

May 4, 2015

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

Re: **Notice of Exempt Modification – Facility Modification
151 Sand Hill Road, South Windsor, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) wireless telecommunications antennas at the 140-foot level on an existing 187-foot monopole tower at 151 Sand Hill Road, South Windsor, Connecticut (the “Property”). The tower is owned by SBA. Cellco’s use of the tower was approved by the Council in 2002. Cellco now intends to modify its facility by replacing nine (9) of its existing antennas with three (3) model LNX-6514DS-VTM, 700 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 140-foot level on the tower. Cellco also intends to replace three (3) existing remote radio heads (“RRHs”) and add three (3) additional RRHs, one (1) each behind its 700 MHz and 2100 MHz antennas. 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 Matthew B. Galligan, Manager of the Town of South Windsor. The Town of South Windsor is the owner of the Property.

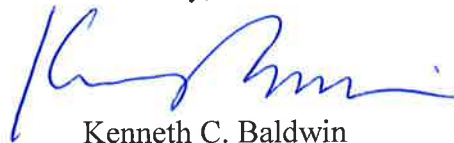
The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

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 platform at the 140-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:

Matthew B. Galligan, Town Manager
Tim Parks

ATTACHMENT 1



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
	0 ° 15.7	0 ° 15.9
Gain by Beam Tilt, average, dBi	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®

INX-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



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

POWERED BY



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

RoHS 2011/65/EU
China RoHS SJ/T 11364-2006
ISO 9001:2008

Classification

Compliant by Exemption
Above Maximum Concentration Value (MCV)
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.

Alcatel-Lucent RRH2x40-07-U

REMOTE RADIO HEAD

The Alcatel-Lucent RRH2x40-07-U is a high-power, small form-factor Remote Radio Head (RRH) operating in the North American Digital Dividend / 700MHz frequency band (3GPP Band 13). The Alcatel-Lucent RRH2x40-07-U is designed with an eco-efficient approach, providing operators with the means to achieve high quality and capacity coverage with minimum site requirements.



A distributed eNodeB expands 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 an eNodeB to be installed separately, within the same site or several kilometres apart.

The Alcatel-Lucent RRH2x40-07-U 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 RRH2x40-07-U has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to two-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 10 MHz of bandwidth.

The Alcatel-Lucent RRH2x40-07-U is designed to make available all the benefits of a distributed eNodeB, with excellent RF characteristics, with low

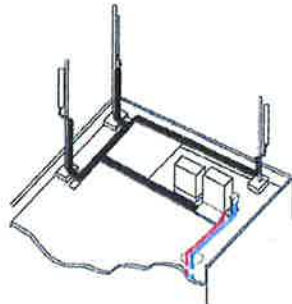
capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent RRH2x40-07-U installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

Fast, low-cost installation and deployment

The Alcatel-Lucent RRH2x40-07-U is a zero-footprint solution and operates noise-free, simplifying negotiations with site property owners and minimizing environmental impacts. Installation can easily be done by a single person because the Alcatel-Lucent RRH2x40-07-U is compact and weighs less than 23 kg (50 lb), 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 — a fraction of the time required for a traditional BTS.

Excellent RF performance

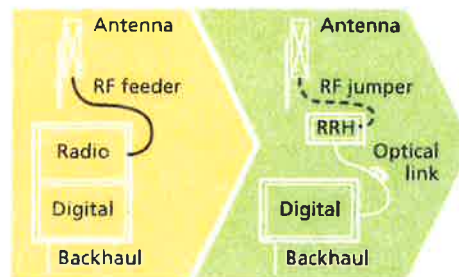
Because of its small size and weight, the Alcatel-Lucent RRH2x40-07-U can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-07-U where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation costs are reduced or eliminated, and there is no need for a Tower Mounted Amplifier (TMA) because losses introduced by the RF feeder are greatly reduced. The Alcatel-Lucent RRH2x40-07-U provides more RF power while at the same time consuming less electricity.



