Robinson+Cole

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

Also admitted in Massachusetts

April 9, 2015

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

Re: **Notice of Exempt Modification – Facility Modification**
1 Deerfield Lane, Ansonia, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 157-foot level on an existing 169-foot tower at 1 Deerfield Lane in Ansonia (the "Property"). The tower is owned by SBA. The Council approved Cellco's shared use of this tower in 2007 (Docket No. 340). Cellco now intends to modify its facility by replacing six (6) of its existing antennas with three (3) model HBXX-6517DS-VTM, 1900 MHz antennas and three (3) model HBXX-6517DS-VTM, 2100 MHz antennas, all at the same 157-foot level on the tower. Cellco also intends to install six (6) remote radio heads ("RRHs") behind its 1900 MHz and 2100 MHz antennas and one (1) HYBRIFLEX™ antenna cable inside the monopole tower. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cable.

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 David S. Cassetti, Mayor for the City of Ansonia. A copy of this letter is also being sent to Macabee Properties LLC, 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. Cellco's replacement antennas and RRHs will be installed on its existing antenna platform at the 157-foot level on the 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. A cumulative General Power Density table with Cellco's modified facility is included in Attachment 2.

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:
David S. Cassetti, Ansonia Mayor
Macabee Properties LLC
Tim Parks

ATTACHMENT 1

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

Product Specifications

HBXX-6517DS-VTM

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.

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	2 Branch RX – LA6.0.1
	1900A HW version	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)

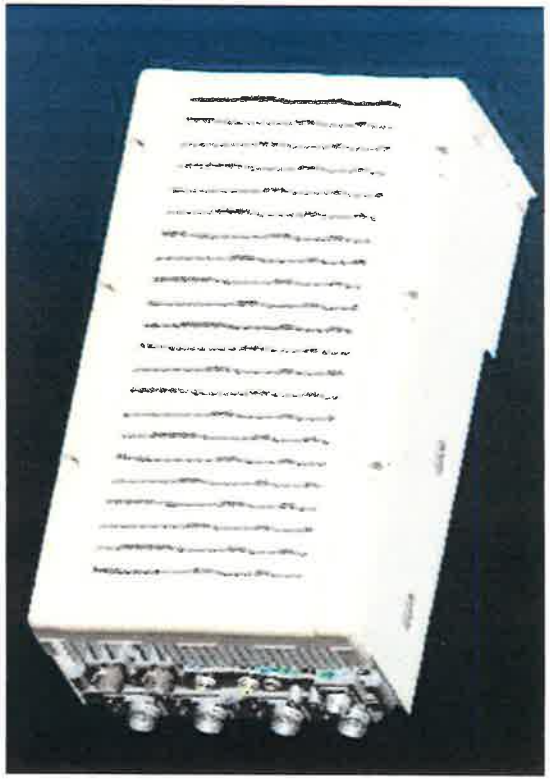
** Not a Verizon Wireless deployed product

Alcatel·Lucent

NEW PCS RF MODULES FOR VZW
RRH2X60 - HW CHARACTERISTICS

LR14.3

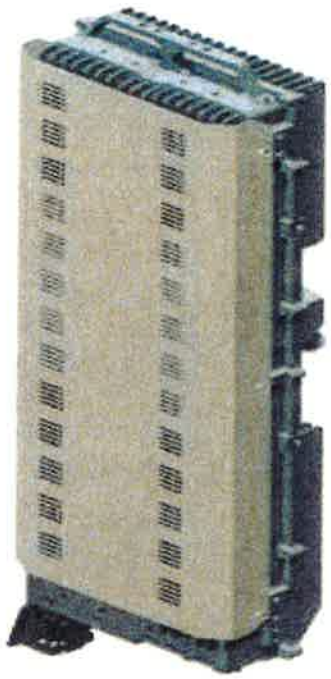
	RRH2x60
RF Output Power	2x60W (4x30W HW Ready)
Instantaneous Bandwidth	60MHz
Target Reliability (Annual Return Rate)	<2%
Receiver	4 Branch Rx
Features	AISG 2.0 for RET/TMA
Power	-48VDC
	Internal Smart Bias-T
CPRI Ports	2 CPRI Rate 5 Ports
External Alarms	4 External User Alarms
Monitor Ports	TX, RX
Environmental	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.)

