Project CAR-Benguet
LINKPlanner PTP Installation Report

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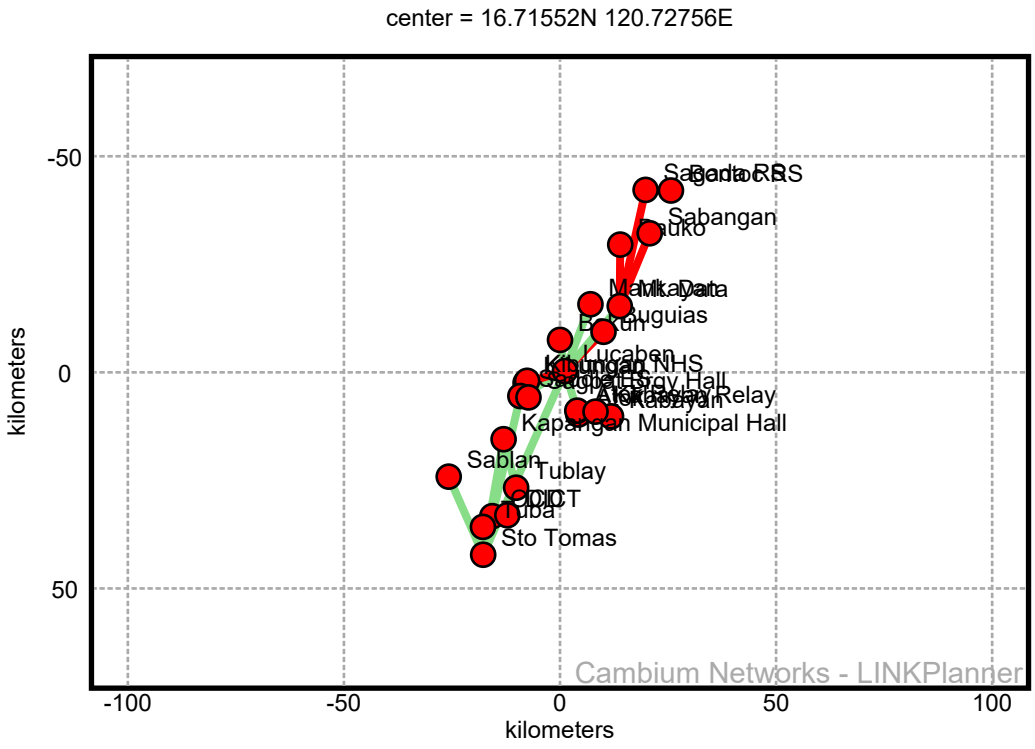


Cambium Networks™

Table of Contents

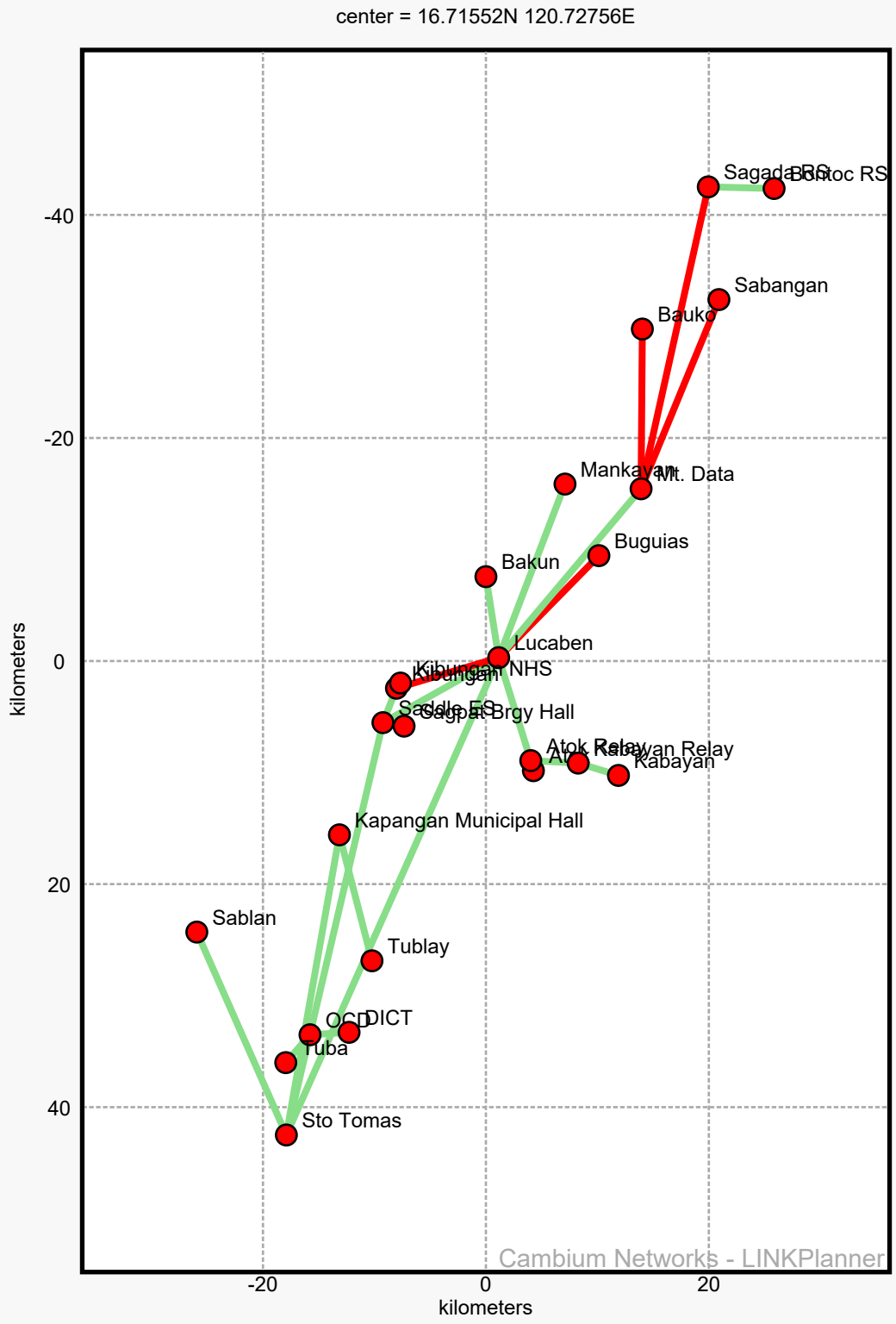
1. Project Summary

Project: CAR-Benguet

Description: CAR Broadband

General Information	
Customer Name	DICT CAR
Company Name	DICT CAR
Address	
Phone	
Cell Phone	
Email	

Network Map


center = 16.71552N 120.72756E
Sagada BRS
Bontoc RS
Sabangan
Bauko
Mankayan
Mt. Data
Buguias
Bakun
Lucaben
Kibungan NHS
Saddle ES
Gagpat Brgy Hall
Atok Relay
Kabayan Relay
Kapangan Municipal Hall
Sablan
Tublay
OCD
DICT
Tuba
Sto Tomas
-40
-20
0
20
40
kilometers
-20
0
20
kilometers
Cambium Networks - LINKPlanner

