

May 21, 2015

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

Re: **Notice of Exempt Modification – Facility Modification
170 Mount Tobe Road, Plymouth, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) wireless telecommunications antennas at the 137-foot level on an existing 160-foot monopole tower at 170 Mount Tobe Road in Plymouth, Connecticut (the “Property”). The tower is owned by SBA. Cellco’s use of the tower was approved by the Council in 2004. Cellco now intends to modify its facility by replacing nine (9) of its existing antennas with three (3) model BXA-70080-6CF, 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 137-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. 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 Plymouth’s Mayor David V. Merchant. A copy of this letter is also being sent to Susan and Walter MacDonald, the owners 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).

13822632-v1

Melanie A. Bachman

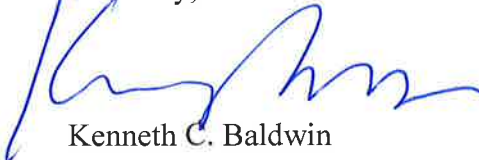
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1. The proposed modifications will not result in an increase in the height of the existing tower. The replacement antennas and RRHs will be installed on Cellco's existing antenna height of 137 feet.
2. The proposed modifications will not involve any 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:

Mayor David V. Merchant
Susan and Walter MacDonald
Tim Parks

ATTACHMENT 1

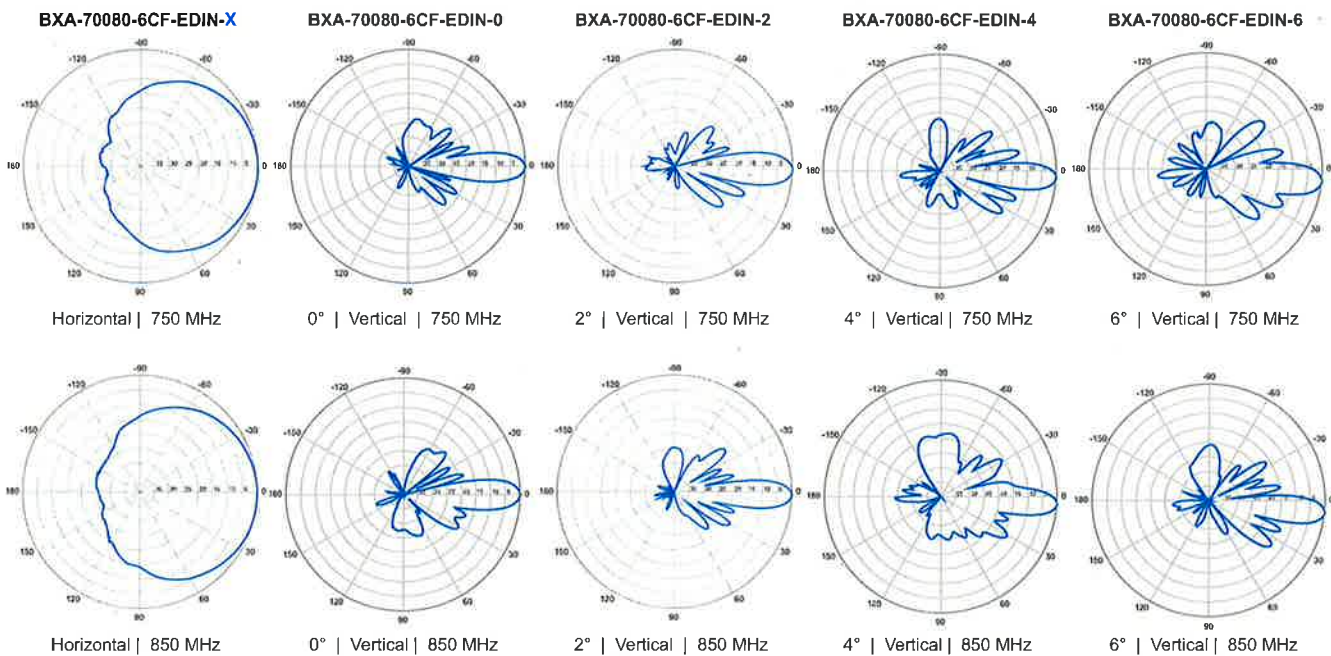
BXA-70080-6CF-EDIN-X

X-Pol | FET Panel | 80° | 13.5 dBd

Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	696-900 MHz		
Frequency bands	696-806 MHz	806-900 MHz	
Polarization	±45°		
Horizontal beamwidth	82°	80°	
Vertical beamwidth	12°	10°	
Gain	13.0 dBd (15.1 dBi)	13.5 dBd (15.6 dBi)	
Electrical downtilt (X)	0, 2, 4, 6, 8, 10		