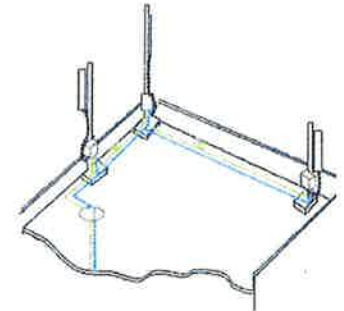
Macro

Features

- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless), noise-free, and heaterless unit
- Best-in-class power efficiency, with significantly reduced energy consumption



RRH for space-constrained cell sites



Distributed

Benefits

- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility to network planning

Technical specifications

Physical dimensions

- Height: 390 mm (15.4 in.)
- Width: 380 mm (15 in.)
- Depth: 210 mm (8.2 in.)
- Weight (without mounting kit): less than 23 kg (50 lb)

Power

- Power supply: -48V

Operating environment

- Outdoor temperature range:
 - With solar load: -40°C to +50°C (-40°F to +122°F)
 - Without solar load: -40°C to +55°C (-40°F to +131°F)
- Passive convection cooling (no fans)

- Enclosure protection
 - IP65 (International Protection rating)

RF characteristics

- Frequency band: 700 MHz; 3GPP Band 13
- Bandwidth: up to 10 MHz
- RF output power at antenna port:
 - 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way
- Noise figure: below 2.5 dB typical
- ALD features
 - TMA
 - Remote electrical tilt (RET) support (AISG v2.0)

Optical characteristics

Type/number of fibers

- Up to 3.12 Gb/s line bit rate
- Single-mode variant
 - One SM fiber (9/125 μm) per RRH2x, carrying UL and DL using CWDM (at 1550/1310 nm)
- Multi-mode variant
 - Two MM fibers (50/125 μm) per RRH2x: one carrying UL, the other carrying DL (at 850 nm)

Optical fiber length

- Up to 500 m (0.31 mi), using MM fiber
- Up to 20 km (12.43 mi), using SM fiber

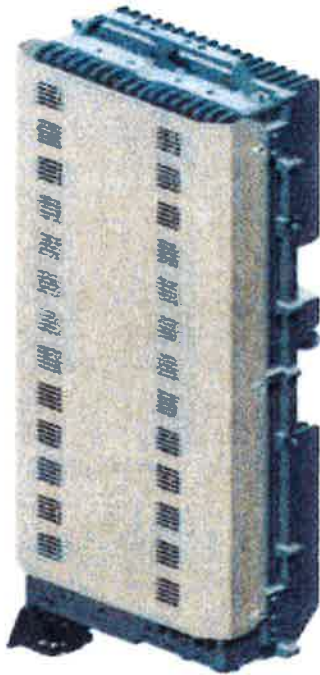
Alarms and ports

- Six external alarms
- Two optical ports to support daisy-chaining

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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.

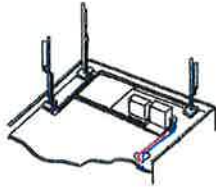
EASY INSTALLATION

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.

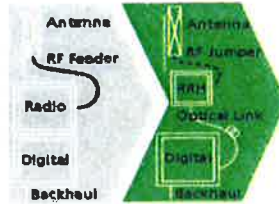
The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation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

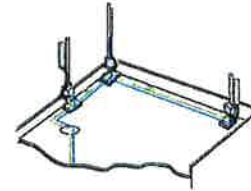
Installation can easily be done by a single person as the Alcatel-Lucent RRH2x60-AWS is compact and weighs about 20 kg, eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day.



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™



ATTACHMENT 2

CARRIER	General		Power		Density		CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total
	# OF CHAN.	WATTS ERP	HEIGHT	DENSITY							
*Town	1	400	193	0.0039	857.7375	0.5718	0.68%				
*Town	1	40	193	0.0004	453.2375	0.3022	0.13%				
*Town	1	110	193	0.0011	45.24	0.2000	0.53%				
*Town	1	100	193	0.0010	33.9	0.2000	0.48%				
*Town	1	50	97	0.0019	462.325	0.3082	0.62%				
*Town	1	50	97	0.0019	154.265	0.2000	0.96%				
*Town	1	50	100	0.0018	45.86	0.2000	0.90%				
*Town	1	100	100	0.0036	45.86	0.2000	1.80%				
*Town	1	100	100	0.0036	960	0.6400	0.56%				
*Town	1	30	95	0.0012	821	0.5473	0.22%				
*Sprint CDMA/LTE	3	693	130	0.0442	1900	1.0000	4.42%				
*Sprint CDMA/LTE	1	390	130	0.0083	850	0.5473	1.52%				
*Sprint CDMA/LTE	1	779	130	0.0166	2500	1.0000	1.66%				
*AT&T UMTS	2	565	170	0.0141	880	0.5867	2.40%				
*AT&T UMTS	2	875	170	0.0218	1900	1.0000	2.18%				
*AT&T GSM	1	491	170	0.0061	880	0.5867	1.04%				
*AT&T GSM	4	813	170	0.0405	1900	1.0000	4.05%				
*AT&T LTE	1	1313	170	0.0163	734	0.4893	3.34%				
*Pocket (now MetroPCS)	3	631	180	0.0210	2130	1.0000	2.10%				
*Clearwire	2	153	150	0.0049	2496	1.0000	0.49%				
*Clearwire	1	211	150	0.0034	11 GHz	1.0000	0.34%				
*Nextel	9	100	150	0.0144	851	0.5673	2.54%				
*T-Mobile	2	953	160	0.0268	1900	1.0000	2.68%				
*T-Mobile	4	476	160	0.0267	2100	1.0000	2.67%				
Verizon PCS	11	408	140	0.0823	1970	1.0000	8.23%				
Verizon Cellular	9	386	140	0.0637	869	0.5793	11.00%				
Verizon AWS	1	1750	140	0.0321	2145	1.0000	3.21%				
Verizon 700	1	1050	140	0.0193	746	0.4973	3.87%			64.60%	
* Source: Siting Council											

