

July 11, 2014

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

Re: **Notice of Exempt Modification – Facility Modification
257 Norman Road, Jewett City (Griswold), Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains fifteen (15) antennas at the top of the existing 160-foot lattice tower at 257 Norman Road in Jewett City, Connecticut (the “Property”). The tower is owned by SBA. The Council approved Cellco’s use of this tower in 1999. Cellco now intends to modify its facility by removing nine (9) existing antennas and replacing them with three (3) model BXA-70080-4CF, 850 MHz antennas; three (3) model BXA-171085-12BF, 1900 MHz antenna; and three (3) model WBX065X19x050, 2100 MHz antennas, all at the same level on the tower. Cellco also intends to install three (3) remote radio heads (“RRHs”) behind its 2100 MHz antennas and one (1) HYBRIFLEX™ antenna cable. 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 Kevin Skulczyck, First Selectman for the Town of Griswold. A copy of this letter is also being sent to Ernest R. Norman, 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).

13019397-v1

Robinson+Cole

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1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's new antennas and RRHs will be installed at a centerline height of 158 feet on the existing 160-foot tower.

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

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

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative General Power Density table for 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:

Kevin Skulczyck, Griswold First Selectman
Ernest R. Norman
Sandy M. Carter

ATTACHMENT 1

BXA-70080-4CF-EDIN-X

X-Pol | FET Panel | 80° | 12.0 dBd

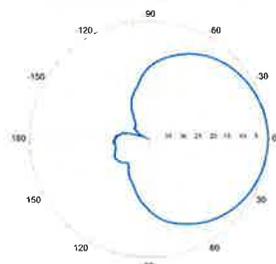
Replace 'X' with desired electrical downtilt

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



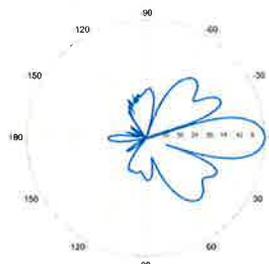
Electrical Characteristics	696-900 MHz		
Frequency bands	696-806 MHz	806-900 MHz	
Polarization	±45°		
Horizontal beamwidth	82°	80°	
Vertical beamwidth	17°	15°	
Gain	11.5 dBd (13.6 dBi)	12.0 dBd (14.1 dBi)	
Electrical downtilt (X)	0, 2, 4, 6, 8, 10, 12, 14		
Impedance	50Ω		
VSWR	≤1.35:1		
Upper sidelobe suppression (0°)	-11.8 dB	-13.1 dB	
Front-to-back ratio (+/-30°)	-30.3 dB	-36.7 dB	
Null fill	5% (-26.02 dB)		
Isolation between ports	< -30 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	1206 x 204 x 151 mm	47.5 x 8.0 x 5.9 in	
Depth with z-brackets	196 mm	7.7 in	
Weight without mounting brackets	5.4 kg	12 lbs	
Survival wind speed	> 201 km/hr	> 125 mph	
Wind area	Front: 0.25 m ² Side: 0.18 m ²	Front: 2.6 ft ² Side: 1.9 ft ²	
Wind load @ 161 km/hr (100 mph)	Front: 351 N Side: 280 N	Front: 79 lbf Side: 61 lbf	
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting & Downtilt Bracket Kit	36210006	40-115 mm 1.57-4.5 in	4.1 kg 9 lbs
Concealment Configurations	For concealment configurations, order BXA-70080-4CF-EDIN-X-FP		

BXA-70080-4CF-EDIN-X



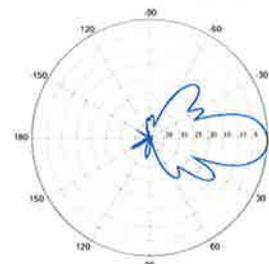
Horizontal | 750 MHz

BXA-70080-4CF-EDIN-0

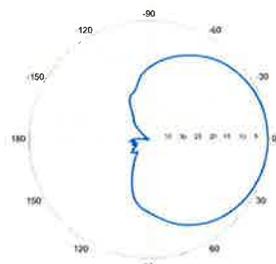


0° | Vertical | 750 MHz

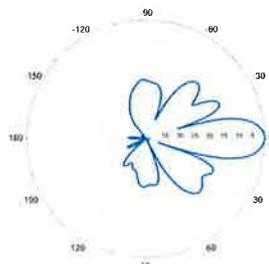
BXA-70080-4CF-EDIN-2



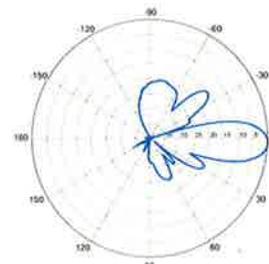
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz



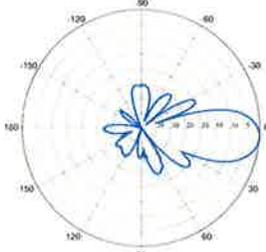
2° | Vertical | 850 MHz

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.