ALCATEL-LUCENT
WIRELESS PRODUCT DATASHEET
RRH2X60-AWS FOR BAND 4 APPLICATIONS

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.

SUPERIOR RF PERFORMANCE

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.

OPTIMIZED TCO

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.

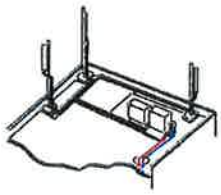
EASY INSTALLATION

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.

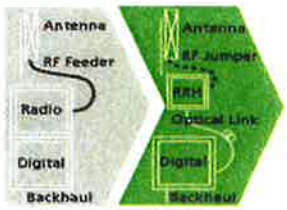
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

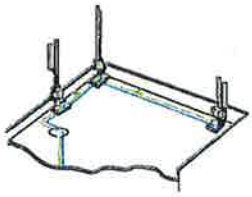
Installation can easily be done by a single person as the Alcatel–Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



Macro



RRH for space-constrained cell sites



Distributed

FEATURES

- 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

BENEFITS

- 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.

TECHNICAL SPECIFICATIONS

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

Alcatel·Lucent

AT THE SPEED OF IDEAS™

Product Data Sheet HB158-1-08U8-S8J18

HYBRIFLEX™ RRH Hybrid Feeder Cabling Solution, 1-5/8", Single-Mode Fiber

Product Description

RFS' HYBRIFLEX Remote Radio Head (RRH) hybrid feeder cabling solution combines optical fiber and DC power for RRHs in a single lightweight aluminum corrugated cable, making it the world's most innovative solution for RRH deployments.

It was developed to reduce installation complexity and costs at Cellular sites. HYBRIFLEX allows mobile operators deploying an RRH architecture to standardize the RRH installation process and eliminate the need for and cost of cable grounding. HYBRIFLEX combines optical fiber (multi-mode or single-mode) and power in a single corrugated cable. It eliminates the need for junction boxes and can connect multiple RRHs with a single feeder. Standard RFS CELLFLEX® accessories can be used with HYBRIFLEX cable. Both pre-connectorized and on-site options are available.

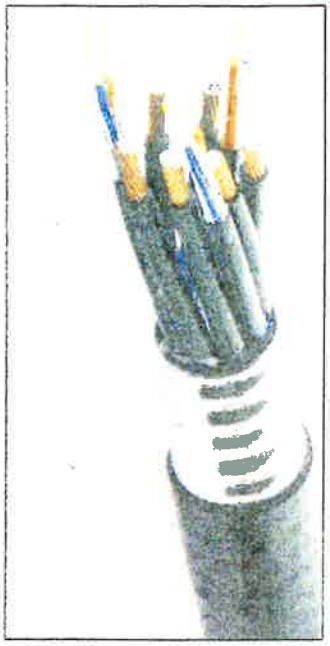


Figure 1: HYBRIFLEX Series

Features/Benefits

- Aluminum corrugated armor with outstanding bending characteristics – minimizes installation time and enables mechanical protection and shielding
- Same accessories as 1 5/8" coaxial cable
- Outer conductor grounding – Eliminates typical grounding requirements and saves on installation costs
- Lightweight solution and compact design – Decreases tower loading
- Robust cabling – Eliminates need for expensive cable trays and ducts
- Installation of tight bundled fiber optic cable pairs directly to the RRH – Reduces CAPEX and wind load by eliminating need for interconnection
- Optical fiber and power cables housed in single corrugated cable – Saves CAPEX by standardizing RRH cable installation and reducing installation requirements
- Outdoor polyethylene jacket – Ensures long-lasting cable protection

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Mechanical Properties			
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
Electrical Properties			
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	068 (0.205)
DC-Resistance Power Cable, 8.4mm² (8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Fiber Optic Properties			
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
DC Power Cable Properties			
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Environment			
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

