Project #23-001
Cache County Wireless Pt2Pt Sheriff Tower
Located at 1225 West Gateway Drive

REPORT SUMMARY

Project Name:	Cache County Wireless Pt2Pt Sheriff Tower
Proponent / Owner:	Bartt Nelson / Cache County Corp
Project Address:	1225 West Gateway Drive
Request:	Conditional Use Permit
Current Zoning:	Public (PUB)
Type of Action:	Quasi-Judicial
Hearing Date	January 12th, 2023
Submitted By:	Russ Holley, Senior Planner

RECOMMENDATION

Staff recommends that the Planning Commission **conditionally approve** a Conditional Use Permit for Project #23-001, Cache County Wireless Pt2Pt Sheriff Tower, in the Public (PUB) zone located at 1225 Gateway Drive, TIN #05-061-0017

Current Land use adjoining the subject property

North:	CS: Commercial Uses/Vacant Land	*East:*	CS: Commercial Uses/Vacant Land
South:	CS: Commercial Uses/Vacant Land	*West:*	CS: Commercial Uses/Vacant Land

PROPOSAL

This is a proposal for a new 120-foot-tall galvanized steel monopole for Cache County emergency and public point-to-point wireless communication purposes. The pole is proposed with two round antenna arrays near the top. The pole placement is planned near the northwest corner of the nearly 20-acre Sheriff's Complex and Cache County Jail along Highway 30 on the west side of the city. The pole is part of a network of wireless point-to-point facilities throughout the entire county and surrounding mountains. Cache County desires to be their own sole provider of wireless communications and these infrastructure additions are needed to provide adequate levels of service as per the attached wireless frequency analysis (consultant). An application for a similar pole is also being proposed at the County Fairground property near 400 S and 300 W.

LAND DEVELOPMENT CODE

The Land Development Code (LDC) 17.15 outlines development standards in the Recreation and Public zones to better integrate necessary public facilities and in a way that does not detract from adjacent properties and neighborhood character. Certain allowances and exemptions are given to certain public/emergency facilities with the procurement of a Conditional Use Permit. Standard heights in the PUB zone (without allowances/exemptions) are 45 feet tall. Only public emergency or public utility poles are allowed to be taller than 45 feet tall and the overall height is limited to only what it necessary for service levels based on professional analysis. No commercial or similar types of poles or towers are allowed to exceed code standards.

LDC 17.38 outline standards for all new wireless telecommunications facilities and specifies design requirements. Monopoles are allowed to be 70' tall in Industrial and Commercial Service zones, 60' in Commercial zones and 40' tall in all other zoning districts. Antennas (pole attachments) mounted to the side of pole should be as slim as possible and shall not extend beyond three (3) feet of the outside edge of the pole. Poles must be setback two (2) horizontal

feet to every one (1) vertical feet of pole height from adjacent streets and residential properties. In no case can a pole be placed within 150 feet of a residential structure. The accessory ground equipment shall be enclosed within a solid fence/wall. Co-location is encouraged to discourage the proliferation of wireless communications facilities.

SETBACKS

The Land Development Code (LDC) setback requirements for cell towers in the PUB zone are as follows (as measured from property lines):

Front (street):	2 to 1 horizontal to vertical pole height
Residential Zone:	2 to 1 horizontal to vertical pole height
Residential Structure:	150’

The following setbacks are proposed for the pole base (as measured from the base of the pole):

Front (HWY 30):	~790’
Corner (Future 1400 West):	~200’
Res. Zone (South):	~3,600’

For the proposed 120-foot pole, a 240 setback would be required from 1400 West (future) and as proposed in not in compliance with the above LDC standards. All ground equipment structures would be subject to standard PUB zone setbacks of 20 feet from a front or side property line and 10 feet from a rear property line. As conditioned, the project meets minimum setback requirements of the LDC.

Figure 1 shows the proposed pole location near the northwest corner of the site.

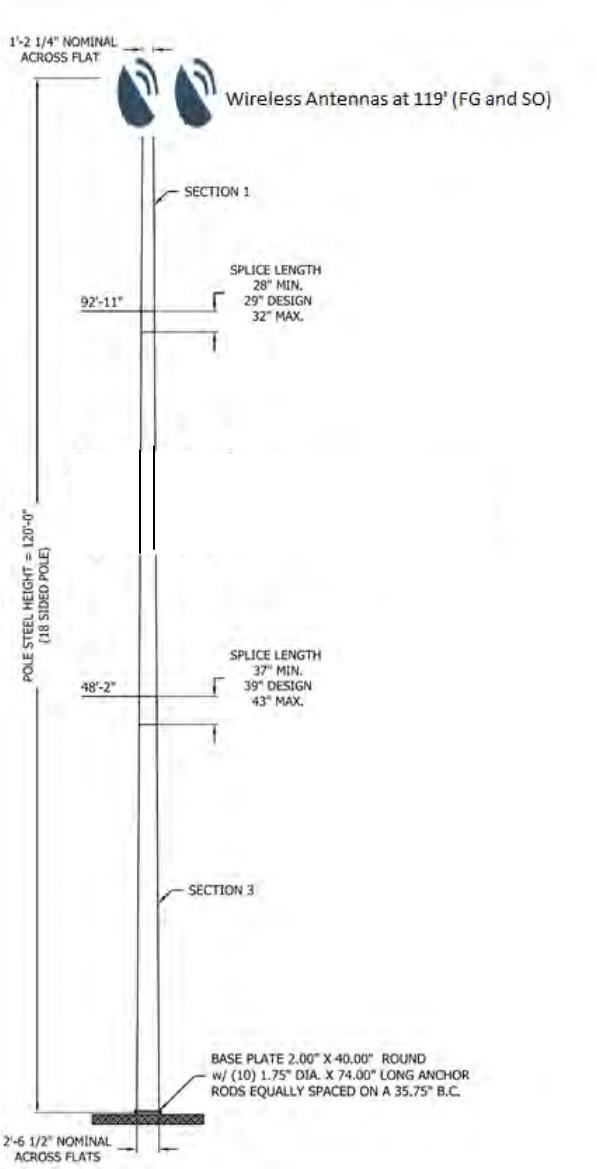
PLACEMENT & STEALTH DESIGN

The LDC also requires “stealth” design measures to limit the negative visual impacts of telecommunication and wireless towers to neighboring properties. Blending or mimicking nearby architecture, backgrounds or vegetation is encouraged to help camouflage the towers and its associated equipment. The Planning Commission may consider surrounding land use and compatibility, parcel size, and parcel location when determining the appropriate design and placement of these facilities.

The proposed tower attempts to achieve stealth design through color and materials. Being a lighter silver color, the galvanized pole, should blend into the background sky color as this area of town is quite flat and most perspectives from a lower angle. This pole material will not fade or discolor over time creating a consistent view. The antenna design, in staff's perspective, could use more stealth application to help better blend into the background. As conditioned, with the Planning Commission determining the appropriate level of stealth, the project meets the requirements of the LDC.

FENCING, NOISE AND SCREENING

The LDC requires that if ground equipment is associated with the cell tower it be screened from view with a solid screen fence or wall and landscaping. As conditioned, with a fence, the project meets the requirements of the LDC. Often these facilities have back-up diesel generators and may be periodical turned on from general maintenance. Existing noise ordinance would regulate any noise disturbance between 10:00 pm and 7:00 am. This area of town, other than jail inmates, does not contain nearby residential land uses.



CONDITIONAL USE PERMITS

The Planning Commission may conditionally approve a Conditional Use Permit that is based on an objective standard in compliance with Utah Code (10-9a-507) and only upon substantiating the following findings:

A. The proposed use is consistent with the allowable maximum densities of the underlying zone.
B. The proposed use is consistent with the requirements of the Land Development Code.
C. The use is compatible with surrounding land uses and will not interfere with the use and enjoyment of adjoining properties.
D. The site will be served by infrastructure having sufficient capacities to meet the service demands of the proposed use.
E. The proposed use is compatible with the surrounding neighborhood character as defined in Section 17.62.
F. The proposed access is consistent with Logan City access and roadway standards and Utah Department of Transportation requirements where applicable.
G. The conditional use is aimed at mitigating the possible negative impacts of excessive light, noise, and traffic.

SUMMARY
Although the Wireless Chapter of the LDC does not apply to public emergency wireless facilities, the Public and Recreation zoning development standards specifically require a Conditional Use Permit for any proposal that exceeds PUB zone standards (heights, coverage, etc.). When reviewing the project for a Conditional Use Permit, the adopted LDC 17.38 Wireless Chapter provides really good information to appropriately implement these structures in areas of town in a sensitive and less-impactful method. Staff considers the placement and color of this tower to be minimally impactful to the character of this part of the city. Consideration should be given to the future 1400 West Street as this will be relatively close to that new arterial street. As conditioned, staff recommends approval of this tower proposal.

AGENCY AND CITY DEPARTMENT COMMENTS
Comments were solicited from the following departments or agencies:

● Engineering	

PUBLIC COMMENTS
Notices were mailed to property owners within 300 feet of the subject property. As of the time of this report, no comment had been received.

PUBLIC NOTIFICATION
Legal notices were published in the Herald Journal on 12/31/22 and the Utah Public Meeting website on 1/02/23. Public notices were mailed to all property owners within 300 feet of the project site on 12/26/22.

RECOMMENDED CONDITIONS OF APPROVAL
This project is subject to the proponent or property owner agreeing to comply with the following conditions as written, or as may be amended by the Planning Commission.
1. All standard conditions of approval will be recorded with the Design Review and are available in the Community Development Department.
2. The tower shall be no taller than 120'.
3. If ground equipment is ever installed, a solid fence shall enclose and screen the equipment.
4. The pole base shall be setback 240 feet from the future edge of 1400 West.
5. The Planning Commission will determine antenna and stealth design standards.
6. Prior to issuance of a Building Permit, the Director of Community Development shall receive a written memorandum from each of the following departments or agencies indicating that their requirements have been satisfied:
   a. <u>Engineering</u> - contact 435-716-9160
      b. Groundwater is shallow at the site and there is a moderate potential for liquefaction in the area. All design shall account for these conditions in the design.

RECOMMENDED FINDINGS FOR APPROVAL FOR THE CONDITIONAL USE PERMIT

The Planning Commission bases its decisions on the following findings supported in the administrative record for this project:

1. The proposed project is compatible with surrounding land uses and will not interfere with the use and enjoyment of adjacent properties and stealth design of the tower will help to mitigate visual impacts.
2. The Conditional Use Permit conforms to the requirements of Title 17 of the Logan Municipal Code and is consistent with the allowable maximum densities of the underlying zone compatible with surrounding land uses and will not interfere with the use and enjoyment of adjoining properties.
3. The site will be served by infrastructure having sufficient capacities to meet the service demands of the proposed use.
4. The proposed use is compatible with the surrounding neighborhood character as defined in Section 17.62.
5. The proposed access is consistent with Logan City access and roadway standards and Utah Department of Transportation requirements where applicable.
6. The conditional use is aimed at mitigating the possible negative impacts of excessive light, noise, and traffic.
7. The project meets the goals and objectives of the PUB designation within the Logan General Plan by providing reliable and quality public service options.
8. The project met the minimum public noticing requirements of the Land Development Code and the Municipal Code.

This staff report is an analysis of the application based on adopted city documents, standard city development practices, and available information. The report is to be used to review and consider the merits of the application prior to and during the course of the Planning Commission meeting. Additional information may be revealed by participants at the Planning Commission meeting which may modify the staff report and become the Certificate of Decision. The Director of Community Development reserves the right to supplement the material in the report with additional information at the Planning Commission meeting.

LOGAN CITY UNITED IN SERVICE
COMMUNITY DEVELOPMENT

APPLICATION FOR PROJECT REVIEW

For Staff Only				
☒ Planning Commission		☐ Land Use Appeal Board		☐ Administrative Review
Date Received	**Planner**	**Zone/Neighborhood**	**Scheduled Meeting Date**	**Application Number**
11/28/22		PUB. / ELLIS	JAN 12, 2023	PC 23-001

Type of Application (Check all that apply):

☐ Design Review ☒ Conditional Use ☐ Subdivision ☐ Administrative Design Review
☐ Code Amendment ☐ Appeal ☐ Zone Change ☐ Other

PROJECT NAME
Cache County Wireless Pt2Pt Network - SHERIFF TOWER

PROJECT ADDRESS
1225 W 200 N, Logan, UT 84321 1225 W. GATEWAY DRIVE.

COUNTY PLAT TAX ID #
05-061-00[illegible] - 0017

AUTHORIZED PROJECT REPRESENTATIVE FOR OWNER
Sheriff Chad Jensen / Bartt Nelson

PHONE #
435-755-1006

MAILING ADDRESS | **CITY** | **STATE** | **ZIP**
1225 W 200 N, Logan, UT 84321

EMAIL ADDRESS
ccso@cachesheriff.org / cjensen@cachesheriff.org / bartt.nelson@cachecounty.org

PROPERTY OWNER OF RECORD
Cache Count Corp

PHONE #
435-755-1850

MAILING ADDRESS | **CITY** | **STATE** | **ZIP**
199 N Main St, Logan, UT, 84321

EMAIL ADDRESS
executive@cachecounty.org / david.zook@cachecounty.org / dspraggins@cachesheriff.org

DESCRIBE THE PROPOSED PROJECT AS IT SHOULD BE NOTICED AND PRESENTED
(Include as much detail as possible - attach a separate sheet if needed)
See SOW

Total Lot Size (acres)
19.01

Size of Proposed New Building (square feet)
—

Number of Proposed New Units/Lots
—

I certify that the information contained in this application and all supporting plans are correct and accurate. I also certify that I am authorized to sign all further legal documents and permit on behalf of the property owner.	**Signature of Property Owner's Authorized Project Representative**
I certify that I am the property owner on record of the subject property and that I consent to the submittal of this project. I understand that all further legal documents and permits will be sent to my authorized agent listed above.	**Signature of Property Owner**

APPLICATION MUST BE ACCURATE AND COMPLETE
NO SITE ACTIVITY MAY OCCUR UNTIL AFTER APPROPRIATE COMMITTEE APPROVAL -

Revised Wednesday, October 12, 2022

Cache County Wireless Pt-2-Pt Network

Statement of Work

Prepared by Cache County IT

Prepared for Potential Bidders / Contractors

Date of Publish 10/01/2022

Statement of Work / Scope of Work

Cache County seeks a partner to oversee, perform and collaborate all aspects of a project to build an internal wireless pt-2-pt network, to connect and provide services to in-scope County sites. The high level considerations are listed for definition of scope and overall consideration within project efforts.

Participants

- County Personnel (IT, Legal, Finance, others as needed)
- Contractor / Partner
- Subcontractors, as Approved / Needed

Planning / Due Diligence

Imbedded document, Cambium Link Planner	Cache County Link Planner 8-25-2022_AfterSurvey_vt.pdf

Line of Sight / Obstructions / Flight Paths

Link Speeds

- 1GB minimum speed between sites

Towers

- Large 2 x 120’ (Cache County Sheriff Office (CCSO), Event Center) / Construction / Lifts
  - Mono pole towers
- Airport Tower 75’
  - Existing tower

- Small 4 x 18’ rooftop
    - Non penetrating skid-mounts
    - Wall mount for Hyrum Road wash bay

Mountain Tops

- Pisgah
    - Use County leased building/structure/power
- Crow (rent)
    - Need to acquire tower space, power and licensing
    - Possible Syringa internet capability

FCC / FAA Licensing

- Validate bands and channels

Communications Antennas / Gear

- Prefer gear that can be managed in existing cloud management stack (reference Cambium link planner data)

Equipment Setup / Configuration / Management / Performance Tuning / Maintenance

Conduit / Boring

- Fairgrounds fiber and power extensions
- CCSO fiber and power extensions
- Other facilities as needed

Cabling / Electrical / Data

- POE equipment preferred
- Cabling / power lines as required per site

Site Permits

- Use building permit / inspection process by locality

5-year Support / Licensing - All Inclusive

- Initial support and maintenance costs, minimum
- Project continuing costs

Training

- Educate County IT and Staff in all aspects of on-going operations and maintenance

Financing

- Federal grant funding guidelines
- Budgetary details to be revealed and discussed after awarding contractor

Requirements / Specifications

Minimum speed between any two points is 1GB, and optimal speed desired is 10GB.

Network communication, reliability and uptime to meet or exceed 99.999%.

Backbone for future communications expansion, to possibly include serving internet to public.

Prefer using subcontractors from County Approved Vendor List.

Coordinate with facility lighting projects at Fairgrounds / Outdoor Rodeo Arena

Timing and Milestones

- Disruptive Fairgrounds construction occurs only between October and March
- Project completion 2024

Site Connectivity List

1. **Admin (4, 3, 5)**
    - 179 North Main Street, Logan, UT, 84321 - County Admin
2. **CCSO (4, 6)**
    - 1225 West Valley View, Logan, UT, 84321 - Offices & Jail
3. **Road Hyrum (1, 4, 8, 9)**
    - 1020 North 600 East, Hyrum, UT, 84319
4. **Event Center (3, 1, 2)**
    - 490 South 500 West, Logan, UT, 84321
5. **Senior Center (1)**
    - 240 North 100 East, Logan, UT, 84321
6. **Airport (6, 9)**
    - 2500 N 900 W, Logan, UT 84321
7. **Road Richmond (9)**
    - 90 South 100 West, Richmond, UT, 84333
8. **Pisgah (3)**
    - 41.550762187876124, -111.93683166787659
9. **Crow (3, 6)**
    - 41.87155444867544, -111.80961884305508

Sites Currently Out of Scope

- FJC
- CJC
- Library
- Perry
- Public Defenders
- Courts

Sheriff tower location

Write a description for your map.

