

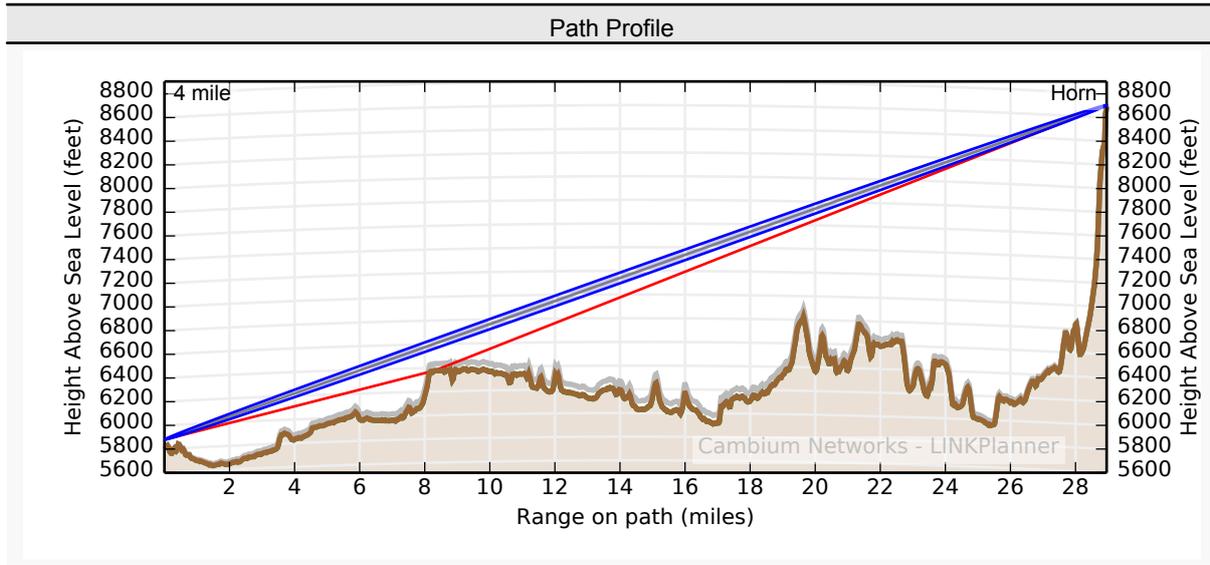
Project RCW, Link 4 mile to Horn LINKPlanner Installation Report

06 March 2017

Royce
Organization: RCW
Phone: 435-259-6763
Email: royceselectronics@hotmail.com



Summary	
Link Name	4 mile to Horn
Customer Company Name	Royce's Electronics Inc
Profile Type	Line-of-Sight
Equipment Type	PTP11820S (Wide)
Maximum Obstruction	0 feet
Link Distance	28.957 miles
Free Space Path Loss	146.80 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate	Aggregate 1191.90 Mbps assuming PTP-820 Series running the Release 8.7 software
RF Frequency Band	11 GHz (10700 to 11700 MHz)
RF Channel Bandwidth	80 MHz



Link Configuration	
Link Type	1+0
T/R Spacing	490 MHz
Bandwidth	80 MHz
Modulation Mode	Adaptive
Maximum Mod Mode	8 - 1024QAM
Minimum Mod Mode	0 - QPSK
Polarization	Vertical
ATPC	Enabled
Header Compression	Disabled
Hi	4 mile
Lo	Horn

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)
C110082B015	1	PTP 820S Radio 11WGHz,TR500,Ch1W6,Hi,11185-11485MHz. Stock item, short lead time
C110082B016	1	PTP 820S Radio 11WGHz,TR500,Ch1W6,Lo,10695-10955MHz. Stock item, short lead time
N000065L001	2	PTP 650 AC Power Injector
N000082L014	2	PTP 820 Glands_x5_KIT
N000082L016	1	PTP 820 CAT5E Outdoor 100m drum
N000082L017	4	PTP 820 Grounding Kit for CAT5e F/UTP 8mm cable. Add 2 additional kits per PoE Injector that is installed outdoors

Bill of Materials (continued)		
Part Number	Qty	Description
N000082L033	2	PTP 820S Act.Key - Capacity 500M with ACM Enabled, per Tx Chan
N000082L073	2	PTP 820 GBE_Connector_kit
N000082L116	2	PTP 820 GROUND CABLE FOR IDU and ODU
N110082D074	1	PTP 820 4' ANT,SP,10_11GHz,RFU-C & UBR100 - CNT. Only available for order in APAC and EMEA regions
N110082D100	1	PTP 820 4' ANT,SP,11GHz,RFU-C TYPE&UBR100 - Radiowave. Only available for order in North America and CALA regions

