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Also admitted in Massachusetts

January 6, 2014

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

Re: **Notice of Exempt Modification – Antenna Swap
60 Commerce Street, East Haven, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) wireless telecommunications antennas at the 55-foot level on the existing 70-foot tower at the above-referenced address. The tower is owned by SBA. Cellco’s shared use of this tower was approved in 2009. Cellco now intends to replace six (6) of its existing antennas with three (3) model BXA-80063-6BF 850 MHz antennas and three (3) model BXA-171063-8BF 2100 MHz antennas at the 55-foot level on the tower. Cellco also intends to install six (6) cable diplexers behind its cellular antennas; three (3) remote radio heads (“RRHs”) behind its 2100 MHz antennas; and one (1) HYBRIFLEX™ antenna cable. Included in Attachment 1 are specifications for the replacement antennas, diplexers, 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 Joseph Maturo, Jr., Mayor for the Town of East Haven. A copy of this letter is also being sent to Perrelli Associates, LLC, the owner of the property at 60 Commerce Street.

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



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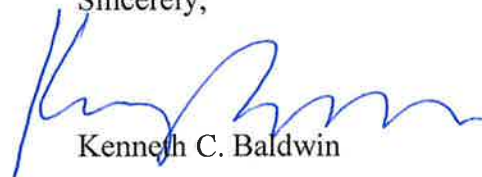
ROBINSON & COLE^{LLP}

Melanie A. Bachman
January 6, 2014
Page 2

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's proposed antennas, diplexers and RRHs will be located at the 55-foot level on the 70-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 modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. Far Field Approximation tables for the RF emissions at each of Cellco's operating frequencies at the modified 60 Commerce Street facility are included in Attachment 2. As indicated on these tables, Cellco's modified facility will operate well within the FCC standards for RF emissions.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The tower and its foundation can support Cellco's proposed modifications. (See Structural Analysis included in Attachment 3).

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

Sincerely,



Kenneth C. Baldwin

Enclosures
Copy to:

Joseph Maturo, Jr., East Haven Mayor
Perrelli Associates, LLC
Sandy M. Carter



ATTACHMENT 1

BXA-80063-6BF-EDIN-X

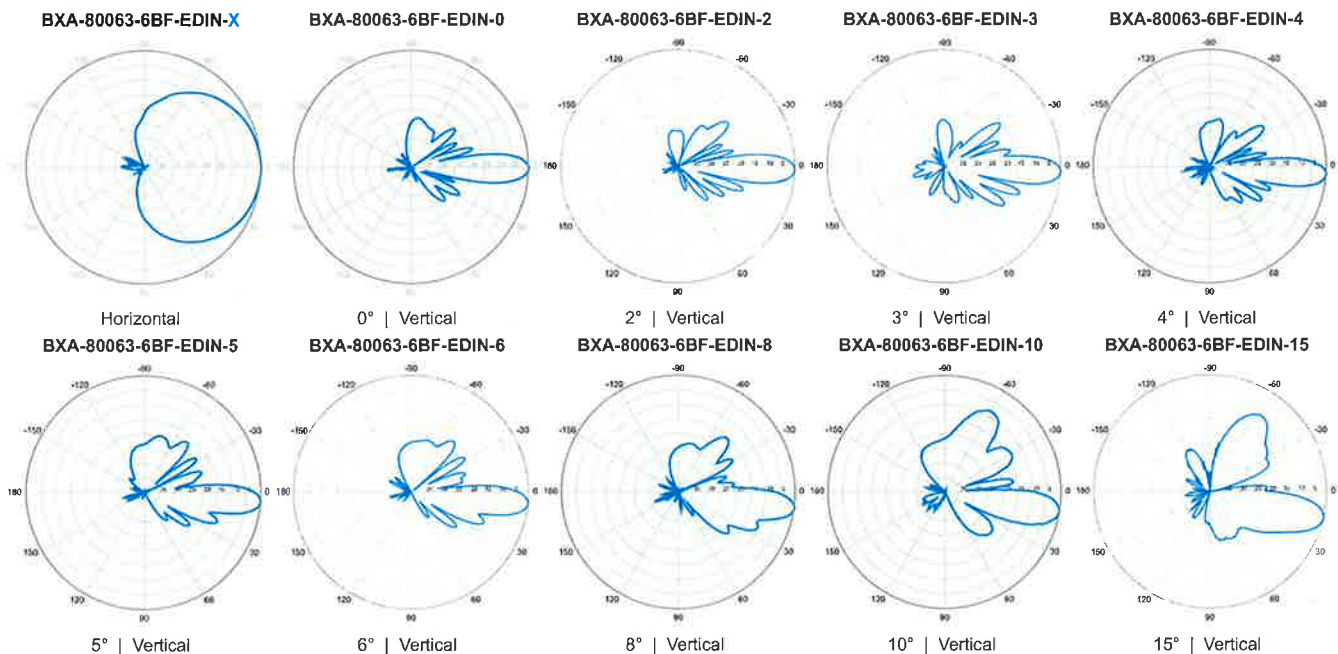
X-Pol | FET Panel | 63° | 14.5 dBd

Replace "X" with desired electrical downtilt.