Legend

- Cache County
- fairgrounds tower
- Logan Aquatic Center
- Zootah

Sheriff's tower

Cache County Jail

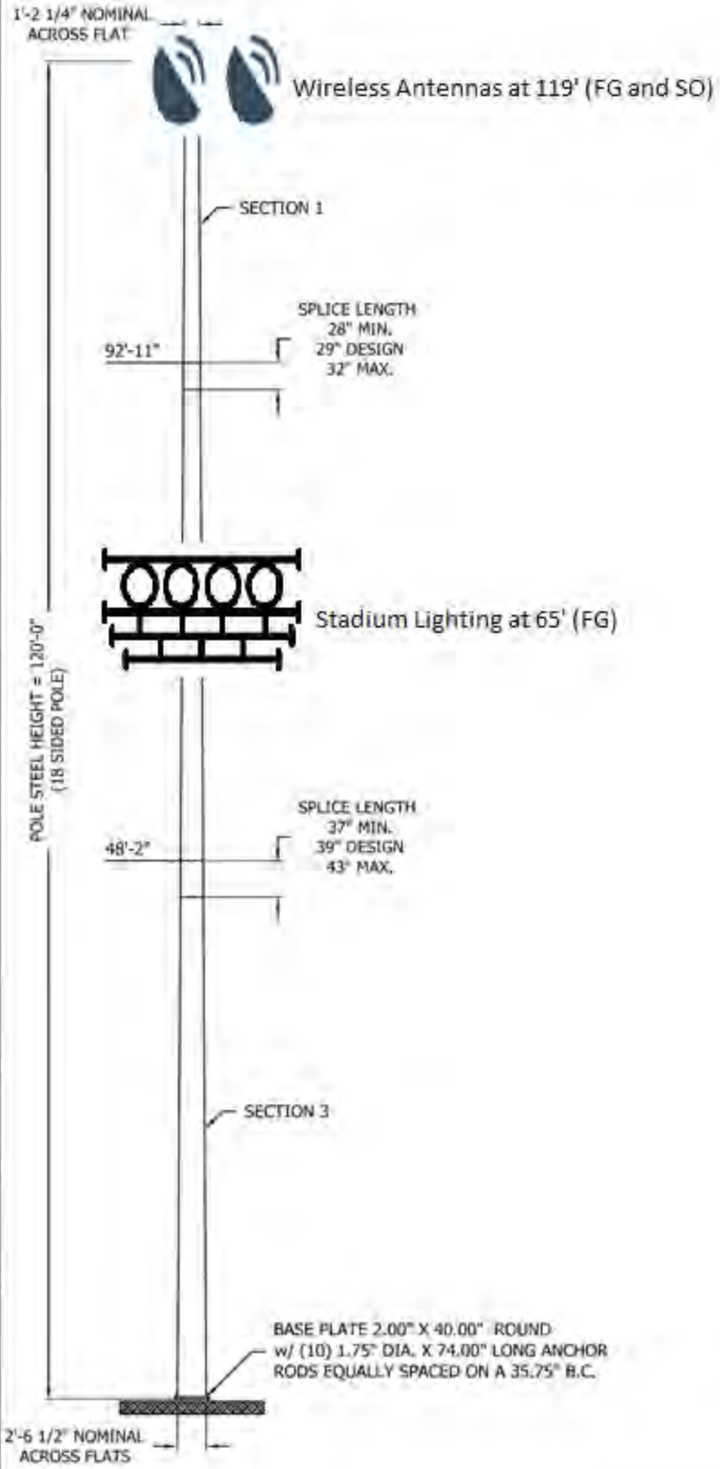
Auto Bahn Performance & Repair

W 200 N

N

300 ft

Google Earth



MAXIMUM FACTORED REACTIONS			
DOWNLOAD	=	11.1	KIPS
SHEAR	=	6.4	KIPS
O.T.M	=	383.4	FT-KIPS

POLE DESIGN LOADING
DESIGN WIND LOAD PER ANSI/TIA-222-H USING THE FOLLOWING DESIGN CRITERIA: RISK CATEGORY: III BASIC WIND SPEED (NO ICE): 110 MPH PER ASCE 7-16 BASIC WIND SPEED (W/ICE): 50 MPH PER ASCE 7-16 DESIGN ICE THICKNESS: 0.25 INCHES PER ASCE 7-16 GROUND ELEVATION, Z_G: 4,496 FT EXPOSURE CATEGORY: C TOPOGRAPHIC METHOD: 1 , CATEGORY: 1 SEISMIC DESIGN PARAMETERS , S_S: 1.081, S_1: 0.361, T_L: 12, SITE CLASS: D THIS STRUCTURE HAS BEEN DESIGNED TO SUPPORT THE FOLLOWING LOADS:

ELEVATION (FT)	ANTENNA LOADING	LINE SIZE (NOM)
TOP	LIGHTNING ROD	-
TOP	(1) 1FT STD. & (2) 2FT STD. DISH [AZ. 0, 120, 240 DEG][6 GHZ] W/ (3) PTP LINKS	(3) 7/8"
30	STADIUM LIGHTS	(1) 1-5/8"

SECTION SCHEDULE						
SECTION	LENGTH (FT)	DIAMETER		WALL THICK (IN)	Fy (KSI)	WEIGHT (KIPS)
		BOT	TOP			
1	29.50	18.49	14.25	0.1875	65.0	1.0
2	48.00	24.54	17.65	0.1875	65.0	2.2
3	48.17	30.50	23.58	0.1875	65.0	2.8

NOTE:
FOR POLYGONAL POLES, DIAMETER IS MEASURED ACROSS FLATS. TABULATED WEIGHTS ARE APPROXIMATE. REFER TO ASSEMBLY DRAWING FOR FINAL WEIGHTS. ALL WEIGHTS SHALL BE VERIFIED PRIOR TO LIFTING.

FILE NO.
Q22-10969-1

REVISIONS

REV.	DESCRIPTION	DWN	CHK	APP

PRELIMINARY
NOT FOR CONSTRUCTION

ROHN® PRODUCTS LLC
PO BOX 5999
PEORIA, IL 61601-5999
TOLL FREE 800-727-ROHN

FORTIUS NETWORKS
DESIGN PROFILE
120 FT TSP
EVENTS CENTER, UT

DWN:	CHK'D:	DATE:
SWG		09/08/2022
ENG'R:		SHEET #: 1 OF 1
PRJ. ENG'R: SWG		PRJ. MANG'R:
DRAWING NO: Q22-10969-1 PROFILE		REV: 0

ROHN™
Products LLC

PRODUCT CATALOG

No. 3

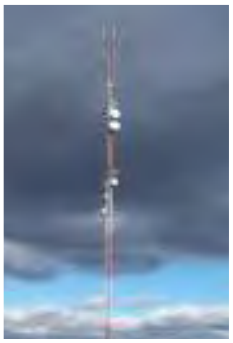
65th Anniversary Edition
Established 1948

broadcast | wireless | sports lighting | utility | wind | transportation

HISTORY

Founded in 1948, in Peoria, Illinois by Dwight Rohn, the ROHN product quickly became the industry standard for towers. The need for ROHN structures grew out of the television industry and a need for homeowners to have small towers adjacent to their homes to enable signal reception. The demand grew quickly and the company's knowledge and capacity were forced to grow with it. Soon television reception towers grew into radio towers, microwave towers, lighting structures and more. When the cellular technology exploded in the U.S., ROHN was there to provide the towers to support the rapid growth. This growth was not just in markets but in geographies.

By 1980, ROHN had structures standing on every continent and in nearly every country on the globe. We continue to supply towers and poles to all of the communication giants and regional carriers. We support utilities and transportation in all of North America. We have wind turbine towers and meteorological towers across the globe. For over 60 years, our products have endured and our name continues to be recognized around the world as the industry standard.



WIRELESS SOLUTIONS

ROHN has been supplying towers to the wireless industry since the industry was born. Whether the application is microwave, cellular, PCS or broadband, we have the towers in service supporting wireless communications.

When the first microwave towers were constructed in the United States, ROHN was the quality supplier of choice. We designed and fabricated to the most stringent standards for wind, ice and dish twist and sway requirements.

As the communication system progressed to cellular, then PCS, ROHN was again leading the market with our ROHN SSV towers serving as the industry preference for wireless sites.

ROHN continues to support wireless communication from microwave to broadband communications. Our structures are still the leaders in the industry.

ROHN also offers a variety of steel poles to meet your specific communication needs. Our tapered and flanged steel poles feature designs that are aesthetically pleasing and blend well into the environment while requiring minimum space for installation. All of our steel poles are hot-dip galvanized after fabrication to ensure years of corrosion free use. As one of the largest manufacturers of communication structures, with unmatched attention to detail and design, our steel poles provide an extremely efficient design. ROHN's steel poles meet the stringent demands of today's communication environment.

Phone (309) 566-3000 • Fax (309) 566-3079 • www.rohnnet.com • *The Industry Standard*

SPORTS LIGHTING SOLUTIONS

Whatever your application - from little league baseball to a major league sports stadium, ROHN has a steel pole to do the job. Poles are available with the traditional anchor base or for direct embedment. ROHN's engineering staff will select the proper pole based on your specific requirements, considering wind speed, luminaire size, weight and quantity.

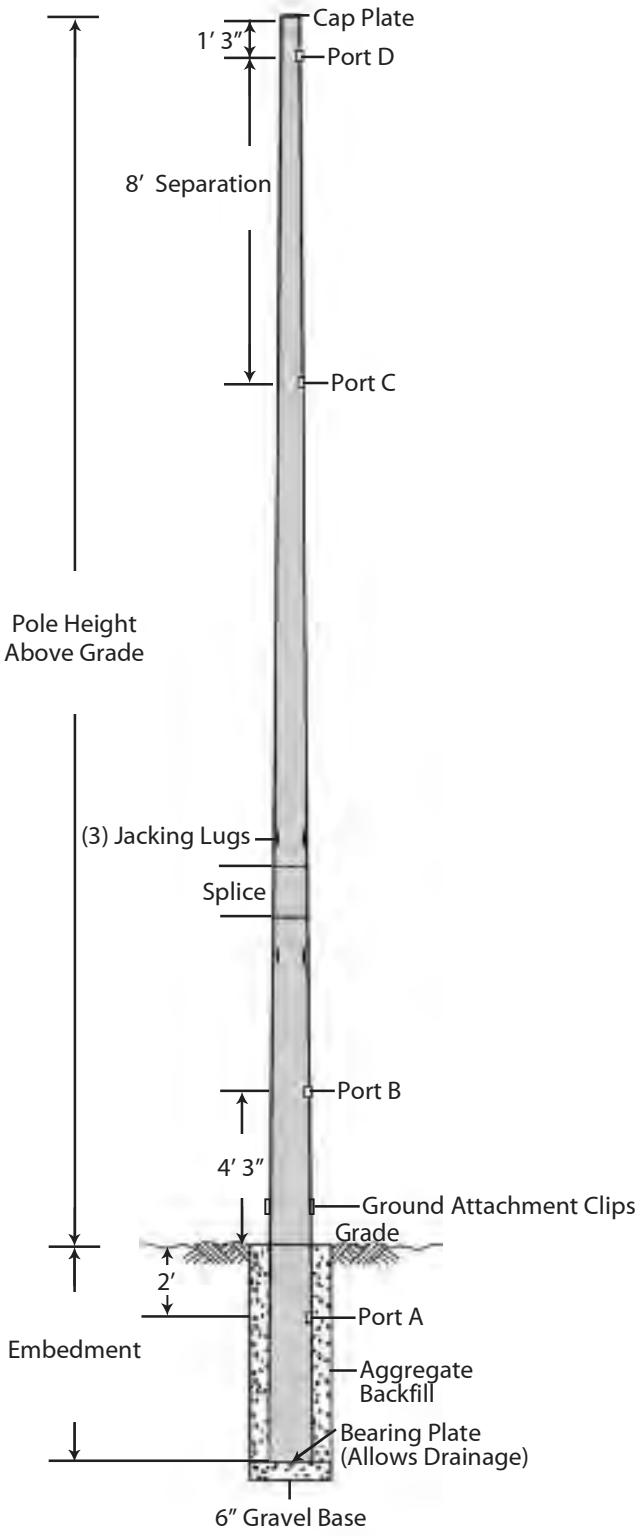
For decades, ROHN has supplied sports lighting structures. ROHN towers support lights for the Anaheim Angels professional baseball team, the University of Illinois football team and the Peoria Chiefs, the local minor league baseball team near our plant location in Peoria, IL.

All poles and towers are hot-dip galvanized and our direct embed poles can be purchased with an extra subsurface corrosion resistant coating.

POLES

DIRECT EMBED POLE
STANDARD DESIGNS

DIRECT EMBED POLES

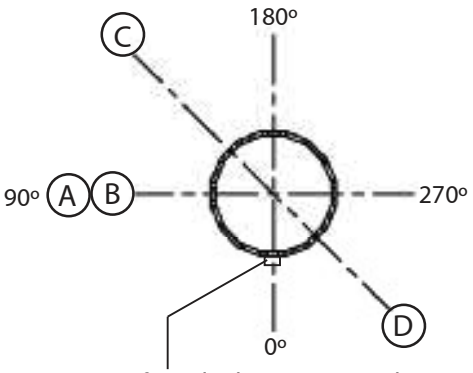


GENERAL USE

ROHN Direct Embed Poles minimize site requirements, lowering lease rates and acquisition costs. They are designed for rapid installation, meeting the demands of today's dynamic communication environments. Whether you are supporting broadband, PCS, security or other lightweight systems, ROHN Tapered Steel Poles offer extremely efficient designs.

FEATURES

- Completely hot-dip galvanized after fabrication
- Fast, easy installation
- Designed for applications with stringent deflection requirements
- Internal routing of transmission lines
- Each pole ships with the following:
  - Assembly Drawings and Standard Foundation Details
  - (4) 5″ x 7″ Ports with (2) port covers
  - (3) Jacking Lugs on each side of splices
  - (3) Ground attachment clips
  - (1) Vented cap plate
  - (1) Bearing plate welded to bottom
  - Safety Climb Support Brackets
  - (1) Safety warning sign
  - (1) Pole ID tag
  - Attachment clips for optional step bolts
- Optional items are available and may be ordered separately. Please see accessories on page 225.
- Custom designs available for any height or application.



Safety Climb Support Bracket
(Safety Cable System Ordered Separately)

PORT ORIENTATIONS

Per Rev G requirements, any structure greater than 10′ requires a climber safety device. Please see page 225 for ordering information.

BUYERS GUIDE

The pole loading charts included in this section were created to help you identify the standard pole that most closely meets your needs. The charts include the design wind speed, sway, total EPA that the pole can support and pole embedment requirements. Once the correct structure is identified, use the part number at the top of each section to order your pole.

Part Number for ordering direct embed poles

Sway at TIA operational wind speed

30′

Height Above Grade

WIND SPEED (MPH)		LIGHT			MEDIUM			HEAVY		
		DEP30LA			DEP30MA			DEP30HA		
		SWAY LIMIT			SWAY LIMIT			SWAY LIMIT		
FASTEST MILE	3-SECOND GUST	4°	3°	2°	4°	3°	2°	4°	3°	2°
		EPA (FT^2)			EPA (FT^2)			EPA (FT^2)		
70	85	69	49	29	110	108	68	170	170	143
80	100	52	49	29	80	80	68	126	126	126
90	110	38	38	29	59	59	59	95	95	95
100	120	27	27	27	44	44	44	74	74	74
110	130	19	19	19	32	32	32	57	57	57
120	140	13	13	13	24	24	24	45	45	45
EMBEDMENT		DEPTH 10′	DIA. 2.5′		DEPTH 11′	DIA. 2.5′		DEPTH 13′	DIA. 3.0′	

Total effective projected area of antennas, mounts and lighting allowed on pole (see pg. 226)

Depth and diameter of embedment for gravel backfill. Installation adds 6" to the depth for gravel base

LOADING CHARTS

40′

WIND SPEED (MPH)		LIGHT			MEDIUM			HEAVY		
		DEP40LA			DEP40MA			DEP40HA		
		SWAY LIMIT			SWAY LIMIT			SWAY LIMIT		
FASTEST MILE	3-SECOND GUST	4°	3°	2°	4°	3°	2°	4°	3°	2°
		EPA (FT^2)			EPA (FT^2)			EPA (FT^2)		
70	85	69	49	29	110	108	68	170	170	143
80	100	52	49	29	80	80	68	126	126	126
90	110	38	38	29	59	59	59	95	95	95
100	120	27	27	27	44	44	44	74	74	74
110	130	19	19	19	32	32	32	57	57	57
120	140	13	13	13	24	24	24	45	45	45
EMBEDMENT		DEPTH 12′	DIA. 2.5′		DEPTH 13′	DIA. 2.5′		DEPTH 15′	DIA. 3.0′	

50′

WIND SPEED (MPH)		LIGHT			MEDIUM			HEAVY		
		DEP50LA			DEP50MA			DEP50HA		
		SWAY LIMIT			SWAY LIMIT			SWAY LIMIT		
FASTEST MILE	3-SECOND GUST	4°	3°	2°	4°	3°	2°	4°	3°	2°
		EPA (FT^2)			EPA (FT^2)			EPA (FT^2)		
70	85	69	49	29	110	108	68	170	170	143
80	100	52	49	29	80	80	68	126	126	126
90	110	38	38	29	59	59	59	95	95	95
100	120	27	27	27	44	44	44	74	74	74
110	130	19	19	19	32	32	32	57	57	57
120	140	13	13	13	24	24	24	45	45	45
EMBEDMENT		DEPTH 15′	DIA. 2.5′		DEPTH 16′	DIA. 2.5′		DEPTH 17′	DIA. 3.0′	

LOADING CHARTS

60′

WIND SPEED (MPH)		LIGHT			MEDIUM			HEAVY		
		DEP60LA			DEP60MA			DEP60HA		
		SWAY LIMIT			SWAY LIMIT			SWAY LIMIT		
FASTEST MILE	3-SECOND GUST	4°	3°	2°	4°	3°	2°	4°	3°	2°
		EPA (FT^2)			EPA (FT^2)			EPA (FT^2)		
70	85	52	35	19	99	80	48	150	150	104
80	100	46	35	19	71	71	48	109	109	104
90	110	32	32	19	50	50	48	81	81	81
100	120	21	21	19	36	36	36	61	61	61
110	130	14	14	14	25	25	25	46	46	46
120	140	8	8	8	17	17	17	35	35	35
EMBEDMENT		DEPTH	15′	DIA.	2.5′	DEPTH	17′	DIA.	3.0′	DEPTH	19′	DIA.	3.0′

70′

WIND SPEED (MPH)		LIGHT			MEDIUM			HEAVY		
		DEP70LA			DEP70MA			DEP70HA		
		SWAY LIMIT			SWAY LIMIT			SWAY LIMIT		
FASTEST MILE	3-SECOND GUST	4°	3°	2°	4°	3°	2°	4°	3°	2°
		EPA (FT^2)			EPA (FT^2)			EPA (FT^2)		
70	85	42	28	13	89	63	36	137	129	81
80	100	42	28	13	63	63	36	98	98	81
90	110	28	28	13	43	43	36	72	73	73
100	120	17	17	13	29	29	29	53	53	53
110	130	9	9	9	19	19	19	39	39	39
120	140	3	3	3	10	10	10	28	28	28
EMBEDMENT		DEPTH	16′	DIA.	3.0′	DEPTH	18′	DIA.	3.0′	DEPTH	20′	DIA.	3.5′

80′

WIND SPEED (MPH)		LIGHT			MEDIUM			HEAVY		
		DEP80LA			DEP80MA			DEP80HA		
		SWAY LIMIT			SWAY LIMIT			SWAY LIMIT		
FASTEST MILE	3-SECOND GUST	4°	3°	2°	4°	3°	2°	4°	3°	2°
		EPA (FT^2)			EPA (FT^2)			EPA (FT^2)		
70	85	28	17	6	65	44	23	117	93	56
80	100	28	17	6	50	44	23	82	82	56
90	110	19	17	6	32	32	23	58	58	56
100	120	9	9	6	19	19	19	41	41	41
110	130	2	2	2	9	9	9	28	28	28
120	140	-	-	-	2	2	2	18	18	18
EMBEDMENT		DEPTH	16′	DIA.	3.0′	DEPTH	18′	DIA.	3.0′	DEPTH	20′	DIA.	3.5′

90′

WIND SPEED (MPH)		LIGHT			MEDIUM			HEAVY		
		DEP90LA			DEP90MA			DEP90HA		
		SWAY LIMIT			SWAY LIMIT			SWAY LIMIT		
FASTEST MILE	3-SECOND GUST	4°	3°	2°	4°	3°	2°	4°	3°	2°
		EPA (FT^2)			EPA (FT^2)			EPA (FT^2)		
70	85	21	11	2	51	33	16	106	77	44
80	100	21	11	2	43	33	16	73	73	44
90	110	14	11	2	25	25	16	50	50	44
100	120	4	4	2	12	12	12	33	33	33
110	130	-	-	2	3	3	3	21	21	21
120	140	-	-	-	-	-	-	13	13	13
EMBEDMENT		DEPTH	18′	DIA.	3.0′	DEPTH	20′	DIA.	3.0′	DEPTH	22′	DIA.	3.5′

(-) Indicates that pole is not recommended for the tabulated wind speed

LOADING CHARTS

100′

WIND SPEED (MPH)		LIGHT DEP100LA			MEDIUM DEP100MA			HEAVY DEP100HA		
		SWAY LIMIT			SWAY LIMIT			SWAY LIMIT		
FASTEST MILE	3-SECOND GUST	4º	3º	2º	4º	3º	2º	4º	3º	2º
		EPA (FT²)			EPA (FT²)			EPA (FT²)		
70	85	16	7	-	42	26	11	91	63	36
80	100	16	7	-	36	26	11	65	63	36
90	110	9	7	-	18	18	11	43	43	36
100	120	-	-	-	6	6	6	26	26	26
110	130	-	-	-	-	-	-	14	14	14
120	140	-	-	-	-	-	-	7	7	7
EMBEDMENT		DEPTH 18′	DIA. 3.0′		DEPTH 20′	DIA. 3.5′		DEPTH 22′	DIA. 3.5′	

110′

WIND SPEED (MPH)		LIGHT DEP110LA			MEDIUM DEP110MA			HEAVY DEP110HA		
		SWAY LIMIT			SWAY LIMIT			SWAY LIMIT		
FASTEST MILE	3-SECOND GUST	4º	3º	2º	4º	3º	2º	4º	3º	2º
		EPA (FT²)			EPA (FT²)			EPA (FT²)		
70	85	23	13	-	51	32	14	103	70	41
80	100	23	13	-	47	32	14	77	70	41
90	110	13	13	-	25	25	14	50	50	41
100	120	-	-	-	9	9	9	31	31	31
110	130	-	-	-	-	-	-	17	17	17
120	140	-	-	-	-	-	-	8	8	8
EMBEDMENT		DEPTH 19′	DIA. 3.5′		DEPTH 21′	DIA. 4.0′		DEPTH 22′	DIA. 4.0′	