Link name	Product	Primary Local antenna	Primary Remote antenna	Max aggregate IP throughput
Atok Relay to Atok	PTP550	Cambium Networks 2ft High Performance Dual-Polar Parabolic RDH4508C	Cambium Networks 2ft High Performance Dual-Polar Parabolic RDH4508C	596.31 Mbps
Atok Relay to Kabayan Relay	PTP550	Cambium Networks High Gain Integrated	Cambium Networks High Gain Integrated	587.27 Mbps
Bauko to Mt. Data	PTP670	Cambium Networks High Gain Integrated	Cambium Networks High Gain Integrated	0.00 Mbps
DICT to OCD	PTP670	Cambium Networks High Gain Integrated	Cambium Networks High Gain Integrated	450.68 Mbps
Kabayan Relay to Kabayan	PTP550	Cambium Networks High Gain Integrated	Cambium Networks High Gain Integrated	591.79 Mbps
Kapangan Municipal Hall to Tublay	PTP670	Cambium Networks High Gain Integrated	Cambium Networks High Gain Integrated	413.94 Mbps
Kibungan to Lucaben	PTP670	Cambium Networks High Gain Integrated	Cambium Networks High Gain Integrated	1.10 Mbps
Lucaben to Atok Relay	PTP550	Cambium Networks High Gain Integrated	Cambium Networks High Gain Integrated	538.89 Mbps
Lucaben to Bakun	PTP550	Cambium Networks High Gain Integrated	Cambium Networks High Gain Integrated	580.15 Mbps
Lucaben to Buguias	PTP550	Cambium Networks 2ft High Performance Dual-Polar Parabolic RDH4508C	Cambium Networks 2ft High Performance Dual-Polar Parabolic RDH4508C	50.64 Mbps
Lucaben to Mankayan	PTP550E	Cambium Networks High Gain Integrated	Cambium Networks High Gain Integrated	665.19 Mbps
Lucaben to Mt. Data	PTP670	Cambium Networks High Gain Integrated	Cambium Networks High Gain Integrated	343.13 Mbps
Mt. Data to Sabangan	PTP670	Cambium Networks High Gain Integrated	Cambium Networks High Gain Integrated	0.00 Mbps
Mt. Data to Sagada RS	PTP670	Cambium Networks High Gain Integrated	Cambium Networks High Gain Integrated	0.00 Mbps
OCD to Tuba	PTP670	Cambium Networks High Gain Integrated	Cambium Networks High Gain Integrated	154.56 Mbps
Saddle ES to Kibungan	PTP670	Cambium Networks High Gain Integrated	Cambium Networks High Gain Integrated	450.68 Mbps
Saddle ES to Lucaben	PTP670	Cambium Networks High Gain Integrated	Cambium Networks High Gain Integrated	404.75 Mbps
Sagada RS to Bontoc RS	PTP670	Cambium Networks High Gain Integrated	Cambium Networks High Gain Integrated	449.15 Mbps

(continued)

Link name	Product	Primary Local antenna	Primary Remote antenna	Max aggregate IP throughput
Sto Tomas to Kapangan Municipal Hall	PTP670	Cambium Networks High Gain Integrated	Cambium Networks High Gain Integrated	293.30 Mbps
Sto Tomas to Lucaben	PTP670	Cambium Networks High Gain Integrated	Cambium Networks High Gain Integrated	79.81 Mbps
Sto Tomas to Sablan	PTP670	Cambium Networks High Gain Integrated	Cambium Networks High Gain Integrated	341.54 Mbps
Sto Tomas to Saddle ES	PTP670	Cambium Networks High Gain Integrated	Cambium Networks High Gain Integrated	224.45 Mbps

Bill of Materials : PTP Network

Part Number	Qty	Description
01010419001	61	Coaxial Cable Grounding Kits for 1/4" and 3/8" Cable
AR-E4PT6XX-WW	30	PTP 670 All Risks Advance Replacement, 4 additional years (per END)
C000000L033	28	Gigabit Surge Suppressor (56V), 10/100/1000 BaseT
C000065L007	30	LPU and Grounding Kit (1 kit per ODU)
C050055H004	2	PTP 550 Connectorized 5 GHz (ROW) with US Line Cord. Kit includes radio with power supply, line cord and mounting bracket
C050055H005	2	PTP 550 Connectorized 5 GHz (ROW) with EU Line Cord. Kit includes radio with power supply, line cord and mounting bracket
C050055H010	8	PTP 550 Integrated 5 GHz (ROW) with US Line Cord. Kit includes radio with antenna, power supply, line cord and mounting bracket
C050055H019	2	PTP 550E Integrated including 4.9 GHz (ROW) with US Line Cord. Kit includes radio with antenna, power supply, line cord and mounting bracket
C050067H010	26	PTP 670 Integrated 23dBi END with AC+DC Enhanced Supply (ROW - U.S. Line Cord). Kit includes ODU, power supply, mounting bracket and US line cord
C050067H016	4	PTP 670 Integrated 23dBi END with AC+DC Enhanced Supply (ROW - EU Line Cord). Kit includes ODU, power supply, mounting bracket and EU line cord
EW-E2PT550-WW	14	PTP 550 Extended Warranty, 2 Additional years (per END)
RDH4508C	4	High Performance 4.9-6 GHz, 2-FT (0.6M), DUAL-POL antenna with 2 x N-type Connector
WB3176	7	328 ft (100 m) Reel Outdoor Copper Clad CAT5E (Recommended for PTP)

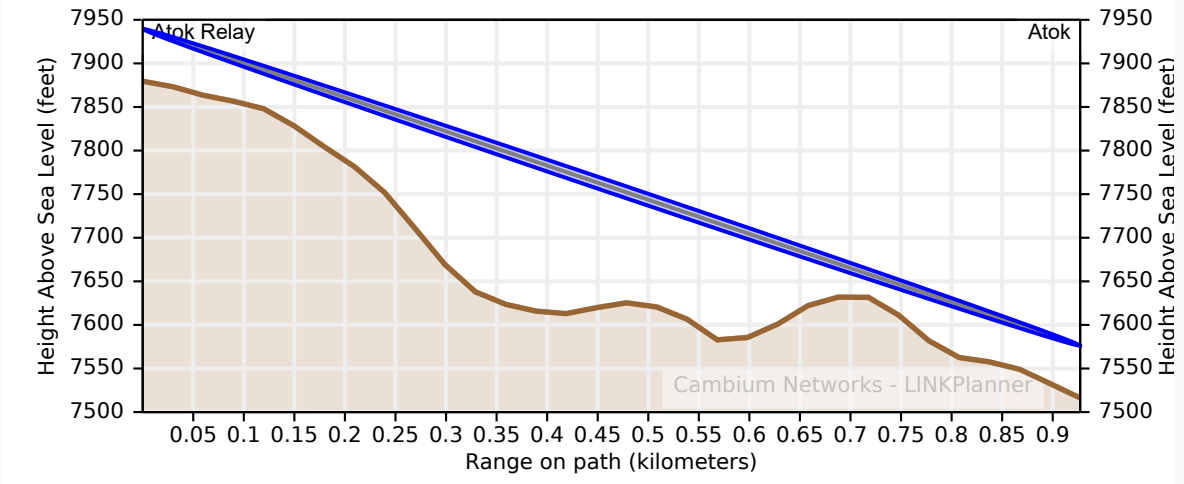
Bill of Materials : Switch Network

Part Number	Qty	Description

2. Atok Relay to Atok

Summary	
Link Name	Atok Relay to Atok
Customer Company Name	DICT CAR
Profile Type	Line-of-Sight
Equipment Type	PTP550
Fresnel Zone Clearance	21.0 feet
Link Distance	0.927 kilometers
Free Space Path Loss	107.04 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate Paths	Aggregate 596.31 Mbps assuming PTP-550 Series running the 4.7 software
RF Frequency Band (Link A)	5.8 GHz (5725 to 5850 MHz)
RF Frequency Band (Link B)	5.8 GHz (5725 to 5850 MHz)
RF Channel Bandwidth (Link A)	40 MHz
RF Channel Bandwidth (Link B)	40 MHz

Path Profile



Link Configuration	
Link Type	2+0
Bandwidth (Link A)	40 MHz
Bandwidth (Link B)	40 MHz
DL/UL Ratio	50/50
Frame Period	5 ms
Maximum Mod Mode (Link A)	MCS9 (256QAM 0.83 Dual)
Maximum Mod Mode (Link B)	MCS9 (256QAM 0.83 Dual)
Master	Atok Relay

Link Configuration (continued)	
Slave	Atok

Bill of Materials		
Part Number	Qty	Description
C000000L033	4	Gigabit Surge Suppressor (56V), 10/100/1000 BaseT
C050055H004	2	PTP 550 Connectorized 5 GHz (ROW) with US Line Cord. Kit includes radio with power supply, line cord and mounting bracket
EW-E2PT550-WW	2	PTP 550 Extended Warranty, 2 Additional years (per END)
RDH4508C	2	High Performance 4.9-6 GHz, 2-FT (0.6M), DUAL-POL antenna with 2 x N-type Connector