Impedance	50Ω		
VSWR	≤1.35:1		
Upper sidelobe suppression (0°)	-18.3 dB	-18.6 dB	
Front-to-back ratio (+/-30°)	-26.9 dB	-25.6 dB	
Null fill	5% (-26.02 dB)		
Isolation between ports	< -25 dB		
Input power with EDIN connectors	500 W		
Input power with NE connectors	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)		
Mechanical Characteristics			
Dimensions Length x Width x Depth	1804 x 204 x 151 mm	71.0 x 8.0 x 5.9 in	
Depth with z-brackets	191 mm	7.5 in	
Weight without mounting brackets	8.2 kg	18 lbs	
Survival wind speed	> 201 km/hr	> 125 mph	
Wind area	Front: 0.37 m ² Side: 0.27 m ²	Front: 3.9 ft ² Side: 2.9 ft ²	
Wind load @ 161 km/hr (100 mph)	Front: 531 N Side: 475 N	Front: 119 lbf Side: 104 lbf	
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70080-6CF-EDIN-X-FP		

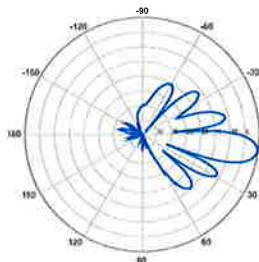


Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

BXA-70080-6CF-EDIN-X

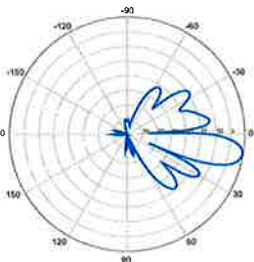
X-Pol | FET Panel | 80° | 13.5 dBd

BXA-70080-6CF-EDIN-8

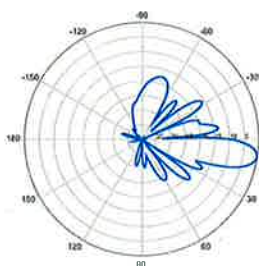


8° | Vertical | 750 MHz

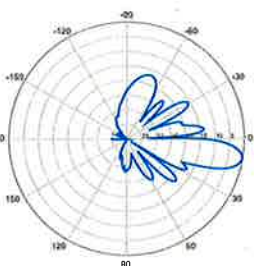
BXA-70080-6CF-EDIN-10



10° | Vertical | 750 MHz



8° | Vertical | 850 MHz



10° | Vertical | 850 MHz

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.



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
	0 ° 18.4	0 ° 18.4	0 ° 18.7
Gain by Beam Tilt, average, dBi	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

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.

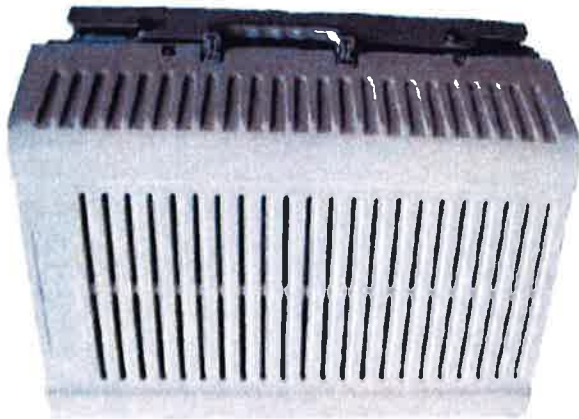
* Footnotes

Performance Note Severe environmental conditions may degrade optimum performance

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
Features	2 Branch RX – LA6.0.1 4 Branch RX – LR13.3 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)