BXA-70080-4CF-EDIN-X

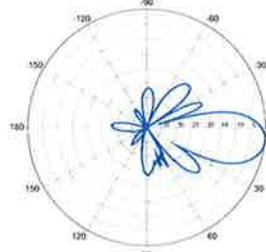
X-Pol | FET Panel | 80° | 12.0 dBd

BXA-70080-4CF-EDIN-4



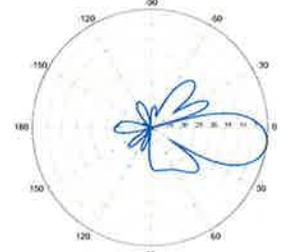
4° | Vertical | 750 MHz

BXA-70080-4CF-EDIN-6

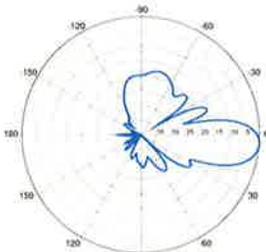


6° | Vertical | 750 MHz

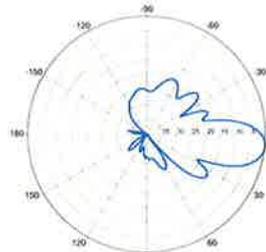
BXA-70080-4CF-EDIN-8



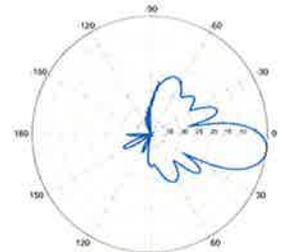
8° | Vertical | 750 MHz



4° | Vertical | 850 MHz

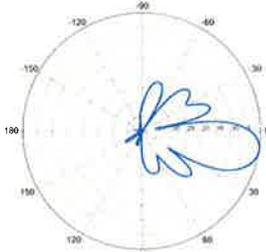


6° | Vertical | 850 MHz



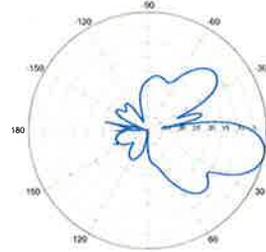
8° | Vertical | 850 MHz

BXA-70080-4CF-EDIN-10



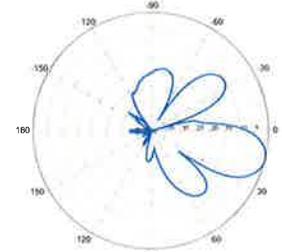
10° | Vertical | 750 MHz

BXA-70080-4CF-EDIN-12

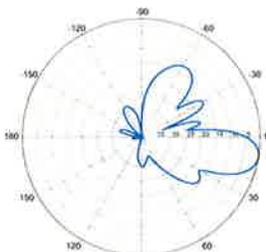


12° | Vertical | 750 MHz

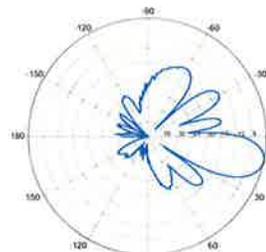
BXA-70080-4CF-EDIN-14



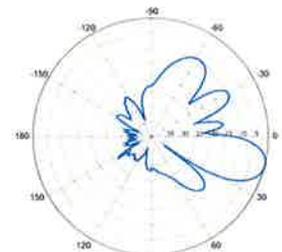
14° | Vertical | 750 MHz



10° | Vertical | 850 MHz



12° | Vertical | 850 MHz



14° | Vertical | 850 MHz

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BXA-171085-12BF-EDIN-X

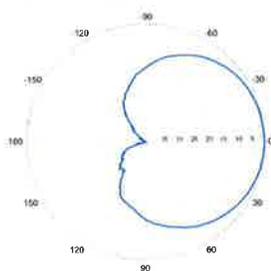
Replace "X" with desired electrical downtilt.

X-Pol | FET Panel | 85° | 18.0 dBi

Electrical Characteristics	1710-2170 MHz				
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz		
Polarization	±45°	±45°	±45°		
Horizontal beamwidth	88°	85°	80°		
Vertical beamwidth	4.5°	4.5°	4.5°		
Gain	15.1 dBd / 17.2 dBi	15.5 dBd / 17.6 dBi	15.9 dBd / 18.0 dBi		
Electrical downtilt (X)		0, 2, 4			
Impedance	50Ω				
VSWR	≤1.5:1				
First upper sidelobe	< -17 dB				
Front-to-back ratio	> 30 dB				
In-band isolation	> 28 dB				
IM3 (20W carrier)	< -150 dBc				
Input power	300 W				
Lightning protection	Direct Ground				
Connector(s)	2 Ports / EDIN / Female / Bottom				
Operating temperature	-40° to +60° C / -40° to +140° F				
Mechanical Characteristics					
Dimensions Length x Width x Depth	1820 x 154 x 105 mm	71.7 x 6.1 x 4.1 in			
Depth with z-brackets	133 mm	5.2 in			
Weight without mounting brackets	6.8 kg	15 lbs			
Survival wind speed	> 201 km/hr	> 125 mph			
Wind area	Front: 0.28 m ² Side: 0.19 m ²	Front: 3.1 ft ² Side: 2.1 ft ²			
Wind load @ 161 km/hr (100 mph)	Front: 460 N Side: 304 N	Front: 103 lbf Side: 68 lbf			
Mounting Options	Part Number	Fits Pipe Diameter		Weight	
2-Point Mounting Bracket Kit	26799997	50-102 mm	2.0-4.0 in	2.3 kg	5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm	2.0-4.0 in	3.6 kg	8 lbs
Concealment Configurations	For concealment configurations, order BXA-171085-12BF-EDIN-X-FP				