Physical Installation Notes for Atok Relay	
Link Name	Atok Relay to Atok
Latitude	16.63555N
Longitude	120.76496E
Site Elevation	7940 feet AMSL
Equipment Type	PTP550
Platform Variant	Connectorized
Antenna Type	Cambium Networks 2ft High Performance Dual-Polar Parabolic RDH4508C
Antenna Beamwidth	6.1°
Antenna Gain	29.11 dBi
Antenna Height	60.0 feet AGL
Antenna Tilt Angle	-6.8° (downtilt)
Bearing to Atok	165.47° from True North 168.59° from Magnetic North
Magnetic Declination	3.12° W ±0.28° changing by 0.10° W per year
Cable Loss (Link A)	1.0 dB
Cable Loss (Link B)	1.0 dB

Physical Installation Notes for Atok	
Link Name	Atok Relay to Atok
Latitude	16.62744N
Longitude	120.76714E
Site Elevation	7576 feet AMSL
Equipment Type	PTP550
Platform Variant	Connectorized
Antenna Type	Cambium Networks 2ft High Performance Dual-Polar Parabolic RDH4508C
Antenna Beamwidth	6.1°
Antenna Gain	29.11 dBi
Antenna Height	60.0 feet AGL
Antenna Tilt Angle	6.8° (uptilt)

Physical Installation Notes for Atok (continued)	
Bearing to Atok Relay	345.47° from True North 348.59° from Magnetic North
Magnetic Declination	3.12° W ±0.28° changing by 0.10° W per year
Cable Loss (Link A)	1.0 dB
Cable Loss (Link B)	1.0 dB

Radio Commissioning Notes for Atok Relay	
Radio Mode	Master
Driver Mode	TDD PTP
Country	Argentina
Channel Bonding	Enabled
Max Range	1 kilometers
Range Unit	kilometers
Link Name	Atok Relay
Antenna Gain	28 dBi
Slave Module Target Receive Level	-31 dBm
Downlink/Uplink Ratio	50/50
Channel Bandwidth Radio 1 (Link A)	40 MHz
Frequency Carrier Radio 1 (Link A)	Unknown
Transmitter Power Radio 1 (Link A)	20.0 dBm
Downlink Max Rate Radio 1 (Link A)	MCS9 (256QAM 0.83 Dual)
Channel Bandwidth Radio 2 (Link B)	40 MHz
Frequency Carrier Radio 2 (Link B)	Unknown
Transmitter Power Radio 2 (Link B)	20.0 dBm
Downlink Max Rate Radio 2 (Link B)	MCS9 (256QAM 0.83 Dual)
Frame Size	5 ms
Synchronization Source	Internal
Device Latitude (degrees)	16.63555N
Device Longitude (degrees)	120.76496E
Device Height (meters)	2420.0 m (7939.5 ft) AMSL
Predicted Receive Power	-31 dBm ± 5 dB
Predicted Link Loss	107.05 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Atok	
Radio Mode	Slave
Driver Mode	TDD
Country Code	Argentina
Channel Bonding	Enabled
Max Tx Power	Manual
Antenna Gain	28 dBi

Radio Commissioning Notes for Atok (continued)	
Transmitter Power Radio 1 (Link A)	20.0 dBm
Uplink Max Rate Radio 1 (Link A)	MCS9 (256QAM 0.83 Dual)
Transmitter Power Radio 2 (Link B)	20.0 dBm
Uplink Max Rate Radio 2 (Link B)	MCS9 (256QAM 0.83 Dual)
Device Name	Atok
Device Latitude (degrees)	16.62744N
Device Longitude (degrees)	120.76714E
Device Height (meters)	2309.2 m (7576.2 ft) AMSL
Predicted Receive Power	-31 dBm ± 5 dB
Predicted Link Loss	107.05 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Regulation	Argentina
Band (Link A)	5.8 GHz
Band (Link B)	5.8 GHz
Max EIRP (Link A)	48.1 dBm
Max EIRP (Link B)	48.1 dBm
Output Power (Link A)	20.0 dBm
Output Power (Link B)	20.0 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 disarm check that the mean value for the link loss is as predicted (107.05 dB ± 5.00 dB). Also check that the received power is not greater than -30dBm.

Atok Relay Performance (Link A) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	149.08 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Atok Performance (Link A) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	149.08 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Atok Relay Performance (Link B) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	149.08 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Atok Performance (Link B) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	149.08 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

* Multipath availability calculated using ITU-R P.530-17

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Atok Relay - Link A			Atok - Link A		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS9 (256QAM 0.83 Dual)	298.16	149.08	29.17	99.9995	99.9995	30.17	99.9995	99.9995
MCS8 (256QAM 0.75 Dual)	271.06	135.53	32.17	99.9995	0.0000	33.17	99.9995	0.0000
MCS7 (64QAM 0.83 Dual)	225.88	112.94	36.17	99.9995	0.0000	37.17	99.9995	0.0000
MCS6 (64QAM 0.75 Dual)	203.30	101.65	38.17	99.9995	0.0000	39.17	99.9995	0.0000
MCS5 (64QAM 0.67 Dual)	180.70	90.35	40.17	99.9995	0.0000	40.17	99.9995	0.0000

(continued)

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Atok Relay - Link A			Atok - Link A		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS4 (16QAM 0.75 Dual)	135.52	67.76	43.17	99.9995	0.0000	43.17	99.9995	0.0000
MCS3 (16QAM 0.5 Dual)	90.36	45.18	45.17	99.9995	0.0000	46.17	99.9995	0.0000
MCS2 (QPSK 0.75 Dual)	67.76	33.88	49.17	99.9995	0.0000	50.17	99.9995	0.0000
MCS1 (QPSK 0.5 Dual)	45.18	22.59	50.17	99.9995	0.0000	51.17	99.9995	0.0000
MCS9 (256QAM 0.83 Sngl)	149.08	74.54	32.17	0.0005	0.0005	34.17	0.0005	0.0005
MCS8 (256QAM 0.75 Sngl)	135.52	67.76	35.17	0.0005	0.0000	36.17	0.0005	0.0000
MCS7 (64QAM 0.83 Sngl)	112.94	56.47	38.17	0.0005	0.0000	41.17	0.0005	0.0000
MCS6 (64QAM 0.75 Sngl)	99.38	49.69	40.17	0.0005	0.0000	42.17	0.0005	0.0000
MCS5 (64QAM 0.67 Sngl)	90.36	45.18	42.17	0.0005	0.0000	43.17	0.0005	0.0000
MCS4 (16QAM 0.75 Sngl)	67.76	33.88	45.17	0.0005	0.0000	46.17	0.0005	0.0000
MCS3 (16QAM 0.5 Sngl)	45.18	22.59	47.17	0.0005	0.0000	48.17	0.0005	0.0000
MCS2 (QPSK 0.75 Sngl)	31.62	15.81	49.17	0.0005	0.0000	50.17	0.0005	0.0000
MCS1 (QPSK 0.5 Sngl)	22.58	11.29	52.17	100.0000	0.0000	52.17	100.0000	0.0000

