1/2x1 1/2x3/16x3/8	21.8 51.4 (b)	Pass
		Secondary Horizontal	4x3/8	17.8 25.1 (b)	Pass
T12	88 - 84	Leg	P4.5x0.237 + P5.5625x0.375 [129°] - 12B	47.5	Pass
		Diagonal	2L1 1/2x1 1/2x3/16x3/8	20.1 48.2 (b)	Pass
		Secondary Horizontal	4x3/8	22.0 27.6 (b)	Pass
T13	84 - 80	Leg	P4.5x0.237 + P5.5625x0.375 [129°] - 12B	52.7	Pass
		Diagonal	2L1 1/2x1 1/2x3/16x3/8	19.1 45.8 (b)	Pass
		Secondary Horizontal	4x3/8	21.6 23.3 (b)	Pass
T14	80 - 75	Leg	P6x.28 (6.625 OD)	55.1	Pass
		Diagonal	L2x2x1/4	34.3 77.7 (b)	Pass
T15	75 - 70	Leg	P6x.28 (6.625 OD)	63.2	Pass
		Diagonal	2L1 3/4x1 3/4x3/16x3/8	25.5 61.0 (b)	Pass
T16	70 - 65	Leg	P6x.28 (6.625 OD)	70.7	Pass
		Diagonal	2L1 3/4x1 3/4x3/16x3/8	23.5 55.5 (b)	Pass
T17	65 - 60	Leg	P6x.28 (6.625 OD)	77.5	Pass
		Diagonal	2L1 3/4x1 3/4x3/16x3/8	23.7 55.5 (b)	Pass
T18	60 - 55	Leg	P6x.28 (6.625 OD)	79.5	Pass
		Diagonal	2L1 1/2x1 1/2x3/16x3/8	30.3 63.2 (b)	Pass
		Secondary Horizontal	L2x2x1/8	29.5 68.1 (b)	Pass
T19	55 - 50	Leg	P6.625x0.28 + P7.625x0.301 [136°] - 12B	65.9	Pass
		Diagonal	2L1 1/2x1 1/2x3/16x3/8	27.4 54.6 (b)	Pass
T20	50 - 45	Leg	P6.625x0.28 + P7.625x0.301 [136°] - 12B	70.0	Pass
		Diagonal	2L1 1/2x1 1/2x3/16x3/8	30.0 58.7 (b)	Pass
T21	45 - 40	Leg	P6.625x0.28 + P7.625x0.301 [136°] - 12B	71.2	Pass
		Diagonal	L2x2x1/4	34.7 69.6 (b)	Pass
		Secondary Horizontal	L3x3x5/16	9.0 71.4 (b)	Pass
T22	40 - 20	Leg	P6x.432 (6.625 OD)	84.8	Pass
		Diagonal	2L1 3/4x1 3/4x3/16x3/8	33.1 57.3 (b)	Pass
T23	20 - 13.3333	Leg	P6x.432 (6.625 OD)	89.1	Pass
		Diagonal	L2x2x3/16	72.0 85.3 (b)	Pass
T24	13.3333 - 6.66667	Leg	P6x.432 (6.625 OD)	86.3	Pass
		Diagonal	L2x2x3/16	71.9 75.9 (b)	Pass
		Secondary Horizontal	L2x2x1/4	31.4 52.1 (b)	Pass
T25	6.66667 - 0	Leg	P6.625x0.432 + P7.625x0.301 [136°] - 12B	78.5	Pass

Section No.	Elevation (ft)	Component Type	Size	% Capacity*	Pass Fail
		Diagonal	2L2x2x3/16x3/8	28.6 66.5 (b)	Pass

*Capacities include a 1/3 allowable stress increase for wind per *TIA/EIA-222-F* standards.
**Diagonal sizes from 120' to 100' taken from Vertical Solutions, Inc. (Project No. 121081 Rev 0) Rigorous Structural Analysis dated June 4, 2012

Table 4 - Maximum Base Reactions

Load Type	Direction	Current Analysis* *(TIA/EIA-222-F)*	Original Design *(TIA/EIA-222-F)*
Individual Foundation	Horizontal	18 k	22 k
	Uplift	319 k	253 k
	Compression	297 k	---
Overturning Moment	---	2,013 k-ft	1,685 k-ft

* Foundation determined to be adequate per independent analysis.