120′

WIND SPEED (MPH)		LIGHT DEP120LA			MEDIUM DEP120MA			HEAVY DEP120HA		
		SWAY LIMIT			SWAY LIMIT			SWAY LIMIT		
FASTEST MILE	3-SECOND GUST	4º	3º	2º	4º	3º	2º	4º	3º	2º
		EPA (FT²)			EPA (FT²)			EPA (FT²)		
70	85	18	10	-	39	24	6	90	62	35
80	100	18	10	-	36	24	6	80	62	35
90	110	5	5	-	15	15	6	55	55	35
100	120	-	-	-	-	-	-	36	36	35
110	130	-	-	-	-	-	-	23	23	23
120	140	-	-	-	-	-	-	14	14	14
EMBEDMENT		DEPTH 19′	DIA. 3.5′		DEPTH 22′	DIA. 4.0′		DEPTH 23′	DIA. 4.0′	

130′

WIND SPEED (MPH)		LIGHT DEP130LA			MEDIUM DEP130MA			HEAVY DEP130HA		
		SWAY LIMIT			SWAY LIMIT			SWAY LIMIT		
FASTEST MILE	3-SECOND GUST	4º	3º	2º	4º	3º	2º	4º	3º	2º
		EPA (FT²)			EPA (FT²)			EPA (FT²)		
70	85	19	8	-	39	24	6	83	57	30
80	100	19	8	-	39	24	6	76	57	30
90	110	14	8	-	24	24	6	51	51	30
100	120	2	2	-	11	11	6	32	32	30
110	130	-	-	-	-	-	-	21	21	21
120	140	-	-	-	-	-	-	10	10	10
EMBEDMENT		DEPTH 22′	DIA. 4.0′		DEPTH 23′	DIA. 4.0′		DEPTH 24′	DIA. 4.5′	

(-) Indicates that pole is not recommended for the tabulated wind speed

LOADING CHARTS

140′

WIND SPEED (MPH)		LIGHT DEP140LA			MEDIUM DEP140MA			HEAVY DEP140HA		
		SWAY LIMIT			SWAY LIMIT			SWAY LIMIT		
FASTEST MILE	3-SECOND GUST	4º	3º	2º	4º	3º	2º	4º	3º	2º
		EPA (FT^2)			EPA (FT^2)			EPA (FT^2)		
70	85	16	5	-	42	26	6	86	62	31
80	100	16	5	-	42	26	6	86	62	31
90	110	8	5	-	36	26	6	66	62	31
100	120	-	-	-	16	16	6	45	45	31
110	130	-	-	-	-	-	-	28	28	28
120	140	-	-	-	-	-	-	13	13	13
EMBEDMENT		**DEPTH** 24′	**DIA.** 4.0′		**DEPTH** 25′	**DIA.** 4.5′		**DEPTH** 26′	**DIA.** 4.5′	

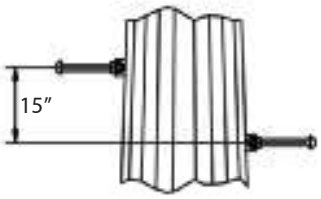
150′

WIND SPEED (MPH)		LIGHT DEP150LA			MEDIUM DEP150MA			HEAVY DEP150HA		
		SWAY LIMIT			SWAY LIMIT			SWAY LIMIT		
FASTEST MILE	3-SECOND GUST	4º	3º	2º	4º	3º	2º	4º	3º	2º
		EPA (FT^2)			EPA (FT^2)			EPA (FT^2)		
70	85	17	5	-	47	26	6	89	63	31
80	100	17	5	-	47	26	6	89	63	31
90	110	17	5	-	30	26	6	65	63	31
100	120	-	-	-	10	10	6	39	39	31
110	130	-	-	-	-	-	-	22	22	22
120	140	-	-	-	-	-	-	6	6	6
EMBEDMENT		**DEPTH** 24′	**DIA.** 4.0′		**DEPTH** 26′	**DIA.** 4.5′		**DEPTH** 27′	**DIA.** 5.0′	

(-) Indicates that pole is not recommended for the tabulated wind speed

1. Pole designs conform to ANSI/TIA/EIA-222-F with 1/2" radial ice and to ANSI/TIA-222-G (Class I, Exposure B, Topographic Catagory I). Design criteria must be verified prior to installation based on site-specific requirements.
2. Embedment depths are based on "Normal" soil (TIA Rev. F) and clay "Presumptive" soil (TIA Rev. G) with aggregate backfill. Actual site soil design parameters must be verified prior to installation.
3. For corrosive groundwater and/or soil conditions, ROHN recommends additional corrosion control protection such as concrete backfill, additional protective coating over galvanizing or the installation of sacrificial anodes.
4. Embedment depths may require adjustment based on local soil conditions.

PARTS & ACCESSORIES



STEP BOLTS

STEP BOLTS START AT 20′ ABOVE GRADE (NOMINAL). WHEN ORDERING STEP BOLTS, PLEASE SPECIFY POLE HEIGHT.

EX. SBDEP120 for a 120′ POLE

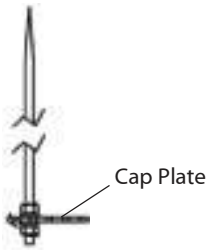
JOURNEYMAN CLIMBING HARNESS
TTFBH-4D

PROFESSIONAL CLIMBING HARNESS
TTFBH-C/P

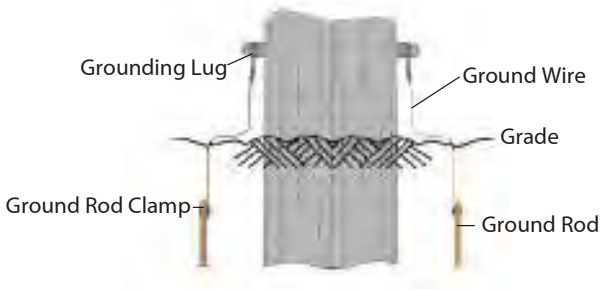
SAFETY CABLE SLIDER WITH CARABINEER
TT-WG-500-W/SMC

SAFETY CABLE SYSTEM

Pole Height	Part Number
30′ - 50′	**TT050TSP**
60′ - 100′	**TT100TSP**
110′ - 150′	**TT150TSP**

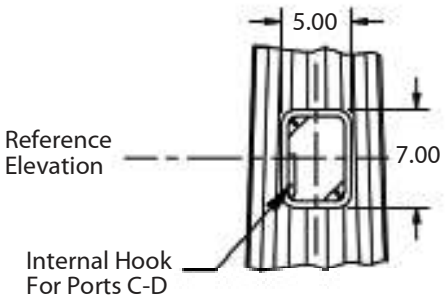


LIGHTNING ROD
LRCL
5′ COPPER CLAD
BOLTS TO CAP PLATE, PROVIDED WITH POLE.



GROUNDING KIT
BGK5GGXTSP
3 LINES 6 WIRE KIT INCLUDES (1) GROUND LEAD, GROUND ROD AND CONNECTIONS.
ORDER (1) KITS FOR REV G GROUNDING.

PORT DIMENSIONS



A through D PORTS
Larger ports are available, upon request.

ANTENNA INDEX

DISH ANTENNA			
DIAMETER	EPA - FT²		SWAY LIMIT
	W/ RADOME	W/O RADOME	
(1) 2 FT.	3	6	4°
(1) 3FT.	7	13	3°
(1) 4FT.	11	22	2°
(2) 2 FT. B-TO-B	5	8	4°
(2) 3 FT. B-TO-B	11	18	3°
(2) 4 FT. B-TO-B	19	34	2°

FLAT PANEL ANTENNA		
DIMENSION	EPA - FT²	SWAY LIMIT
1 FT. SQUARE W/ MOUNT	2	4°
2 FT. SQUARE W/ MOUNT	5	2°
3 FT. SQUARE W/ MOUNT	11	2°

1. The above antenna data is intended to assist in the selection of the appropriate ROHN pole. Once the total EPA and sway limit is determined for the antennas, the standard ROHN pole can be selected from the tabulated values. (See example below)
2. Tabulated pole EPA capacities represent the maximum EPA capacity of a pole. The capacity is based on the assumption that 80% of the total EPA is located at the top of the pole and the remaining 20% is located 20 ft. below the top. When all loading is located at the top of the pole, the tabulated EPA capacity must be reduced by 20%.
3. Sway limits are determined under a 50 MPH fastest-mile (Rev. F) or 60 MPH 3-second gust (Rev. G) wind speed.
4. The antenna effective projected areas (EPA) and sway limits provided in the antenna index are guidelines for typical antenna systems. Other values may apply for specific antenna models or for site-specific systems.

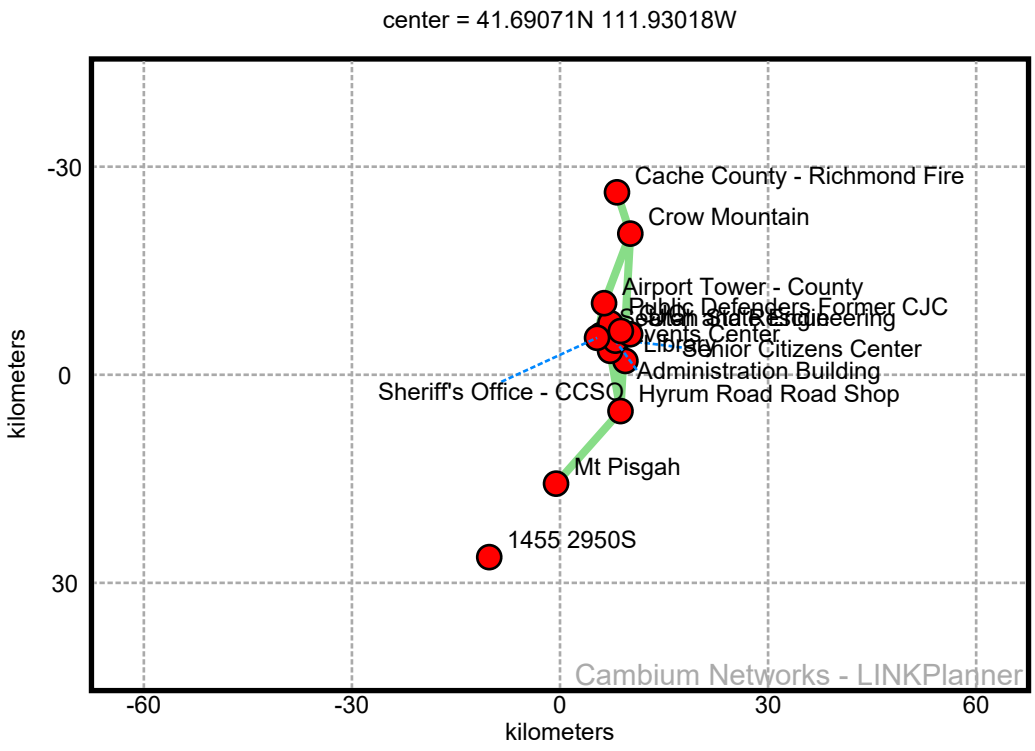
Determine EPA & Sway Limit for Dishes or Flat Panel Antennas

1. Using the antenna index, determine the types of antennas to be installed on the pole.
2. Add together the EPA value of all the antennas to be supported.
3. Determine the most restrictive sway limit considering all the antennas to be supported. For example, for one 3′ dish with a 3° sway limit and one 1′ flat panel with a 4° sway limit, the sway limit for the pole would be 3° and the required pole EPA capacity would be 13+2=15 ft ^{2}.
4. If all antennas are to be supported at the top of the pole, only 80% of the tabulated EPA capacity shown may be considered when selecting a pole. Alternately, the antenna EPA to be supported may be increased by 25%. For example, the required pole capacity would be 15x1.25=19 ft ^{2}.
5. Using the pole sway limit and the required EPA capacities, the appropriate pole may be determined from the tabulated values. For example, for a 120 ft. pole and a 100 mph 3-sec gust wind speed, a medium pole [P/N: DEP120MA] would be required for an EPA capacity greater than 19 ft^2 for a 3° sway limit.

Project Cache County Link Planner 8-23-2022_AfterSurvey_vt

LINKPlanner PTP Installation Report

08 November 2022



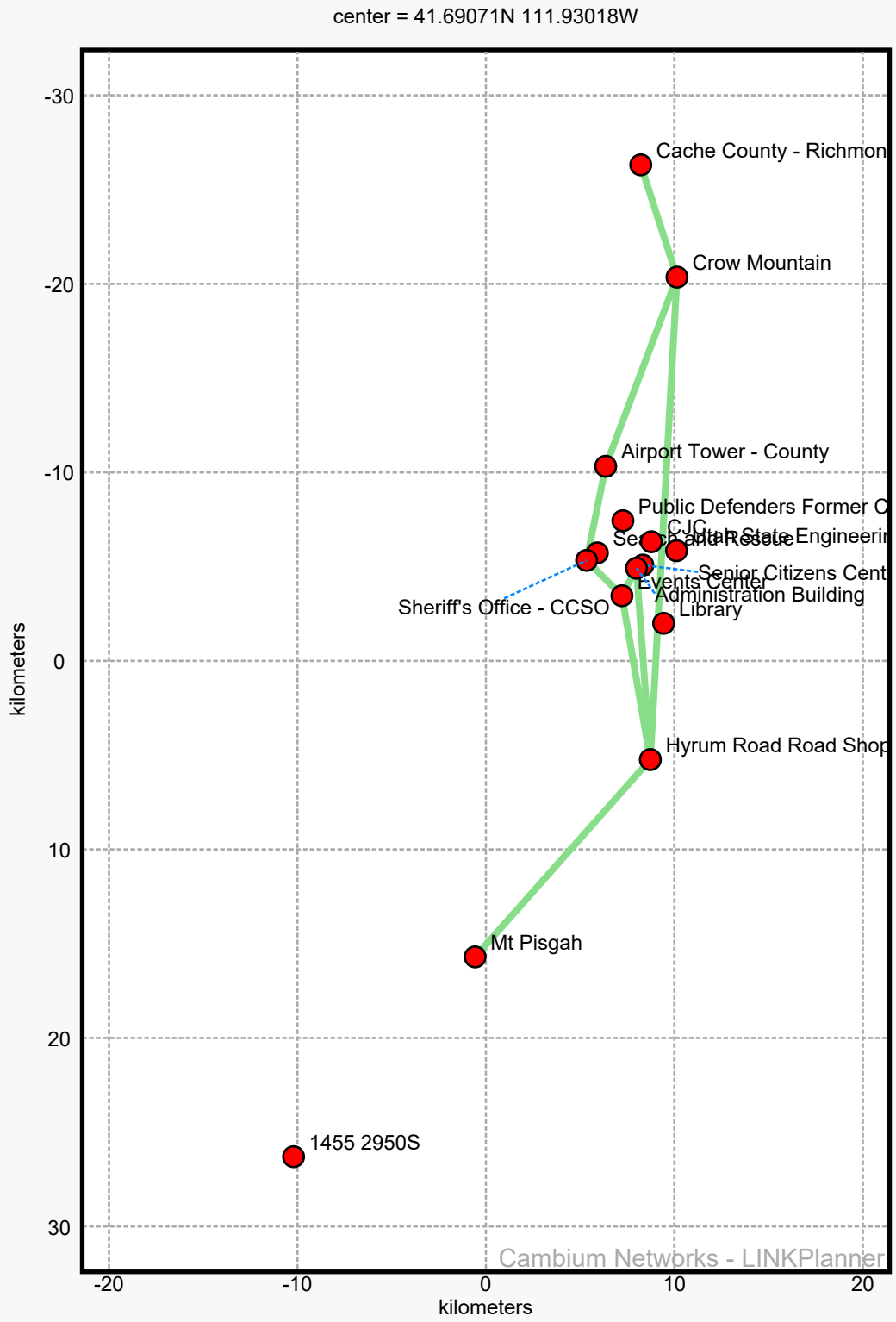
Cambium Networks

Table of Contents

1. Project Summary

Project:	Cache County Link Planner 8-23-2022_AfterSurvey_vt
General Information	
Customer Name	
Company Name	
Address	
Phone	
Cell Phone	
Email	

Network Map


center = 41.69071N 111.93018W
Cache County - Richmon
Crow Mountain
Airport Tower - County
Public Defenders Former C
CJC
Senior Citizens Cent
Events Center
Administration Building
Sheriff's Office - CCSO
Library
Hyrum Road Road Shop
Mt Pisgah
1455 2950S
Cambium Networks - LINKPlanner
kilometers
kilometers
-30
-20
-10
0
10
20
30
-20
-10
0
10
20

Link name	Product	Primary Local antenna	Primary Remote antenna	Max aggregate IP throughput
Administration Building to Hyrum Road Road Shop	PTP18850C	Cambium Networks 2ft Single Pol (NA & CALA Only) N180082D052 - Direct	Cambium Networks 2ft Single Pol (NA & CALA Only) N180082D052 - Direct	2646.63 Mbps
Administration Building to Senior Citizens Center	PTP80850E	Cambium Networks 1ft High Gain Integrated (Global) - Direct	Cambium Networks 1ft High Gain Integrated (Global) - Direct	19.621 Gbps
Airport Tower - County to Crow Mountain	PTP18850C	Cambium Networks 2ft Single Pol (NA & CALA Only) N180082D052 - Direct	Cambium Networks 2ft Single Pol (NA & CALA Only) N180082D052 - Direct	2792.43 Mbps
Cache County - Richmond Fire to Crow Mountain	PTP18850C	Cambium Networks 1ft Single Pol (Global) N180082D031 - Direct	Cambium Networks 2ft Single Pol (NA & CALA Only) N180082D052 - Direct	2646.79 Mbps
Crow Mountain to Hyrum Road Road Shop	PTP11850C	Cambium Networks 3ft Single Pol (NA & CALA Only) N110082D098 - Direct	Cambium Networks 3ft Single Pol (NA & CALA Only) N110082D098 - Direct	2646.49 Mbps
Events Center to Administration Building	PTP18850C	Cambium Networks 1ft Single Pol (Global) N180082D031 - Direct	Cambium Networks 1ft Single Pol (Global) N180082D031 - Direct	1396.88 Mbps
Events Center to Hyrum Road Road Shop	PTP11850C	Cambium Networks 2ft Single Pol (Global) N110082D072 - Direct	Cambium Networks 2ft Single Pol (Global) N110082D072 - Direct	1396.87 Mbps
Mt Pisgah to Hyrum Road Road Shop	PTP11820S (Narrow)	Cambium Networks 2ft Single Pol (Global) N110082D072 - Direct	Cambium Networks 2ft Single Pol (Global) N110082D072 - Direct	1054.04 Mbps
Sheriff's Office - CCSO to Airport Tower - County	PTP11820S (Narrow)	Cambium Networks 2ft Single Pol (Global) N110082D072 - Direct	Cambium Networks 2ft Single Pol (Global) N110082D072 - Direct	1010.02 Mbps
Sheriff's Office - CCSO to Events Center	PTP11820S (Narrow)	Cambium Networks 2ft Single Pol (Global) N110082D072 - Direct	Cambium Networks 2ft Single Pol (Global) N110082D072 - Direct	1054.12 Mbps

Bill of Materials : PTP Network		
Part Number	Qty	Description
(no part number)	10	Unspecified 11 GHz ODU (invalid TX frequency selection). Please select a TX frequency
(no part number)	8	Unspecified 18 GHz ODU (invalid TX frequency selection). Please select a TX frequency
(no part number)	12	Unspecified Power Lead. (set the region in the Bill of Materials options)