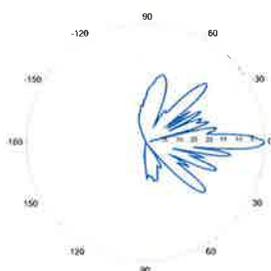


BXA-171085-12BF-EDIN-X



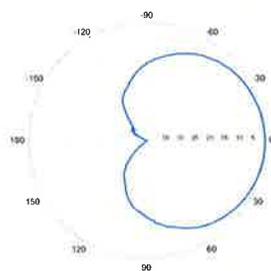
Horizontal | 1710-1880 MHz

BXA-171085-12BF-EDIN-0



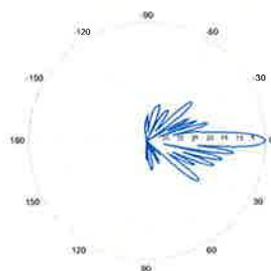
0° | Vertical | 1710-1880 MHz

BXA-171085-12BF-EDIN-X



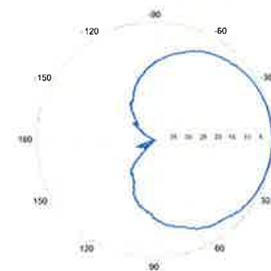
Horizontal | 1850-1990 MHz

BXA-171085-12BF-EDIN-0



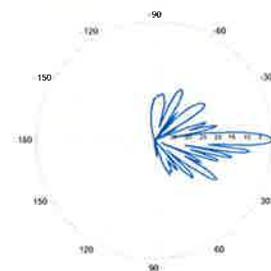
0° | Vertical | 1850-1990 MHz

BXA-171085-12BF-EDIN-X



Horizontal | 1920-2170 MHz

BXA-171085-12BF-EDIN-0



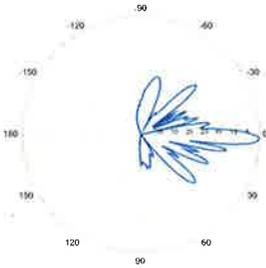
0° | Vertical | 1920-2170 MHz

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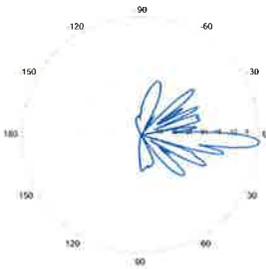
BXA-171085-12BF-EDIN-X

X-Pol | FET Panel | 85° | 18.0 dBi

BXA-171085-12BF-EDIN-2

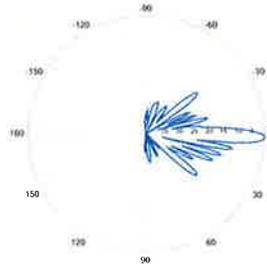


2° | Vertical | 1710-1880 MHz
BXA-171085-12BF-EDIN-4

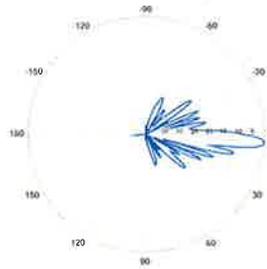


4° | Vertical | 1710-1880 MHz

BXA-171085-12BF-EDIN-2

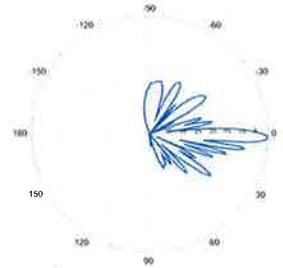


2° | Vertical | 1850-1990 MHz
BXA-171085-12BF-EDIN-4

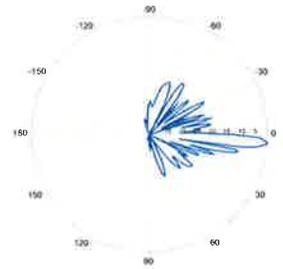


4° | Vertical | 1850-1990 MHz

BXA-171085-12BF-EDIN-2



2° | Vertical | 1920-2170 MHz
BXA-171085-12BF-EDIN-4



4° | Vertical | 1920-2170 MHz

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WBX065X19x050

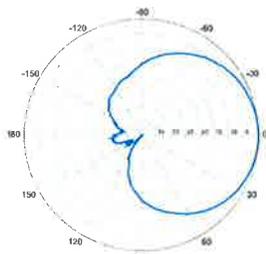
X-Pol | VET Panel | 65° | 19.0 dBi



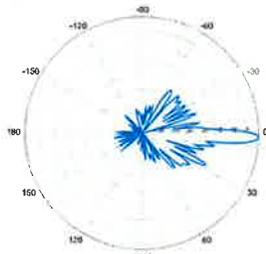
Model Number Options
 WBX065X19M150 - Manual Electrical Tilt Antenna (aka 5142100)
 WBX065X19R150 - Remote Electrical Tilt Antenna (aka 5142000)

Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1900-2170 MHz
Polarization	± 45°	± 45°	± 45°
Horizontal beamwidth	69°	66°	63°
Vertical beamwidth	4.9°	4.6°	4.3°
Gain	15.9 dBd / 18.0 dBi	16.4 dBd / 18.5 dBi	16.9 dBd / 19.0 dBi
Electrical downtilt	2°-10° Variable Electrical Tilt		
Impedance	50Ω		
VSWR	< 1.4:1		
Upper sidelobe suppression	< -18 dB		
Front-to-Back ratio	> 25 dB		
First null	> -20 dB typical		
Inter-port isolation	> 30 dB		
IM3 (2x20W carrier)	< -153 dBc		
Input power	2 x 160 W		
Connector(s)	2 Ports / 7/16 DIN / Female / Bottom		
Operating temperature	-40° to +60° C (-40° to +140° F)		
Mechanical Characteristics			
Dimensions HxWxD	1950 x 157 x 69 mm		76.8 x 6.2 x 2.7 in
Weight without brackets	9.5 kg		20.9 lbs
Survival wind speed	241 km/hr		
Wind load @ 161 km/hr (100 mph)	Front: 405 N	Side: 176 N	Front: 91 lbf Side: 40 lbf
RET type / Part number	Internal / RETU-CA01		
Mounting Options	Part Number	Fits Pipe Diameter	Weight
Pole mounting bracket kit	MKS05P01	40-115 mm 1.6-4.5 in	2.9 kg 6.5 lbs
Scissor tilt bracket kit	MKS05T03	40-115 mm 1.6-4.5 in	4.1 kg 9.1 lbs
Bar tilt bracket kit	MKS05T04	40-115 mm 1.6-4.5 in	4.0 kg 8.8 lbs
Concealment Options			
UNICELL module	UNX14-19	UNX20-19	
Azimuth swivel	± 30°	± 30°	
Elevation tilt	Fixed	Fixed	
Required mounting kit	UNX14-WBX-AZ	UNX20-WBX-AZ	
FP mounting configuration	None		