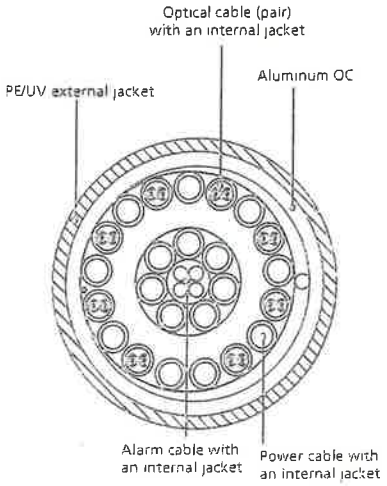


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Ansonia E								
Tower Height: 169Ft.								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*T-Mobile LTE	2	24	167.5	0.0006	2100	1.0000	0.06%	
*T-Mobile GSM/UMTS	2	12	167.5	0.0003	1950	1.0000	0.03%	
*T-Mobile UMTS	2	12	167.5	0.0003	2100	1.0000	0.03%	
*Clearwire	2	153	127	0.0068	2496	1.0000	0.68%	
*Clearwire	1	211	127	0.0047	11 GHz	1.0000	0.47%	
*Pocket (now MetroPCS)	3	631	137	0.0363	2130	1.0000	3.63%	
*AT&T UMTS	2	565	148	0.0185	880	0.5867	3.16%	
*AT&T UMTS	2	875	148	0.0287	1900	1.0000	2.87%	
*AT&T GSM	1	283	148	0.0046	880	0.5867	0.79%	
*AT&T GSM	4	525	148	0.0345	1900	1.0000	3.45%	
*AT&T LTE	1	1615	148	0.0265	734	0.4893	5.42%	
Verizon PCS	**7**	**386**	**157**	**0.0394**	**1970**	**1.0000**	**3.94%**	
Verizon Cellular	**9**	**382**	**157**	**0.0502**	**869**	**0.5793**	**8.66%**	
Verizon AWS	**1**	**2812**	**157**	**0.0410**	**2145**	**1.0000**	**4.10%**	
Verizon 700	**1**	**796**	**157**	**0.0116**	**746**	**0.4973**	**2.33%**	
								39.63%
* Source: Siting Council								

ATTACHMENT 3

FDH Engineering, Inc., 6521 Meridien Dr. Raleigh, NC 27616, Ph. 919.755.1012, Fax 919.755.1031

Structural Analysis for SBA Network Services, Inc.

169' Monopole Tower

SBA Site Name: Woodbridge
SBA Site ID: CT13071-A-04
Verizon Site Name: Ansonia East

FDH Project Number 1462LB1400

Analysis Results

Tower Components	95.8%	Sufficient
Foundation	97.1%	Sufficient

Prepared By:

Cary J. Webb, PE
Project Engineer

Reviewed By:

Dennis D. Abel, PE
Director of Structural Engineering
CT PE License No. 23247

FDH Engineering, Inc.
6521 Meridien Dr.
Raleigh, NC 27616
(919) 755-1012
info@fdh-inc.com

STATE OF CONNECTICUT
No. 23247
LICENSED
PROFESSIONAL ENGINEER
04-18-2014

April 18, 2014

Prepared pursuant to TIA/EIA-222-F June 1996 Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and 2005 Connecticut State Building Code

TABLE OF CONTENTS

EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Engineering, Inc. performed a structural analysis of the monopole located in Ansonia, 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 *2005 Connecticut State Building Code*. Information pertaining to the existing/proposed antenna loading, current tower geometry, soil parameters, foundation dimensions, and member sizes was obtained from:

- Sabre Tower and Poles (Job No. 08-01016) Structural Design Report dated January 30, 2008
- Sabre Communications Corporation (Job No. 08-01016) Erection Drawings dated February 1, 2008
- FDH, Inc. (Project No. 08-07136T) TIA Inspection Report dated September 9, 2008
- JGI Eastern, Inc. (Project No. J2085109) Geotechnical Evaluation dated January 29, 2008
- SBA Network Services, Inc.

The *basic design wind speed* per the *TIA/EIA-222-F* standards and *2005 Connecticut State Building Code* is 85 mph without ice and 38 mph with 3/4" radial ice. Ice is considered to increase in thickness with height.