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Atok Relay - Link B			Atok - Link B		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS9 (256QAM 0.83 Dual)	298.16	149.08	29.17	99.9995	99.9995	30.17	99.9995	99.9995
MCS8 (256QAM 0.75 Dual)	271.06	135.53	32.17	99.9995	0.0000	33.17	99.9995	0.0000
MCS7 (64QAM 0.83 Dual)	225.88	112.94	36.17	99.9995	0.0000	37.17	99.9995	0.0000
MCS6 (64QAM 0.75 Dual)	203.30	101.65	38.17	99.9995	0.0000	39.17	99.9995	0.0000
MCS5 (64QAM 0.67 Dual)	180.70	90.35	40.17	99.9995	0.0000	40.17	99.9995	0.0000
MCS4 (16QAM 0.75 Dual)	135.52	67.76	43.17	99.9995	0.0000	43.17	99.9995	0.0000
MCS3 (16QAM 0.5 Dual)	90.36	45.18	45.17	99.9995	0.0000	46.17	99.9995	0.0000
MCS2 (QPSK 0.75 Dual)	67.76	33.88	49.17	99.9995	0.0000	50.17	99.9995	0.0000
MCS1 (QPSK 0.5 Dual)	45.18	22.59	50.17	99.9995	0.0000	51.17	99.9995	0.0000
MCS9 (256QAM 0.83 Sngl)	149.08	74.54	32.17	0.0005	0.0005	34.17	0.0005	0.0005
MCS8 (256QAM 0.75 Sngl)	135.52	67.76	35.17	0.0005	0.0000	36.17	0.0005	0.0000
MCS7 (64QAM 0.83 Sngl)	112.94	56.47	38.17	0.0005	0.0000	41.17	0.0005	0.0000
MCS6 (64QAM 0.75 Sngl)	99.38	49.69	40.17	0.0005	0.0000	42.17	0.0005	0.0000
MCS5 (64QAM 0.67 Sngl)	90.36	45.18	42.17	0.0005	0.0000	43.17	0.0005	0.0000
MCS4 (16QAM 0.75 Sngl)	67.76	33.88	45.17	0.0005	0.0000	46.17	0.0005	0.0000
MCS3 (16QAM 0.5 Sngl)	45.18	22.59	47.17	0.0005	0.0000	48.17	0.0005	0.0000

(continued)

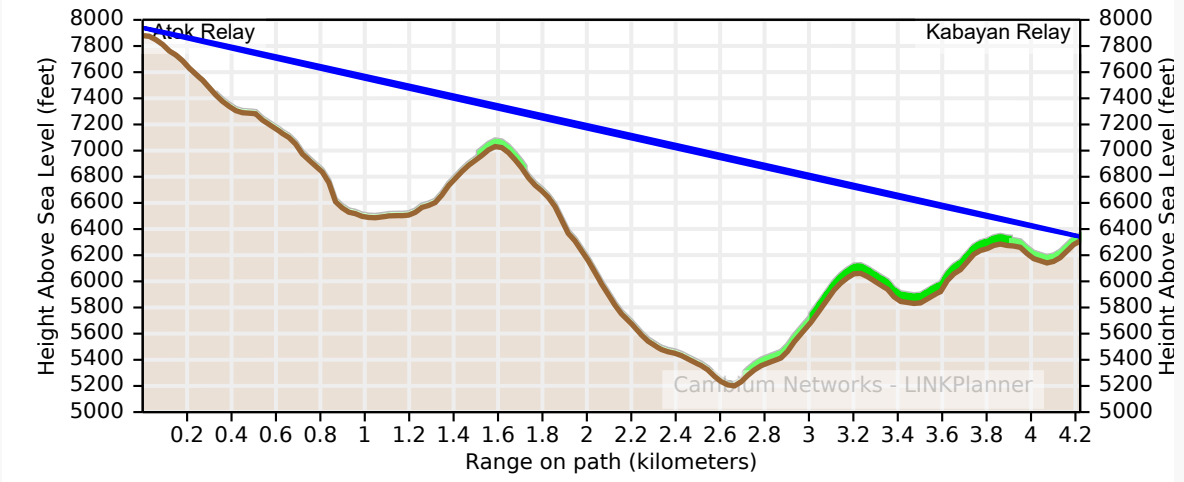
Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Atok Relay - Link B			Atok - Link B		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS2 (QPSK 0.75 Sngl)	31.62	15.81	49.17	0.0005	0.0000	50.17	0.0005	0.0000
MCS1 (QPSK 0.5 Sngl)	22.58	11.29	52.17	100.0000	0.0000	52.17	100.0000	0.0000

* Multipath availability calculated using ITU-R P.530-17

3. Atok Relay to Kabayan Relay

Summary	
Link Name	Atok Relay to Kabayan Relay
Customer Company Name	DICT CAR
Profile Type	Line-of-Sight
Equipment Type	PTP550
Fresnel Zone Clearance	1.8 feet
Link Distance	4.221 kilometers
Free Space Path Loss	120.21 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate Paths	Aggregate 587.27 Mbps assuming PTP-550 Series running the 4.7 software
RF Frequency Band (Link A)	5.8 GHz (5725 to 5850 MHz)
RF Frequency Band (Link B)	5.8 GHz (5725 to 5850 MHz)
RF Channel Bandwidth (Link A)	40 MHz
RF Channel Bandwidth (Link B)	40 MHz

Path Profile



Link Configuration	
Link Type	2+0
Bandwidth (Link A)	40 MHz
Bandwidth (Link B)	40 MHz
DL/UL Ratio	50/50
Frame Period	5 ms
Maximum Mod Mode (Link A)	MCS9 (256QAM 0.83 Dual)
Maximum Mod Mode (Link B)	MCS9 (256QAM 0.83 Dual)
Master	Atok Relay

Link Configuration (continued)	
Slave	Kabayan Relay

Bill of Materials		
Part Number	Qty	Description
C000000L033	4	Gigabit Surge Suppressor (56V), 10/100/1000 BaseT
C050055H010	2	PTP 550 Integrated 5 GHz (ROW) with US Line Cord. Kit includes radio with antenna, power supply, line cord and mounting bracket
EW-E2PT550-WW	2	PTP 550 Extended Warranty, 2 Additional years (per END)

Physical Installation Notes for Atok Relay	
Link Name	Atok Relay to Kabayan Relay
Latitude	16.63555N
Longitude	120.76496E
Site Elevation	7940 feet AMSL
Equipment Type	PTP550
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	60.0 feet AGL
Antenna Tilt Angle	-6.6° (downtilt)
Bearing to Kabayan Relay	93.04° from True North 96.17° from Magnetic North
Magnetic Declination	3.12° W ±0.28° changing by 0.10° W per year

Physical Installation Notes for Kabayan Relay	
Link Name	Atok Relay to Kabayan Relay
Latitude	16.63352N
Longitude	120.80447E
Site Elevation	6342 feet AMSL
Equipment Type	PTP550
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	6.6° (uptilt)
Bearing to Atok Relay	273.06° from True North 276.18° from Magnetic North
Magnetic Declination	3.13° W ±0.28° changing by 0.10° W per year

Radio Commissioning Notes for Atok Relay	
Radio Mode	Master
Driver Mode	TDD PTP
Country	Argentina
Channel Bonding	Enabled
Max Range	5 kilometers
Range Unit	kilometers
Link Name	Atok Relay
Antenna Gain	23 dBi
Slave Module Target Receive Level	-51 dBm
Downlink/Uplink Ratio	50/50
Channel Bandwidth Radio 1 (Link A)	40 MHz
Frequency Carrier Radio 1 (Link A)	Unknown
Transmitter Power Radio 1 (Link A)	23.0 dBm
Downlink Max Rate Radio 1 (Link A)	MCS9 (256QAM 0.83 Dual)
Channel Bandwidth Radio 2 (Link B)	40 MHz
Frequency Carrier Radio 2 (Link B)	Unknown
Transmitter Power Radio 2 (Link B)	23.0 dBm
Downlink Max Rate Radio 2 (Link B)	MCS9 (256QAM 0.83 Dual)
Frame Size	5 ms
Synchronization Source	Internal
Device Latitude (degrees)	16.63555N
Device Longitude (degrees)	120.76496E
Device Height (meters)	2420.0 m (7939.5 ft) AMSL
Predicted Receive Power	-51 dBm ± 5 dB
Predicted Link Loss	120.23 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Kabayan Relay	
Radio Mode	Slave
Driver Mode	TDD
Country Code	Argentina
Channel Bonding	Enabled
Max Tx Power	Manual
Antenna Gain	23 dBi
Transmitter Power Radio 1 (Link A)	23.0 dBm
Uplink Max Rate Radio 1 (Link A)	MCS9 (256QAM 0.83 Dual)
Transmitter Power Radio 2 (Link B)	23.0 dBm
Uplink Max Rate Radio 2 (Link B)	MCS9 (256QAM 0.83 Dual)
Device Name	Kabayan Relay
Device Latitude (degrees)	16.63352N
Device Longitude (degrees)	120.80447E
Device Height (meters)	1933.0 m (6341.9 ft) AMSL
Predicted Receive Power	-51 dBm ± 5 dB

Radio Commissioning Notes for Kabayan Relay (continued)	
Predicted Link Loss	120.23 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Regulation	Argentina
Band (Link A)	5.8 GHz
Band (Link B)	5.8 GHz
Max EIRP (Link A)	46.0 dBm
Max EIRP (Link B)	46.0 dBm
Output Power (Link A)	23.0 dBm
Output Power (Link B)	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 disarm check that the mean value for the link loss is as predicted (120.23 dB ± 5.00 dB). Also check that the received power is not greater than -30dBm.