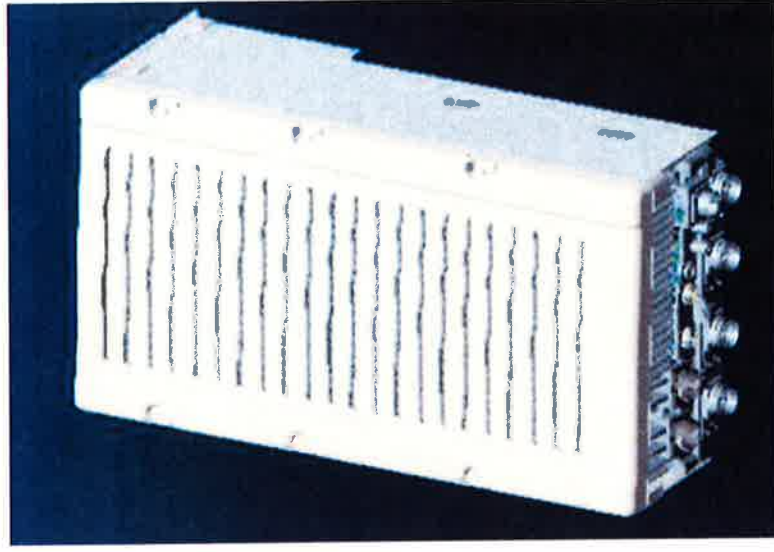
** Not a Verizon Wireless deployed product

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.

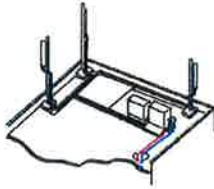
EASY INSTALLATION

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.

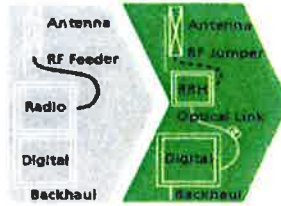
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

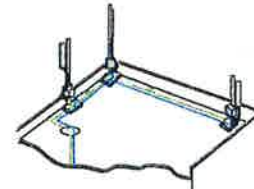
Installation can easily be done by a single person as the Alcatel-Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



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 daisy chaining 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)

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

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)

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.....Alcatel-Lucent

AT THE SPEED OF IDEAS™





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.

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



Figure 1: HYBRIFLEX Series

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
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)
DC-Resistance Outer Conductor Armor		(Ω/km (Ω/1000ft))	068 (0.205)
DC-Resistance Power Cable, 8.4mm ² (8AWG)		(Ω/km (Ω/1000ft))	2.1 (0.307)
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
Size (Power)		(mm (AWG))	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		(mm (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
Installation Temperature		(°C (°F))	-40 to +65 (-40 to 149)
Operation Temperature		(°C (°F))	-40 to +65 (-40 to 149)

* This data is provisional and subject to change

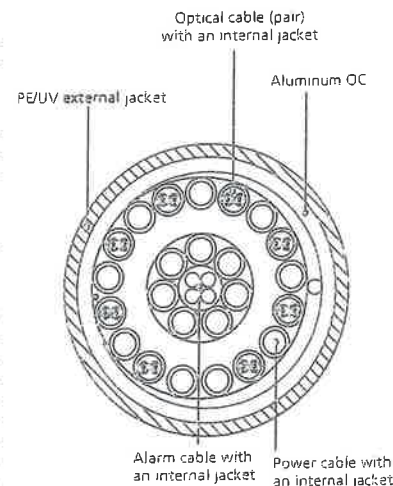


Figure 2: Construction Detail

All information contained in the present datasheet is subject to confirmation at time of ordering.

ATTACHMENT 2

		General		Power		Density							
Site Name: Thomaston S (Plymouth)													
Tower Height: 160Ft.													
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total					
*T-Mobile LTE	2	24	160	0.0007	2100	1.0000	0.07%						
*T-Mobile GSM/UMTS	2	12	160	0.0003	1950	1.0000	0.03%						
*T-Mobile UMTS	2	12	160	0.0003	2100	1.0000	0.03%						
*Sprint CDMA/LTE	2	13	148	0.0004	1900	1.0000	0.04%						
*Sprint CDMA/LTE	1	12	148	0.0002	850	0.5667	0.03%						
*Sprint CDMA/LTE	2	13	148	0.0004	2500	1.0000	0.04%						
*Pocket (now MetroPCS)	3	631	117	0.0497	2130	1.0000	4.97%						
*Nextel	9	100	127	0.0201	851	0.5673	3.54%						
*AT&T UMTS	2	565	108	0.0348	880	0.5867	5.94%						
*AT&T UMTS	2	875	108	0.0539	1900	1.0000	5.39%						
*AT&T GSM	1	283	108	0.0087	880	0.5867	1.49%						
*AT&T GSM	4	525	108	0.0647	1900	1.0000	6.47%						
*AT&T LTE	1	1313	108	0.0405	734	0.4893	8.27%						
Verizon PCS	11	421	137	0.0887	1970	1.0000	8.87%						
Verizon Cellular	9	393	137	0.0678	869	0.5793	11.70%						
Verizon AWS	1	1750	137	0.0335	2145	1.0000	3.35%						
Verizon 700	1	1050	137	0.0201	746	0.4973	4.04%						
								64.29%					
* Source: Siting Council													