1710-1880 MHz

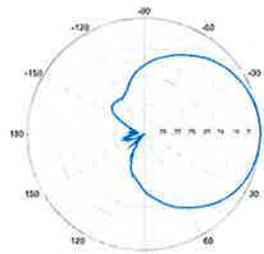


Horizontal

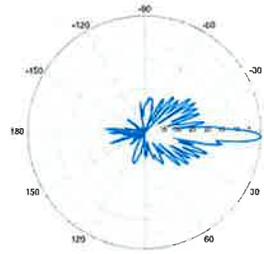


2° | Vertical

1850-1990 MHz

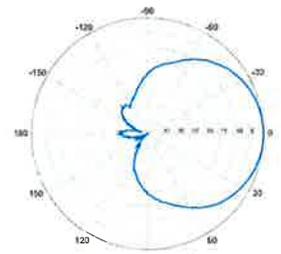


Horizontal

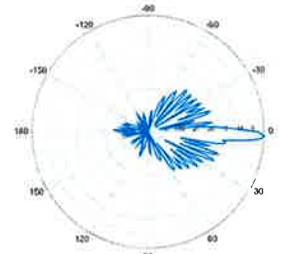


2° | Vertical

1900-2170 MHz



Horizontal



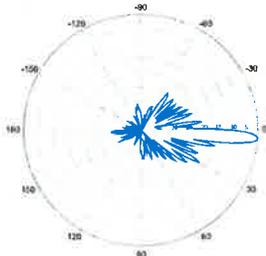
2° | Vertical

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WBX065X19x050

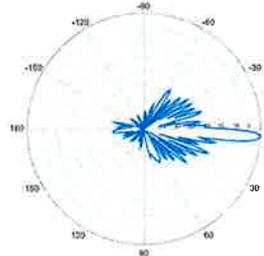
X-Pol | VET Panel | 65° | 19.0 dBi

1710-1880 MHz



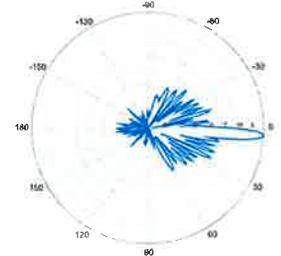
4° | Vertical

1850-1990 MHz

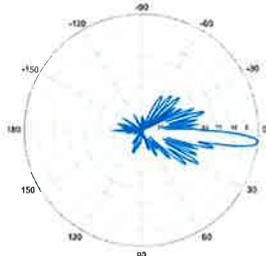


4° | Vertical

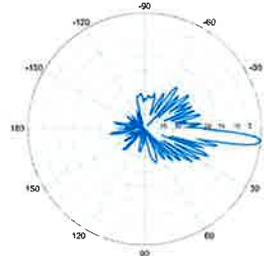
1900-2170 MHz



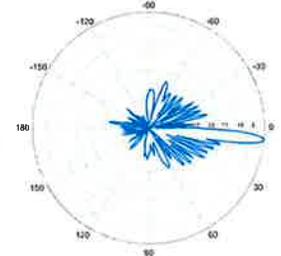
4° | Vertical



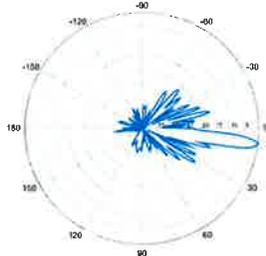
6° | Vertical



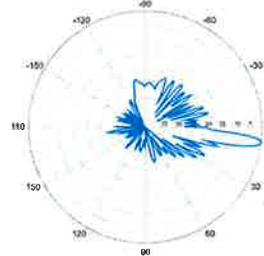
6° | Vertical



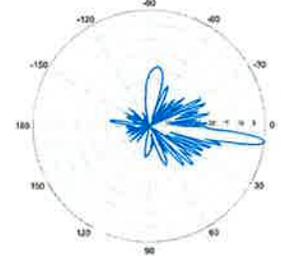
6° | Vertical



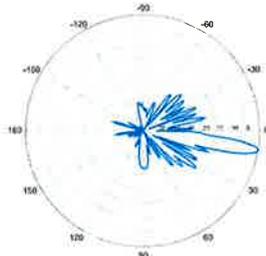
8° | Vertical



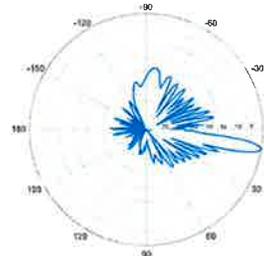
8° | Vertical



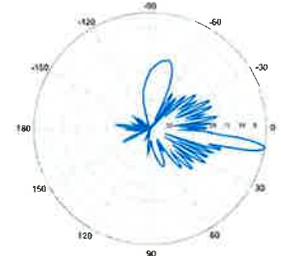
8° | Vertical



10° | Vertical



10° | Vertical



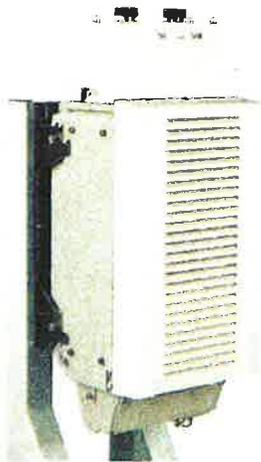
10° | Vertical

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Alcatel-Lucent RRH2x40-AWS

REMOTE RADIO HEAD

The Alcatel-Lucent RRH2x40-AWS is a high-power, small form-factor Remote Radio Head (RRH) operating in the AWS frequency band (1700/2100MHz - 3GPP Band 4). The Alcatel-Lucent RRH2x40-AWS 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-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information. The Alcatel-Lucent RRH2x40-AWS has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to four-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 20 MHz of bandwidth.

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

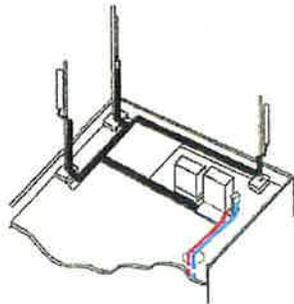
capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent RRH2x40-AWS 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-AWS 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-AWS is compact and weighs less than 20 kg (44 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

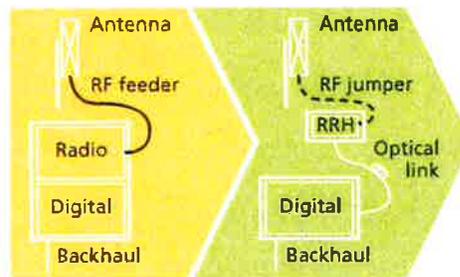
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation 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-AWS provides more RF power while at the same time consuming less electricity.



Macro

Features

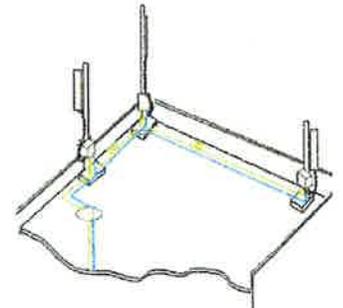
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption



RRH for space-constrained cell sites

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



Distributed

Technical specifications

Physical dimensions

- Height: 620 mm (24.4 in.)
- Width: 270 mm (10.63 in.)
- Depth: 170mm (6.7 in.)
- Weight (without mounting kit): less than 20 kg (44 lb)

Power

- Power supply: -48VDC

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: 1700/2100 MHz (AWS); 3GPP Band 4
- Bandwidth: up to 20 MHz
- RF output power at antenna port: 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way with optional Rx Diversity module
- Noise figure: below 2.0 dB typical
- Antenna Line Device features
 - TMA and Remote electrical tilt (RET) support via AISG v2.0

Optical characteristics

Type/number of fibers

- Single-mode variant
 - One Single Mode Single Fiber per RRH2x, carrying UL and DL using CWDM
 - Single mode dual fiber (SM/DF)
- Multi-mode variant
 - Two Multi-mode fibers per RRH2x: one carrying UL, the other carrying DL

Optical fiber length

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

Digital Ports and Alarms

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

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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

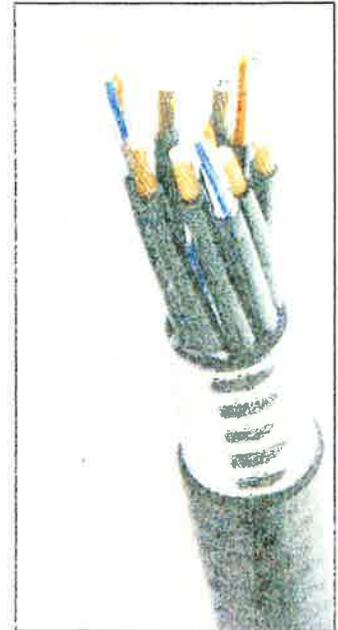


Figure 1: HYBRIFLEX Series

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
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 4mm ² (8AWG)		(Ω/km (Ω/1000ft))	2.1 (0.307)
Other Cable 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)			UL34-V0, UL1656 RoHS Compliant
DC Power and Alarm Wires			
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
Operating Range			
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