Bill of Materials : PTP Network (continued)		
Part Number	Qty	Description
C000000L033	24	Gigabit Surge Suppressor (56V), 10/100/1000 BaseT
C110085B002	4	PTP 850C, Basic Radio, 11 GHz
C800085B003	1	PTP 850E Radio with 43 dBi ant, 10Gbps, Hi, TX 81-86GHz, RX 71-76GHz
C800085B004	1	PTP 850E Radio with 43 dBi ant, 10Gbps, Lo, TX 71-76GHz, RX 81-86GHz
C800085K003	2	PTP 850E Act.Key - Capacity 10G with ACM Enabled, Per Tx Chan
EW-E4PT820S-WW	6	PTP820S Extended Warranty, 4 Additional Years
EW-E4PT850C-WW	12	PTP850C Extended Warranty, 4 Additional Years
EW-E4PT850E-WW	2	PTP 850E Radio Extended Warranty, 4 Additional Years
N000000L155	4	CAT6A Outdoor Cable, 100m
N000065L001	6	AC power Injector 56V, 60W
N000082K167	10	PTP 820/850 Act.Key - 10GE port
N000082L013	25	Dual Feeder Clamp 4.0-7.0mm Cable 6 Way. Default is 1 clamp every 10 meters, installation dependent, check local requirements.
N000082L014	20	PTP 820 Glands_x5_KIT
N000082L019	4	PTP 820 Outdoor_DC_cbl_2x18AWG_drum, 305m
N000082L027	8	PTP 820C/850C Act.Key - 2nd Core Activation
N000082L048	16	PTP 820/850 Act.Key - MC-ABC, per Tx Chan
N000082L056	16	PTP 820/850 Act.Key - XPIC, per Tx Chan
N000082L065	8	PTP 820 DC Connnector
N000082L116	20	Grounding Cable, 1m with M6 ring to M6 ring
N000082L125	6	PTP 820/850 Act.Key - Capacity 500M with ACM Enabled, Per Tx Chan
N000082L126	20	PTP 820/850 Act.Key - Capacity 650M with ACM Enabled, Per Tx Chan
N000082L139	9	Optical CABLE,SM, 30m
N000082L140	1	Optical CABLE,SM, 50m
N000082L147	4	PTP 820 Fiber Adapter
N000082L164	6	PTP 820C INDOOR AC POE INJECTOR, 90W
N000082L173	24	Grounding Kit for CAT5E F/UTP 8mm and Cat6A Cable. Add 2 additional kits per PoE Injector that is installed outdoors
N000082L174	12	RJ45 Connector for CAT6A Cable, Qty 10
N110082D072	8	PTP 820 2' ANT,SP,10_11GHz,RFU-C TYPE&Std UBR100 - Andrew. Shorter lead time. Available in all regions
N110082D098	2	PTP 820 3' ANT,SP,11GHz,RFU-C TYPE&UBR100 - Radiowave. Only available for order in North America and CALA regions
N110082L082	4	PTP 820C OMT KIT 10-11GHz
N110082L092	2	PTP 820 RFU-C 10_11GHz OMT Interface-Andrew
N110082L103	2	PTP 820 RFU-C 10_11GHz OMT Interface-Radiowave

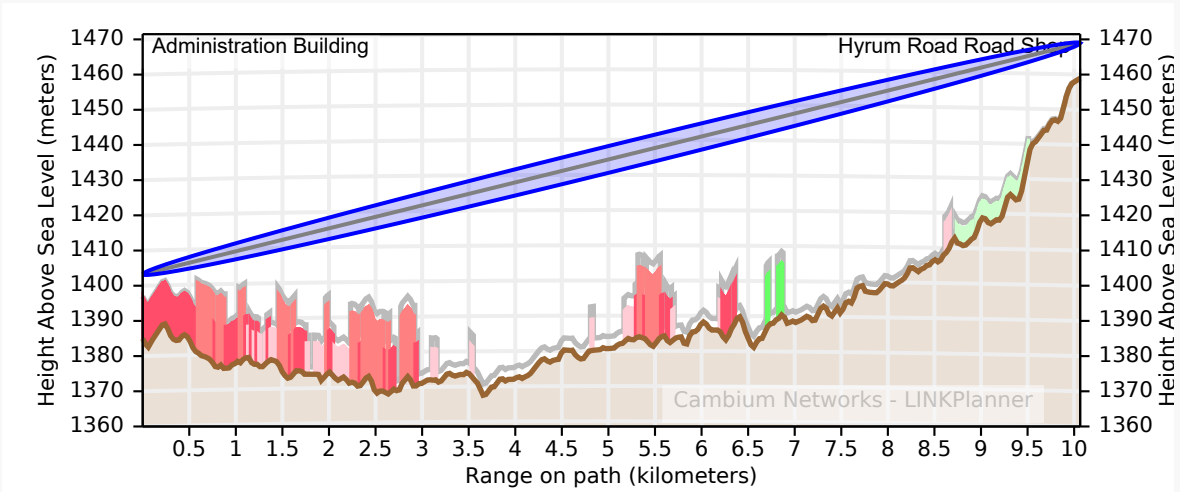
Bill of Materials : PTP Network (continued)		
Part Number	Qty	Description
N180082D031	3	PTP 820 1' ANT,SP,18GHz,RFU-C TYPE&Std UBR220 - Andrew. Shorter lead time. Available in all regions
N180082D052	5	PTP 820 2' ANT,SP,18GHz,RFU-C TYPE&UBR220 - Radiowave. Only available for order in North America and CALA regions
N180082L044	8	PTP 820C OMT KIT 18GHz
N180082L048	3	PTP 820 RFU-C 18GHz OMT Interface-Andrew
N180082L056	5	PTP 820 RFU-C 18GHz OMT Interface-Radiowave
N800082L004	2	PTP 820E/850E Flat Antenna Mounting kit
N800082L013	10	PTP 820/850 SFP+, 1310nm,SM, 10Gbit, Industrial Grade

Bill of Materials : Switch Network		
Part Number	Qty	Description

2. Administration Building to Hyrum Road Road Shop

Summary	
Link Name	Administration Building to Hyrum Road Road Shop
Profile Type	Line-of-Sight
Equipment Type	PTP18850C
Maximum Obstruction	0 meters
Link Distance	10.065 kilometers
Free Space Path Loss	137.94 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate Paths	Aggregate 2646.63 Mbps assuming PTP-850 Series running the Release 11.9 software
RF Frequency Band	18 GHz (17700 to 19700 MHz)
RF Channel Bandwidth	80 MHz

Path Profile



Link Configuration	
Link Type	2+0 XPIC (CCDP)
Ethernet Configuration	Single Ethernet (MC-ABC)
T/R Spacing	1560 MHz
Bandwidth	80 MHz
Modulation Mode	Adaptive
Maximum Mod Mode	11 - 2048QAM
Minimum Mod Mode	1 - QPSK
ATPC	Disabled
Hi	Administration Building
Lo	Hyrum Road Road Shop

Bill of Materials		
Part Number	Qty	Description
(no part number)	2	Unspecified 18 GHz ODU (invalid TX frequency selection). Please select a TX frequency
EW-E4PT850C-WW	2	PTP850C Extended Warranty, 4 Additional Years
N000082K167	2	PTP 820/850 Act.Key - 10GE port
N000082L013	5	Dual Feeder Clamp 4.0-7.0mm Cable 6 Way. Default is 1 clamp every 10 meters, installation dependent, check local requirements.
N000082L014	2	PTP 820 Glands_x5_KIT
N000082L019	1	PTP 820 Outdoor_DC_cbl_2x18AWG_drum, 305m
N000082L027	2	PTP 820C/850C Act.Key - 2nd Core Activation
N000082L048	4	PTP 820/850 Act.Key - MC-ABC, per Tx Chan
N000082L056	4	PTP 820/850 Act.Key - XPIC, per Tx Chan
N000082L065	2	PTP 820 DC Connnector
N000082L116	2	Grounding Cable, 1m with M6 ring to M6 ring
N000082L126	4	PTP 820/850 Act.Key - Capacity 650M with ACM Enabled, Per Tx Chan
N000082L139	2	Optical CABLE,SM, 30m
N180082D052	2	PTP 820 2' ANT,SP,18GHz,RFU-C TYPE&UBR220 - Radiowave. Only available for order in North America and CALA regions
N180082L044	2	PTP 820C OMT KIT 18GHz
N180082L056	2	PTP 820 RFU-C 18GHz OMT Interface-Radiowave
N800082L013	2	PTP 820/850 SFP+, 1310nm,SM, 10Gbit, Industrial Grade

Physical Installation Notes for Administration Building	
Link Name	Administration Building to Hyrum Road Road Shop
Latitude	41.73444N
Longitude	111.83520W
Site Elevation	1385 meters AMSL
Polarization (Link A)	Vertical
Polarization (Link B)	Horizontal
Hardware Platform	PTP18850C
Antenna Type	Cambium Networks 2ft Single Pol (NA & CALA Only) N180082D052 - Direct
Antenna Beamwidth	2.0°
Antenna Gain	38.6 dBi
Antenna Height	18.3 meters AGL
Antenna Tilt Angle	0.3° (uptilt)
Bearing to Hyrum Road Road Shop	175.93° from True North 164.80° from Magnetic North
Magnetic Declination	11.13° E ±0.36° changing by 0.09° W per year
RF Feeder Loss (Link A)	0.3 dB
RF Feeder Loss (Link B)	0.3 dB

Physical Installation Notes for Hyrum Road Road Shop	
Link Name	Administration Building to Hyrum Road Road Shop
Latitude	41.64405N
Longitude	111.82663W
Site Elevation	1459 meters AMSL
Polarization (Link A)	Vertical
Polarization (Link B)	Horizontal
Hardware Platform	PTP18850C
Antenna Type	Cambium Networks 2ft Single Pol (NA & CALA Only) N180082D052 - Direct
Antenna Beamwidth	2.0°
Antenna Gain	38.6 dBi
Antenna Height	10.0 meters AGL
Antenna Tilt Angle	-0.4° (downtilt)
Bearing to Administration Building	355.94° from True North 344.83° from Magnetic North
Magnetic Declination	11.11° E ±0.36° changing by 0.09° W per year
RF Feeder Loss (Link A)	0.3 dB
RF Feeder Loss (Link B)	0.3 dB

Radio Commissioning Notes for Administration Building	
Radio Interface (Link A)	Radio:Slot 2, port 2
Radio Interface (Link B)	Radio:Slot 2, port 1
Tx Frequency (Link A)	Unknown (port 2)
Rx Frequency (Link A)	Unknown (port 2)
Tx Frequency (Link B)	Unknown (port 1)
Rx Frequency (Link B)	Unknown (port 1)
Tx to Rx Frequency Separation	1560.000 MHz
Tx Level (Link A)	24 dBm (port 2)
Tx Level (Link B)	24 dBm (port 1)
MRMC Script	FCC 4501
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	11, 2048QAM
MRMC Script Minimum Profile	1, QPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Disabled
Header Compression	Disabled
XPIC Configuration Admin State	Enable
Multi Carrier ABC	Create a Multi Carrier ABC Group
BNC Voltage (Link A)	1.34 to 1.42 Volts
BNC Voltage (Link B)	1.34 to 1.42 Volts
Predicted Receive Power (Link A)	-38 dBm ± 4 dB while aligning
Predicted Receive Power (Link B)	-38 dBm ± 4 dB while aligning

Radio Commissioning Notes for Hyrum Road Road Shop	
Radio Interface (Link A)	Radio:Slot 2, port 2
Radio Interface (Link B)	Radio:Slot 2, port 1
Tx Frequency (Link A)	Unknown (port 2)
Rx Frequency (Link A)	Unknown (port 2)
Tx Frequency (Link B)	Unknown (port 1)
Rx Frequency (Link B)	Unknown (port 1)
Tx to Rx Frequency Separation	1560.000 MHz
Tx Level (Link A)	24 dBm (port 2)
Tx Level (Link B)	24 dBm (port 1)
MRMC Script	FCC 4501
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	11, 2048QAM
MRMC Script Minimum Profile	1, QPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Disabled
Header Compression	Disabled
XPIC Configuration Admin State	Enable
Multi Carrier ABC	Create a Multi Carrier ABC Group
BNC Voltage (Link A)	1.34 to 1.42 Volts
BNC Voltage (Link B)	1.34 to 1.42 Volts
Predicted Receive Power (Link A)	-38 dBm ± 4 dB while aligning
Predicted Receive Power (Link B)	-38 dBm ± 4 dB while aligning

Regulatory Conditions	
Regulation	FCC
Band	18 GHz
Max EIRP	62.3 dBm
Output Power	24.0 dBm

Installation Instruction

Perform the following checks during the installation (Check the deployment guide and the User Guide.)

1. Check with a GPS that you are installing at the correct location.

2. Check carefully the direction to the other end of the link. Either use a corrected compass or use the GPS waypoint feature about 300 meters from the installation location.

3. When aligning antennas, it is important to find the centre of the main beam. This is done by adjusting the antenna at each end of the link in turn and monitoring the receive level until the peak is found. Once the peak level is found, it should be checked against the prediced receive power to ensure that the antennas have not been aligned on a side lobe.

4. An hour after alignment is complete, if ATPC is disabled, check that the mean value for the RSL is as predicted (see previous tables).

Administration Building Performance (Aggregated) *	
Mean IP Throughput Predicted	1323.32 Mbps
Mean IP Throughput Required	5.00 Mbps

Administration Building Performance (Aggregated) * (continued)	
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	99.9997% (unavailable for 1.5 mins/year)

Hyrum Road Road Shop Performance (Aggregated) *	
Mean IP Throughput Predicted	1323.32 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	99.9997% (unavailable for 1.5 mins/year)

* Multipath availability calculated using VB with ITU rain P.530-17

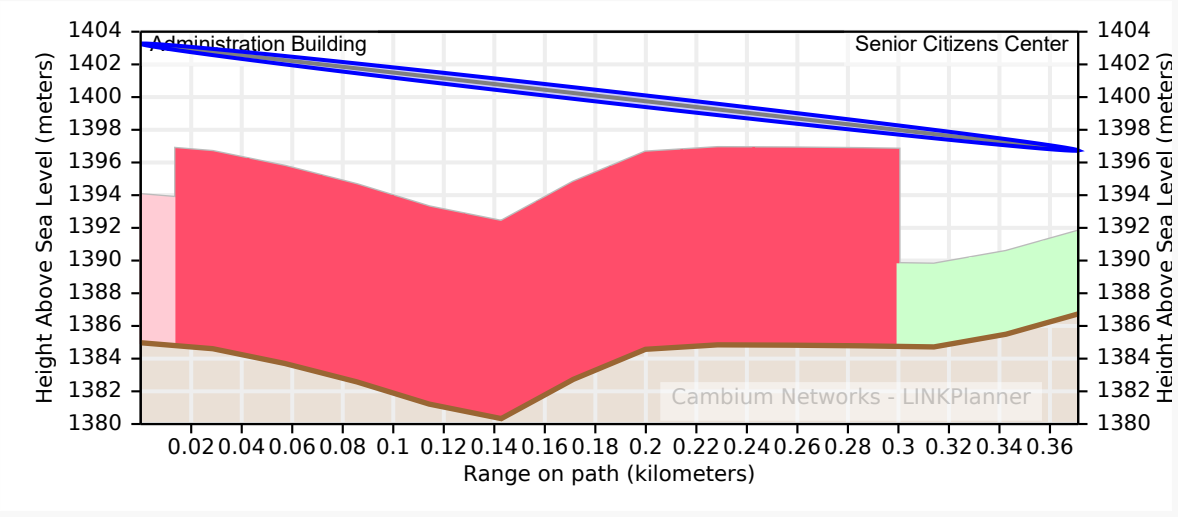
Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Administration Building - Aggregated			Hyrum Road Road Shop - Aggregated		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
11	2646.83	1323.41	8.96	99.9519	99.9519	8.96	99.9519	99.9519
10	2499.89	1249.95	12.46	99.9776	0.0257	12.46	99.9776	0.0257
9	2353.95	1176.97	12.96	99.9796	0.0020	12.96	99.9796	0.0020
8	2163.48	1081.74	17.46	99.9923	0.0127	17.46	99.9923	0.0127
7	1967.89	983.95	20.96	99.9958	0.0035	20.96	99.9958	0.0035
6	1707.48	853.74	23.46	99.9969	0.0011	23.46	99.9969	0.0011
5	1444.01	722.01	26.46	99.9979	0.0010	26.46	99.9979	0.0010
4	1177.50	588.75	30.46	99.9984	0.0006	30.46	99.9984	0.0006
3	894.75	447.38	33.96	99.9989	0.0004	33.96	99.9989	0.0004
2	624.20	312.10	36.96	99.9994	0.0005	36.96	99.9994	0.0005
1	436.74	218.37	44.71	99.9997	0.0004	44.71	99.9997	0.0004

* Multipath availability calculated using VB with ITU rain P.530-17

3. Administration Building to Senior Citizens Center

Summary	
Link Name	Administration Building to Senior Citizens Center
Profile Type	Line-of-Sight
Equipment Type	PTP80850E
Maximum Obstruction	0 meters
Link Distance	0.371 kilometers
Free Space Path Loss	121.74 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate	Aggregate 19.621 Gbps assuming PTP-850 Series running the Release 11.9 software
RF Frequency Band	80 GHz (71000 to 76000 MHz, 81000 to 86000 MHz)
RF Channel Bandwidth	2000 MHz
Description	Caution: Careful node placement required for LOS

Path Profile



Link Configuration	
Link Type	1+0
T/R Spacing	10 GHz
Bandwidth	2000 MHz
Modulation Mode	Adaptive
ACMB	Disabled
Maximum Mod Mode	8 - 128QAM
Minimum Mod Mode	2 - BPSK
Polarization	Vertical
ATPC	Disabled
Hi	Administration Building

Link Configuration (continued)	
Lo	Senior Citizens Center

Bill of Materials		
Part Number	Qty	Description
(no part number)	2	Unspecified Power Lead. (set the region in the Bill of Materials options)
C000000L033	4	Gigabit Surge Suppressor (56V), 10/100/1000 BaseT
C800085B003	1	PTP 850E Radio with 43 dBi ant, 10Gbps, Hi, TX 81-86GHz, RX 71-76GHz
C800085B004	1	PTP 850E Radio with 43 dBi ant, 10Gbps, Lo, TX 71-76GHz, RX 81-86GHz
C800085K003	2	PTP 850E Act.Key - Capacity 10G with ACM Enabled, Per Tx Chan
EW-E4PT850E-WW	2	PTP 850E Radio Extended Warranty, 4 Additional Years
N000000L155	1	CAT6A Outdoor Cable, 100m
N000082K167	2	PTP 820/850 Act.Key - 10GE port
N000082L013	5	Dual Feeder Clamp 4.0-7.0mm Cable 6 Way. Default is 1 clamp every 10 meters, installation dependent, check local requirements.
N000082L014	2	PTP 820 Glands_x5_KIT
N000082L116	2	Grounding Cable, 1m with M6 ring to M6 ring
N000082L139	2	Optical CABLE,SM, 30m
N000082L147	4	PTP 820 Fiber Adapter
N000082L164	2	PTP 820C INDOOR AC POE INJECTOR, 90W
N000082L173	4	Grounding Kit for CAT5E F/UTP 8mm and Cat6A Cable. Add 2 additional kits per PoE Injector that is installed outdoors
N000082L174	2	RJ45 Connector for CAT6A Cable, Qty 10
N800082L004	2	PTP 820E/850E Flat Antenna Mounting kit
N800082L013	2	PTP 820/850 SFP+, 1310nm,SM, 10Gbit, Industrial Grade

Physical Installation Notes for Administration Building	
Link Name	Administration Building to Senior Citizens Center
Latitude	41.73444N
Longitude	111.83520W
Site Elevation	1385 meters AMSL
Polarization	Vertical
Hardware Platform	PTP80850E - C800085B003
Antenna Type	Cambium Networks 1ft High Gain Integrated (Global) - Direct
Antenna Beamwidth	1.0°
Antenna Gain	44.0 dBi
Antenna Height	18.3 meters AGL
Antenna Tilt Angle	-1.0° (downtilt)

Physical Installation Notes for Administration Building (continued)	
Bearing to Senior Citizens Center	63.71° from True North 52.58° from Magnetic North
Magnetic Declination	11.13° E ±0.36° changing by 0.09° W per year

Physical Installation Notes for Senior Citizens Center	
Link Name	Administration Building to Senior Citizens Center
Latitude	41.73592N
Longitude	111.83120W
Site Elevation	1387 meters AMSL
Polarization	Vertical
Hardware Platform	PTP80850E - C800085B004
Antenna Type	Cambium Networks 1ft High Gain Integrated (Global) - Direct
Antenna Beamwidth	1.0°
Antenna Gain	44.0 dBi
Antenna Height	10.0 meters AGL
Antenna Tilt Angle	1.0° (uptilt)
Bearing to Administration Building	243.71° from True North 232.58° from Magnetic North
Magnetic Declination	11.13° E ±0.36° changing by 0.09° W per year

Radio Commissioning Notes for Administration Building	
Radio Interface	Radio:Slot 1, port 1
Tx Frequency	Unknown
Rx Frequency	Unknown
Tx to Rx Frequency Separation	10000.000 MHz
Tx Level	19 dBm
MRMC Script	FCC 5710
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	8, 128QAM
MRMC Script Minimum Profile	2, BPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Disabled
BNC Voltage	1.11 to 1.19 Volts
Predicted Receive Power	-15 dBm ± 4 dB while aligning

Radio Commissioning Notes for Senior Citizens Center	
Radio Interface	Radio:Slot 1, port 1
Tx Frequency	Unknown
Rx Frequency	Unknown
Tx to Rx Frequency Separation	10000.000 MHz
Tx Level	19 dBm
MRMC Script	FCC 5710

Radio Commissioning Notes for Senior Citizens Center (continued)	
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	8, 128QAM
MRMC Script Minimum Profile	2, BPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Disabled
BNC Voltage	1.11 to 1.19 Volts
Predicted Receive Power	-15 dBm ± 4 dB while aligning

Regulatory Conditions	
Regulation	FCC
Band	80 GHz
Max EIRP	63.0 dBm
Output Power	19.0 dBm

Installation Instruction

Perform the following checks during the installation (Check the deployment guide and the User Guide.)