Table 5 - Maximum Antenna Rotations at Service Wind Speeds (Dishes Only)

Centerline Elevation (ft)	Antenna	Tilt* (deg)	Twist* (deg)
124	(3) Andrew VHLP2.5	0.8913	0.0360

* Allowable tilt and twist values to be determined by the carrier.

GENERAL COMMENTS

This engineering analysis is based upon the theoretical capacity of the structure. It is not a condition assessment of the tower and its foundation. It is the responsibility of SBA Network Services, Inc. to verify that the tower modeled and analyzed is the correct structure (with accurate antenna loading information) modeled. If there are substantial modifications to be made or the assumptions made in this analysis are not accurate, FDH Velocitel should be notified immediately to perform a revised analysis.

LIMITATIONS

All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of this report. All opinions and conclusions are subject to revision based upon receipt of new or additional/updated information. All services are provided exercising a level of care and diligence equivalent to the standard and care of our profession. No other warranty or guarantee, expressed or implied, is offered. Our services are confidential in nature and we will not release this report to any other party without the client's consent. The use of this engineering work is limited to the express purpose for which it was commissioned and it may not be reused, copied, or distributed for any other purpose without the written consent of FDH Velocitel.

APPENDIX

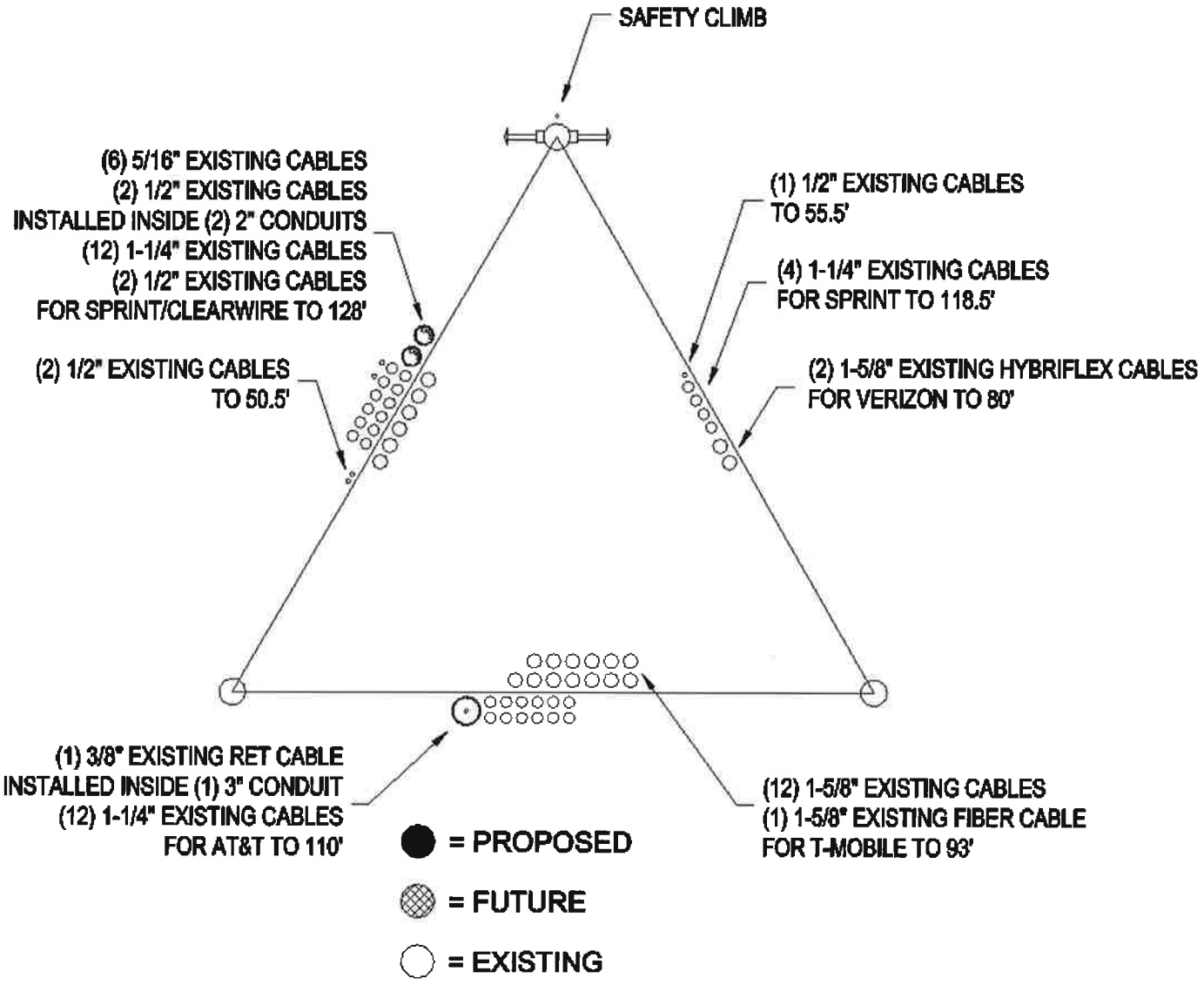
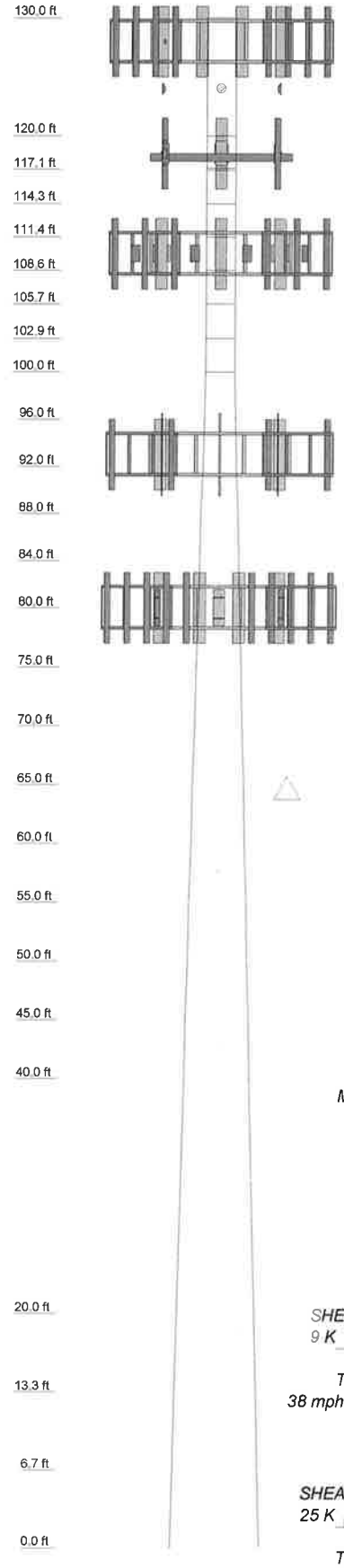