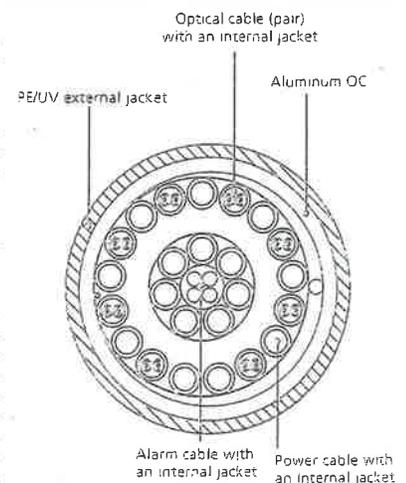


Figure 2: Construction Detail

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

ATTACHMENT 2

Site Name: Jewett City (Griswold)		General		Power		Density					
Tower Height: 160'											
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total			
*Fire Dept	4	300	160	0.0169	33	0.2000	8.43%				
*Fire Dept	2	200	160	0.0056	458	0.3053	1.84%				
*Fire Dept	1	200	160	0.0028	152	0.2000	1.40%				
*Fire Dept	1	100	60	0.0100	76	0.2000	4.99%				
*MetroPCS	3	443.61	128	0.0292	2140	1.0000	2.92%				
*VoiceStream	2	441	148	0.0145	1930	1.0000	1.45%				
*AT&T UMTS	2	565	135	0.0223	880	0.5867	3.80%				
*AT&T UMTS	2	875	135	0.0345	1900	1.0000	3.45%				
*AT&T GSM	1	283	135	0.0056	880	0.5867	0.95%				
*AT&T GSM	4	525	135	0.0414	1900	1.0000	4.14%				
*AT&T LTE	1	1615	135	0.0319	740	0.4933	6.46%				
Verizon	11	394	158	0.0624	1970	1.0000	6.24%				
Verizon	9	377	158	0.0489	869	0.5793	8.44%				
Verizon	1	1750	158	0.0252	2145	1.0000	2.52%				
Verizon	1	1050	158	0.0151	698	0.4973	3.04%				
									60.1%		
* Source: Siting Council											

ATTACHMENT 3



FDH Engineering, Inc., 6521 Meridien Drive Raleigh, NC 27616, Ph. 919.755.1012

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

160' Self-Support Tower

**SBA Site Name: Griswold 2
SBA Site ID: CT10012-A-03
Verizon Site ID: 117858
Verizon Site Name: Jewett City CT**

FDH Project Number 1425PL1400

Analysis Results

Tower Components	95.0%	Sufficient
Foundation	94.2%	Sufficient

Prepared By:

Mark S. Girgis, EI
Project Engineer

Reviewed By:

Bradley Newman, PE
Senior Project Engineer
CT License No. 29630

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March 28, 2014

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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EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Engineering, Inc. performed a structural analysis of the existing self-supported tower located in Griswold, 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 Building Code (CBC)*. Information pertaining to the existing/proposed antenna loading, current tower geometry, the member sizes, and foundation dimensions was obtained from:

- Rohn Industries, Inc. (File No. 37696SP001) original design drawings dated April 6, 1999
- FDH, Inc. (Job No. 07-0317T) TIA Inspection Report dated April 6, 2007
- SBA Network Services, Inc.

The *basic design wind speed* per the *TIA/EIA-222-F* standards and *2005 CBC* 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 158 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 Rohn, Inc. File No. 37696SP001), the foundation should be adequate 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 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 the *2005 CBC* are met with the existing and proposed loading in place, we have the following recommendations:

1. Feed lines must be installed as shown in **Figure 1**.
2. RRU/RRH Stipulation: The equipment may be installed in any arrangement as determined by the client.
3. The proposed and existing TMAs and diplexers should be installed directly behind the existing and proposed panel antennas.

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	Feed Lines	Carrier	Mount Elevation (ft)	Mount Type
169	(2) Decibel 20' x 2" Dipoles	(2) 7/8"	Quinebaug Comm 911	160	Direct Mount
163	(1) Andrew DB201-C Yagi	(1) 1/2"			
158	(6) RFS APL869012-42T0 (3) Antel BXA-70063/6CF (6) RFS APL 199016-4XT2 (6) RFS FD9R6004/2C-3L Diplexers	(18) 1-5/8"	Verizon	158	(3) 15' T-Frames
149	(6) Powerwave 63SSFL TMAs	(6) 1-5/8"	T-Mobile	148	(3) 10.5' T-Frames
148	(6) Dapa 59212				
135	(9) Powerwave 7770.00 (2) Powerwave P65-17-XLH-RR (1) KMW AM-X-CD-16-65-00T-RET (6) Powerwave LGP17201 TMAs (6) Ericsson RRUS-11 RRUs (6) Powerwave LGP21901 Diplexers (1) Raycap DC6-48-60-18-8F Surge Arrestor	(12) 1-1/4" (2) DC Cables (1) Fiber Cable	New Cingular	137	(3) 12' T-Frames
128	(6) Kathrein 742 351	(12) 1-5/8" (1) 3/8"	Metro PCS	128	(3) 12' T-Frames
82	(1) Yagi	(1) 1/2"	Quinebaug Comm 911	82	Direct Mount
76	(1) GPS	(1) 1/2"	Verizon	76	(1) 3' Standoff
68	(1) 6' Trombone	(1) 1/2"	Quinebaug Comm 911	65	Direct Mount

Proposed Loading:

Antenna Elevation (ft)	Description	Feed Lines	Carrier	Mount Elevation (ft)	Mount Type
158	(3) Antel BXA-70063/6CF (3) RFS APL869012-T0 (3) Antel BXA-70080/4CF (3) Antel BXA-171085/12BF (3) Antel WBX065X19R050 (3) Alcatel Lucent RRH2X40-AWS RRHs (1) RFS DB-T1-6Z-8AB-0Z Distribution Box	(18) 1-5/8" (1) 1-5/8" Fiber	Verizon	158	(3) 15' T-Frames (1) Sabre Universal Pipe Mount

RESULTS

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

Table 2 - Material Strength

Member Type	Yield Strength
Legs	50 ksi
Bracing	36 ksi & 50 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.