Atok Relay Performance (Link A) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	146.82 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Kabayan Relay Performance (Link A) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	146.82 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Atok Relay Performance (Link B) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	146.82 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Kabayan Relay Performance (Link B) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	146.82 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

* Multipath availability calculated using ITU-R P.530-17

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Atok Relay - Link A			Kabayan Relay - Link A		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS9 (256QAM 0.83 Dual)	293.64	146.82	5.77	99.9915	99.9915	6.77	99.9978	99.9978
MCS8 (256QAM 0.75 Dual)	266.54	133.27	8.77	99.9993	0.0078	9.77	99.9994	0.0016
MCS7 (64QAM 0.83 Dual)	221.36	110.68	12.77	99.9995	0.0003	13.77	99.9995	0.0001
MCS6 (64QAM 0.75 Dual)	198.78	99.39	15.77	99.9995	0.0000	16.77	99.9995	0.0000
MCS5 (64QAM 0.67 Dual)	176.18	88.09	18.77	99.9995	0.0000	18.77	99.9995	0.0000
MCS4 (16QAM 0.75 Dual)	135.52	67.76	22.77	99.9995	0.0000	22.77	99.9995	0.0000
MCS3 (16QAM 0.5 Dual)	90.36	45.18	24.77	99.9995	0.0000	25.77	99.9995	0.0000
MCS2 (QPSK 0.75 Dual)	67.76	33.88	28.77	99.9995	0.0000	29.77	99.9995	0.0000

(continued)

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Atok Relay - Link A			Kabayan Relay - Link A		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS1 (QPSK 0.5 Dual)	45.18	22.59	29.77	99.9995	0.0000	30.77	99.9995	0.0000
MCS9 (256QAM 0.83 Sngl)	149.08	74.54	8.77	0.0005	0.0005	10.77	0.0005	0.0005
MCS8 (256QAM 0.75 Sngl)	135.52	67.76	11.77	0.0005	0.0000	12.77	0.0005	0.0000
MCS7 (64QAM 0.83 Sngl)	112.94	56.47	14.77	0.0005	0.0000	17.77	0.0005	0.0000
MCS6 (64QAM 0.75 Sngl)	99.38	49.69	17.77	0.0005	0.0000	19.77	0.0005	0.0000
MCS5 (64QAM 0.67 Sngl)	90.36	45.18	20.77	0.0005	0.0000	21.77	0.0005	0.0000
MCS4 (16QAM 0.75 Sngl)	67.76	33.88	24.77	0.0005	0.0000	25.77	0.0005	0.0000
MCS3 (16QAM 0.5 Sngl)	45.18	22.59	26.77	0.0005	0.0000	27.77	0.0005	0.0000
MCS2 (QPSK 0.75 Sngl)	31.62	15.81	28.77	0.0005	0.0000	29.77	0.0005	0.0000
MCS1 (QPSK 0.5 Sngl)	22.58	11.29	31.77	100.0000	0.0000	31.77	100.0000	0.0000

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Atok Relay - Link B			Kabayan Relay - Link B		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS9 (256QAM 0.83 Dual)	293.64	146.82	5.77	99.9915	99.9915	6.77	99.9978	99.9978
MCS8 (256QAM 0.75 Dual)	266.54	133.27	8.77	99.9993	0.0078	9.77	99.9994	0.0016
MCS7 (64QAM 0.83 Dual)	221.36	110.68	12.77	99.9995	0.0003	13.77	99.9995	0.0001

(continued)

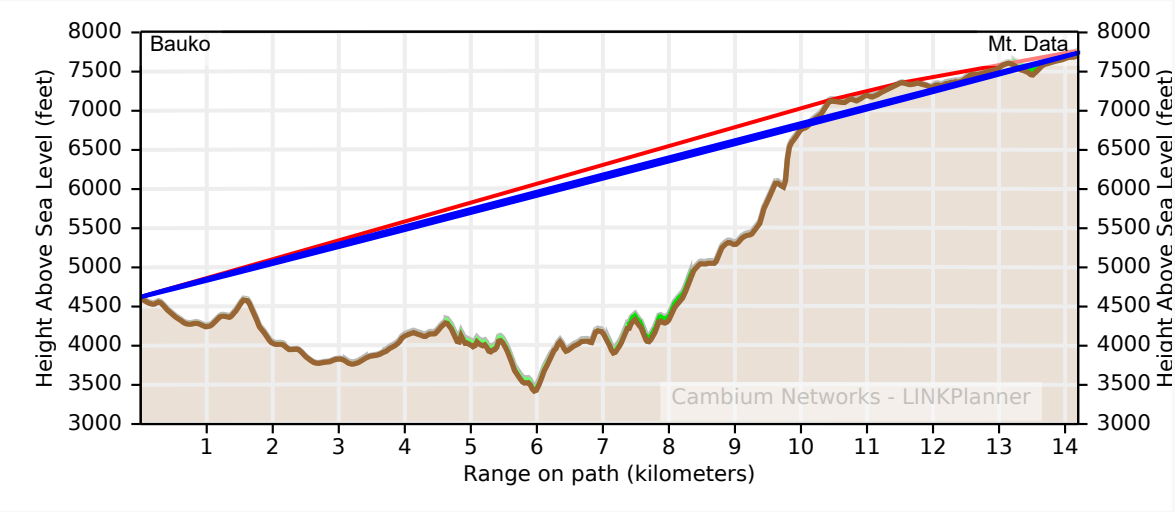
Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Atok Relay - Link B			Kabayan Relay - Link B		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS6 (64QAM 0.75 Dual)	198.78	99.39	15.77	99.9995	0.0000	16.77	99.9995	0.0000
MCS5 (64QAM 0.67 Dual)	176.18	88.09	18.77	99.9995	0.0000	18.77	99.9995	0.0000
MCS4 (16QAM 0.75 Dual)	135.52	67.76	22.77	99.9995	0.0000	22.77	99.9995	0.0000
MCS3 (16QAM 0.5 Dual)	90.36	45.18	24.77	99.9995	0.0000	25.77	99.9995	0.0000
MCS2 (QPSK 0.75 Dual)	67.76	33.88	28.77	99.9995	0.0000	29.77	99.9995	0.0000
MCS1 (QPSK 0.5 Dual)	45.18	22.59	29.77	99.9995	0.0000	30.77	99.9995	0.0000
MCS9 (256QAM 0.83 Sngl)	149.08	74.54	8.77	0.0005	0.0005	10.77	0.0005	0.0005
MCS8 (256QAM 0.75 Sngl)	135.52	67.76	11.77	0.0005	0.0000	12.77	0.0005	0.0000
MCS7 (64QAM 0.83 Sngl)	112.94	56.47	14.77	0.0005	0.0000	17.77	0.0005	0.0000
MCS6 (64QAM 0.75 Sngl)	99.38	49.69	17.77	0.0005	0.0000	19.77	0.0005	0.0000
MCS5 (64QAM 0.67 Sngl)	90.36	45.18	20.77	0.0005	0.0000	21.77	0.0005	0.0000
MCS4 (16QAM 0.75 Sngl)	67.76	33.88	24.77	0.0005	0.0000	25.77	0.0005	0.0000
MCS3 (16QAM 0.5 Sngl)	45.18	22.59	26.77	0.0005	0.0000	27.77	0.0005	0.0000
MCS2 (QPSK 0.75 Sngl)	31.62	15.81	28.77	0.0005	0.0000	29.77	0.0005	0.0000
MCS1 (QPSK 0.5 Sngl)	22.58	11.29	31.77	100.0000	0.0000	31.77	100.0000	0.0000