ATTACHMENT 3

**Structural Analysis for
SBA Network Services, Inc.**

160' Monopole Tower

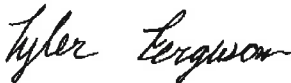
**SBA Site Name: South Plymouth
SBA Site ID: CT03538-S-05
Verizon Site Name: Thomaston South**

FDH Velocitel Project Number 15BJPA1400

Analysis Results

Tower Components	94.5%	Sufficient
Foundation	72.0%	Sufficient

Prepared By:



Tyler Ferguson
Project Engineer I

Reviewed By:



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

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



May 8, 2015

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EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Velocitel performed a structural analysis of the monopole located in Plymouth, 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 (CBC)*. Information pertaining to the existing/proposed antenna loading, current tower geometry, geotechnical data, foundation dimensions, and member sizes was obtained from:

- Paul J. Ford and Company (Job No. 29201-1019) original design drawings dated August 21, 2001
- Jaworski Geotech, Inc. (Project No. 00244G) Geotechnical Evaluation dated July 31, 2001
- SBA Network Services, Inc.

The *basic design wind speed* per the *TIA/EIA-222-F* standards and the *2005 CBC* is 80 mph without ice and 28 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 137 ft, the tower meets the requirements of the *TIA/EIA-222-F* standards and the *2005 CBC* provided the **Recommendations** listed below are satisfied. Furthermore, provided the foundation was constructed per the original design drawings (see Paul J. Ford and Company Job No. 29201-1019), and given the soil parameters (see Jaworski Geotech, Inc. Project No. 00244G), the foundation should have the necessary capacity to support the existing and proposed 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 CBC* are met with the existing and proposed loading in place, we have the following recommendations:

1. The feed lines should be installed inside the pole's shaft.
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 ¹	Carrier	Mount Elevation (ft)	Mount Type
160	(3) Ericsson AIR 21 B2A/B4P (3) Ericsson AIR 21 B4A/B2P (3) Ericsson KRY 112 144/1	(12) 1-5/8" (1) 1-5/8" Fiber	T-Mobile	160	(1) Low Profile Platform
156.5	(1) Lone Star Electronics Co. LS-230C	(1) 7/8"	Thomaston PD	153	(1) 4' Side-Arm
153	(1) Andrew VHLP-2.6-11 (1) Hutton HPD3.4-4.7 (3) Motorola ODU-A-RF Bands	(2) EW90			(2) Pipe Mounts
150	(3) RFS APXVTM14-C-I20	(4) 1-1/4"	Sprint	148	(1) Low Profile Platform
148	(3) RFS APXVSP18-C-A20 (3) Alcatel Lucent 1900 MHz RRH (3) Alcatel Lucent 800 MHz RRH (3) Alcatel Lucent 800 MHz Filters (4) RFS ACU-A20-N (3) TD-RRH8x20-25				
137	(6) Antel LPA-80080/6CF (3) Antel BXA-70063-6CF-2 (3) Antel BXA-171085-8CF-EDIN-X (3) Antel BXA-171063/12CF	(12) 1-5/8"	Verizon	137	(1) Low Profile Platform
134.5	(1) Bird Technologies CSA10-67-DIM	(1) 7/8"	Thomaston PD	133	(1) 4' Side-Arm
117	(3) RFS APXV18-206515S-C	(6) 1-5/8"	Pocket	117	(3) Pipe Mounts
108	(6) Powerwave 7770 (3) CSS DUO1417-8686-40 (3) KMW AM-X-CD-16-65-00T-RET (6) Powerwave LGP21401 (6) Powerwave LGP21903 (6) Ericsson RRUS-11 RRUs (1) Andrew ABT-DFDM-ADBH (1) Raycap DC6-48-60-18-8F	(12) 1-5/8" (1) 3" Conduit (1) 7/16" Fiber (2) 3/4" DC Power	AT&T	108	(1) Low Profile Platform
75	(1) GPS	(1) 1/2"	T-Mobile	75	(1) Pipe Mount