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



Electrical Characteristics	
Frequency bands	806-900 MHz*
*Optional frequency band for iDEN	806-941 MHz (specify when ordering)
Polarization	±45°
Horizontal beamwidth	63°
Vertical beamwidth	11°
Gain	14.5 dBd (16.6 dBi)
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10, 15
Impedance	50Ω
VSWR	≤1.4:1
Upper sidelobe suppression (0°)	-18.2 dB
Front-to-back ratio (+/-30°)	-36.3 dB
Null fill	5% (-26.02 dB)
Isolation between ports	< -25 dB
Input power with EDIN connectors	500 W
Input power with N connectors	300 W
Lightning protection	Direct Ground
Connector(s)	2 Ports / EDIN or N / Female / Bottom
Mechanical Characteristics	
Dimensions Length x Width x Depth	1742 x 285 x 135 mm 68.6 x 11.2 x 5.3 in
Depth with z-brackets	175 mm 6.9 in
Weight without mounting brackets	8.7 kg 19.2 lbs
Survival wind speed	> 201 km/hr > 125 mph
Wind area	Front: 0.50 m ² Side: 0.24 m ² Front: 5.3 ft ² Side: 2.5 ft ²
Wind load @ 161 km/hr (100 mph)	Front: 733 N Side: 386 N Front: 164 lbf Side: 88 lbf
Mounting Options	
3-Point Mounting & Downtilt Bracket Kit	Part Number: 36210008 Fits Pipe Diameter: 40-115 mm 1.57-4.5 in Weight: 6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-80063-6BF-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-171063-8BF-EDIN-X

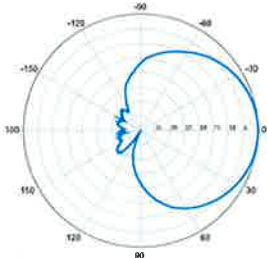
Replace "X" with desired electrical downtilt.

X-Pol | FET Panel | 63° | 17.4 dBi

Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	68°	65°	60°
Vertical beamwidth	7°	7°	7°
Gain	14.5 dBd / 16.6 dBi	14.9 dBd / 17.0 dBi	15.3 dBd / 17.4 dBi
Electrical downtilt (X)	0, 2, 4, 6, 8		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back ratio	> 30 dB		
In-band isolation	< -25 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	1225 x 154 x 105 mm		48.2 x 6.1 x 4.1 in
Depth with t-brackets	133 mm		5.2 in
Weight without mounting brackets	4.2 kg		9.2 lbs
Survival wind speed	296 km/hr		184 mph
Wind area	Front: 0.19 m ² Side: 0.14 m ²	Front: 2.0 ft ² Side: 1.5 ft ²	
Wind load @ 161 km/hr (100 mph)	Front: 281 N Side: 223 N	Front: 63 lbf Side: 50 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-171063-8BF-EDIN-X-FP		

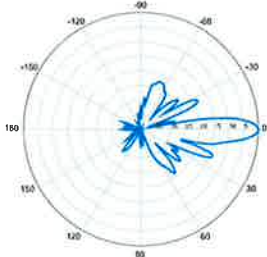


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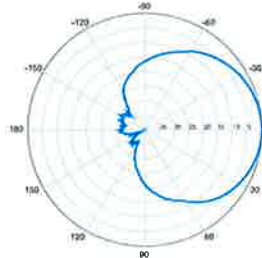
Horizontal | 1710-1880 MHz

BXA-171063-8BF-EDIN-0



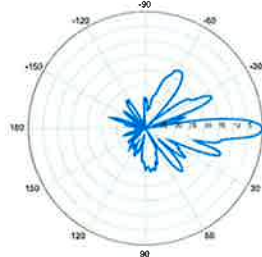
0° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-X



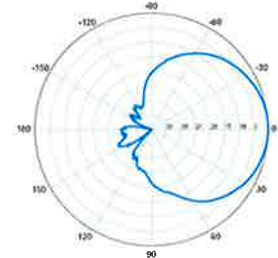
Horizontal | 1850-1990 MHz

BXA-171063-8BF-EDIN-0



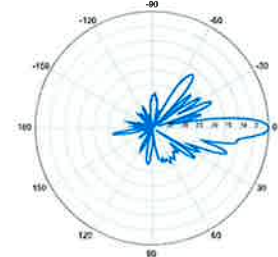
0° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-X



Horizontal | 1920-2170 MHz

BXA-171063-8BF-EDIN-0



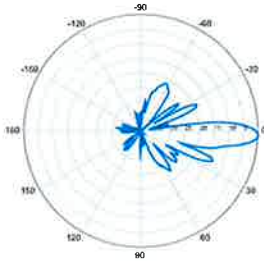
0° | Vertical | 1920-2170 MHz

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BXA-171063-8BF-EDIN-X

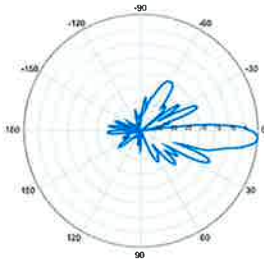
X-Pol | FET Panel | 63° | 17.4 dBi

BXA-171063-8BF-EDIN-2



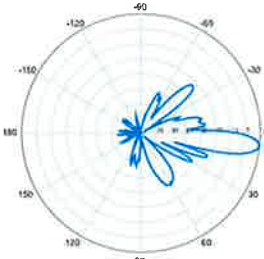
2° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-4



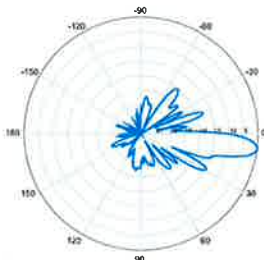
4° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-6



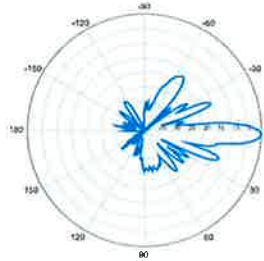
6° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-8



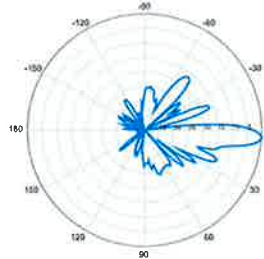
8° | Vertical | 1710-1880 MHz

BXA-171063-8BF-EDIN-2



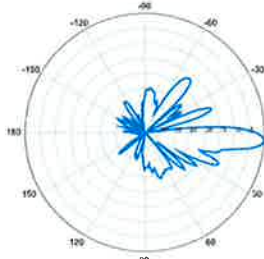
2° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-4