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
T1	160 - 140	Leg	ROHN 2.5 STD	35.8	Pass
		Diagonal	L1 3/4x1 3/4x3/16	40.9 61.4 (b)	Pass
		Top Girt	L1 3/4x1 3/4x3/16	3.9	Pass
T2	140 - 120	Leg	ROHN 3 STD	72.5	Pass
		Diagonal	L2x2x3/16	74.6 84.7 (b)	Pass
		Top Girt	L1 3/4x1 3/4x3/16	5.4	Pass
T3	120 - 100	Leg	ROHN 3.5 EH	75.6	Pass
		Diagonal	L2 1/2x2 1/2x3/16	66.5 82.0 (b)	Pass
T4	100 - 80	Leg	ROHN 4 EH	81.1	Pass
		Diagonal	L2 1/2x2 1/2x3/16	90.8	Pass
T5	80 - 60	Leg	ROHN 5 EH	68.4	Pass
		Diagonal	L3x3x1/4	55.2 73.9 (b)	Pass
T6	60 - 40	Leg	ROHN 6 EHS	78.3	Pass
		Diagonal	L3 1/2x3 1/2x1/4	59.5 61.1 (b)	Pass
T7	40 - 20	Leg	ROHN 6 EH	73.2	Pass
		Diagonal	L3 1/2x3 1/2x1/4	78.0	Pass
T8	20 - 0	Leg	ROHN 6 EH	83.2	Pass
		Diagonal	L3 1/2x3 1/2x1/4	95.0	Pass

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

Table 4 - Maximum Base Reactions

Load Type	Direction	Current Analysis (TIA/EIA-222-F)	Original Design (TIA/EIA-222-F)
Individual Foundation	Horizontal	25 k	28 k
	Uplift	194 k	214 k
	Compression	226 k	240 k
Overturing Moment	---	3,894 k-ft	4,053 k-ft

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

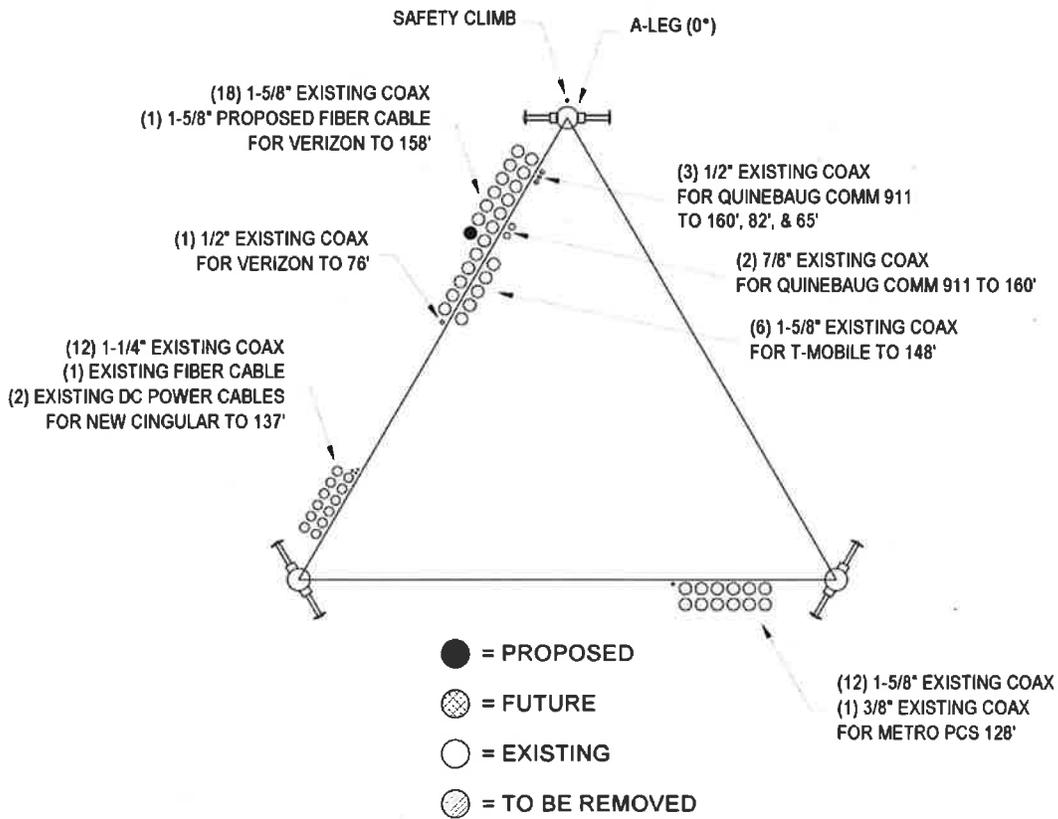
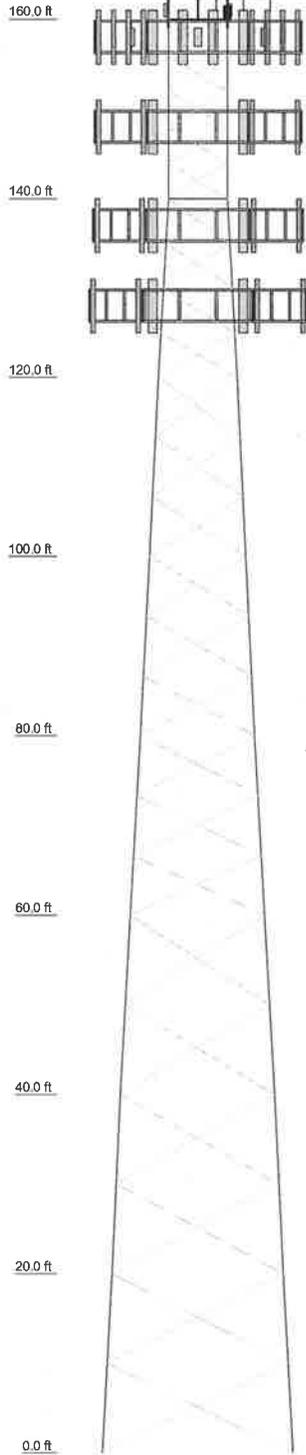