Physical Installation Notes for 4 mile	
Link Name	4 mile to Horn
Latitude	39.54488N
Longitude	110.81661W
Site Elevation	5834 feet AMSL
Polarization	Vertical
Hardware Platform	PTP11820S (Wide) - C110082B015
Antenna Type	Cambium Networks 4ft Single Pol (APAC & EMEA Only) N110082D074 - Direct
Antenna Beamwidth	1.5°
Antenna Gain	41.31 dBi
Antenna Height	45.0 feet AGL
Antenna Tilt angle	0.9° (uptilt)
Bearing to Horn	217.08° from True North 206.18° from Magnetic North
Magnetic Declination	10.90° E ±0.35° changing by 0.10° W per year
RF Feeder Loss	0.2 dB

Physical Installation Notes for Horn	
Link Name	4 mile to Horn
Latitude	39.20956N
Longitude	111.14194W
Site Elevation	8692 feet AMSL
Polarization	Vertical
Hardware Platform	PTP11820S (Wide) - C110082B016
Antenna Type	Cambium Networks 4ft Single Pol (NA & CALA Only) N110082D100 - Direct
Antenna Beamwidth	1.7°
Antenna Gain	40.63 dBi
Antenna Height	12.0 feet AGL
Antenna Tilt angle	-1.2° (downtilt)
Bearing to 4 mile	36.88° from True North 25.90° from Magnetic North
Magnetic Declination	10.97° E ±0.35° changing by 0.10° W per year
RF Feeder Loss	0.2 dB

Radio Commissioning Notes for 4 mile	
Radio Interface	Radio:Slot 1, port 2
Tx Frequency	11227.000 MHz
Rx Frequency	10737.000 MHz
Tx to Rx Frequency Separation	490.000 MHz
Tx Level	21 dBm
MRMC Script	FCC 1501
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	8, 1024QAM
MRMC Script Minimum Profile	0, QPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Enabled
Header Compression	Disabled
BNC Voltage	1.35 to 1.43 Volts
Predicted Receive Power	-39 dBm ± 4 dB while aligning

Radio Commissioning Notes for Horn	
Radio Interface	Radio:Slot 1, port 2
Tx Frequency	10737.000 MHz
Rx Frequency	11227.000 MHz
Tx to Rx Frequency Separation	490.000 MHz
Tx Level	27 dBm
MRMC Script	FCC 1501
MRMC Script Operational Mode	Adaptive
MRMC Script Maximum Profile	8, 1024QAM
MRMC Script Minimum Profile	0, QPSK
Adaptive Tx Power Admin	Enable
ATPC Configuration	Enabled
Header Compression	Disabled
BNC Voltage	1.40 to 1.48 Volts
Predicted Receive Power	-44 dBm ± 4 dB while aligning

Regulatory Conditions	
Regulation	FCC
Band	11 GHz
Max EIRP	67.43 dBm
Output Power	27.00 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.

Installation Instruction (continued)

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 predicted 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.

4 mile Performance *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	595.95 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	99.9999% (unavailable for 29 secs/year)

Horn Performance *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	595.95 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	99.9998% (unavailable for 53 secs/year)

* Multipath availability calculated using ITU-R

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	4 mile			Horn		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
8	1191.94	595.97	10.68	99.9883	99.9883	9.47	99.9840	99.9840
7	1096.05	548.02	14.18	99.9946	0.0063	11.97	99.9914	0.0074
6	997.37	498.68	18.18	99.9974	0.0028	14.97	99.9954	0.0040
5	866.23	433.12	21.18	99.9984	0.0010	17.97	99.9973	0.0019
4	733.24	366.62	23.68	99.9989	0.0005	20.47	99.9982	0.0009
3	599.20	299.60	26.68	99.9993	0.0004	23.47	99.9989	0.0006
2	456.47	228.24	31.18	99.9996	0.0003	26.97	99.9993	0.0004
1	320.27	160.14	34.18	99.9997	0.0001	28.97	99.9995	0.0002
0	225.76	112.88	43.43	99.9999	0.0002	38.22	99.9998	0.0004

* Multipath availability calculated using ITU-R



Cambium Networks assumes no responsibility for the accuracy of the information produced by the Cambium LINKPlanner. Reference to products or services which are not provided by Cambium Networks is for information purposes only and constitutes neither an endorsement nor a recommendation. All information provided by the Cambium LINKPlanner is provided without warranty of any kind, either expressed or implied.

All product or service names are the property of their respective owners. © Cambium Networks. 2017