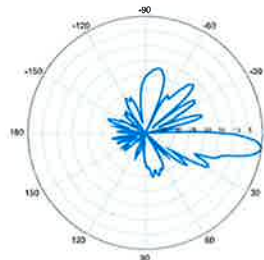
4° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-6



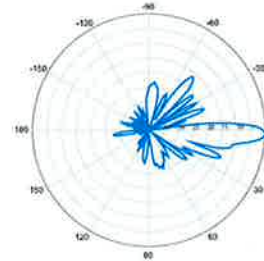
6° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-8



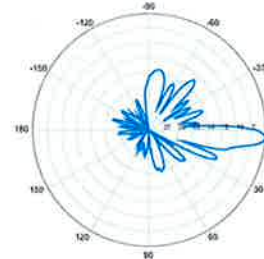
8° | Vertical | 1850-1990 MHz

BXA-171063-8BF-EDIN-2



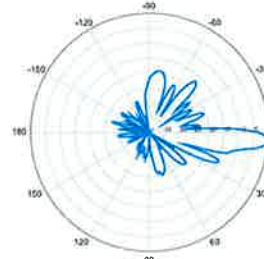
2° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-4



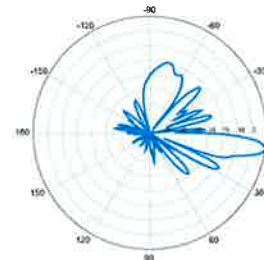
4° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-6



6° | Vertical | 1920-2170 MHz

BXA-171063-8BF-EDIN-8



8° | Vertical | 1920-2170 MHz

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ShareLite Wideband Diplexer – In-line 698-960 MHz/1710-2200 MHz, DC pass in low frequency path

Product Description

The ShareLite FD9R6004 Series of diplexers are designed to enable feeder sharing between systems in the 698-960 MHz range and in the 1710-2200 MHz range. The diplexer is equipped with in-line connector placement so it can be installed in the BTS cabinet or at the tower top. This is especially valuable in crowded sites or when the feeders are not easily accessible. Due to its wideband design, the FD9R6004 Series can accommodate many combining solutions between 698-960 MHz and 1710-2200 MHz systems such as LTE 700 MHz, Cellular 800 MHz with PCS, GSM900 with GSM1800, or GSM900 with UMTS. This diplexer features a highly selective filter. It provides a high level of isolation between ports, while keeping the insertion loss on both paths at an extremely low level. The FD9R6004 diplexers are available with various DC pass options, helpful in configurations with or without the Tower Mount Amplifiers installed.



Features/Benefits

- LTE ready design
- Extremely Low Insertion Loss
- High level of Rejection between bands – Protection against interferences
- Extremely High Power Handling Capability
- Integrated DC block/bypass versions available
- Very compact & small size design – Easy installation and reduced tower load
- In-line long-neck connectors for easy connection & waterproofing
- Exceptional reliability & environmental protection (IP 67)
- Equipped with 1 * Breathable Vent – Prevent any humidity inside the product
- Mounting hardware for Wall and Pole mount provided (P/N SEM2-1A)
- Grounding already provided through the mounting bracket
- Kit available for easy dual mount

Technical Specifications

Product Type	Diplexer/Cross Band Coupler
Application	LTE700, GSM900, UMTS, GSM1800, Cellular 800, PCS
Frequency Range 1, MHz	698-960
Frequency Range 2, MHz	1710-2200
Configuration	Sharelite Single diplexer, outdoor, DC pass in the 698-960MHz path, with mounting hardware SEM2-1A
Mounting	Wall Mounting: With 4 screws (maximum 6mm diameter); Pole Mounting: With included clamp set 40-110mm (1.57-4.33)
Return Loss All Ports Min/Typ, dB	19/23
Power Handling Continuous, Max, W	1250 at common port; 750 in low frequency path & 500 in high frequency path
Power Handling Peak, Max, W	15000 in low frequency path & 8000 in high frequency path
Impedance, Ohms	50
Insertion Loss, Path 1, dB	0.07 typ.
Insertion Loss, Path 2, dB	0.13 typ.
Rejection Between Bands Min/Typ, dB	58/64@698-960MHz; 57/70@1710-2200MHz
IMP Level at the COM Port, Typ, dBm	-112 @ 2x43
DC Pass in Low Frequency Path	Yes
DC Pass in High Frequency Path	No
Temperature Range, °C (°F)	-40 to +60 (-40 to +140)
Environmental	ETSI 300-019-2-4 Class 4.1E
Ingress Protection	IP 67
Lightning Protection	EN/IEC61000-4-5 Level 4
Connectors	In-line long-neck 7-16-Female
Weight, kg (lb)	1.2 (2.6)
Shipping Weight, kg (lb)	3.2 (7) for 2 * single units in 1 * box, 9.8 (21.6) for 6 * units = 3 * Boxes in 1 * overwrap
Dimensions, H x W x D, mm (in)	147 x 164 x 37 (5.8 x 6.5 x 1.5)
Shipping Dimensions, H x W x D, mm (in)	254 x 406 x 82 (10 x 16 x 3.2) for 2 * Single Units in 1 * box, 280 x 406 x 241 (11 x 16 x 9.5) for 6 * units = 3 * Boxes in 1 * overwrap
Volume, L	0.43
Housing	Aluminum

Notes

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

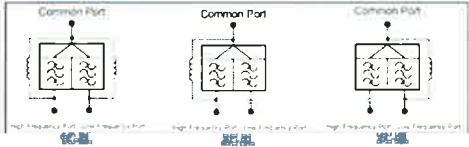


ShareLite Wideband Diplexer – In-line 698-960 MHz/1710-2200 MHz, DC pass in low frequency path

Other Documentation

FD9R6004/3C-3L Installation Instructions: Wideband_Diplexer_Installation_Rev5.pdf

	Model Number	Full DC Pass	DC Pass High Band	DC Pass Low Band	Mounting Hardware Included
Single	FD9R6004/3C-3L				3
	FD9R6004/3C-3L				3
	FD9R6004/3C-3L				3
Dual	FD9R6004/3C-3L				3
	FD9R6004/3C-3L				3
	FD9R6004/3C-3L				3



1. See FD9R6004/3C-3L Installation Instructions for a detailed diplexer filter measurement. 2. Diplexer can be mounted horizontally like FD9R6004/3C-3L and FD9R6004/3C-3L.