1. Check with a GPS that you are installing at the correct location.

2. Check carefully the direction to the other end of the link. Either use a corrected compass or use the GPS waypoint feature about 300 meters from the installation location.

3. When aligning antennas, it is important to find the centre of the main beam. This is done by adjusting the antenna at each end of the link in turn and monitoring the receive level until the peak is found. Once the peak level is found, it should be checked against the prediced receive power to ensure that the antennas have not been aligned on a side lobe.

4. An hour after alignment is complete, check that the mean value for the RSL is as predicted (see previous tables).

Administration Building Performance *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	9.811 Gbps
Mean IP Throughput Required	0.500 Gbps
Minimum IP Throughput Required	0.100 Gbps
Minimum IP Throughput Availability Predicted	99.9999% (unavailable for 25 secs/year)

Senior Citizens Center Performance *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	9.811 Gbps
Mean IP Throughput Required	0.500 Gbps
Minimum IP Throughput Required	0.100 Gbps
Minimum IP Throughput Availability Predicted	99.9999% (unavailable for 25 secs/year)

* Multipath availability calculated using VB with ITU rain P.530-17

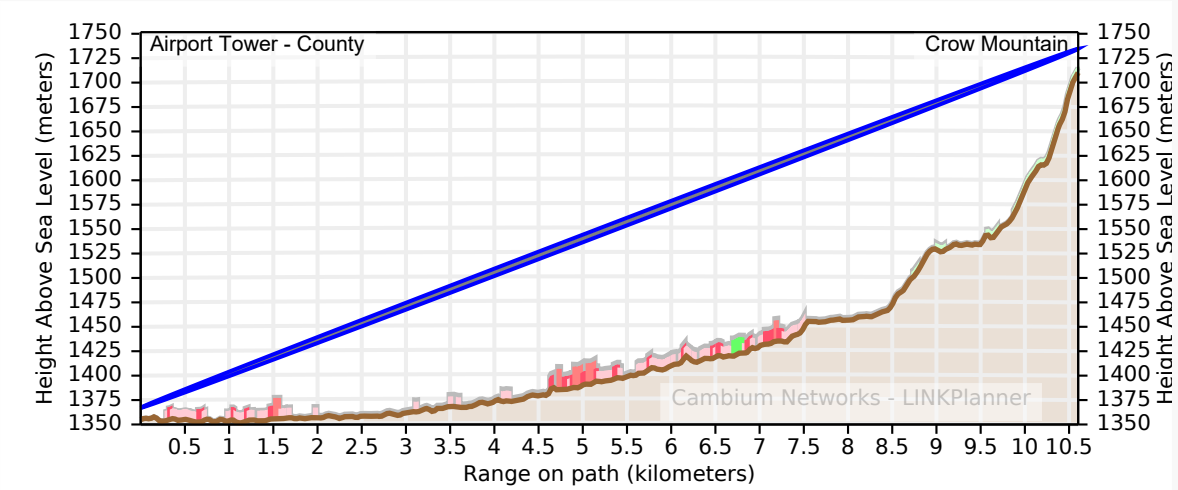
Mode	Max Aggregate User IP Throughput (Gbps)	Max User IP Throughput in Either Direction (Gbps)	Administration Building			Senior Citizens Center		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
8	19.621	9.811	24.92	99.9999	99.9999	24.92	99.9999	99.9999
7	16.269	8.134	29.32	99.9999	0.0000	29.32	99.9999	0.0000
6	13.556	6.778	33.42	99.9999	0.0000	33.42	99.9999	0.0000
5	10.864	5.432	36.52	99.9999	0.0000	36.52	99.9999	0.0000
4	8.148	4.074	39.82	99.9999	0.0000	39.82	99.9999	0.0000
3	5.235	2.618	45.82	99.9999	0.0000	45.82	99.9999	0.0000
2	2.617	1.308	52.57	99.9999	0.0000	52.57	99.9999	0.0000

* Multipath availability calculated using VB with ITU rain P.530-17

4. Airport Tower - County to Crow Mountain

Summary	
Link Name	Airport Tower - County to Crow Mountain
Profile Type	Line-of-Sight
Equipment Type	PTP18850C
Maximum Obstruction	0 meters
Link Distance	10.603 kilometers
Free Space Path Loss	138.39 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate Paths	Aggregate 2792.43 Mbps assuming PTP-850 Series running the Release 11.9 software
RF Frequency Band	18 GHz (17700 to 19700 MHz)
RF Channel Bandwidth	80 MHz

Path Profile



Link Configuration	
Link Type	2+0 XPIC (CCDP)
Ethernet Configuration	Single Ethernet (MC-ABC)
T/R Spacing	1560 MHz
Bandwidth	80 MHz
Modulation Mode	Adaptive
Maximum Mod Mode	12 - 4096QAM
Minimum Mod Mode	1 - QPSK
ATPC	Disabled
Hi	Airport Tower - County
Lo	Crow Mountain

Bill of Materials		
Part Number	Qty	Description
(no part number)	2	Unspecified 18 GHz ODU (invalid TX frequency selection). Please select a TX frequency
EW-E4PT850C-WW	2	PTP850C Extended Warranty, 4 Additional Years
N000082K167	2	PTP 820/850 Act.Key - 10GE port
N000082L013	7	Dual Feeder Clamp 4.0-7.0mm Cable 6 Way. Default is 1 clamp every 10 meters, installation dependent, check local requirements.
N000082L014	2	PTP 820 Glands_x5_KIT
N000082L019	1	PTP 820 Outdoor_DC_cbl_2x18AWG_drum, 305m
N000082L027	2	PTP 820C/850C Act.Key - 2nd Core Activation
N000082L048	4	PTP 820/850 Act.Key - MC-ABC, per Tx Chan
N000082L056	4	PTP 820/850 Act.Key - XPIC, per Tx Chan
N000082L065	2	PTP 820 DC Connnector
N000082L116	2	Grounding Cable, 1m with M6 ring to M6 ring
N000082L126	4	PTP 820/850 Act.Key - Capacity 650M with ACM Enabled, Per Tx Chan
N000082L139	1	Optical CABLE,SM, 30m
N000082L140	1	Optical CABLE,SM, 50m
N180082D052	2	PTP 820 2' ANT,SP,18GHz,RFU-C TYPE&UBR220 - Radiowave. Only available for order in North America and CALA regions
N180082L044	2	PTP 820C OMT KIT 18GHz
N180082L056	2	PTP 820 RFU-C 18GHz OMT Interface-Radiowave
N800082L013	2	PTP 820/850 SFP+, 1310nm,SM, 10Gbit, Industrial Grade

Physical Installation Notes for Airport Tower - County	
Link Name	Airport Tower - County to Crow Mountain
Latitude	41.78258N
Longitude	111.85459W
Site Elevation	1355 meters AMSL
Polarization (Link A)	Vertical
Polarization (Link B)	Horizontal
Hardware Platform	PTP18850C
Antenna Type	Cambium Networks 2ft Single Pol (NA & CALA Only) N180082D052 - Direct
Antenna Beamwidth	2.0°
Antenna Gain	38.6 dBi
Antenna Height	12.2 meters AGL
Antenna Tilt Angle	1.9° (uptilt)
Bearing to Crow Mountain	20.72° from True North 9.57° from Magnetic North
Magnetic Declination	11.15° E ±0.36° changing by 0.09° W per year
RF Feeder Loss (Link A)	0.3 dB

Physical Installation Notes for Airport Tower - County (continued)	
RF Feeder Loss (Link B)	0.3 dB

Physical Installation Notes for Crow Mountain	
Link Name	Airport Tower - County to Crow Mountain
Latitude	41.87186N
Longitude	111.80941W
Site Elevation	1710 meters AMSL
Polarization (Link A)	Vertical
Polarization (Link B)	Horizontal
Hardware Platform	PTP18850C
Antenna Type	Cambium Networks 2ft Single Pol (NA & CALA Only) N180082D052 - Direct
Antenna Beamwidth	2.0°
Antenna Gain	38.6 dBi
Antenna Height	24.4 meters AGL
Antenna Tilt Angle	-2.0° (downtilt)
Bearing to Airport Tower - County	200.75° from True North 189.60° from Magnetic North
Magnetic Declination	11.14° E ±0.36° changing by 0.09° W per year
RF Feeder Loss (Link A)	0.3 dB
RF Feeder Loss (Link B)	0.3 dB

Radio Commissioning Notes for Airport Tower - County	
Radio Interface (Link A)	Radio:Slot 2, port 2
Radio Interface (Link B)	Radio:Slot 2, port 1
Tx Frequency (Link A)	Unknown (port 2)
Rx Frequency (Link A)	Unknown (port 2)
Tx Frequency (Link B)	Unknown (port 1)
Rx Frequency (Link B)	Unknown (port 1)
Tx to Rx Frequency Separation	1560.000 MHz
Tx Level (Link A)	24 dBm (port 2)
Tx Level (Link B)	24 dBm (port 1)
MRMC Script	FCC 4501
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	12, 4096QAM
MRMC Script Minimum Profile	1, QPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Disabled
Header Compression	Disabled
XPIC Configuration Admin State	Enable
Multi Carrier ABC	Create a Multi Carrier ABC Group
BNC Voltage (Link A)	1.34 to 1.42 Volts
BNC Voltage (Link B)	1.34 to 1.42 Volts
Predicted Receive Power (Link A)	-38 dBm ± 4 dB while aligning

Radio Commissioning Notes for Airport Tower - County (continued)	
Predicted Receive Power (Link B)	-38 dBm ± 4 dB while aligning

Radio Commissioning Notes for Crow Mountain	
Radio Interface (Link A)	Radio:Slot 2, port 2
Radio Interface (Link B)	Radio:Slot 2, port 1
Tx Frequency (Link A)	Unknown (port 2)
Rx Frequency (Link A)	Unknown (port 2)
Tx Frequency (Link B)	Unknown (port 1)
Rx Frequency (Link B)	Unknown (port 1)
Tx to Rx Frequency Separation	1560.000 MHz
Tx Level (Link A)	24 dBm (port 2)
Tx Level (Link B)	24 dBm (port 1)
MRMC Script	FCC 4501
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	12, 4096QAM
MRMC Script Minimum Profile	1, QPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Disabled
Header Compression	Disabled
XPIC Configuration Admin State	Enable
Multi Carrier ABC	Create a Multi Carrier ABC Group
BNC Voltage (Link A)	1.34 to 1.42 Volts
BNC Voltage (Link B)	1.34 to 1.42 Volts
Predicted Receive Power (Link A)	-38 dBm ± 4 dB while aligning
Predicted Receive Power (Link B)	-38 dBm ± 4 dB while aligning

Regulatory Conditions	
Regulation	FCC
Band	18 GHz
Max EIRP	62.3 dBm
Output Power	24.0 dBm

Installation Instruction

Perform the following checks during the installation (Check the deployment guide and the User Guide.)

1. Check with a GPS that you are installing at the correct location.

2. Check carefully the direction to the other end of the link. Either use a corrected compass or use the GPS waypoint feature about 300 meters from the installation location.

3. When aligning antennas, it is important to find the centre of the main beam. This is done by adjusting the antenna at each end of the link in turn and monitoring the receive level until the peak is found. Once the peak level is found, it should be checked against the prediced receive power to ensure that the antennas have not been aligned on a side lobe.

4. An hour after alignment is complete, if ATPC is disabled, check that the mean value for the RSL is as predicted (see previous tables).

Airport Tower - County Performance (Aggregated) *	
Mean IP Throughput Predicted	1396.21 Mbps
Mean IP Throughput Required	500.00 Mbps
Minimum IP Throughput Required	100.00 Mbps
Minimum IP Throughput Availability Predicted	99.9999% (unavailable for 34 secs/year)

Crow Mountain Performance (Aggregated) *	
Mean IP Throughput Predicted	1396.21 Mbps
Mean IP Throughput Required	500.00 Mbps
Minimum IP Throughput Required	100.00 Mbps
Minimum IP Throughput Availability Predicted	99.9999% (unavailable for 34 secs/year)

* Multipath availability calculated using VB with ITU rain P.530-17

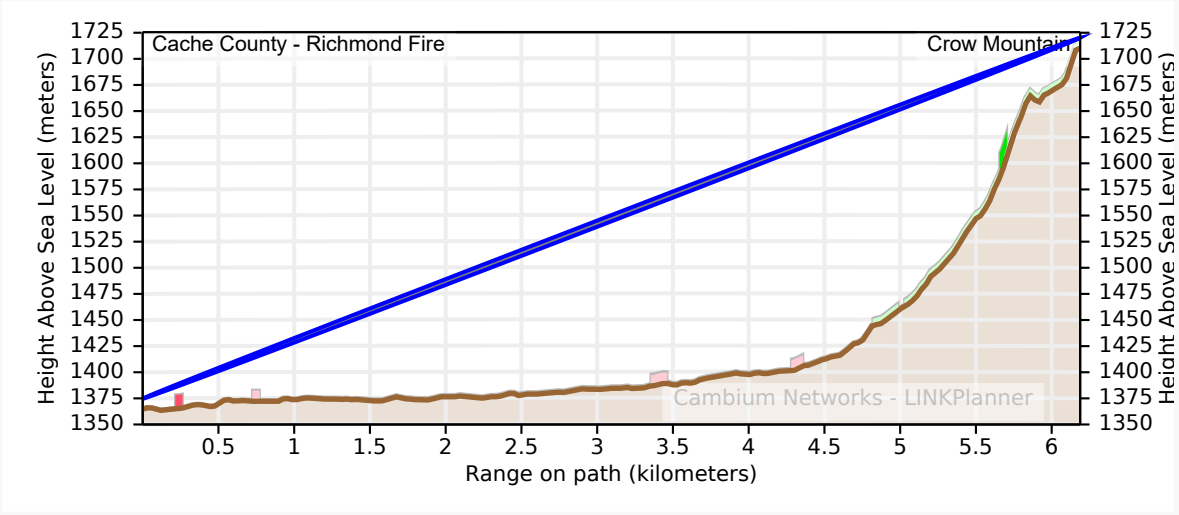
Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Airport Tower - County - Aggregated			Crow Mountain - Aggregated		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
12	2793.76	1396.88	3.51	99.1913	99.1913	3.51	99.1913	99.1913
11	2646.83	1323.41	8.51	99.9623	0.7710	8.51	99.9623	0.7710
10	2499.89	1249.95	12.01	99.9835	0.0212	12.01	99.9835	0.0212
9	2353.95	1176.97	12.51	99.9851	0.0016	12.51	99.9851	0.0016
8	2163.48	1081.74	17.01	99.9941	0.0090	17.01	99.9941	0.0090
7	1967.89	983.95	20.51	99.9968	0.0027	20.51	99.9968	0.0027
6	1707.48	853.74	23.01	99.9978	0.0010	23.01	99.9978	0.0010
5	1444.01	722.01	26.01	99.9985	0.0008	26.01	99.9985	0.0008
4	1177.50	588.75	30.01	99.9991	0.0005	30.01	99.9991	0.0005
3	894.75	447.38	33.51	99.9994	0.0003	33.51	99.9994	0.0003
2	624.20	312.10	36.51	99.9997	0.0003	36.51	99.9997	0.0003
1	436.74	218.37	44.26	99.9999	0.0002	44.26	99.9999	0.0002

* Multipath availability calculated using VB with ITU rain P.530-17

5. Cache County - Richmond Fire to Crow Mountain

Summary	
Link Name	Cache County - Richmond Fire to Crow Mountain
Profile Type	Line-of-Sight
Equipment Type	PTP18850C
Maximum Obstruction	0 meters
Link Distance	6.188 kilometers
Free Space Path Loss	133.72 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate Paths	Aggregate 2646.79 Mbps assuming PTP-850 Series running the Release 11.9 software
RF Frequency Band	18 GHz (17700 to 19700 MHz)
RF Channel Bandwidth	80 MHz

Path Profile



Link Configuration	
Link Type	2+0 XPIC (CCDP)
Ethernet Configuration	Single Ethernet (MC-ABC)
T/R Spacing	1560 MHz
Bandwidth	80 MHz
Modulation Mode	Adaptive
Maximum Mod Mode	11 - 2048QAM
Minimum Mod Mode	1 - QPSK
ATPC	Disabled
Hi	Cache County - Richmond Fire
Lo	Crow Mountain

Bill of Materials		
Part Number	Qty	Description
(no part number)	2	Unspecified 18 GHz ODU (invalid TX frequency selection). Please select a TX frequency
EW-E4PT850C-WW	2	PTP850C Extended Warranty, 4 Additional Years
N000082K167	2	PTP 820/850 Act.Key - 10GE port
N000082L013	4	Dual Feeder Clamp 4.0-7.0mm Cable 6 Way. Default is 1 clamp every 10 meters, installation dependent, check local requirements.
N000082L014	2	PTP 820 Glands_x5_KIT
N000082L019	1	PTP 820 Outdoor_DC_cbl_2x18AWG_drum, 305m
N000082L027	2	PTP 820C/850C Act.Key - 2nd Core Activation
N000082L048	4	PTP 820/850 Act.Key - MC-ABC, per Tx Chan
N000082L056	4	PTP 820/850 Act.Key - XPIC, per Tx Chan
N000082L065	2	PTP 820 DC Connnector
N000082L116	2	Grounding Cable, 1m with M6 ring to M6 ring
N000082L126	4	PTP 820/850 Act.Key - Capacity 650M with ACM Enabled, Per Tx Chan
N000082L139	2	Optical CABLE,SM, 30m
N180082D031	1	PTP 820 1' ANT,SP,18GHz,RFU-C TYPE&Std UBR220 - Andrew. Shorter lead time. Available in all regions
N180082D052	1	PTP 820 2' ANT,SP,18GHz,RFU-C TYPE&UBR220 - Radiowave. Only available for order in North America and CALA regions
N180082L044	2	PTP 820C OMT KIT 18GHz
N180082L048	1	PTP 820 RFU-C 18GHz OMT Interface-Andrew
N180082L056	1	PTP 820 RFU-C 18GHz OMT Interface-Radiowave
N800082L013	2	PTP 820/850 SFP+, 1310nm,SM, 10Gbit, Industrial Grade

Physical Installation Notes for Cache County - Richmond Fire	
Link Name	Cache County - Richmond Fire to Crow Mountain
Latitude	41.92490N
Longitude	111.83223W
Site Elevation	1365 meters AMSL
Polarization (Link A)	Vertical
Polarization (Link B)	Horizontal
Hardware Platform	PTP18850C
Antenna Type	Cambium Networks 1ft Single Pol (Global) N180082D031 - Direct
Antenna Beamwidth	3.2°
Antenna Gain	34.6 dBi
Antenna Height	10.0 meters AGL
Antenna Tilt Angle	3.2° (uptilt)
Bearing to Crow Mountain	162.17° from True North 151.01° from Magnetic North

Physical Installation Notes for Cache County - Richmond Fire (continued)	
Magnetic Declination	11.16° E ±0.36° changing by 0.09° W per year
RF Feeder Loss (Link A)	0.3 dB
RF Feeder Loss (Link B)	0.3 dB