* Multipath availability calculated using ITU-R P.530-17

4. Bauko to Mt. Data

Summary	
Link Name	Bauko to Mt. Data
Customer Company Name	DICT CAR
Profile Type	Non Line-of-Sight
Equipment Type	PTP670
Fresnel Zone Clearance	-246.4 feet
Link Distance	14.198 kilometers
Free Space Path Loss	130.74 dB
Excess Path Loss	51.68 dB
User IP Throughput Expectation Aggregate	Aggregate 0.00 Mbps assuming PTP-670 Series running the 670-03-60 software
RF Frequency Band	5.8 GHz (5725 to 5850 MHz)
RF Channel Bandwidth	45 MHz

Path Profile



Link Configuration	
Precise Network Timing	Disabled
Bandwidth	45 MHz
E1/T1	None
Optimization	IP
Sync	Disabled
Symmetry	Adaptive
Dual Payload	Enabled
Highest Mod Mode	256QAM 0.81
Lowest Ethernet Mode	BPSK 0.63 Sngl
Master	Bauko

Link Configuration (continued)	
Slave	Mt. Data

Bill of Materials		
Part Number	Qty	Description
01010419001	4	Coaxial Cable Grounding Kits for 1/4" and 3/8" Cable
AR-E4PT6XX-WW	2	PTP 670 All Risks Advance Replacement, 4 additional years (per END)
C000065L007	2	LPU and Grounding Kit (1 kit per ODU)
C050067H010	2	PTP 670 Integrated 23dBi END with AC+DC Enhanced Supply (ROW - U.S. Line Cord). Kit includes ODU, power supply, mounting bracket and US line cord
WB3176	1	328 ft (100 m) Reel Outdoor Copper Clad CAT5E (Recommended for PTP)

Physical Installation Notes for Bauko	
Link Name	Bauko to Mt. Data
Latitude	16.98211N
Longitude	120.85820E
Site Elevation	4623 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	4.2° (uptilt)
Bearing to Mt. Data	180.49° from True North 183.70° from Magnetic North
Magnetic Declination	3.20° W ±0.28° changing by 0.10° W per year

Physical Installation Notes for Mt. Data	
Link Name	Bauko to Mt. Data
Latitude	16.85382N
Longitude	120.85705E
Site Elevation	7739 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	7.4° (uptilt)
Bearing to Bauko	0.49° from True North 3.67° from Magnetic North

Physical Installation Notes for Mt. Data (continued)	
Magnetic Declination	3.17° W ±0.28° changing by 0.10° W per year

Radio Commissioning Notes for Bauko (Primary)	
Link Name	Bauko to Mt. Data
Site Name	Bauko
Latitude	16.98211N
Longitude	120.85820E
Altitude	4623 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Master
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Link Symmetry	Adaptive
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-110 dBm ± 21 dB
Predicted Link Loss	182.52 dB ± 20.50 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Mt. Data (Primary)	
Link Name	Bauko to Mt. Data
Site Name	Mt. Data
Latitude	16.85382N
Longitude	120.85705E
Altitude	7739 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Slave
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl

Radio Commissioning Notes for Mt. Data (Primary) (continued)	
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-110 dBm ± 21 dB
Predicted Link Loss	182.52 dB ± 20.50 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Country	Argentina (Private)
Band	5.8 GHz
Region Code	44
Max EIRP	50.0 dBm
Output Power	27.0 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 disarm check that the mean value for the link loss is as predicted (182.52 dB ± 20.50 dB). Also check that the received power is not greater than -51dBm.

Bauko Performance *	
Mean IP Throughput Predicted	0.00 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	0.0000% (unavailable for 365.0 days/year)

Mt. Data Performance *	
Mean IP Throughput Predicted	0.00 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps

Mt. Data Performance * (continued)	
Minimum IP Throughput Availability Predicted	0.0000% (unavailable for 365.0 days/year)

* Multipath availability calculated using ITU-R P.530-17

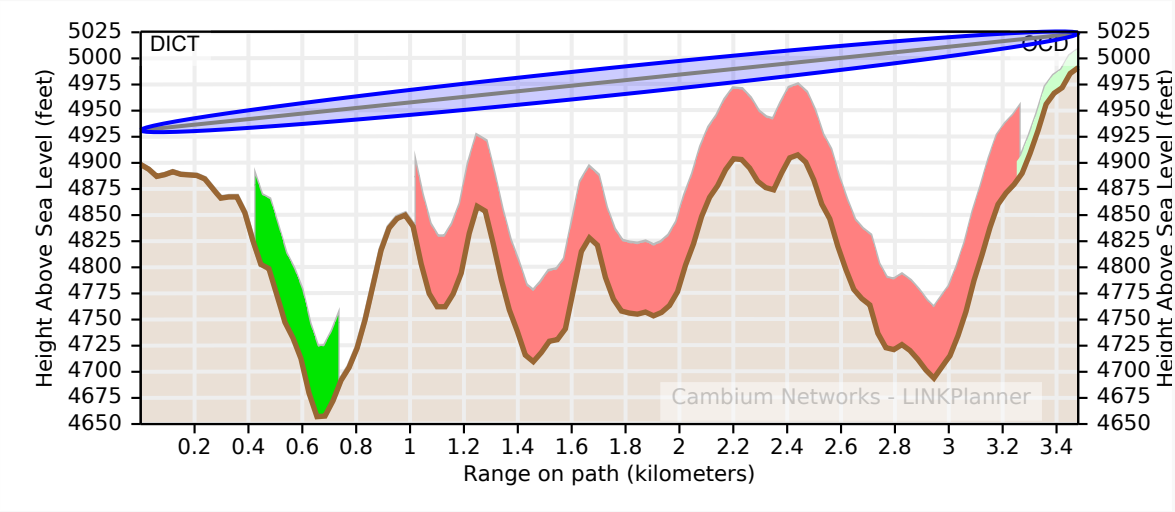
Mode	Max Aggregate User IP Throughput (Mbps)	Bauko				Mt. Data			
		Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
256QAM 0.81 Dual	444.13	222.06	-53.25	0.0000	0.0000	222.06	-53.25	0.0000	0.0000
64QAM 0.92 Dual	374.19	187.09	-48.52	0.0000	0.0000	187.09	-48.52	0.0000	0.0000
64QAM 0.75 Dual	305.78	152.89	-44.39	0.0000	0.0000	152.89	-44.39	0.0000	0.0000
16QAM 0.87 Dual	237.89	118.94	-40.27	0.0000	0.0000	118.94	-40.27	0.0000	0.0000
16QAM 0.63 Dual	171.01	85.51	-36.64	0.0000	0.0000	85.51	-36.64	0.0000	0.0000
256QAM 0.81 Sngl	222.06	111.03	-49.60	0.0000	0.0000	111.03	-49.60	0.0000	0.0000
64QAM 0.92 Sngl	187.09	93.55	-45.22	0.0000	0.0000	93.55	-45.22	0.0000	0.0000
64QAM 0.75 Sngl	152.89	76.45	-41.27	0.0000	0.0000	76.45	-41.27	0.0000	0.0000
16QAM 0.87 Sngl	118.94	59.47	-37.20	0.0000	0.0000	59.47	-37.20	0.0000	0.0000
16QAM 0.63 Sngl	85.50	42.75	-32.69	0.0000	0.0000	42.75	-32.69	0.0000	0.0000
QPSK 0.87 Sngl	59.47	29.73	-29.37	0.0000	0.0000	29.73	-29.37	0.0000	0.0000
QPSK 0.63 Sngl	42.75	21.38	-25.35	0.0000	0.0000	21.38	-25.35	0.0000	0.0000
BPSK 0.63 Sngl	21.37	10.69	-21.24	0.0000	0.0000	10.69	-21.24	0.0000	0.0000