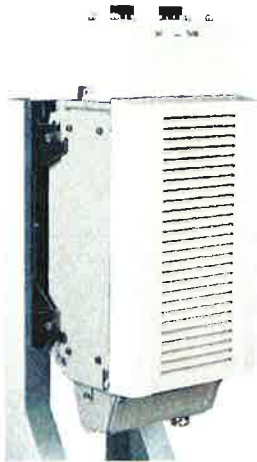
Model Number	Description	
SEMI-LA	Mounting Hardware, Two mount with 10mm (included with the Single and Dual Diplexer) and Ground Nut (not included with the product)	
SEMI-B	Assembly Kit for 3 pcs of FD9R6004/3C-3L. (Can be ordered separately but included with the Dual Diplexer Kit)	
CRAB-2	Ground Cable, 2m, includes lugs (Optional)	
CRAB-3	Ground Cable, 2m, includes lugs (Optional)	
SEMI	Mounting Hardware and Diodes, Torx Bits (Optional)	

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

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

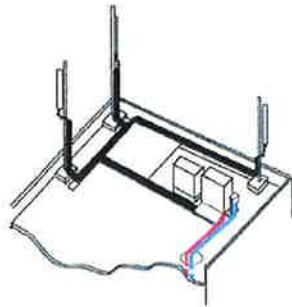
capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent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

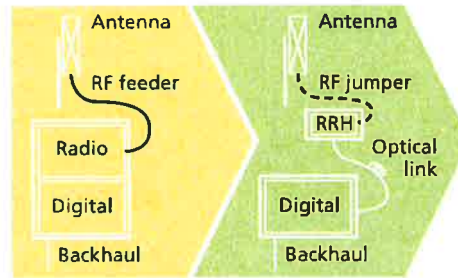
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation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



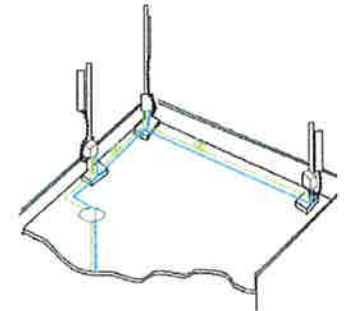
Macro

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



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: 620 mm (24.4 in.)
- Width: 270 mm (10.63 in.)
- Depth: 170 mm (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

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)]	0.68 (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)	UL34-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 XH-HW-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

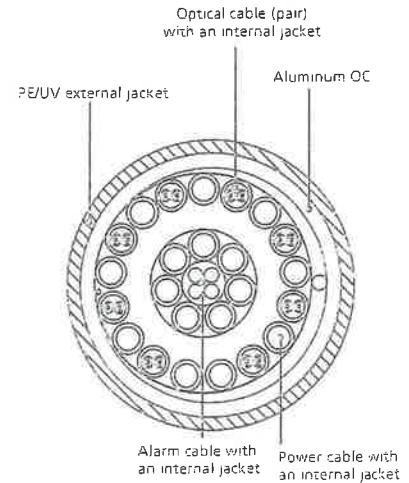


Figure 3: Construction Detail

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

ATTACHMENT 2

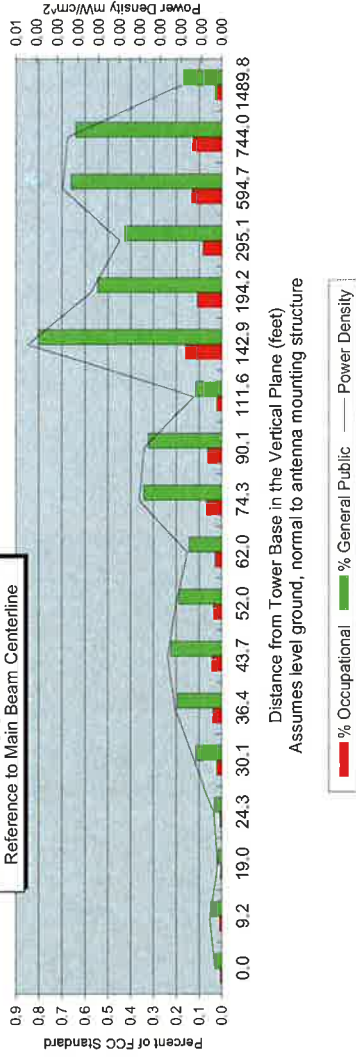
Far Field Approximation
with downtilt variation

Estimated Radiated Emission
Single Emitter Far Field Model
Dipole / Wire/ Yagi Antenna Types



Location:	East Haven Cosey Beach CT
Site #:	2-0600
Date:	12/11/13
Name:	Jaime Laredo
File Name:	EAST HAVEN COSEY BEACH
Operating Freq. (MHz)	878.49
Antenna Height (ft):	55.0
Antenna Gain (dBi):	14.5
Antenna Size (in.):	69
Downtilt (degrees):	0.0
Feedline Loss (dB):	1.0
Power @ J4 (w):	444

Far Field Approximation
Reference to Main Beam Centerline



Distance from Tower Base in the Vertical Plane (feet)
Assumes level ground, normal to antenna mounting structure

■ Occupational ■ General Public — Power Density

This approximation is only valid in the far field, which begins at: **58.4 Feet**

Enter Main Beam
Distance in feet below:

Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0
Solve for r, dx to antenna	52.0	52.8	55.3	57.4	60.1	63.5	67.9	73.6	80.9	90.7	104.0	123.1	152.1	201.0	299.6	596.9	745.8	1490.7
Distance from Antenna Structure Base in Horizontal plane	0.0	9.2	19.0	24.3	30.1	36.4	43.7	52.0	62.0	74.3	90.1	111.6	142.9	194.2	295.1	594.7	744.0	#NUM!
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm ²)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	#NUM!
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.2	0.1	0.1	0.1	0.1	0.0
Percent of General Population Standard	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.1	0.3	0.3	0.1	0.8	0.5	0.4	0.7	0.6	0.2

Antenna Type BXA-80063/6BF
Max% 0.80%

Instructions:

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

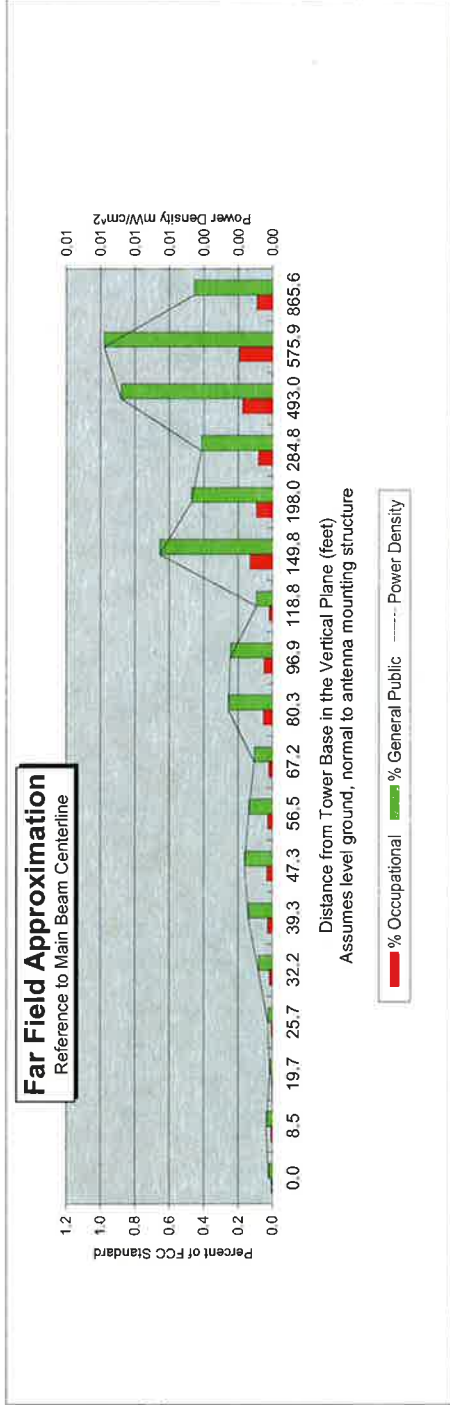
Far Field Approximation
with downtilt variation

**Estimated Radiated Emission
Single Emitter Far Field Model
Dipole / Wire/ Yagi Antenna Types**



Location:	Hamden 2 CT
Site #:	2-0058
Date:	12/10/13
Name:	Jaime Laredo
File Name:	HAMDEN 2, CT - FF POWER

Operating Freq. (MHz)	1973.75
Antenna Height (ft)	63.5
Antenna Gain (dBi)	16.5
Antenna Size (in.)	72.4
Downtilt (degrees)	2.0
Feedline Loss (dB)	1.5
Power @ J4 (wr)	500



This approximation is only valid in the far field, which begins at: **65.2 Feet**

Calc Angle	90.0	82.0	72.0	67.0	62.0	57.0	52.0	47.0	42.0	37.0	32.0	27.0	22.0	17.0	12.0	7.0	6.0	4.0	Enter Main Beam Distance in feet below:
Solve for r, dx to antenna	60.5	61.1	63.6	65.7	68.5	72.2	76.8	82.8	90.5	100.6	114.2	133.3	161.6	207.0	291.1	496.7	579.1	867.7	
Distance from Antenna Structure Base in Horizontal plane	0.0	8.5	19.7	25.7	32.2	39.3	47.3	56.5	67.2	80.3	96.9	118.8	149.8	198.0	284.8	493.0	575.9	865.6	#NUM!
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	0
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	#NUM!
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.1	#NUM!
Percent of General Population Standard	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.3	0.2	0.1	0.1	0.7	0.5	0.4	0.9	1.0	0.5

Antenna Type BXA-171063-12CF-EDIN-2
Max% 0.98%

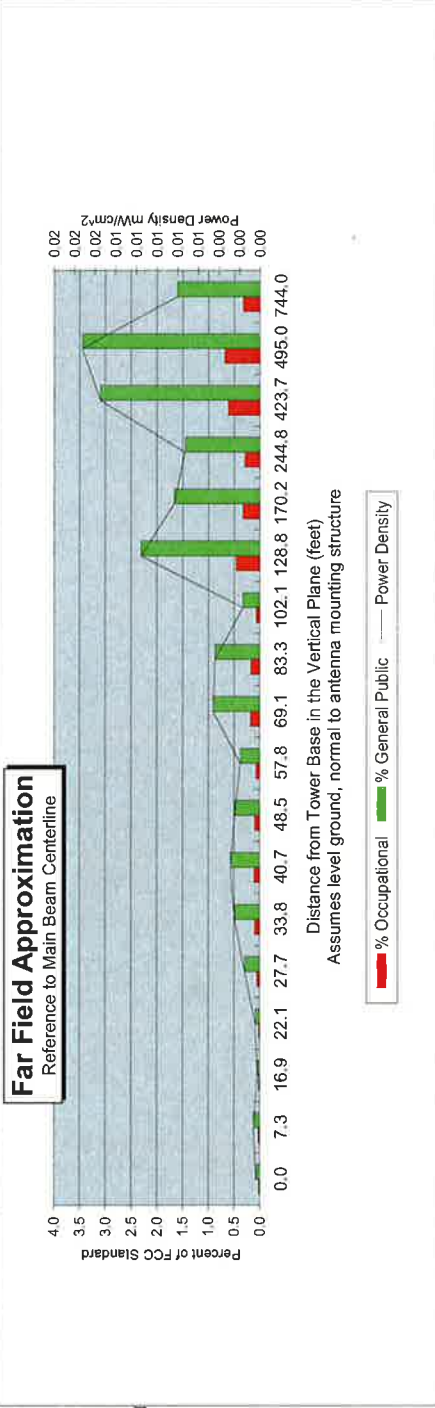
- Instructions:
- 1) Fill in Site Location, Site number, Date, Name of Person Responsible for Date, and enter File Name to be saved as.
 - 2) References to J4 refer to a point where the transmission line exits the equipment shelter and proceeds to the antenna(s). There is typically a connector located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