Physical Installation Notes for Crow Mountain	
Link Name	Cache County - Richmond Fire to Crow Mountain
Latitude	41.87186N
Longitude	111.80941W
Site Elevation	1710 meters AMSL
Polarization (Link A)	Vertical
Polarization (Link B)	Horizontal
Hardware Platform	PTP18850C
Antenna Type	Cambium Networks 2ft Single Pol (NA & CALA Only) N180082D052 - Direct
Antenna Beamwidth	2.0°
Antenna Gain	38.6 dBi
Antenna Height	10.0 meters AGL
Antenna Tilt Angle	-3.2° (downtilt)
Bearing to Cache County - Richmond Fire	342.19° from True North 331.05° from Magnetic North
Magnetic Declination	11.14° E ±0.36° changing by 0.09° W per year
RF Feeder Loss (Link A)	0.3 dB
RF Feeder Loss (Link B)	0.3 dB

Radio Commissioning Notes for Cache County - Richmond Fire	
Radio Interface (Link A)	Radio:Slot 2, port 2
Radio Interface (Link B)	Radio:Slot 2, port 1
Tx Frequency (Link A)	Unknown (port 2)
Rx Frequency (Link A)	Unknown (port 2)
Tx Frequency (Link B)	Unknown (port 1)
Rx Frequency (Link B)	Unknown (port 1)
Tx to Rx Frequency Separation	1560.000 MHz
Tx Level (Link A)	24 dBm (port 2)
Tx Level (Link B)	24 dBm (port 1)
MRMC Script	FCC 4501
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	11, 2048QAM
MRMC Script Minimum Profile	1, QPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Disabled
Header Compression	Disabled
XPIC Configuration Admin State	Enable
Multi Carrier ABC	Create a Multi Carrier ABC Group
BNC Voltage (Link A)	1.33 to 1.41 Volts

Radio Commissioning Notes for Cache County - Richmond Fire (continued)	
BNC Voltage (Link B)	1.33 to 1.41 Volts
Predicted Receive Power (Link A)	-37 dBm ± 4 dB while aligning
Predicted Receive Power (Link B)	-37 dBm ± 4 dB while aligning

Radio Commissioning Notes for Crow Mountain	
Radio Interface (Link A)	Radio:Slot 2, port 2
Radio Interface (Link B)	Radio:Slot 2, port 1
Tx Frequency (Link A)	Unknown (port 2)
Rx Frequency (Link A)	Unknown (port 2)
Tx Frequency (Link B)	Unknown (port 1)
Rx Frequency (Link B)	Unknown (port 1)
Tx to Rx Frequency Separation	1560.000 MHz
Tx Level (Link A)	24 dBm (port 2)
Tx Level (Link B)	24 dBm (port 1)
MRMC Script	FCC 4501
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	11, 2048QAM
MRMC Script Minimum Profile	1, QPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Disabled
Header Compression	Disabled
XPIC Configuration Admin State	Enable
Multi Carrier ABC	Create a Multi Carrier ABC Group
BNC Voltage (Link A)	1.33 to 1.41 Volts
BNC Voltage (Link B)	1.33 to 1.41 Volts
Predicted Receive Power (Link A)	-37 dBm ± 4 dB while aligning
Predicted Receive Power (Link B)	-37 dBm ± 4 dB while aligning

Regulatory Conditions	
Regulation	FCC
Band	18 GHz
Max EIRP	62.3 dBm
Output Power	24.0 dBm

Installation Instruction

Perform the following checks during the installation (Check the deployment guide and the User Guide.)

1. Check with a GPS that you are installing at the correct location.

2. Check carefully the direction to the other end of the link. Either use a corrected compass or use the GPS waypoint feature about 300 meters from the installation location.

3. When aligning antennas, it is important to find the centre of the main beam. This is done by adjusting the antenna at each end of the link in turn and monitoring the receive level until the peak is found. Once the peak level is found, it should be checked against the prediced receive power to ensure that the antennas have not been aligned on a side lobe.

Installation Instruction (continued)

4. An hour after alignment is complete, if ATPC is disabled, check that the mean value for the RSL is as predicted (see previous tables).

Cache County - Richmond Fire Performance (Aggregated) *	
Mean IP Throughput Predicted	1323.40 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 13 secs/year)

Crow Mountain Performance (Aggregated) *	
Mean IP Throughput Predicted	1323.40 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 13 secs/year)

* Multipath availability calculated using VB with ITU rain P.530-17

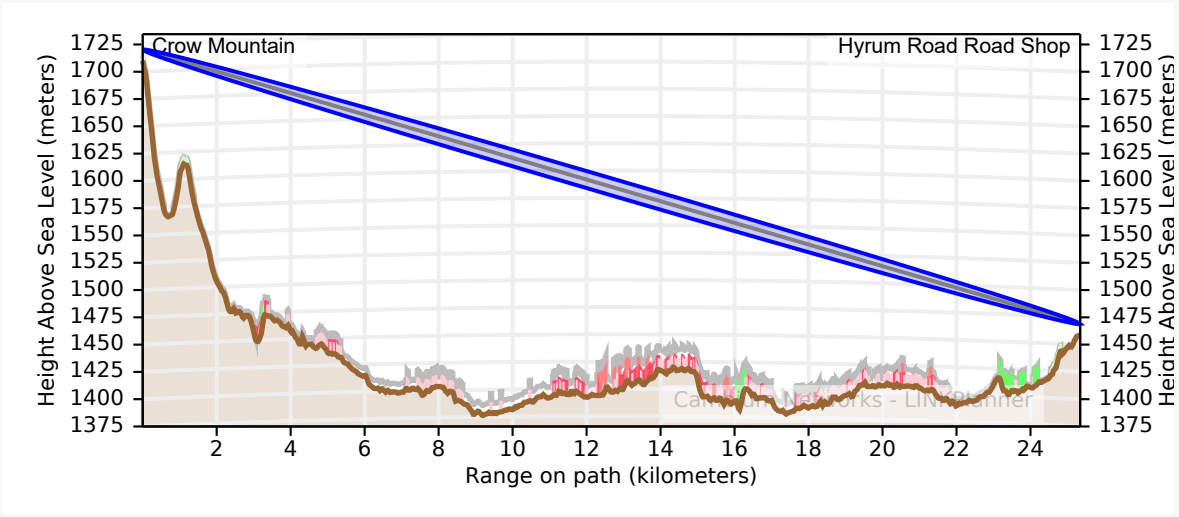
Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Cache County - Richmond Fire - Aggregated			Crow Mountain - Aggregated		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
11	2646.83	1323.41	9.37	99.9902	99.9902	9.37	99.9902	99.9902
10	2499.89	1249.95	12.87	99.9961	0.0059	12.87	99.9961	0.0059
9	2353.95	1176.97	13.37	99.9965	0.0004	13.37	99.9965	0.0004
8	2163.48	1081.74	17.87	99.9989	0.0023	17.87	99.9989	0.0023
7	1967.89	983.95	21.37	99.9995	0.0006	21.37	99.9995	0.0006
6	1707.48	853.74	23.87	99.9997	0.0002	23.87	99.9997	0.0002
5	1444.01	722.01	26.87	99.9998	0.0001	26.87	99.9998	0.0001
4	1177.50	588.75	30.87	99.9999	0.0001	30.87	99.9999	0.0001
3	894.75	447.38	34.37	99.9999	0.0000	34.37	99.9999	0.0000
2	624.20	312.10	37.37	99.9999	0.0000	37.37	99.9999	0.0000
1	436.74	218.37	45.12	100.0000	0.0000	45.12	100.0000	0.0000

* Multipath availability calculated using VB with ITU rain P.530-17

6. Crow Mountain to Hyrum Road Road Shop

Summary	
Link Name	Crow Mountain to Hyrum Road Road Shop
Profile Type	Line-of-Sight
Equipment Type	PTP11850C
Maximum Obstruction	0 meters
Link Distance	25.343 kilometers
Free Space Path Loss	141.51 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate Paths	Aggregate 2646.49 Mbps assuming PTP-850 Series running the Release 11.9 software
RF Frequency Band	11 GHz (10700 to 11700 MHz)
RF Channel Bandwidth	80 MHz

Path Profile



Link Configuration	
Link Type	2+0 XPIC (CCDP)
Ethernet Configuration	Single Ethernet (MC-ABC)
T/R Spacing	490 MHz
Bandwidth	80 MHz
Modulation Mode	Adaptive
Maximum Mod Mode	11 - 2048QAM
Minimum Mod Mode	1 - QPSK
ATPC	Disabled
Hi	Crow Mountain
Lo	Hyrum Road Road Shop

Bill of Materials		
Part Number	Qty	Description
(no part number)	2	Unspecified 11 GHz ODU (invalid TX frequency selection). Please select a TX frequency
C110085B002	2	PTP 850C, Basic Radio, 11 GHz
EW-E4PT850C-WW	2	PTP850C Extended Warranty, 4 Additional Years
N000082K167	2	PTP 820/850 Act.Key - 10GE port
N000082L013	4	Dual Feeder Clamp 4.0-7.0mm Cable 6 Way. Default is 1 clamp every 10 meters, installation dependent, check local requirements.
N000082L014	2	PTP 820 Glands_x5_KIT
N000082L019	1	PTP 820 Outdoor_DC_cbl_2x18AWG_drum, 305m
N000082L027	2	PTP 820C/850C Act.Key - 2nd Core Activation
N000082L048	4	PTP 820/850 Act.Key - MC-ABC, per Tx Chan
N000082L056	4	PTP 820/850 Act.Key - XPIC, per Tx Chan
N000082L065	2	PTP 820 DC Connnector
N000082L116	2	Grounding Cable, 1m with M6 ring to M6 ring
N000082L126	4	PTP 820/850 Act.Key - Capacity 650M with ACM Enabled, Per Tx Chan
N000082L139	2	Optical CABLE,SM, 30m
N110082D098	2	PTP 820 3' ANT,SP,11GHz,RFU-C TYPE&UBR100 - Radiowave. Only available for order in North America and CALA regions
N110082L082	2	PTP 820C OMT KIT 10-11GHz
N110082L103	2	PTP 820 RFU-C 10_11GHz OMT Interface-Radiowave
N800082L013	2	PTP 820/850 SFP+, 1310nm,SM, 10Gbit, Industrial Grade

Physical Installation Notes for Crow Mountain	
Link Name	Crow Mountain to Hyrum Road Road Shop
Latitude	41.87186N
Longitude	111.80941W
Site Elevation	1710 meters AMSL
Polarization (Link A)	Vertical
Polarization (Link B)	Horizontal
Hardware Platform	PTP11850C
Antenna Type	Cambium Networks 3ft Single Pol (NA & CALA Only) N110082D098 - Direct
Antenna Beamwidth	2.1°
Antenna Gain	38.5 dBi
Antenna Height	10.0 meters AGL
Antenna Tilt Angle	-0.7° (downtilt)
Bearing to Hyrum Road Road Shop	183.25° from True North 172.10° from Magnetic North
Magnetic Declination	11.14° E ±0.36° changing by 0.09° W per year
RF Feeder Loss (Link A)	0.3 dB

Physical Installation Notes for Crow Mountain (continued)	
RF Feeder Loss (Link B)	0.3 dB

Physical Installation Notes for Hyrum Road Road Shop	
Link Name	Crow Mountain to Hyrum Road Road Shop
Latitude	41.64405N
Longitude	111.82663W
Site Elevation	1459 meters AMSL
Polarization (Link A)	Vertical
Polarization (Link B)	Horizontal
Hardware Platform	PTP11850C
Antenna Type	Cambium Networks 3ft Single Pol (NA & CALA Only) N110082D098 - Direct
Antenna Beamwidth	2.1°
Antenna Gain	38.5 dBi
Antenna Height	10.0 meters AGL
Antenna Tilt Angle	0.5° (uptilt)
Bearing to Crow Mountain	3.23° from True North 352.12° from Magnetic North
Magnetic Declination	11.11° E ±0.36° changing by 0.09° W per year
RF Feeder Loss (Link A)	0.3 dB
RF Feeder Loss (Link B)	0.3 dB

Radio Commissioning Notes for Crow Mountain	
Radio Interface (Link A)	Radio:Slot 2, port 2
Radio Interface (Link B)	Radio:Slot 2, port 1
Tx Frequency (Link A)	Unknown (port 2)
Rx Frequency (Link A)	Unknown (port 2)
Tx Frequency (Link B)	Unknown (port 1)
Rx Frequency (Link B)	Unknown (port 1)
Tx to Rx Frequency Separation	490.000 MHz
Tx Level (Link A)	28 dBm (port 2)
Tx Level (Link B)	28 dBm (port 1)
MRMC Script	FCC 4501
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	11, 2048QAM
MRMC Script Minimum Profile	1, QPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Disabled
Header Compression	Disabled
XPIC Configuration Admin State	Enable
Multi Carrier ABC	Create a Multi Carrier ABC Group
BNC Voltage (Link A)	1.33 to 1.41 Volts
BNC Voltage (Link B)	1.33 to 1.41 Volts
Predicted Receive Power (Link A)	-37 dBm ± 4 dB while aligning

Radio Commissioning Notes for Crow Mountain (continued)	
Predicted Receive Power (Link B)	-37 dBm ± 4 dB while aligning

Radio Commissioning Notes for Hyrum Road Road Shop	
Radio Interface (Link A)	Radio:Slot 2, port 2
Radio Interface (Link B)	Radio:Slot 2, port 1
Tx Frequency (Link A)	Unknown (port 2)
Rx Frequency (Link A)	Unknown (port 2)
Tx Frequency (Link B)	Unknown (port 1)
Rx Frequency (Link B)	Unknown (port 1)
Tx to Rx Frequency Separation	490.000 MHz
Tx Level (Link A)	28 dBm (port 2)
Tx Level (Link B)	28 dBm (port 1)
MRMC Script	FCC 4501
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	11, 2048QAM
MRMC Script Minimum Profile	1, QPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Disabled
Header Compression	Disabled
XPIC Configuration Admin State	Enable
Multi Carrier ABC	Create a Multi Carrier ABC Group
BNC Voltage (Link A)	1.33 to 1.41 Volts
BNC Voltage (Link B)	1.33 to 1.41 Volts
Predicted Receive Power (Link A)	-37 dBm ± 4 dB while aligning
Predicted Receive Power (Link B)	-37 dBm ± 4 dB while aligning

Regulatory Conditions	
Regulation	FCC
Band	11 GHz
Max EIRP	66.2 dBm
Output Power	28.0 dBm

Installation Instruction

Perform the following checks during the installation (Check the deployment guide and the User Guide.)

1. Check with a GPS that you are installing at the correct location.

2. Check carefully the direction to the other end of the link. Either use a corrected compass or use the GPS waypoint feature about 300 meters from the installation location.

3. When aligning antennas, it is important to find the centre of the main beam. This is done by adjusting the antenna at each end of the link in turn and monitoring the receive level until the peak is found. Once the peak level is found, it should be checked against the prediced receive power to ensure that the antennas have not been aligned on a side lobe.

4. An hour after alignment is complete, if ATPC is disabled, check that the mean value for the RSL is as predicted (see previous tables).

Crow Mountain Performance (Aggregated) *	
Mean IP Throughput Predicted	1323.24 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	99.9992% (unavailable for 4.0 mins/year)

Hyrum Road Road Shop Performance (Aggregated) *	
Mean IP Throughput Predicted	1323.24 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	99.9992% (unavailable for 4.0 mins/year)

* Multipath availability calculated using VB with ITU rain P.530-17

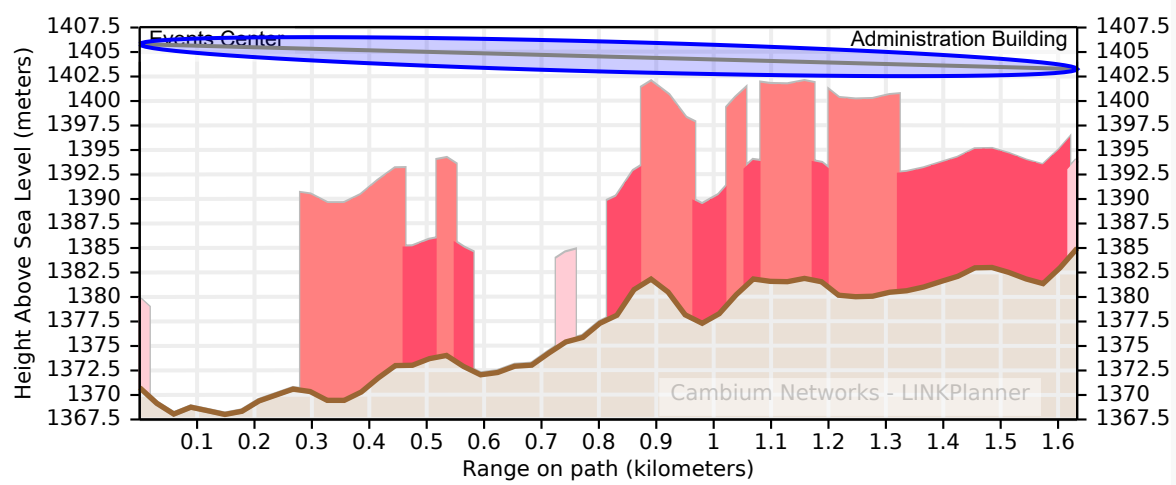
Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Crow Mountain - Aggregated			Hyrum Road Road Shop - Aggregated		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
11	2646.83	1323.41	9.88	99.9163	99.9163	9.88	99.9163	99.9163
10	2499.89	1249.95	13.78	99.9624	0.0461	13.78	99.9624	0.0461
9	2353.95	1176.97	14.18	99.9646	0.0022	14.18	99.9646	0.0022
8	2163.48	1081.74	18.38	99.9867	0.0221	18.38	99.9867	0.0221
7	1967.89	983.95	21.08	99.9919	0.0052	21.08	99.9919	0.0052
6	1707.48	853.74	23.78	99.9942	0.0023	23.78	99.9942	0.0023
5	1444.01	722.01	27.78	99.9962	0.0020	27.78	99.9962	0.0020
4	1177.50	588.75	31.68	99.9967	0.0005	31.68	99.9967	0.0005
3	894.75	447.38	35.08	99.9973	0.0006	35.08	99.9973	0.0006
2	624.20	312.10	38.08	99.9985	0.0012	38.08	99.9985	0.0012
1	436.74	218.37	46.03	99.9992	0.0008	46.03	99.9992	0.0008

* Multipath availability calculated using VB with ITU rain P.530-17

7. Events Center to Administration Building

Summary	
Link Name	Events Center to Administration Building
Profile Type	Line-of-Sight
Equipment Type	PTP18850C
Maximum Obstruction	0 meters
Link Distance	1.633 kilometers
Free Space Path Loss	122.15 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate	Aggregate 1396.88 Mbps assuming PTP-850 Series running the Release 11.9 software
RF Frequency Band	18 GHz (17700 to 19700 MHz)
RF Channel Bandwidth	80 MHz

Path Profile



Link Configuration	
Link Type	1+0
T/R Spacing	1560 MHz
Bandwidth	80 MHz
Modulation Mode	Adaptive
Maximum Mod Mode	12 - 4096QAM
Minimum Mod Mode	0 - BPSK
Polarization	Vertical
ATPC	Disabled
Hi	Events Center
Lo	Administration Building

Bill of Materials		
Part Number	Qty	Description
(no part number)	2	Unspecified 18 GHz ODU (invalid TX frequency selection). Please select a TX frequency
(no part number)	2	Unspecified Power Lead. (set the region in the Bill of Materials options)
C000000L033	4	Gigabit Surge Suppressor (56V), 10/100/1000 BaseT
EW-E4PT850C-WW	2	PTP850C Extended Warranty, 4 Additional Years
N000000L155	1	CAT6A Outdoor Cable, 100m
N000082L014	2	PTP 820 Glands_x5_KIT
N000082L116	2	Grounding Cable, 1m with M6 ring to M6 ring
N000082L126	2	PTP 820/850 Act.Key - Capacity 650M with ACM Enabled, Per Tx Chan
N000082L164	2	PTP 820C INDOOR AC POE INJECTOR, 90W
N000082L173	4	Grounding Kit for CAT5E F/UTP 8mm and Cat6A Cable. Add 2 additional kits per PoE Injector that is installed outdoors
N000082L174	2	RJ45 Connector for CAT6A Cable, Qty 10
N180082D031	2	PTP 820 1' ANT,SP,18GHz,RFU-C TYPE&Std UBR220 - Andrew. Shorter lead time. Available in all regions
N180082L044	2	PTP 820C OMT KIT 18GHz
N180082L048	2	PTP 820 RFU-C 18GHz OMT Interface-Andrew

Physical Installation Notes for Events Center	
Link Name	Events Center to Administration Building
Latitude	41.72145N
Longitude	111.84440W
Site Elevation	1371 meters AMSL
Polarization	Vertical
Hardware Platform	PTP18850C
Antenna Type	Cambium Networks 1ft Single Pol (Global) N180082D031 - Direct
Antenna Beamwidth	3.2°
Antenna Gain	34.6 dBi
Antenna Height	35.1 meters AGL
Antenna Tilt Angle	-0.1° (downtilt)
Bearing to Administration Building	27.95° from True North 16.81° from Magnetic North
Magnetic Declination	11.13° E ±0.36° changing by 0.09° W per year
RF Feeder Loss	0.3 dB

Physical Installation Notes for Administration Building	
Link Name	Events Center to Administration Building
Latitude	41.73444N
Longitude	111.83520W

Physical Installation Notes for Administration Building (continued)	
Site Elevation	1385 meters AMSL
Polarization	Vertical
Hardware Platform	PTP18850C
Antenna Type	Cambium Networks 1ft Single Pol (Global) N180082D031 - Direct
Antenna Beamwidth	3.2°
Antenna Gain	34.6 dBi
Antenna Height	18.3 meters AGL
Antenna Tilt Angle	0.1° (uptilt)
Bearing to Events Center	207.95° from True North 196.82° from Magnetic North
Magnetic Declination	11.13° E ±0.36° changing by 0.09° W per year
RF Feeder Loss	0.3 dB

Radio Commissioning Notes for Events Center	
Radio Interface	Radio:Slot 2, port 2
Tx Frequency	Unknown
Rx Frequency	Unknown
Tx to Rx Frequency Separation	1560.000 MHz
Tx Level	23 dBm
MRMC Script	FCC 4501
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	12, 4096QAM
MRMC Script Minimum Profile	0, BPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Disabled
Header Compression	Disabled
BNC Voltage	1.27 to 1.35 Volts
Predicted Receive Power	-31 dBm ± 4 dB while aligning

Radio Commissioning Notes for Administration Building	
Radio Interface	Radio:Slot 2, port 2
Tx Frequency	Unknown
Rx Frequency	Unknown
Tx to Rx Frequency Separation	1560.000 MHz
Tx Level	23 dBm
MRMC Script	FCC 4501
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	12, 4096QAM
MRMC Script Minimum Profile	0, BPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Disabled
Header Compression	Disabled
BNC Voltage	1.27 to 1.35 Volts

Radio Commissioning Notes for Administration Building (continued)	
Predicted Receive Power	-31 dBm ± 4 dB while aligning

Regulatory Conditions	
Regulation	FCC
Band	18 GHz
Max EIRP	57.3 dBm
Output Power	23.0 dBm

Installation Instruction

Perform the following checks during the installation (Check the deployment guide and the User Guide.)