Conclusions

With the existing and proposed antennas from Verizon in place at 157 ft., the tower meets the requirements of the *TIA/EIA-222-F* standards and *2005 Connecticut State Building Code* provided the **Recommendations** listed below are satisfied. Furthermore, provided the foundation was designed and constructed per the original design drawings (see Sabre Job No. 08-01016) and given existing soil parameters (see JGI Eastern, Inc. Project No. J2085109), 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 Engineering, Inc. 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 *2005 Connecticut State Building Code* are met with the existing and proposed loading in place, we have the following recommendations:

1. Proposed coax should be installed inside the pole's shaft, but may be installed outside the shaft in a single row with the existing coax if necessary.
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 Engineering, Inc. should be contacted to perform a revised analysis.*

Table 1 - Appurtenance Loading

Existing Loading:

Antenna Elevation (ft)	Description	Coax and Lines[1]	Carrier	Mount Elevation (ft)	Mount Type
167.5	(3) Ericsson Air21 B2A/B4P (3) Ericsson Air21 B4A/B2P (3) Ericsson KRY 112/114 TMAs	(12) 1-5/8" (1) 1-5/8" Fiber	T-Mobile	167.5	(3) 4' T-Arms
157[2]	(4) Decibel DB846F65ZAXY (2) Decibel DB846H80E-SX (6) Antel LPA-185063/12CF (1) Antel BXA-70063/6CF (1) Swedcom SLCP 2X6014 (1) Antel BXA 70063/6BF (1) GPS	(18) 1-5/8" (1) 1/2"	Verizon	157	(3) T-Arms
150	(6) Ericsson RRUS 11 RRUs (1) Raycap DC6-48-60-18-8F Surge Arrestor	(12) 1-5/8" (1) 10mm Fiber (2) DC Power	AT&T	150	(1) Andrew MTC3335 Collar Mount
148	(6) Powerwave 7770 (3) KMW AM-X-CD-16-65-00T (6) Powerwave LGP21401 TMAs (6) Powerwave LGP13519 Diplexers			148	(3) T-Arms
137	(3) RFS APXV18-206517S-C	(6) 1-5/8"	Pocket	137	(3) Pipe Mounts
127	(3) Argus LLPX310R (3) Samsung 2.5Ghz RRH BTSs (3) Andrew VHLP2-11 Dishes (1) Andrew VHLP800-11 Dish	(3) 5/16" (4) 1/2" (3) 5/8" (3) 1/4"	Clearwire	127	(3) 12' T-Arms

1. Coax installed inside the pole shaft unless otherwise noted.
2. Verizon currently has (6) 1-5/8" coax installed outside the pole in a single row to 157'.

Proposed Loading:

Antenna Elevation (ft)	Description	Coax and Lines	Carrier	Mount Elevation (ft)	Mount Type
157	(1)Antel BXA 70063/6CF (2)Swedcom SLCP 2X6014F (4) Decibel DB846F65ZAXY (2) Decibel DB846H80E-SX (6) Andrew HBXX 6517DS-VTM (3) Alcatel Lucent RRH2X60AWS RRH (3) Alcatel Lucent RRH2X60PCS RRH (1) RFS DB T1-6Z-8AB-OZ Distribution Box (1) GPS	(18) 1-5/8" (1) 1/2" (1) 1-5/8" Fiber	Verizon	157	(3) T-Arms

RESULTS

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

Table 2 - Material Strength

Member Type	Yield Strength
Tower Shaft Sections	65 ksi
Base Plate	60 ksi
Anchor Bolts	75 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 antenna rotations at service wind speed (dishes only).

If the assumptions outlined in this report differ from actual field conditions, FDH Engineering, Inc. 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
L1	169 - 139	Pole	TP30x24x0.1875	39.8	Pass
L2	139 - 89.25	Pole	TP39.58x28.875x0.25	95.8	Pass
L3	89.25 - 40.75	Pole	TP48.78x38.0795x0.375	84.4	Pass
L4	40.75 - 0	Pole	TP56.18x46.7799x0.4375	82.1	Pass
		Anchor Bolts	(16) 2.25" Ø on a 62.75" B.C.	90.3	Pass
		Base Plate	PL 3" Thk. x 61.25" Sq.	66.8	Pass

*Capacities include 1/3 allowable stress increase for wind per *TIA/EIA-222-F* standards.