Far Field Approximation
with downtilt variation

Estimated Radiated Emission
Single Emitter Far Field Model
Dipole / Wire/ Yagi Antenna Types



Location:	East Haven Cossey Beach CT
Site #:	2-0600
Date:	12/11/13
Name:	Jaime Laredo
File Name:	EAST HAVEN COSEY BEACH
Operating Freq. (MHz)	751.0
Antenna Height (ft):	55.0
Antenna Gain (dBi):	14.5
Antenna Size (in.):	71
Downtilt (degrees):	2.0
Feedline Loss (dB):	1.0
Power @ J4 (w):	908



This approximation is only valid in the far field, which begins at: **62.6 Feet**

Enter Main Beam
Distance in feet below:

Calc Angle	90.0	82.0	72.0	67.0	62.0	57.0	52.0	47.0	42.0	37.0	32.0	27.0	22.0	17.0	12.0	7.0	6.0	4.0	
Solve for r, dx to antenna	52.0	52.5	54.7	56.5	58.9	62.0	66.0	71.1	77.7	86.4	98.2	114.6	138.9	177.9	250.2	426.9	497.7	745.8	
Distance from Antenna Structure Base in Horizontal plane	0.0	7.3	16.9	22.1	27.7	33.8	40.7	48.5	57.8	69.1	83.3	102.1	128.8	170.2	244.8	423.7	495.0	744.0	
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2	0
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm²)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.01	#NUM!
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.5	0.3	0.3	0.6	0.7	0.3	#NUM!
Percent of General Population Standard	0.1	0.1	0.0	0.1	0.3	0.5	0.6	0.5	0.4	0.9	0.9	0.3	2.3	1.7	1.5	3.1	3.4	1.6	#NUM!

Antenna Type BXA-70063/6CF
Max% 3.44%

Instructions:

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

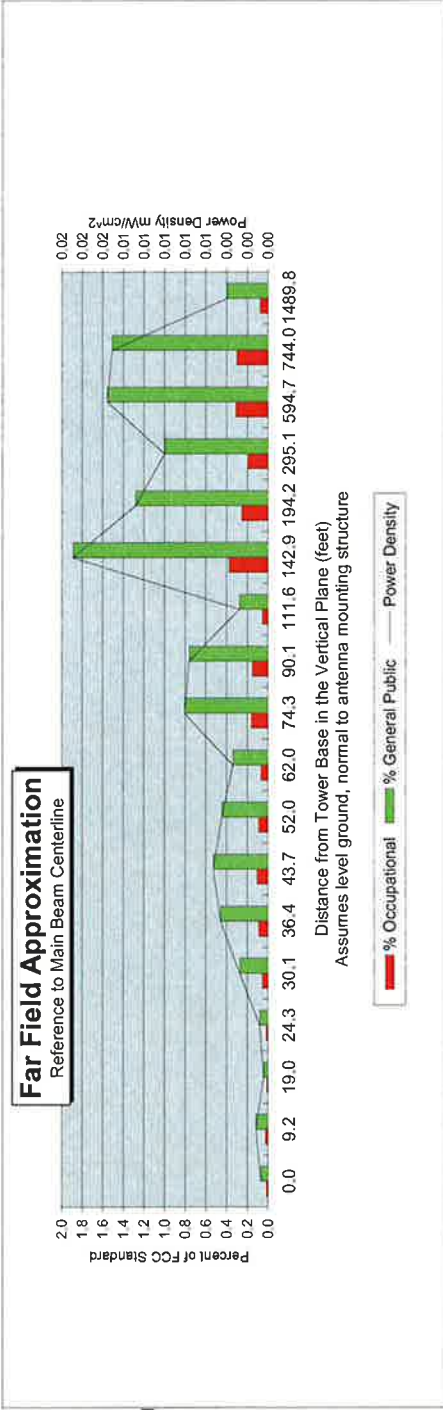
Far Field Approximation
with downtilt variation

Estimated Radiated Emission
Single Emitter Far Field Model
Dipole / Wire/ Yagi Antenna Types



Location:	East Haven Cossey Beach CT
Site #:	2-0600
Date:	12/11/13
Name:	Jaime Laredo
File Name:	EAST HAVEN COSEY BEACH

Operating Freq. (MHz)	2120.00
Antenna Height (ft):	55.0
Antenna Gain (dBi):	15.3
Antenna Size (in.):	49
Downtilt (degrees):	0.0
Feedline Loss (dB):	0.3
Power @ J4 (w):	1265



This approximation is only valid in the far field, which begins at: **29.2 Feet**

Enter Main Beam
Distance in feet below:

Calc Angle	90.0	80.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	4.0	2.0
Solve for r. dx to antenna	52.0	52.8	55.3	57.4	60.1	63.5	67.9	73.6	80.9	90.7	104.0	123.1	152.1	201.0	299.6	596.9	745.8	1490.7
Distance from Antenna Structure Base in Horizontal plane	0.0	9.2	19.0	24.3	30.1	36.4	43.7	52.0	62.0	74.3	90.1	111.6	142.9	194.2	295.1	594.7	744.0	#NUM!
Angle from Main Beam (reference to horizontal plane)	90	80	70	65	60	55	50	45	40	35	30	25	20	15	10	5	4	2
dB down from centerline (referenced to centerline)	36.76	34.35	38.52	35.34	29.54	26.8	25.59	25.63	25.99	21.21	20.29	23.24	13.03	12.3	9.92	2	0.2	0
Reflection Coefficient (1 to 4, 2.56 typical)	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Power Density (mW/cm²)	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.02	0.01	0.01	0.02	0.02	0.00
Percent of Occupational Standard	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.4	0.3	0.2	0.3	0.3	0.1
Percent of General Population Standard	0.1	0.1	0.0	0.1	0.3	0.5	0.5	0.4	0.3	0.8	0.8	0.3	1.9	1.3	1.0	1.6	1.5	0.4

Antenna Type BXA-171063-8BF
Max% 1.89%

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

ATTACHMENT 3



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

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

70' Monopole Tower

SBA Site Name: New Haven Tweed

SBA Site ID: CT46147-A-02

Verizon Site Name: Cosey Beach

FDH Project Number 13SFRL1400

Analysis Results

Tower Components	70.5%	Sufficient
Foundation	65.0%	Sufficient

Prepared By:

Logan Poe, EI
Project Engineer

Reviewed By:

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

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



November 14, 2013

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

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 Recommendations 3

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EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Engineering, Inc. performed a structural analysis of the monopole located in East Haven, 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, foundation dimensions, soil parameters, and member sizes was obtained from:

- Valmont Structures (Eng. File No. A-121647-F-1008179) original design drawings dated October 11, 2005
- JGI Eastern, Inc. (Project No. 05557G) Geotechnical Evaluation dated September 27, 2005
- Tower Engineering Professionals (Project No. 127423) Structural Analysis Report - Overlap Loading dated September 25, 2012
- SBA Network Services, Inc.

The *basic design wind speed* per the *TIA/EIA-222-F* standards and the *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 55 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 Valmont Structures Eng. File No. A-121647-F-1008179), the foundation should have the necessary capacity to support both the proposed and existing loading. For a more detailed description of the analysis of the tower, see the **Results** section of this report.

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

Recommendations

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

1. The proposed coax should be installed inside the pole's shaft see Figure 1 for details.
2. RRU/RRH Stipulation: The equipment should be installed directly behind the proposed panel antennas.
3. The proposed diplexers should be installed directly behind the existing and/or 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	Feedlines	Carrier	Mount Elevation (ft)	Mount Type
65	(3) RFS APXVSP18-C-A20 (3) ALU 1900MHz RRH (25mhz) (3) ALU 800 MHz RRHs (3) ALU 800 MHz External Notch Filters (6) RFS 1900 ACU-A20-N RETs (3) RFS 800 ACU-A20-N RETs	(3) 1-1/4"	Sprint/Nextel	65	(3) T-Arms
55	(6) Andrew DB846F65ZAXY (3) Antel BXA-70063-6CF (3) Antel BXA-185063/8CF	(12) 1-5/8"	Verizon	55	(3) T-Arms

1. See Figure 1 for feedline layout.

Proposed Loading:

Antenna Elevation (ft)	Description	Feedlines	Carrier	Mount Elevation (ft)	Mount Type
55	(3) Antel BXA-70063-6CF (3) Antel BXA-171063-8BF (3) Antel BXA-185063/8CF (3) Antel BXA-80063-6BF (3) ALU RRH2X40-AWS RRUUs (6) RFS FD9R6004/2C-3L Diplexers (1) RFS DB-T1-6Z-8AB-0Z Distribution Box	(12) 1-5/8" (1) 1-5/8" Fiber Cable	Verizon	55	(3) T-Arms

RESULTS

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

Table 2 - Material Strength

Member Type	Yield Strength
Tower Shaft Sections	65 ksi
Base Plate	60 ksi
Anchor Bolts	75 ksi

Table 3 displays the summary of the ratio (as a percentage) of force in the member to their capacities. Values greater than 100% indicate locations where the maximum force in the member exceeds its capacity. *Note: Capacities up to 105% 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
L1	70 - 30.917	Pole	TP25.27x16.28x0.188	46.5	Pass
L2	30.917 - 0	Pole	TP32x24.0123x0.219	70.5	Pass
-	0	Anchor Bolts	(8) 2.25"Ø on 39.13" BC	36.8	Pass
-	0	Base Plate	45.13"Ø PL x 2" thk.	31.4	Pass

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

Table 4 - Maximum Base Reactions

Base Reactions	Current Analysis (TIA/EIA-222-F)	Original Design (TIA/EIA-222-F)
Axial	8 k	10 k
Shear	10 k	13 k
Moment	474 k-ft	729 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