Figure 1 – Feed Line Layout



SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	P4.5x0.237 + P5.5625x0.375 [129°] - 12B	F	2L2x2x3/16x3/8
B	P6.625x0.28 + P7.625x0.301 [136°] - 12B	G	L1 1/4x1 1/4x3/16
C	P6.625x0.432 + P7.625x0.301 [136°] - 12B	H	L2x2x1/8
D	L1 1/2x1 1/2x3/16	I	L3x3x5/16
E	L2x2x1/4		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A570-45	45 ksi	60 ksi	A500M-54	54 ksi	70 ksi
A36	36 ksi	58 ksi	A572-50	50 ksi	65 ksi

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 89.1%

MAX. CORNER REACTIONS AT BASE:
DOWN: 319 K
SHEAR: 18 K

UPLIFT: -297 K
SHEAR: 17 K

AXIAL
61 K

SHEAR
9 K

MOMENT
729 kip-ft

TORQUE 1 kip-ft
38 mph WIND - 1.0000 in ICE

AXIAL
27 K

SHEAR
25 K

MOMENT
2013 kip-ft

TORQUE 2 kip-ft
REACTIONS - 80 mph WIND

FDH VELOCITEL
ENGINEERING INNOVATION
Tower Analysis

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Job:	Glastonbury-Main St, CT46126-A-06		
Project:	15BRLU1400		
Client:	SBA Network Services, Inc.	Drawn by: KSargent	App'd:
Code:	TIA/EIA-222-F	Date: 06/10/15	Scale: N
Path:			Dwg No.