* Multipath availability calculated using ITU-R P.530-17

5. DICT to OCD

Summary	
Link Name	DICT to OCD
Customer Company Name	DICT CAR
Profile Type	Line-of-Sight
Equipment Type	PTP670
Fresnel Zone Clearance	7.6 feet
Link Distance	3.480 kilometers
Free Space Path Loss	118.53 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate	Aggregate 450.68 Mbps assuming PTP-670 Series running the 670-03-60 software
RF Frequency Band	5.8 GHz (5725 to 5850 MHz)
RF Channel Bandwidth	45 MHz

Path Profile



Link Configuration	
Precise Network Timing	Disabled
Bandwidth	45 MHz
E1/T1	None
Optimization	IP
Sync	Disabled
Symmetry	Adaptive
Dual Payload	Enabled
Highest Mod Mode	256QAM 0.81
Lowest Ethernet Mode	BPSK 0.63 Sngl
Master	DICT

Link Configuration (continued)	
Slave	OCD

Bill of Materials		
Part Number	Qty	Description
01010419001	4	Coaxial Cable Grounding Kits for 1/4" and 3/8" Cable
AR-E4PT6XX-WW	2	PTP 670 All Risks Advance Replacement, 4 additional years (per END)
C000065L007	2	LPU and Grounding Kit (1 kit per ODU)
C050067H010	2	PTP 670 Integrated 23dBi END with AC+DC Enhanced Supply (ROW - U.S. Line Cord). Kit includes ODU, power supply, mounting bracket and US line cord
WB3176	1	328 ft (100 m) Reel Outdoor Copper Clad CAT5E (Recommended for PTP)

Physical Installation Notes for DICT	
Link Name	DICT to OCD
Latitude	16.41728N
Longitude	120.61363E
Site Elevation	4931 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	0.5° (uptilt)
Bearing to OCD	266.41° from True North 269.48° from Magnetic North
Magnetic Declination	3.07° W ±0.28° changing by 0.10° W per year

Physical Installation Notes for OCD	
Link Name	DICT to OCD
Latitude	16.41531N
Longitude	120.58111E
Site Elevation	5024 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	-0.5° (downtilt)
Bearing to DICT	86.40° from True North 89.47° from Magnetic North

Physical Installation Notes for OCD (continued)	
Magnetic Declination	3.06° W ±0.28° changing by 0.10° W per year

Radio Commissioning Notes for DICT (Primary)	
Link Name	DICT to OCD
Site Name	DICT
Latitude	16.41728N
Longitude	120.61363E
Altitude	4931 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Master
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Link Symmetry	Adaptive
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-46 dBm ± 5 dB
Predicted Link Loss	118.56 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for OCD (Primary)	
Link Name	DICT to OCD
Site Name	OCD
Latitude	16.41531N
Longitude	120.58111E
Altitude	5024 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Slave
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl

Radio Commissioning Notes for OCD (Primary) (continued)	
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-46 dBm ± 5 dB
Predicted Link Loss	118.56 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Country	Argentina (Private)
Band	5.8 GHz
Region Code	44
Max EIRP	50.0 dBm
Output Power	27.0 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 disarm check that the mean value for the link loss is as predicted (118.56 dB ± 5.00 dB). Also check that the received power is not greater than -35dBm.

DICT Performance *	
Mean IP Throughput Predicted	225.34 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

OCD Performance *	
Mean IP Throughput Predicted	225.34 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps

OCD Performance * (continued)	
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

* Multipath availability calculated using ITU-R P.530-17

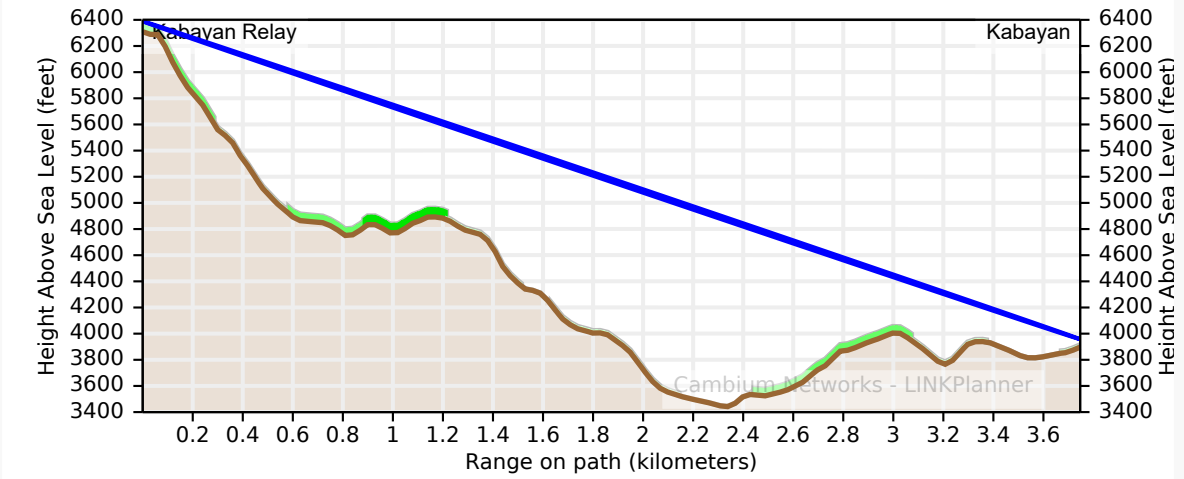
Mode	Max Aggregate User IP Throughput (Mbps)	DICT				OCD			
		Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
256QAM 0.81 Dual	450.69	225.34	10.71	99.9995	99.9995	225.34	10.71	99.9995	99.9995
64QAM 0.92 Dual	379.71	189.86	15.44	99.9995	0.0001	189.86	15.44	99.9995	0.0001
64QAM 0.75 Dual	310.30	155.15	19.57	99.9995	0.0000	155.15	19.57	99.9995	0.0000
16QAM 0.87 Dual	241.40	120.70	23.69	99.9995	0.0000	120.70	23.69	99.9995	0.0000
16QAM 0.63 Dual	173.54	86.77	27.32	99.9995	0.0000	86.77	27.32	99.9995	0.0000
256QAM 0.81 Sngl	225.34	112.67	14.37	0.0005	0.0005	112.67	14.37	0.0005	0.0005
64QAM 0.92 Sngl	189.86	94.93	18.74	0.0005	0.0000	94.93	18.74	0.0005	0.0000
64QAM 0.75 Sngl	155.15	77.57	22.69	0.0005	0.0000	77.57	22.69	0.0005	0.0000
16QAM 0.87 Sngl	120.70	60.35	26.76	0.0005	0.0000	60.35	26.76	0.0005	0.0000
16QAM 0.63 Sngl	86.77	43.38	31.27	100.0000	0.0000	43.38	31.27	100.0000	0.0000
QPSK 0.87 Sngl	60.35	30.17	34.59	100.0000	0.0000	30.17	34.59	100.0000	0.0000
QPSK 0.63 Sngl	43.38	21.69	38.61	100.0000	0.0000	21.69	38.61	100.0000	0.0000
BPSK 0.63 Sngl	21.69	10.84	42.72	100.0000	0.0000	10.84	42.72	100.0000	0.0000

* Multipath availability calculated using ITU-R P.530-17

6. Kabayan Relay to Kabayan

Summary	
Link Name	Kabayan Relay to Kabayan
Customer Company Name	DICT CAR
Profile Type	Line-of-Sight
Equipment Type	PTP550
Fresnel Zone Clearance	10.8 feet
Link Distance	3.747 kilometers
Free Space Path Loss	119.17 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate Paths	Aggregate 591.79 Mbps assuming PTP-550 Series running the 4.7 software
RF Frequency Band (Link A)	5.8 GHz (5725 to 5850 MHz)
RF Frequency Band (Link B)	5.8 GHz (5725 to 5850 MHz)
RF Channel Bandwidth (Link A)	40 MHz
RF Channel Bandwidth (Link B)	40 MHz