Table 4 - Maximum Base Reactions

Base Reactions	Current Analysis* *(TIA/EIA-222-F)*	Original Design *(ANSI/TIA-222-G)*
Axial	42 k	60 k
Shear	31 k	44 k
Moment	3,737 k-ft	4,977 k-ft

*Foundation determined adequate per independent analysis.

Table 5 – Maximum Antenna Rotations at Service Wind Speed

Centerline Elevation (ft)	Antenna	Tilt (deg)*	Twist (deg)*
127	(3) Andrew VHLP2-11 Dishes (1) Andrew VHLP800-11 Dish	1.8073	0.0033

*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 Engineering, Inc. 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 Engineering, Inc.

APPENDIX

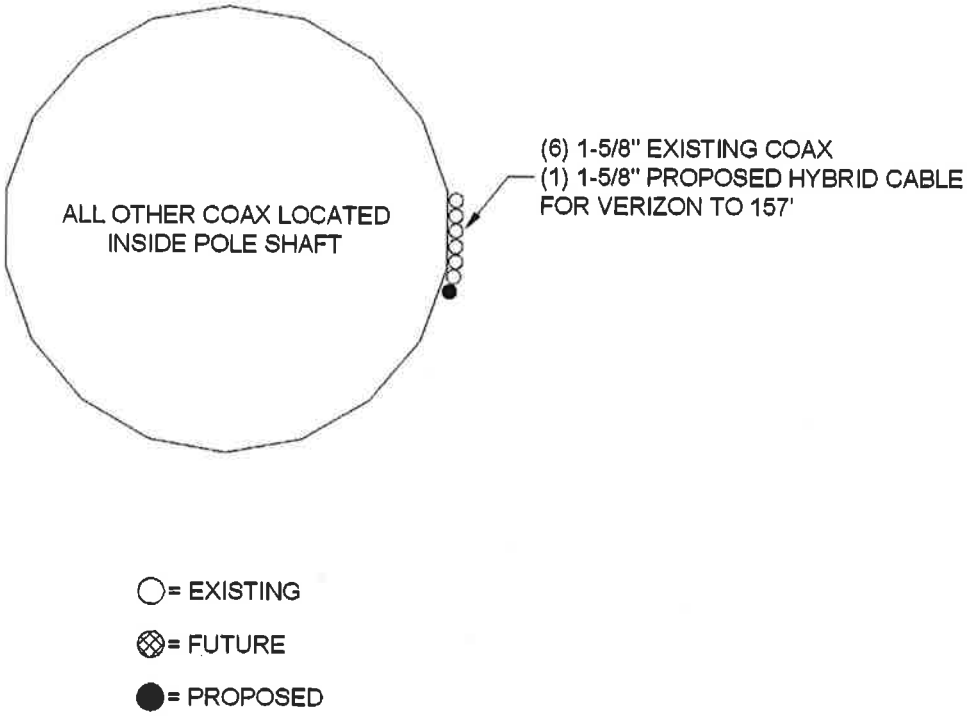
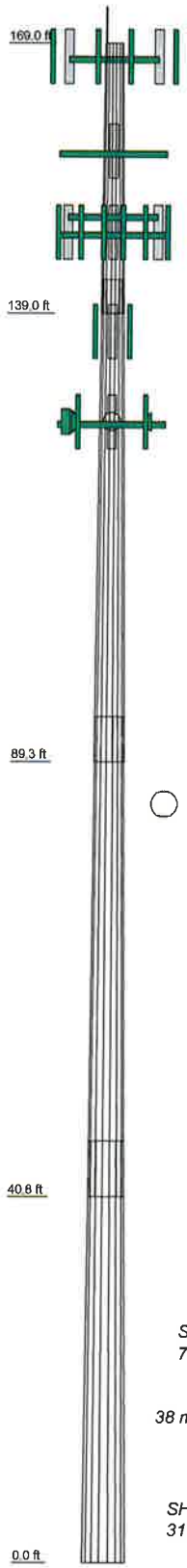
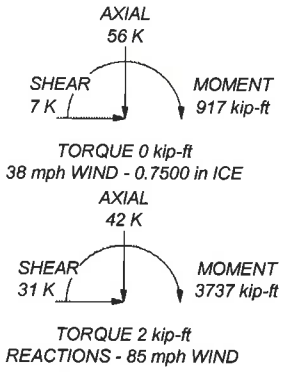