ATTACHMENT 3



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.**

187' Monopole Tower

**SBA Site Name: South Windsor
SBA Site ID: CT07824-S-04
Verizon Site ID: 117979**

FDH Velocitel Project Number 15BJL1400

Analysis Results

Tower Components	75.1%	Sufficient
Foundation	77.8%	Sufficient

Prepared By:

Kevin C. Diaz, EIT
Project Engineer

Reviewed By:

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

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6521 Meridien Drive
Raleigh, NC 27616
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info@fdhvelocitel.com



April 8, 2015

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

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APPENDIX 8

EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Velocitel performed a structural analysis of the monopole located in South Windsor, 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, foundation dimensions, current tower geometry, geotechnical data, and member sizes was obtained from:

- Sabre Communications Corporation (Job No. 02-10062 Revision B) Structural Design Report dated November 1, 2001
- Sabre Communications Corporation (Job No. 02-10062) Erection Drawings dated November 7, 2001
- Clarence Welti Associates, Inc. (Project Name: Nextel Tower @ Police Station) Geotechnical Study dated September 29, 2000
- 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 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 140 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 designed and constructed to support the original design reactions (see Sabre Communications Corporation Job No. 02-10062 Revision B), 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 proposed feed lines should be installed inside the pole's shaft.
2. RRU/RRH Stipulation: The 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
187	(2) Scala MF-900B (2) Telewave ANT900D6-9 (1) Telewave ANT450F6 (2) Decibel DB201	(3) 7/8" (4) 1/2"	Town of South Windsor	187	(1) Low Profile Platform
180	(3) Kathrein 742 213	(6) 1-5/8"	Pocket Communications	180	(1) Collar Mount
170	(3) Powerwave 7770.00 (9) KMW AM-X-CD-16-65-00T-RET (6) CCI DTMABP7819VG12A (6) Ericsson RRUS 11 (12) Kathrein 782 10250 (3) CSS DBC-750 (1) Raycap DC6-48-60-18-8F (3) Andrew ABT-DFDM-ADBH	(12) 1-5/8" (1) 3" Conduit	New Cingular	170	(1) Low Profile Platform
160	(3) Ericsson Air 21 B2A/B4P (3) Ericsson Air 21 B4A/B2P (3) Ericsson KRY 112 144	(12) 1-5/8" (1) 1-5/8" Fiber	T-Mobile	160	(1) Low Profile Platform
140	(3) Antel BXA-70063/6CF (3) Commscope LNX-6514DS-VTM (3) Antel BXA-185090/8CFx2 (3) Commscope HBX-6517DS-VTM (3) Alcatel Lucent RRH2x40-AWS (6) RFS FD9R6004/2C-3L (1) RFS DB-T1-6Z-8AB-0Z (6) Alcatel Lucent KS24019	(12) 1-5/8" (1) 1/2" (1) 1-5/8" Hybriflex	Verizon	140	(1) Low Profile Platform
130	(3) RFS APXVSPP18-C-A20 (3) RFS APXVTM14-C-I20 (3) Alcatel Lucent TD-RRH8x20-25 (3) Alcatel Lucent 1900MHz (3) Alcatel Lucent 800MHz (3) Alcatel Lucent 800MHz Filters (3) RF Filters (4) RFS ACU-A20-N	(3) 1-1/4" (1) 0.7" Fiber	Sprint	130	(1) Low Profile Platform
92	(2) Scala MF-900B (1) Telewave ANT4506-9 (1) Telewave ANT150D3 (1) Telewave ANT450Y10-WR (1) Decibel DB205	(6) 1/2"	Town of South Windsor	92	(1) Low Profile Platform

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

Proposed Carrier Final Loading:

Antenna Elevation (ft)	Description	Feed Lines	Carrier	Mount Elevation (ft)	Mount Type
140	(3) Commscope LNX-6514DS-A1M (3) Commscope LNX-6514DS-VTM (6) Commscope HBXX-6517DS-A2M (3) Alcatel Lucent 2x60-1900 RRH (3) Alcatel Lucent RRH 2x40 07-U RRU (6) RFS FD9R6004/2C-3L (1) RFS DB-T1-6Z-8AB-0Z (6) Alcatel Lucent KS24019	(12) 1-5/8" (1) 1/2" (1) 1-5/8" Hybriflex	Verizon	140	(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	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. **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 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	187 - 142.75	Pole	TP34.17x24x0.25	39.7	Pass
L2	142.75 - 93.75	Pole	TP44.94x32.6358x0.375	66.1	Pass
L3	93.75 - 46.25	Pole	TP55.12x42.8101x0.4375	75.1	Pass
L4	46.25 - 0	Pole	TP64.88x52.6344x0.5	73.6	Pass
		Anchor Bolts	(26) 2.25"Ø w/ BC = 72"	65.7	Pass
		Base Plate	PL 78"Ø x 2.5" Thick	60.2	Pass

*Capacities include a 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 (TIA/EIA-222-F)
Axial*	62 k	83 k
Shear*	39 k	48 k
Moment	5,091 k-ft	6,541 k-ft

*Per our experience with foundations of similar type, the axial and shear loading should not control the foundation analysis.

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

Centerline Elevation (ft)	Antenna	Tilt* (deg)	Twist* (deg)
187	(2) Scala MF-900B	1.8831	0.0025
92	(2) Scala MF-900B	1.0453	0.0007

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

GENERAL COMMENTS

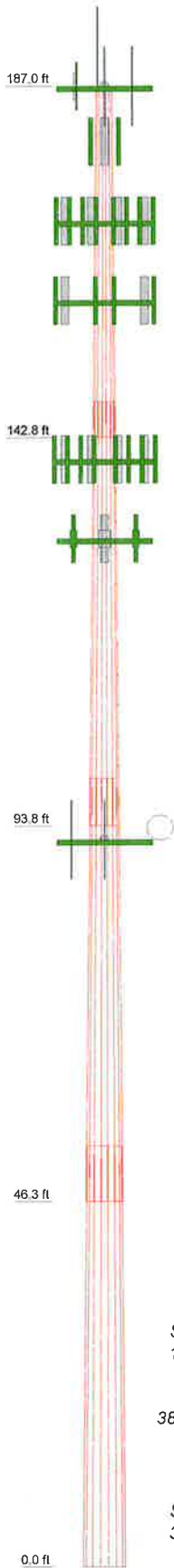
This engineering analysis is based upon the theoretical capacity of the structure. It is not a condition assessment of the tower and its foundation. It is the responsibility of SBA Network Services, Inc. to verify that the tower modeled and analyzed is the correct structure (with accurate antenna loading 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	1	2	3	4
Length (ft)	44.25	53.50	53.50	53.25
Number of Sides	18	18	18	18
Thickness (in)	0.2500	0.3750	0.4375	0.5000
Socket Length (ft)	4.50	6.00	7.00	52.6344
Top Dia (in)	24.0000	32.6356	42.8101	64.8800
Bot Dia (in)	34.1700	44.9400	55.1200	16.8
Grade		A572-65		
Weight (K)	3.4	8.3	12.3	40.8