Figure 1 – Coax Layout

Section	T8	T7	T6	T5	T4	T3	T2	T1
Legs	ROHN 6 EH	ROHN 6 EHS	ROHN 5 EH	ROHN 5 EH	ROHN 4 EH	ROHN 3.5 EH	ROHN 3 STD	ROHN 2.5 STD
Leg Grade			A572-50					
Diagonals	L3 1/2x3 1/2x1/4	L3x3x1/4	L3x3x1/4	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2x2x3/16	L1 3/4x1 3/4x3/16	L1 3/4x1 3/4x3/16
Diagonal Grade	A572-50					A36		
Top Girts		N.A.					L1 3/4x1 3/4x3/16	
Face Width (ft)	20.96	18.88	16.92	14.83	12.74	10.65	6.58	6.58
# Panels @ (ft)		6 @ 10				9 @ 6.66667	4 @ 5	5 @ 4
Weight (K)	16.5	3.3	2.7	2.8	1.5	1.4	1.0	0.9



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod	160	(2) Powerwave 63SSFL TMAs	148
Beacon	160	(2) Powerwave 63SSFL TMAs	148
Andrew DB201-C Yagi	160	(2) Powerwave 63SSFL TMAs	148
Leg Extension	160	(3) 10.5' T-Frames MNT	148
Decibel 20' x 2" Dipole	160	(3) 7770.00A w/Mount Pipe	137
Decibel 20' x 2" Dipole	160	(3) 7770.00A w/Mount Pipe	137
BXA-70063/6CF w/ Mount Pipe	158	(3) 7770.00A w/Mount Pipe	137
BXA-70063/6CF w/ Mount Pipe	158	P65-17-XLH-RR w/Mount Pipe	137
BXA-70063/6CF w/ Mount Pipe	158	P65-17-XLH-RR w/Mount Pipe	137
APL869012-T0 w/ Mount Pipe	158	AM-X-CD-16-65-00T-RET w/ Mount Pipe	137
APL869012-T0 w/ Mount Pipe	158	(2) Powerwave LGP17201 TMAs	137
APL869012-T0 w/ Mount Pipe	158	(2) Powerwave LGP17201 TMAs	137
BXA-70080/4CF w/ Mount Pipe	158	(2) Powerwave LGP17201 TMAs	137
BXA-70080/4CF w/ Mount Pipe	158	(2) RRUS-11	137
BXA-70080/4CF w/ Mount Pipe	158	(2) RRUS-11	137
BXA-171085-12BF w/ Mount Pipe	158	(2) RRUS-11	137
BXA-171085-12BF w/ Mount Pipe	158	(2) Powerwave LGP21901 Diplexers	137
BXA-171085-12BF w/ Mount Pipe	158	(2) Powerwave LGP21901 Diplexers	137
WBX065X19R050 w/ Mount Pipe	158	(2) Powerwave LGP21901 Diplexers	137
WBX065X19R050 w/ Mount Pipe	158	DC6-48-60-18-8F Surge Arrestor	137
WBX065X19R050 w/ Mount Pipe	158	(3) 12' T-Frames MNT	137
RRH2X40-AWS	158	(2) 742 351 w/ Mount Pipe	128
RRH2X40-AWS	158	(2) 742 351 w/ Mount Pipe	128
RRH2X40-AWS	158	(2) 742 351 w/ Mount Pipe	128
DB-T1-6Z-8AB-0Z Distribution Box	158	(2) 742 351 w/ Mount Pipe	128
Sabre Universal Pipe Mount Kit	158	(3) 12' T-Frames MNT	128
(3) 15' T-Frames	158	Yagi	82
(2) 59212 w/ Mount Pipe	148	GPS	76
(2) 59212 w/ Mount Pipe	148	(1) 3' Standoff MNT	76
(2) 59212 w/ Mount Pipe	148	6' Trombone	65

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

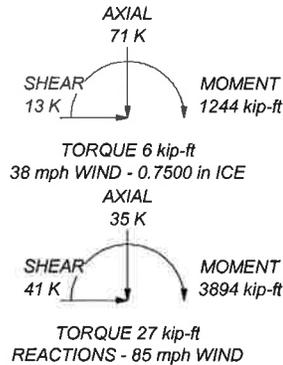
TOWER DESIGN NOTES

1. Tower is located in New London 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%

MAX. CORNER REACTIONS AT BASE:

DOWN: 226 K
SHEAR: 25 K

UPLIFT: -194 K
SHEAR: 22 K



FDH Engineering, Inc. 6521 Meridien Drive Raleigh, NC 27616 Phone: (919) 755-1012 FAX: (919) 755-1031	Job: Griswold 2, CT10012-A-03 Project: 1425PL1400
	Client: SBA Network Services, Inc. Drawn by: Mark S. Gargis App't: Code: TIA/EIA-222-F Date: 03/28/14 Scale: NTS Path: Dwg No. E-1