1. Feed lines installed inside pole's shaft unless otherwise noted

Proposed Carrier - Final Loading:

Antenna Elevation (ft)	Description	Feed Lines	Carrier	Mount Elevation (ft)	Mount Type
137	(6) Commscope HBXX-6517DS-A2M (3) Antel BXA-70063-6CF-2 (3) Antel BXA-70080-6CF-2 (6) RFS Celwave FD9R6004/2C-3L (3) Alcatel Lucent 2x60-1900 RRH (3) Alcatel Lucent RRH AWS (1) RFS DB-T1-8AB-0Z Distribution Box	(12) 1-5/8" (1) 1-5/8" Fiber	Verizon	137	(1) Low Profile Platform

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	55 ksi
Base Plate	55 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 maximum antenna 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
L1	160 - 119.25	Pole	TP32.763x24x0.25	50.9	Pass
L2	119.25 - 78.5	Pole	TP41.025x31.3491x0.3125	87.2	Pass
L3	78.5 - 38.75	Pole	TP48.947x39.2711x0.375	94.5	Pass
L4	38.75 - 0	Pole	TP56.53x46.8531x0.4375	91.7	Pass
		Anchor Bolts	(20) 2.25" Ø w/ BC = 64"	67.5	Pass
		Base Plate	PL 64" Square x 3" Thick	83.2	Pass

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

Table 4 - Maximum Base Reactions

Base Reactions	Current Analysis* (TIA/EIA-222-F)	Original Design (TIA/EIA-222-F)
Axial	45 k	37 k
Shear	31 k	38 k
Moment	3,570 k-ft	4,450 k-ft

*Foundation determined adequate per independent analysis.

Table 5 - Maximum Dish Rotations at Service Wind Speed (Dishes Only)

Centerline Elevation (ft)	Dish	Tilt* (deg)	Twist* (deg)
153	(1) Andrew VHLP-2.6-11 (1) Hutton HPD3.4-4.7	1.8742	0.0057

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

GENERAL COMMENTS

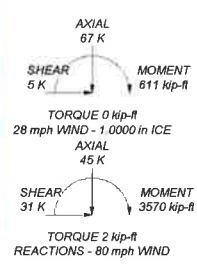
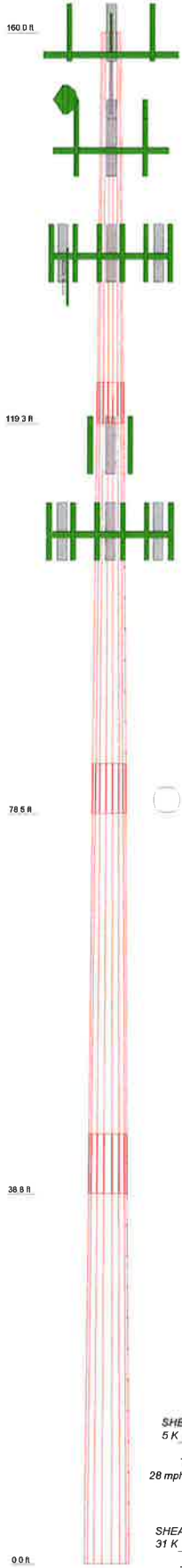
This engineering analysis is based upon the theoretical capacity of the structure. It is not a condition assessment of the tower and its foundation. It is the responsibility of SBA Network Services, Inc. to verify that the tower modeled and analyzed is the correct structure (with accurate antenna loading 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

Section	Length (ft)	Number of Slides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	40.75	18	0.2500	4.25	24.0000	22.7000	3.1	
2	45.00	18	0.3125	5.25	31.3491	41.0250	5.4	
3	45.00	18	0.3750	6.25	38.2711	48.9470	8.0	
4	45.00	18	0.4375	6.25	46.6551	56.5305	10.9	
							A607-55	27.4