Figure 1 – Assumed Coax Layout

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	30.00	18	0.1875	3.75	24.0000	30.0000	A572-65	1.6
2	53.50	18	0.2500	5.00	28.8750	39.5800		4.9
3	53.50	18	0.3750	6.25	38.0795	48.7800		9.3
4	47.00	18	0.4375		46.7799	56.1800		11.3
								27.2





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod	169	(2) Pipe Mount	150
AIR 21 B2A/B4P w/Mount Pipe	167.5	(2) Pipe Mount	150
AIR 21 B2A/B4P w/Mount Pipe	167.5	(2) Pipe Mount	150
AIR 21 B2A/B4P w/Mount Pipe	167.5	(1) Andrew TMC3335 Collar Mount MNT	150
AIR 21 B4A/B2P w/Mount Pipe	167.5		
AIR 21 B4A/B2P w/Mount Pipe	167.5	(2) LGP 21401 TMA	148
AIR 21 B4A/B2P w/Mount Pipe	167.5	(2) LGP 13519 Diplexer	148
KTY 112-114	167.5	(2) LGP 13519 Diplexer	148
KTY 112-114	167.5	(2) LGP 13519 Diplexer	148
KTY 112-114	167.5	(3) T-Arms	148
(3) 4' T-Arms	167.5	(2) 7770 w/Mount Pipe	148
BXA-70063/6CF w/ Mount Pipe	157	(2) 7770 w/Mount Pipe	148
(2) DB846F65ZAXY w/ Mount Pipe	157	(2) 7770 w/Mount Pipe	148
DB846F65ZAXY w/ Mount Pipe	157	AM-X-CD-16-65-00T w/ Mount Pipe	148
DB846F65ZAXY w/ Mount Pipe	157	AM-X-CD-16-65-00T w/ Mount Pipe	148
DB846H80E-SX w/ Mount Pipe	157	AM-X-CD-16-65-00T w/ Mount Pipe	148
DB846H80E-SX w/ Mount Pipe	157	(2) LGP 21401 TMA	148
(2) HBXX-6517DS-VTM w/ Mount Pipe	157	(2) LGP 21401 TMA	148
(2) HBXX-6517DS-VTM w/ Mount Pipe	157	APXV18-206517 w/ mount pipe	137
(2) HBXX-6517DS-VTM w/ Mount Pipe	157	APXV18-206517 w/ mount pipe	137
(3) RRH2X60-AWS	157	APXV18-206517 w/ mount pipe	137
(3) RRH2X60-PCS	157	LLPX310R w/ mount pipe	127
157 DB-T1-6Z-8AB-0Z	157	LLPX310R w/ mount pipe	127
SLCP 2x6014F w/ Mount Pipe	157	127 2.5 Ghz RRH BTS	127
SLCP 2x6014F w/ Mount Pipe	157	2.5 Ghz RRH BTS	127
(3) T-Arms	157	2.5 Ghz RRH BTS	127
GPS	157	(3) 12' T-Arms	127
(2) RRUS 11 RRU	150	VHLP800-11	127
(2) RRUS 11 RRU	150	VHLP2-11	127
(2) RRUS 11 RRU	150	VHLP2-11	127
DC6-48-60-18-8F Surge Arrestor	150	VHLP2-11	127

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 95.8%

FDH Engineering, Inc.
6521 Meridien Drive, Suite 107
Raleigh, NC 27616
Phone: 9197551012
FAX: 9197551031

Tower Analysis

Job: Woodbridge, CT13071-A			
Project: 1462LB1400			
Client: SBA Network Services, Inc.	Drawn by: Cary Webb	App'd:	
Code: TIA/EIA-222-F	Date: 04/18/14	Scale: NTS	
Path:		Dwg No. E-1	