1. Check with a GPS that you are installing at the correct location.

2. Check carefully the direction to the other end of the link. Either use a corrected compass or use the GPS waypoint feature about 300 meters from the installation location.

3. When aligning antennas, it is important to find the centre of the main beam. This is done by adjusting the antenna at each end of the link in turn and monitoring the receive level until the peak is found. Once the peak level is found, it should be checked against the prediced receive power to ensure that the antennas have not been aligned on a side lobe.

4. An hour after alignment is complete, if ATPC is disabled, check that the mean value for the RSL is as predicted (see previous tables).

Events Center Performance *	
Mean IP Throughput Predicted	698.44 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 4 secs/year)

Administration Building Performance *	
Mean IP Throughput Predicted	698.44 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 4 secs/year)

* Multipath availability calculated using VB with ITU rain P.530-17

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Events Center			Administration Building		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
12	1396.88	698.44	12.13	99.9999	99.9999	12.13	99.9999	99.9999
11	1323.41	661.71	17.13	100.0000	0.0001	17.13	100.0000	0.0001

(continued)

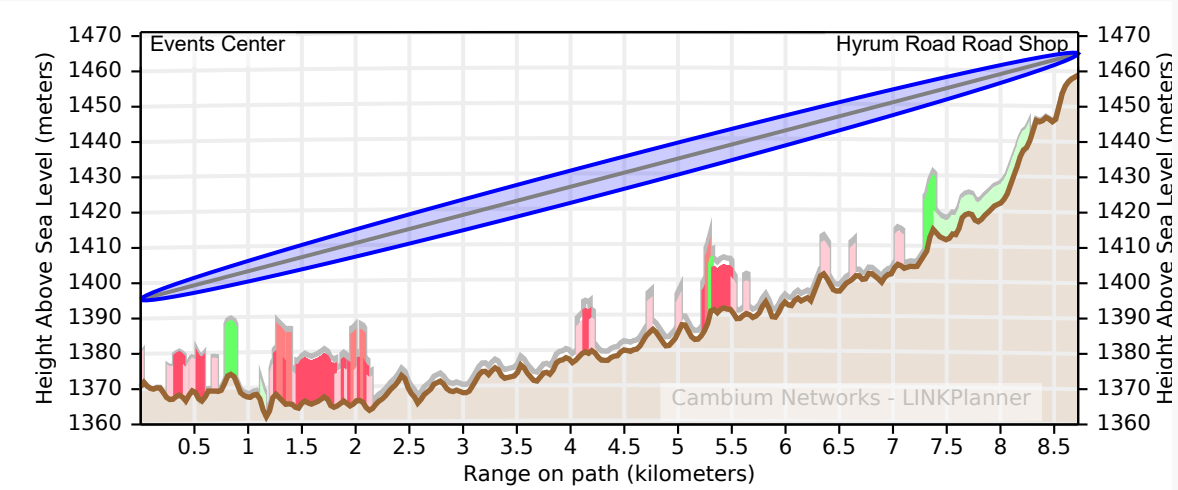
Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Events Center			Administration Building		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
10	1249.95	624.97	20.63	100.0000	0.0000	20.63	100.0000	0.0000
9	1176.97	588.49	21.13	100.0000	0.0000	21.13	100.0000	0.0000
8	1081.74	540.87	25.63	100.0000	0.0000	25.63	100.0000	0.0000
7	983.95	491.97	29.13	100.0000	0.0000	29.13	100.0000	0.0000
6	853.74	426.87	31.63	100.0000	0.0000	31.63	100.0000	0.0000
5	722.01	361.00	34.63	100.0000	0.0000	34.63	100.0000	0.0000
4	588.75	294.37	37.63	100.0000	0.0000	37.63	100.0000	0.0000
3	447.38	223.69	41.13	100.0000	0.0000	41.13	100.0000	0.0000
2	312.10	156.05	44.13	100.0000	0.0000	44.13	100.0000	0.0000
1	218.37	109.18	47.63	100.0000	0.0000	47.63	100.0000	0.0000
0	106.90	53.45	54.38	100.0000	0.0000	54.38	100.0000	0.0000

* Multipath availability calculated using VB with ITU rain P.530-17

8. Events Center to Hyrum Road Road Shop

Summary	
Link Name	Events Center to Hyrum Road Road Shop
Profile Type	Line-of-Sight
Equipment Type	PTP11850C
Maximum Obstruction	0 meters
Link Distance	8.723 kilometers
Free Space Path Loss	132.25 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate	Aggregate 1396.87 Mbps assuming PTP-850 Series running the Release 11.9 software
RF Frequency Band	11 GHz (10700 to 11700 MHz)
RF Channel Bandwidth	80 MHz

Path Profile



Link Configuration	
Link Type	1+0
T/R Spacing	490 MHz
Bandwidth	80 MHz
Modulation Mode	Adaptive
Maximum Mod Mode	12 - 4096QAM
Minimum Mod Mode	0 - BPSK
Polarization	Vertical
ATPC	Disabled
Hi	Events Center
Lo	Hyrum Road Road Shop

Bill of Materials		
Part Number	Qty	Description
(no part number)	2	Unspecified 11 GHz ODU (invalid TX frequency selection). Please select a TX frequency
(no part number)	2	Unspecified Power Lead. (set the region in the Bill of Materials options)
C000000L033	4	Gigabit Surge Suppressor (56V), 10/100/1000 BaseT
C110085B002	2	PTP 850C, Basic Radio, 11 GHz
EW-E4PT850C-WW	2	PTP850C Extended Warranty, 4 Additional Years
N000000L155	1	CAT6A Outdoor Cable, 100m
N000082L014	2	PTP 820 Glands_x5_KIT
N000082L116	2	Grounding Cable, 1m with M6 ring to M6 ring
N000082L126	2	PTP 820/850 Act.Key - Capacity 650M with ACM Enabled, Per Tx Chan
N000082L164	2	PTP 820C INDOOR AC POE INJECTOR, 90W
N000082L173	4	Grounding Kit for CAT5E F/UTP 8mm and Cat6A Cable. Add 2 additional kits per PoE Injector that is installed outdoors
N000082L174	2	RJ45 Connector for CAT6A Cable, Qty 10
N110082D072	2	PTP 820 2' ANT,SP,10_11GHz,RFU-C TYPE&Std UBR100 - Andrew. Shorter lead time. Available in all regions
N110082L082	2	PTP 820C OMT KIT 10-11GHz
N110082L092	2	PTP 820 RFU-C 10_11GHz OMT Interface-Andrew

Physical Installation Notes for Events Center	
Link Name	Events Center to Hyrum Road Road Shop
Latitude	41.72145N
Longitude	111.84440W
Site Elevation	1371 meters AMSL
Polarization	Vertical
Hardware Platform	PTP11850C
Antenna Type	Cambium Networks 2ft Single Pol (Global) N110082D072 - Direct
Antenna Beamwidth	3.3°
Antenna Gain	34.79 dBi
Antenna Height	24.7 meters AGL
Antenna Tilt Angle	0.4° (uptilt)
Bearing to Hyrum Road Road Shop	170.23° from True North 159.10° from Magnetic North
Magnetic Declination	11.13° E ±0.36° changing by 0.09° W per year
RF Feeder Loss	0.3 dB

Physical Installation Notes for Hyrum Road Road Shop	
Link Name	Events Center to Hyrum Road Road Shop

Physical Installation Notes for Hyrum Road Road Shop (continued)	
Latitude	41.64405N
Longitude	111.82663W
Site Elevation	1459 meters AMSL
Polarization	Vertical
Hardware Platform	PTP11850C
Antenna Type	Cambium Networks 2ft Single Pol (Global) N110082D072 - Direct
Antenna Beamwidth	3.3°
Antenna Gain	34.79 dBi
Antenna Height	6.1 meters AGL
Antenna Tilt Angle	-0.5° (downtilt)
Bearing to Events Center	350.24° from True North 339.13° from Magnetic North
Magnetic Declination	11.11° E ±0.36° changing by 0.09° W per year
RF Feeder Loss	0.3 dB

Radio Commissioning Notes for Events Center	
Radio Interface	Radio:Slot 2, port 2
Tx Frequency	Unknown
Rx Frequency	Unknown
Tx to Rx Frequency Separation	490.000 MHz
Tx Level	28 dBm
MRMC Script	FCC 4501
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	12, 4096QAM
MRMC Script Minimum Profile	0, BPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Disabled
Header Compression	Disabled
BNC Voltage	1.31 to 1.39 Volts
Predicted Receive Power	-35 dBm ± 4 dB while aligning

Radio Commissioning Notes for Hyrum Road Road Shop	
Radio Interface	Radio:Slot 2, port 2
Tx Frequency	Unknown
Rx Frequency	Unknown
Tx to Rx Frequency Separation	490.000 MHz
Tx Level	28 dBm
MRMC Script	FCC 4501
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	12, 4096QAM
MRMC Script Minimum Profile	0, BPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Disabled

Radio Commissioning Notes for Hyrum Road Road Shop (continued)	
Header Compression	Disabled
BNC Voltage	1.31 to 1.39 Volts
Predicted Receive Power	-35 dBm ± 4 dB while aligning

Regulatory Conditions	
Regulation	FCC
Band	11 GHz
Max EIRP	62.5 dBm
Output Power	28.0 dBm

Installation Instruction

Perform the following checks during the installation (Check the deployment guide and the User Guide.)

1. Check with a GPS that you are installing at the correct location.

2. Check carefully the direction to the other end of the link. Either use a corrected compass or use the GPS waypoint feature about 300 meters from the installation location.

3. When aligning antennas, it is important to find the centre of the main beam. This is done by adjusting the antenna at each end of the link in turn and monitoring the receive level until the peak is found. Once the peak level is found, it should be checked against the prediced receive power to ensure that the antennas have not been aligned on a side lobe.

4. An hour after alignment is complete, if ATPC is disabled, check that the mean value for the RSL is as predicted (see previous tables).

Events Center Performance *	
Mean IP Throughput Predicted	698.43 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 2 secs/year)

Hyrum Road Road Shop Performance *	
Mean IP Throughput Predicted	698.43 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 2 secs/year)

* Multipath availability calculated using VB with ITU rain P.530-17

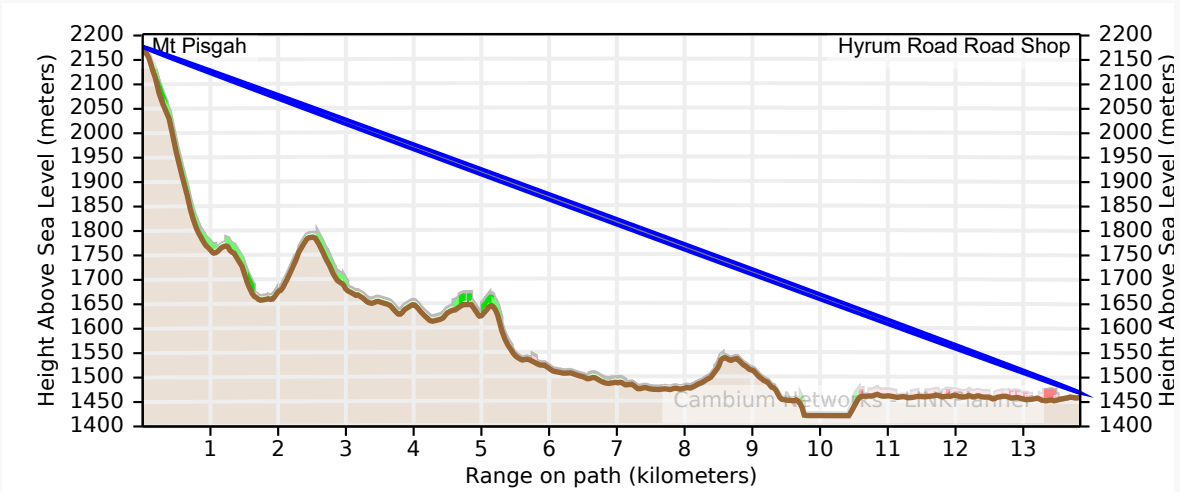
Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Events Center			Hyrum Road Road Shop		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
12	1396.88	698.44	6.29	99.9897	99.9897	6.29	99.9897	99.9897
11	1323.41	661.71	11.89	99.9972	0.0075	11.89	99.9972	0.0075
10	1249.95	624.97	15.79	99.9988	0.0017	15.79	99.9988	0.0017
9	1176.97	588.49	16.19	99.9989	0.0001	16.19	99.9989	0.0001
8	1081.74	540.87	20.39	99.9996	0.0007	20.39	99.9996	0.0007
7	983.95	491.97	23.09	99.9998	0.0002	23.09	99.9998	0.0002
6	853.74	426.87	25.79	99.9999	0.0001	25.79	99.9999	0.0001
5	722.01	361.00	29.79	100.0000	0.0001	29.79	100.0000	0.0001
4	588.75	294.37	33.69	100.0000	0.0000	33.69	100.0000	0.0000
3	447.38	223.69	37.09	100.0000	0.0000	37.09	100.0000	0.0000
2	312.10	156.05	40.09	100.0000	0.0000	40.09	100.0000	0.0000
1	218.37	109.18	43.79	100.0000	0.0000	43.79	100.0000	0.0000
0	106.90	53.45	50.34	100.0000	0.0000	50.34	100.0000	0.0000

* Multipath availability calculated using VB with ITU rain P.530-17

9. Mt Pisgah to Hyrum Road Road Shop

Summary	
Link Name	Mt Pisgah to Hyrum Road Road Shop
Profile Type	Line-of-Sight
Equipment Type	PTP11820S (Narrow)
Maximum Obstruction	0 meters
Link Distance	13.840 kilometers
Free Space Path Loss	136.25 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate	Aggregate 1054.04 Mbps assuming PTP-820 Series running the Release 11.9 software
RF Frequency Band	11 GHz (10700 to 11700 MHz)
RF Channel Bandwidth	80 MHz

Path Profile



Link Configuration	
Link Type	1+0
T/R Spacing	490 MHz
Bandwidth	80 MHz
Modulation Mode	Adaptive
Maximum Mod Mode	10 - 2048QAM
Minimum Mod Mode	0 - QPSK
Polarization	Vertical
ATPC	Disabled
Header Compression	Disabled
Hi	Mt Pisgah
Lo	Hyrum Road Road Shop

Bill of Materials		
Part Number	Qty	Description
(no part number)	2	Unspecified 11 GHz ODU (invalid TX frequency selection). Please select a TX frequency
(no part number)	2	Unspecified Power Lead. (set the region in the Bill of Materials options)
C000000L033	4	Gigabit Surge Suppressor (56V), 10/100/1000 BaseT
EW-E4PT820S-WW	2	PTP820S Extended Warranty, 4 Additional Years
N000000L155	1	CAT6A Outdoor Cable, 100m
N000065L001	2	AC power Injector 56V, 60W
N000082L014	2	PTP 820 Glands_x5_KIT
N000082L116	2	Grounding Cable, 1m with M6 ring to M6 ring
N000082L125	2	PTP 820/850 Act.Key - Capacity 500M with ACM Enabled, Per Tx Chan
N000082L173	4	Grounding Kit for CAT5E F/UTP 8mm and Cat6A Cable. Add 2 additional kits per PoE Injector that is installed outdoors
N000082L174	2	RJ45 Connector for CAT6A Cable, Qty 10
N110082D072	2	PTP 820 2' ANT,SP,10_11GHz,RFU-C TYPE&Std UBR100 - Andrew. Shorter lead time. Available in all regions

Physical Installation Notes for Mt Pisgah	
Link Name	Mt Pisgah to Hyrum Road Road Shop
Latitude	41.55094N
Longitude	111.93695W
Site Elevation	2167 meters AMSL
Polarization	Vertical
Hardware Platform	PTP11820S (Narrow)
Antenna Type	Cambium Networks 2ft Single Pol (Global) N110082D072 - Direct
Antenna Beamwidth	3.3°
Antenna Gain	34.79 dBi
Antenna Height	10.0 meters AGL
Antenna Tilt Angle	-3.0° (downtilt)
Bearing to Hyrum Road Road Shop	41.61° from True North 30.48° from Magnetic North
Magnetic Declination	11.14° E ±0.36° changing by 0.09° W per year
RF Feeder Loss	0.2 dB

Physical Installation Notes for Hyrum Road Road Shop	
Link Name	Mt Pisgah to Hyrum Road Road Shop
Latitude	41.64405N
Longitude	111.82663W
Site Elevation	1459 meters AMSL
Polarization	Vertical

Physical Installation Notes for Hyrum Road Road Shop (continued)	
Hardware Platform	PTP11820S (Narrow)
Antenna Type	Cambium Networks 2ft Single Pol (Global) N110082D072 - Direct
Antenna Beamwidth	3.3°
Antenna Gain	34.79 dBi
Antenna Height	10.0 meters AGL
Antenna Tilt Angle	2.9° (uptilt)
Bearing to Mt Pisgah	221.69° from True North 210.57° from Magnetic North
Magnetic Declination	11.11° E ±0.36° changing by 0.09° W per year
RF Feeder Loss	0.2 dB

Radio Commissioning Notes for Mt Pisgah	
Radio Interface	Radio:Slot 2, port 1
Tx Frequency	Unknown
Rx Frequency	Unknown
Tx to Rx Frequency Separation	490.000 MHz
Tx Level	26 dBm
MRMC Script	FCC 1506
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	10, 2048QAM
MRMC Script Minimum Profile	0, QPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Disabled
Header Compression	Disabled
BNC Voltage	1.37 to 1.45 Volts
Predicted Receive Power	-41 dBm ± 4 dB while aligning

Radio Commissioning Notes for Hyrum Road Road Shop	
Radio Interface	Radio:Slot 2, port 1
Tx Frequency	Unknown
Rx Frequency	Unknown
Tx to Rx Frequency Separation	490.000 MHz
Tx Level	26 dBm
MRMC Script	FCC 1506
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	10, 2048QAM
MRMC Script Minimum Profile	0, QPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Disabled
Header Compression	Disabled
BNC Voltage	1.37 to 1.45 Volts
Predicted Receive Power	-41 dBm ± 4 dB while aligning

Regulatory Conditions	
Regulation	FCC
Band	11 GHz
Max EIRP	60.6 dBm
Output Power	26.0 dBm

Installation Instruction

Perform the following checks during the installation (Check the deployment guide and the User Guide.)