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lighting Rod	150	BXA-70003-6CF-2	137
AR 21 B2AB4P w/Mount Pipe	158	BXA-70003-6CF-2	137
AR 21 B2AB4P w/Mount Pipe	158	BXA-70003-6CF-2	137
AR 21 B2AB4P w/Mount Pipe	158	BXA-70003-6CF-2	137
AR 21 B4AB2P w/Mount Pipe	158	BXA-70003-6CF-2	137
AR 21 B4AB2P w/Mount Pipe	158	BXA-70003-6CF-2	137
AR 21 B4AB2P w/Mount Pipe	158	BXA-70003-6CF-2	137
AR 21 B4AB2P w/Mount Pipe	158	(2) F09R0004/2C-3L	137
KRY 112 1441 TMA	158	(2) F09R0004/2C-3L	137
KRY 112 1441 TMA	158	(2) F09R0004/2C-3L	137
KRY 112 1441 TMA	158	RRH2X60-1900	137
Empty Mount Pipe	158	RRH2X60-1900	137
Empty Mount Pipe	158	RRH2X60-1900	137
Empty Mount Pipe	158	RRH AWS	137
(1) Low Profile Platform	158	RRH AWS	137
Loose Star LS-230C RX Omni	153	RRH AWS	137
Motorola ODU-A-RF Bands	153	DB-T1-62-345-02	137
Motorola ODU-A-RF Bands	153	(1) Low Profile Platform	137
Motorola ODU-A-RF Bands	153	(2) HBDX-65170S-A2M	137
(1) 4' Side Arm	153	(2) HBDX-65170S-A2M	137
Pipe Mount	153	Best Technologies CSA1047-DM TX Dipole	133
Pipe Mount	153	4' Standoff	133
VHLP2-6-11	153	APXV18-2065155-C w/Mount Pipe	117
Hutton HPD3-4-4.7	153	(3) Pipe Mounts	117
APXVSP18-C-A20 w/Mount Pipe	148	APXV18-2065155-C w/Mount Pipe	117
APXV1M14-C-120 w/ Mount Pipe	148	APXV18-2065155-C w/Mount Pipe	117
APXV1M14-C-120 w/ Mount Pipe	148	(2) 7770 00	108
APXV1M14-C-120 w/ Mount Pipe	148	DUD1417-8686-40i	108
1900 MHz RRH	148	DUD1417-8686-40i	108
1900 MHz RRH	148	DUD1417-8686-40i	108
1900 MHz RRH	148	AM-X-CD-16-65-00T-RET	108
800 MHz RRH	148	AM-X-CD-16-65-00T-RET	108
800 MHz RRH	148	AM-X-CD-16-65-00T-RET	108
800 MHz RRH	148	(2) LGP21401 TMA	108
TD-RRH8-25-25	148	(2) LGP21401 TMA	108
TD-RRH8-25-25	148	(2) LGP21903 Dipole	108
TD-RRH8-25-25	148	(2) LGP21903 Dipole	108
800 MHz External Notch Filter	148	(2) LGP21903 Dipole	108
800 MHz External Notch Filter	148	(2) LGP21903 Dipole	108
800 MHz External Notch Filter	148	(2) RRRUS-11	108
ACU-A20-N RET	148	(2) RRRUS-11	108
ACU-A20-N RET	148	(2) RRRUS-11	108
(2) ACU-A20-N RET	148	ABT-DFDM-ADBN	108
(2) Empty Mount Pipe	148	DC6-48-60-18-8F	108
(2) Empty Mount Pipe	148	(1) Low Profile Platform	108
(2) Empty Mount Pipe	148	(2) 7770 00	108
(1) Low Profile Platform	148	(2) 7770 00	108
APXVSP18-C-A20 w/Mount Pipe	148	GPS	75
APXVSP18-C-A20 w/Mount Pipe	148	Pipe Mount	75
(2) HBDX-65170S-A2M	137		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-55	55 ksi	70 ksi			

TOWER DESIGN NOTES

1. Tower is located in Litchfield 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 28 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: 94.5%

	Velocitel, Inc., d.b.a. FDH Velocitel 6521 Meridian Drive, Suite 107 Raleigh, North Carolina 27616 Phone: 9197551012 FAX: 9197551031	South Plymouth, CT03538-S-05 Project: 15BPA11400 Client: SBA Network Services, Inc. Code: TIA/EIA-222-F Path:	Drawn by: Tyler Ferguson Date: 05/08/15 Scale: Dwg No:
	Tower Analysis		