DESIGNED APPURTENANCE LOADING

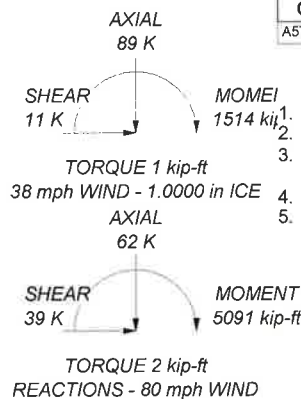
TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod	187	LNX-6514DS-A1M w/ Mount Pipe	140
(2) DB201-A	187	LNX-6514DS-A1M w/ Mount Pipe	140
(2) ANT900D6-9	187	LNX-6514DS-VTM w/ Mount Pipe	140
ANT450F6 Omni	187	LNX-6514DS-VTM w/ Mount Pipe	140
(4) Empty Mount Pipe	187	LNX-6514DS-VTM w/ Mount Pipe	140
(4) Empty Mount Pipe	187	RRH 2x40 07-U RRU	140
(4) Empty Mount Pipe	187	RRH 2x40 07-U RRU	140
Low Profile Platform	187	RRH 2x40 07-U RRU	140
(2) Scala MF-900B Dishes	187	2x60-1900 RRH	140
742 213 w/Mount Pipe	180	2x60-1900 RRH	140
742 213 w/Mount Pipe	180	2x60-1900 RRH	140
Collar Mount	180	(2) FD9R6004/2C-3L Diplexer	140
742 213 w/Mount Pipe	180	(2) FD9R6004/2C-3L Diplexer	140
7770.00 w/Mount Pipe	170	(2) FD9R6004/2C-3L Diplexer	140
7770.00 w/Mount Pipe	170	DB-T1-6Z-8AB-0Z	140
(3) AM-X-CD-16-65-00T-RET w/ Mount Pipe	170	(2) KS24019	140
(3) AM-X-CD-16-65-00T-RET w/ Mount Pipe	170	(2) KS24019	140
(3) AM-X-CD-16-65-00T-RET w/ Mount Pipe	170	(2) KS24019	140
(3) AM-X-CD-16-65-00T-RET w/ Mount Pipe	170	Low Profile Platform	140
(2) DTMABP7819VG12A TMA	170	APXVTM14-C-I20 w/ Mount Pipe	130
(2) DTMABP7819VG12A TMA	170	APXVTM14-C-I20 w/ Mount Pipe	130
(2) DTMABP7819VG12A TMA	170	APXVTM14-C-I20 w/ Mount Pipe	130
(2) RRUS 11	170	APXVSPP18-C-A20 w/Mount Pipe	130
(2) RRUS 11	170	APXVSPP18-C-A20 w/Mount Pipe	130
(2) RRUS 11	170	APXVSPP18-C-A20 w/Mount Pipe	130
(4) 782 10250 Combiner	170	APXVSPP18-C-A20 w/Mount Pipe	130
(4) 782 10250 Combiner	170	APXVSPP18-C-A20 w/Mount Pipe	130
(4) 782 10250 Combiner	170	APXVSPP18-C-A20 w/Mount Pipe	130
DBC-750 Diplexer	170	TD-RRH8x20-25	130
DBC-750 Diplexer	170	TD-RRH8x20-25	130
DBC-750 Diplexer	170	TD-RRH8x20-25	130
DCS-48-60-18-8F Surge Arrestor	170	RF Filter	130
Low Profile Platform	170	RF Filter	130
7770.00 w/Mount Pipe	170	RF Filter	130
AIR 21 B2A/B4P w/Mount Pipe	160	RRU-ALU 1900MHZ	130
AIR 21 B2A/B4P w/Mount Pipe	160	RRU-ALU 1900MHZ	130
AIR 21 B4A/B2P w/Mount Pipe	160	RRU-ALU 1900MHZ	130
AIR 21 B4A/B2P w/Mount Pipe	160	RRU-ALU 1900MHZ	130
AIR 21 B4A/B2P w/Mount Pipe	160	RRU-ALU 1900MHZ	130
Empty Mount Pipe	160	RRU-ALU 800MHZ	130
Empty Mount Pipe	160	RRU-ALU 800MHZ	130
Empty Mount Pipe	160	RRU-ALU 800MHZ	130
KRY 112 144	160	Filter- ALU 800MHZ	130
KRY 112 144	160	Filter- ALU 800MHZ	130
KRY 112 144	160	Filter- ALU 800MHZ	130
Low Profile Platform	160	(2) ACU-A20-N RET	130
AIR 21 B2A/B4P w/Mount Pipe	160	ACU-A20-N RET	130
(2) HBXX-6517DS-A2M w/ Mount Pipe	140	ACU-A20-N RET	130
(2) HBXX-6517DS-A2M w/ Mount Pipe	140	Low Profile Platform	130
(2) HBXX-6517DS-A2M w/ Mount Pipe	140	(4) Empty Mount Pipe	92
(2) HBXX-6517DS-A2M w/ Mount Pipe	140	(4) Empty Mount Pipe	92
LNX-6514DS-A1M w/ Mount Pipe	140	Low Profile Platform	92
		ANT4506-9	92
		ANT150D3	92
		ANT450Y10-WR	92
		(4) Empty Mount Pipe	92
		DB205-A	92
		(2) Scala MF-900B Dishes	92


MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 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: 75.1%





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Job: South Windsor, CT07824-S-04

Project: 15BJL1400

Client: SBA Network Services, Inc. Drawn by: KDiaz App'd:

Code: TIA/EIA-222-F Date: 04/08/15 Scale: N

Path: _____ Dwg No: _____