1. Check with a GPS that you are installing at the correct location.

2. Check carefully the direction to the other end of the link. Either use a corrected compass or use the GPS waypoint feature about 300 meters from the installation location.

3. When aligning antennas, it is important to find the centre of the main beam. This is done by adjusting the antenna at each end of the link in turn and monitoring the receive level until the peak is found. Once the peak level is found, it should be checked against the prediced receive power to ensure that the antennas have not been aligned on a side lobe.

4. An hour after alignment is complete, if ATPC is disabled, check that the mean value for the RSL is as predicted (see previous tables). Also check that the received power is not greater than -30dBm with ATPC enabled or disabled.

Mt Pisgah Performance *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	527.02 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 2 secs/year)

Hyrum Road Road Shop Performance *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	527.02 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 2 secs/year)

* Multipath availability calculated using VB with ITU rain P.530-17

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Mt Pisgah			Hyrum Road Road Shop		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
10	1054.12	527.06	4.54	99.9107	99.9107	4.54	99.9107	99.9107
9	972.79	486.40	9.54	99.9946	0.0839	9.54	99.9946	0.0839
8	915.60	457.80	10.54	99.9957	0.0011	10.54	99.9957	0.0011
7	842.06	421.03	15.04	99.9985	0.0028	15.04	99.9985	0.0028

(continued)

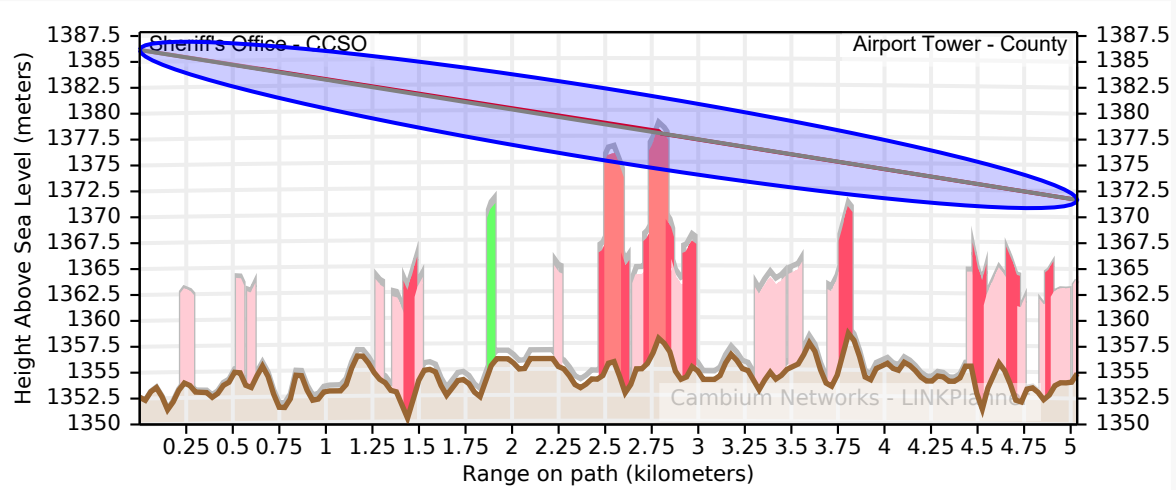
Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Mt Pisgah			Hyrum Road Road Shop		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
6	782.93	391.47	18.04	99.9992	0.0008	18.04	99.9992	0.0008
5	678.49	339.24	21.04	99.9996	0.0004	21.04	99.9996	0.0004
4	561.28	280.64	24.04	99.9998	0.0002	24.04	99.9998	0.0002
3	457.09	228.55	27.04	99.9999	0.0001	27.04	99.9999	0.0001
2	347.42	173.71	32.04	100.0000	0.0001	32.04	100.0000	0.0001
1	250.12	125.06	34.04	100.0000	0.0000	34.04	100.0000	0.0000
0	171.60	85.80	43.29	100.0000	0.0000	43.29	100.0000	0.0000

* Multipath availability calculated using VB with ITU rain P.530-17

10. Sheriff's Office - CCSO to Airport Tower - County

Summary	
Link Name	Sheriff's Office - CCSO to Airport Tower - County
Profile Type	Non Line-of-Sight
Equipment Type	PTP11820S (Narrow)
Maximum Obstruction	0 meters
Link Distance	5.035 kilometers
Free Space Path Loss	127.47 dB
Excess Path Loss	13.05 dB
User IP Throughput Expectation Aggregate	Aggregate 1010.02 Mbps assuming PTP-820 Series running the Release 11.9 software
RF Frequency Band	11 GHz (10700 to 11700 MHz)
RF Channel Bandwidth	80 MHz

Path Profile



Link Configuration	
Link Type	1+0
T/R Spacing	490 MHz
Bandwidth	80 MHz
Modulation Mode	Adaptive
Maximum Mod Mode	10 - 2048QAM
Minimum Mod Mode	0 - QPSK
Polarization	Vertical
ATPC	Disabled
Header Compression	Disabled
Hi	Sheriff's Office - CCSO
Lo	Airport Tower - County

Bill of Materials		
Part Number	Qty	Description
(no part number)	2	Unspecified 11 GHz ODU (invalid TX frequency selection). Please select a TX frequency
(no part number)	2	Unspecified Power Lead. (set the region in the Bill of Materials options)
C000000L033	4	Gigabit Surge Suppressor (56V), 10/100/1000 BaseT
EW-E4PT820S-WW	2	PTP820S Extended Warranty, 4 Additional Years
N000000L155	1	CAT6A Outdoor Cable, 100m
N000065L001	2	AC power Injector 56V, 60W
N000082L014	2	PTP 820 Glands_x5_KIT
N000082L116	2	Grounding Cable, 1m with M6 ring to M6 ring
N000082L125	2	PTP 820/850 Act.Key - Capacity 500M with ACM Enabled, Per Tx Chan
N000082L173	4	Grounding Kit for CAT5E F/UTP 8mm and Cat6A Cable. Add 2 additional kits per PoE Injector that is installed outdoors
N000082L174	2	RJ45 Connector for CAT6A Cable, Qty 10
N110082D072	2	PTP 820 2' ANT,SP,10_11GHz,RFU-C TYPE&Std UBR100 - Andrew. Shorter lead time. Available in all regions

Physical Installation Notes for Sheriff's Office - CCSO	
Link Name	Sheriff's Office - CCSO to Airport Tower - County
Latitude	41.73816N
Longitude	111.86667W
Site Elevation	1353 meters AMSL
Polarization	Vertical
Hardware Platform	PTP11820S (Narrow)
Antenna Type	Cambium Networks 2ft Single Pol (Global) N110082D072 - Direct
Antenna Beamwidth	3.3°
Antenna Gain	34.79 dBi
Antenna Height	33.5 meters AGL
Antenna Tilt Angle	-0.2° (downtilt)
Bearing to Airport Tower - County	11.51° from True North 0.36° from Magnetic North
Magnetic Declination	11.14° E ±0.36° changing by 0.09° W per year
RF Feeder Loss	0.2 dB

Physical Installation Notes for Airport Tower - County	
Link Name	Sheriff's Office - CCSO to Airport Tower - County
Latitude	41.78258N
Longitude	111.85459W
Site Elevation	1355 meters AMSL
Polarization	Vertical

Physical Installation Notes for Airport Tower - County (continued)	
Hardware Platform	PTP11820S (Narrow)
Antenna Type	Cambium Networks 2ft Single Pol (Global) N110082D072 - Direct
Antenna Beamwidth	3.3°
Antenna Gain	34.79 dBi
Antenna Height	16.8 meters AGL
Antenna Tilt Angle	0.2° (uptilt)
Bearing to Sheriff's Office - CCSO	191.51° from True North 180.37° from Magnetic North
Magnetic Declination	11.15° E ±0.36° changing by 0.09° W per year
RF Feeder Loss	0.2 dB

Radio Commissioning Notes for Sheriff's Office - CCSO	
Radio Interface	Radio:Slot 2, port 1
Tx Frequency	Unknown
Rx Frequency	Unknown
Tx to Rx Frequency Separation	490.000 MHz
Tx Level	26 dBm
MRMC Script	FCC 1506
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	10, 2048QAM
MRMC Script Minimum Profile	0, QPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Disabled
Header Compression	Disabled
BNC Voltage	1.37 to 1.53 Volts
Predicted Receive Power	-45 dBm ± 8 dB while aligning

Radio Commissioning Notes for Airport Tower - County	
Radio Interface	Radio:Slot 2, port 1
Tx Frequency	Unknown
Rx Frequency	Unknown
Tx to Rx Frequency Separation	490.000 MHz
Tx Level	26 dBm
MRMC Script	FCC 1506
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	10, 2048QAM
MRMC Script Minimum Profile	0, QPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Disabled
Header Compression	Disabled
BNC Voltage	1.37 to 1.53 Volts
Predicted Receive Power	-45 dBm ± 8 dB while aligning

Regulatory Conditions	
Regulation	FCC
Band	11 GHz
Max EIRP	60.6 dBm
Output Power	26.0 dBm

Installation Instruction

Perform the following checks during the installation (Check the deployment guide and the User Guide.)

1. Check with a GPS that you are installing at the correct location.

2. Check carefully the direction to the other end of the link. Either use a corrected compass or use the GPS waypoint feature about 300 meters from the installation location.

3. When aligning antennas, it is important to find the centre of the main beam. This is done by adjusting the antenna at each end of the link in turn and monitoring the receive level until the peak is found. Once the peak level is found, it should be checked against the prediced receive power to ensure that the antennas have not been aligned on a side lobe.

4. An hour after alignment is complete, if ATPC is disabled, check that the mean value for the RSL is as predicted (see previous tables). Also check that the received power is not greater than -34dBm with ATPC enabled or disabled.

Sheriff's Office - CCSO Performance *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	505.01 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	99.9999% (unavailable for 28 secs/year)

Airport Tower - County Performance *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	505.01 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	99.9999% (unavailable for 28 secs/year)

* Multipath availability calculated using VB with ITU rain P.530-17

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Sheriff's Office - CCSO			Airport Tower - County		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
10	1054.12	527.06	0.35	51.0102	51.0102	0.35	51.0102	51.0102
9	972.79	486.40	5.35	95.9645	44.9543	5.35	95.9645	44.9543
8	915.60	457.80	6.35	97.6892	1.7247	6.35	97.6892	1.7247
7	842.06	421.03	10.85	99.7694	2.0802	10.85	99.7694	2.0802

(continued)

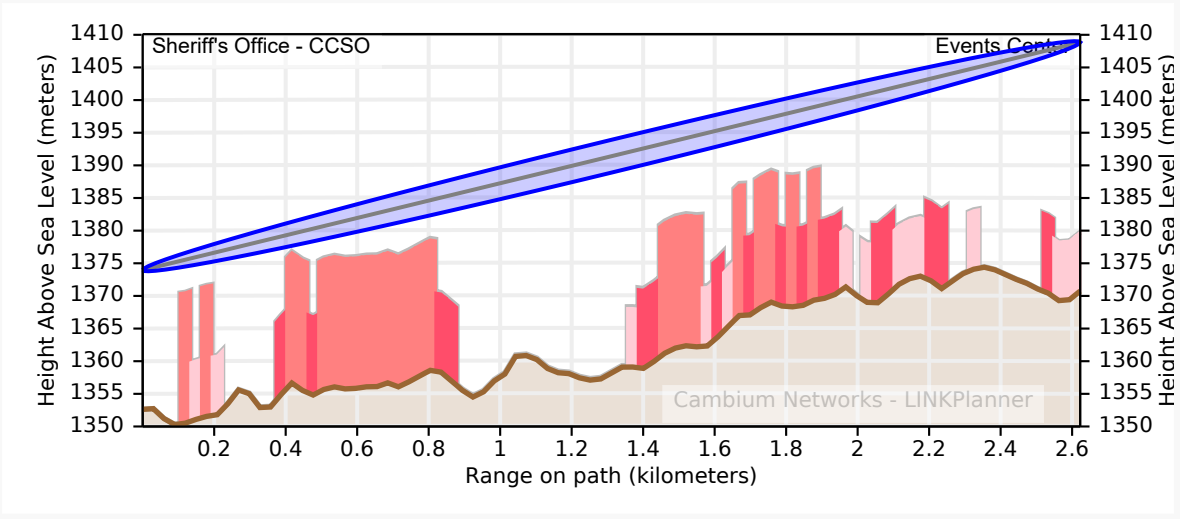
Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Sheriff's Office - CCSO			Airport Tower - County		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
6	782.93	391.47	13.85	99.9341	0.1646	13.85	99.9341	0.1646
5	678.49	339.24	16.85	99.9769	0.0428	16.85	99.9769	0.0428
4	561.28	280.64	19.85	99.9906	0.0137	19.85	99.9906	0.0137
3	457.09	228.55	22.85	99.9958	0.0052	22.85	99.9958	0.0052
2	347.42	173.71	27.85	99.9988	0.0030	27.85	99.9988	0.0030
1	250.12	125.06	29.85	99.9992	0.0005	29.85	99.9992	0.0005
0	171.60	85.80	39.10	99.9999	0.0007	39.10	99.9999	0.0007

* Multipath availability calculated using VB with ITU rain P.530-17

11. Sheriff's Office - CCSO to Events Center

Summary	
Link Name	Sheriff's Office - CCSO to Events Center
Profile Type	Line-of-Sight
Equipment Type	PTP11820S (Narrow)
Maximum Obstruction	0 meters
Link Distance	2.623 kilometers
Free Space Path Loss	121.81 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate	Aggregate 1054.12 Mbps assuming PTP-820 Series running the Release 11.9 software
RF Frequency Band	11 GHz (10700 to 11700 MHz)
RF Channel Bandwidth	80 MHz

Path Profile



Link Configuration	
Link Type	1+0
T/R Spacing	490 MHz
Bandwidth	80 MHz
Modulation Mode	Adaptive
Maximum Mod Mode	10 - 2048QAM
Minimum Mod Mode	0 - QPSK
Polarization	Vertical
ATPC	Disabled
Header Compression	Disabled
Hi	Sheriff's Office - CCSO
Lo	Events Center

Bill of Materials		
Part Number	Qty	Description
(no part number)	2	Unspecified 11 GHz ODU (invalid TX frequency selection). Please select a TX frequency
(no part number)	2	Unspecified Power Lead. (set the region in the Bill of Materials options)
C000000L033	4	Gigabit Surge Suppressor (56V), 10/100/1000 BaseT
EW-E4PT820S-WW	2	PTP820S Extended Warranty, 4 Additional Years
N000000L155	1	CAT6A Outdoor Cable, 100m
N000065L001	2	AC power Injector 56V, 60W
N000082L014	2	PTP 820 Glands_x5_KIT
N000082L116	2	Grounding Cable, 1m with M6 ring to M6 ring
N000082L125	2	PTP 820/850 Act.Key - Capacity 500M with ACM Enabled, Per Tx Chan
N000082L173	4	Grounding Kit for CAT5E F/UTP 8mm and Cat6A Cable. Add 2 additional kits per PoE Injector that is installed outdoors
N000082L174	2	RJ45 Connector for CAT6A Cable, Qty 10
N110082D072	2	PTP 820 2' ANT,SP,10_11GHz,RFU-C TYPE&Std UBR100 - Andrew. Shorter lead time. Available in all regions

Physical Installation Notes for Sheriff's Office - CCSO	
Link Name	Sheriff's Office - CCSO to Events Center
Latitude	41.73816N
Longitude	111.86667W
Site Elevation	1353 meters AMSL
Polarization	Vertical
Hardware Platform	PTP11820S (Narrow)
Antenna Type	Cambium Networks 2ft Single Pol (Global) N110082D072 - Direct
Antenna Beamwidth	3.3°
Antenna Gain	34.79 dBi
Antenna Height	21.3 meters AGL
Antenna Tilt Angle	0.8° (uptilt)
Bearing to Events Center	135.04° from True North 123.90° from Magnetic North
Magnetic Declination	11.14° E ±0.36° changing by 0.09° W per year
RF Feeder Loss	0.2 dB

Physical Installation Notes for Events Center	
Link Name	Sheriff's Office - CCSO to Events Center
Latitude	41.72145N
Longitude	111.84440W
Site Elevation	1371 meters AMSL
Polarization	Vertical

Physical Installation Notes for Events Center (continued)	
Hardware Platform	PTP11820S (Narrow)
Antenna Type	Cambium Networks 2ft Single Pol (Global) N110082D072 - Direct
Antenna Beamwidth	3.3°
Antenna Gain	34.79 dBi
Antenna Height	38.1 meters AGL
Antenna Tilt Angle	-0.8° (downtilt)
Bearing to Sheriff's Office - CCSO	315.05° from True North 303.92° from Magnetic North
Magnetic Declination	11.13° E ±0.36° changing by 0.09° W per year
RF Feeder Loss	0.2 dB

Radio Commissioning Notes for Sheriff's Office - CCSO	
Radio Interface	Radio:Slot 2, port 1
Tx Frequency	Unknown
Rx Frequency	Unknown
Tx to Rx Frequency Separation	490.000 MHz
Tx Level	22 dBm
MRMC Script	FCC 1506
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	10, 2048QAM
MRMC Script Minimum Profile	0, QPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Disabled
Header Compression	Disabled
BNC Voltage	1.27 to 1.35 Volts
Predicted Receive Power	-31 dBm ± 4 dB while aligning

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ATPC Configuration	Disabled
Header Compression	Disabled
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Predicted Receive Power	-31 dBm ± 4 dB while aligning

Regulatory Conditions	
Regulation	FCC
Band	11 GHz
Max EIRP	56.6 dBm
Output Power	22.0 dBm

Installation Instruction

Perform the following checks during the installation (Check the deployment guide and the User Guide.)

1. Check with a GPS that you are installing at the correct location.

2. Check carefully the direction to the other end of the link. Either use a corrected compass or use the GPS waypoint feature about 300 meters from the installation location.

3. When aligning antennas, it is important to find the centre of the main beam. This is done by adjusting the antenna at each end of the link in turn and monitoring the receive level until the peak is found. Once the peak level is found, it should be checked against the prediced receive power to ensure that the antennas have not been aligned on a side lobe.

4. An hour after alignment is complete, if ATPC is disabled, check that the mean value for the RSL is as predicted (see previous tables). Also check that the received power is not greater than -30dBm with ATPC enabled or disabled.

Sheriff's Office - CCSO Performance *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	527.06 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 2 secs/year)

Events Center Performance *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	527.06 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 2 secs/year)

* Multipath availability calculated using VB with ITU rain P.530-17

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Sheriff's Office - CCSO			Events Center		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
10	1054.12	527.06	19.09	100.0000	100.0000	19.09	100.0000	100.0000
9	972.79	486.40	23.09	100.0000	0.0000	23.09	100.0000	0.0000
8	915.60	457.80	24.09	100.0000	0.0000	24.09	100.0000	0.0000
7	842.06	421.03	27.59	100.0000	0.0000	27.59	100.0000	0.0000

(continued)

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Sheriff's Office - CCSO			Events Center		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
6	782.93	391.47	29.59	100.0000	0.0000	29.59	100.0000	0.0000
5	678.49	339.24	32.59	100.0000	0.0000	32.59	100.0000	0.0000
4	561.28	280.64	35.59	100.0000	0.0000	35.59	100.0000	0.0000
3	457.09	228.55	38.59	100.0000	0.0000	38.59	100.0000	0.0000
2	347.42	173.71	42.59	100.0000	0.0000	42.59	100.0000	0.0000
1	250.12	125.06	44.59	100.0000	0.0000	44.59	100.0000	0.0000
0	171.60	85.80	53.84	100.0000	0.0000	53.84	100.0000	0.0000

* Multipath availability calculated using VB with ITU rain P.530-17

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