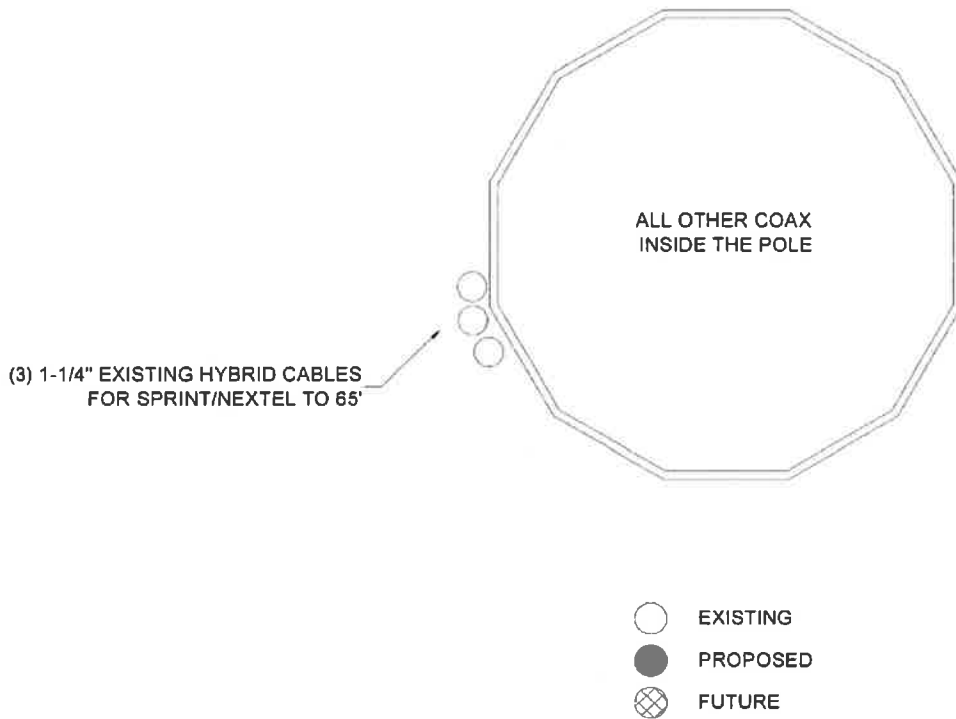
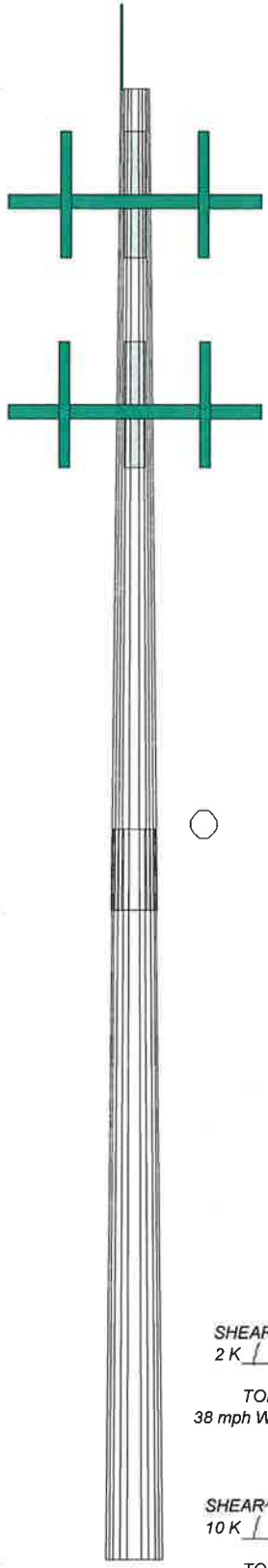


Figure 1- Assumed Coax Layout At Base

Section	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Length (ft)	39.08	34.75	12	0.2180	24.0123	32.0000	A572-65	2.3	4.0	0.0 ft	30.9 ft	70.0 ft					
Number of Sides	12	12															
Thickness (in)	0.1880	0.2180															
Socket Length (ft)	3.83																
Top Dia (in)	16.2800																
Bot Dia (in)	25.2700																
Grade																	
Weight (K)	1.7	2.3															



DESIGNED APPURTENANCE LOADING

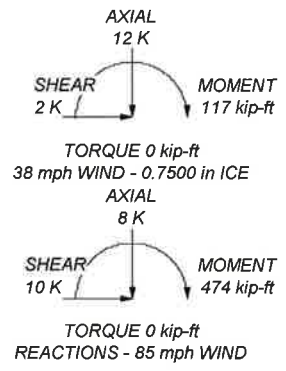
TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod	70	BXA-70063-6CF w/ Mount Pipe	55
APXVSP18-C-A20 w/Mount Pipe	65	BXA-70063-6CF w/ Mount Pipe	55
APXVSP18-C-A20 w/Mount Pipe	65	BXA-70063-6CF w/ Mount Pipe	55
APXVSP18-C-A20 w/Mount Pipe	65	BXA-171063-8BF w/ Mount Pipe	55
1900MHz RRH (25mhz)	65	BXA-171063-8BF w/ Mount Pipe	55
1900MHz RRH (25mhz)	65	BXA-185063/BCF w/ Mount Pipe	55
1900MHz RRH (25mhz)	65	BXA-185063/BCF w/ Mount Pipe	55
800 MHz RRH	65	BXA-185063/BCF w/ Mount Pipe	55
800 MHz RRH	65	BXA-185063/BCF w/ Mount Pipe	55
800 MHz RRH	65	BXA-80063-6BF w/ Mount Pipe	55
800 MHz External Notch Filter	65	BXA-80063-6BF w/ Mount Pipe	55
800 MHz External Notch Filter	65	BXA-80063-6BF w/ Mount Pipe	55
800 MHz External Notch Filter	65	RRH2X40-AWS	55
(2) 1900 ACU-A20-N RET	65	RRH2X40-AWS	55
(2) 1900 ACU-A20-N RET	65	RRH2X40-AWS	55
(2) 1900 ACU-A20-N RET	65	(2) FD9R6004 Diplexer	55
800 ACU-A20-N RET	65	(2) FD9R6004 Diplexer	55
800 ACU-A20-N RET	65	(2) FD9R6004 Diplexer	55
800 ACU-A20-N RET	65	DB-T1-62-8AB-0Z	55
(3) T-Arms	65	(3) T-Arms	55


MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 38 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 70.5%



 FDH Engineering, Inc. 6521 Meridien Drive Raleigh, NC 27616 Phone: 919-7551012 FAX: 919-7552031	Job: New Haven Tweed, CT46147-A-02		
	Project: 13SFRL1400		
	Client: SBA	Drawn by: Logan Poe	App'd:
	Code: TIA/EIA-222-F	Date: 11/14/13	Scale: NTS
	Path:		Dwg No. E-1