Path Profile



Link Configuration	
Link Type	2+0
Bandwidth (Link A)	40 MHz
Bandwidth (Link B)	40 MHz
DL/UL Ratio	50/50
Frame Period	5 ms
Maximum Mod Mode (Link A)	MCS9 (256QAM 0.83 Dual)
Maximum Mod Mode (Link B)	MCS9 (256QAM 0.83 Dual)
Master	Kabayan Relay

Link Configuration (continued)	
Slave	Kabayan

Bill of Materials		
Part Number	Qty	Description
C000000L033	4	Gigabit Surge Suppressor (56V), 10/100/1000 BaseT
C050055H010	2	PTP 550 Integrated 5 GHz (ROW) with US Line Cord. Kit includes radio with antenna, power supply, line cord and mounting bracket
EW-E2PT550-WW	2	PTP 550 Extended Warranty, 2 Additional years (per END)

Physical Installation Notes for Kabayan Relay	
Link Name	Kabayan Relay to Kabayan
Latitude	16.63352N
Longitude	120.80447E
Site Elevation	6389 feet AMSL
Equipment Type	PTP550
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	80.0 feet AGL
Antenna Tilt Angle	-11.2° (downtilt)
Bearing to Kabayan	107.01° from True North 110.14° from Magnetic North
Magnetic Declination	3.13° W ±0.28° changing by 0.10° W per year

Physical Installation Notes for Kabayan	
Link Name	Kabayan Relay to Kabayan
Latitude	16.62361N
Longitude	120.83805E
Site Elevation	3957 feet AMSL
Equipment Type	PTP550
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	60.0 feet AGL
Antenna Tilt Angle	11.2° (uptilt)
Bearing to Kabayan Relay	287.02° from True North 290.15° from Magnetic North
Magnetic Declination	3.13° W ±0.28° changing by 0.10° W per year

Radio Commissioning Notes for Kabayan Relay	
Radio Mode	Master
Driver Mode	TDD PTP
Country	Argentina
Channel Bonding	Enabled
Max Range	4 kilometers
Range Unit	kilometers
Link Name	Kabayan Relay
Antenna Gain	23 dBi
Slave Module Target Receive Level	-50 dBm
Downlink/Uplink Ratio	50/50
Channel Bandwidth Radio 1 (Link A)	40 MHz
Frequency Carrier Radio 1 (Link A)	Unknown
Transmitter Power Radio 1 (Link A)	23.0 dBm
Downlink Max Rate Radio 1 (Link A)	MCS9 (256QAM 0.83 Dual)
Channel Bandwidth Radio 2 (Link B)	40 MHz
Frequency Carrier Radio 2 (Link B)	Unknown
Transmitter Power Radio 2 (Link B)	23.0 dBm
Downlink Max Rate Radio 2 (Link B)	MCS9 (256QAM 0.83 Dual)
Frame Size	5 ms
Synchronization Source	Internal
Device Latitude (degrees)	16.63352N
Device Longitude (degrees)	120.80447E
Device Height (meters)	1947.4 m (6389.1 ft) AMSL
Predicted Receive Power	-50 dBm ± 5 dB
Predicted Link Loss	119.20 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Kabayan	
Radio Mode	Slave
Driver Mode	TDD
Country Code	Argentina
Channel Bonding	Enabled
Max Tx Power	Manual
Antenna Gain	23 dBi
Transmitter Power Radio 1 (Link A)	23.0 dBm
Uplink Max Rate Radio 1 (Link A)	MCS9 (256QAM 0.83 Dual)
Transmitter Power Radio 2 (Link B)	23.0 dBm
Uplink Max Rate Radio 2 (Link B)	MCS9 (256QAM 0.83 Dual)
Device Name	Kabayan
Device Latitude (degrees)	16.62361N
Device Longitude (degrees)	120.83805E
Device Height (meters)	1206.1 m (3957.2 ft) AMSL
Predicted Receive Power	-50 dBm ± 5 dB

Radio Commissioning Notes for Kabayan (continued)	
Predicted Link Loss	119.20 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Regulation	Argentina
Band (Link A)	5.8 GHz
Band (Link B)	5.8 GHz
Max EIRP (Link A)	46.0 dBm
Max EIRP (Link B)	46.0 dBm
Output Power (Link A)	23.0 dBm
Output Power (Link B)	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 disarm check that the mean value for the link loss is as predicted (119.20 dB ± 5.00 dB). Also check that the received power is not greater than -30dBm.

Kabayan Relay Performance (Link A) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	146.82 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Kabayan Performance (Link A) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	149.08 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Kabayan Relay Performance (Link B) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	146.82 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Kabayan Performance (Link B) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	149.08 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

* Multipath availability calculated using ITU-R P.530-17

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Kabayan Relay - Link A			Kabayan - Link A		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS9 (256QAM 0.83 Dual)	295.90	149.08	6.80	99.9979	99.9979	7.80	99.9989	99.9989
MCS8 (256QAM 0.75 Dual)	266.54	133.27	9.80	99.9994	0.0015	10.80	99.9995	0.0006
MCS7 (64QAM 0.83 Dual)	221.36	110.68	13.80	99.9995	0.0001	14.80	99.9995	0.0001
MCS6 (64QAM 0.75 Dual)	198.78	99.39	16.80	99.9995	0.0000	17.80	99.9995	0.0000
MCS5 (64QAM 0.67 Dual)	176.18	88.09	19.80	99.9995	0.0000	19.80	99.9995	0.0000
MCS4 (16QAM 0.75 Dual)	135.52	67.76	23.80	99.9995	0.0000	23.80	99.9995	0.0000
MCS3 (16QAM 0.5 Dual)	90.36	45.18	25.80	99.9995	0.0000	26.80	99.9995	0.0000
MCS2 (QPSK 0.75 Dual)	67.76	33.88	29.80	99.9995	0.0000	30.80	99.9995	0.0000

(continued)

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Kabayan Relay - Link A			Kabayan - Link A		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS1 (QPSK 0.5 Dual)	45.18	22.59	30.80	99.9995	0.0000	31.80	99.9995	0.0000
MCS9 (256QAM 0.83 Sngl)	149.08	74.54	9.80	0.0005	0.0005	11.80	0.0005	0.0005
MCS8 (256QAM 0.75 Sngl)	135.52	67.76	12.80	0.0005	0.0000	13.80	0.0005	0.0000
MCS7 (64QAM 0.83 Sngl)	112.94	56.47	15.80	0.0005	0.0000	18.80	0.0005	0.0000
MCS6 (64QAM 0.75 Sngl)	99.38	49.69	18.80	0.0005	0.0000	20.80	0.0005	0.0000
MCS5 (64QAM 0.67 Sngl)	90.36	45.18	21.80	0.0005	0.0000	22.80	0.0005	0.0000
MCS4 (16QAM 0.75 Sngl)	67.76	33.88	25.80	0.0005	0.0000	26.80	0.0005	0.0000
MCS3 (16QAM 0.5 Sngl)	45.18	22.59	27.80	0.0005	0.0000	28.80	0.0005	0.0000
MCS2 (QPSK 0.75 Sngl)	31.62	15.81	29.80	0.0005	0.0000	30.80	0.0005	0.0000
MCS1 (QPSK 0.5 Sngl)	22.58	11.29	32.80	100.0000	0.0000	32.80	100.0000	0.0000

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Kabayan Relay - Link B			Kabayan - Link B		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS9 (256QAM 0.83 Dual)	295.90	149.08	6.80	99.9979	99.9979	7.80	99.9989	99.9989
MCS8 (256QAM 0.75 Dual)	266.54	133.27	9.80	99.9994	0.0015	10.80	99.9995	0.0006
MCS7 (64QAM 0.83 Dual)	221.36	110.68	13.80	99.9995	0.0001	14.80	99.9995	0.0001

(continued)

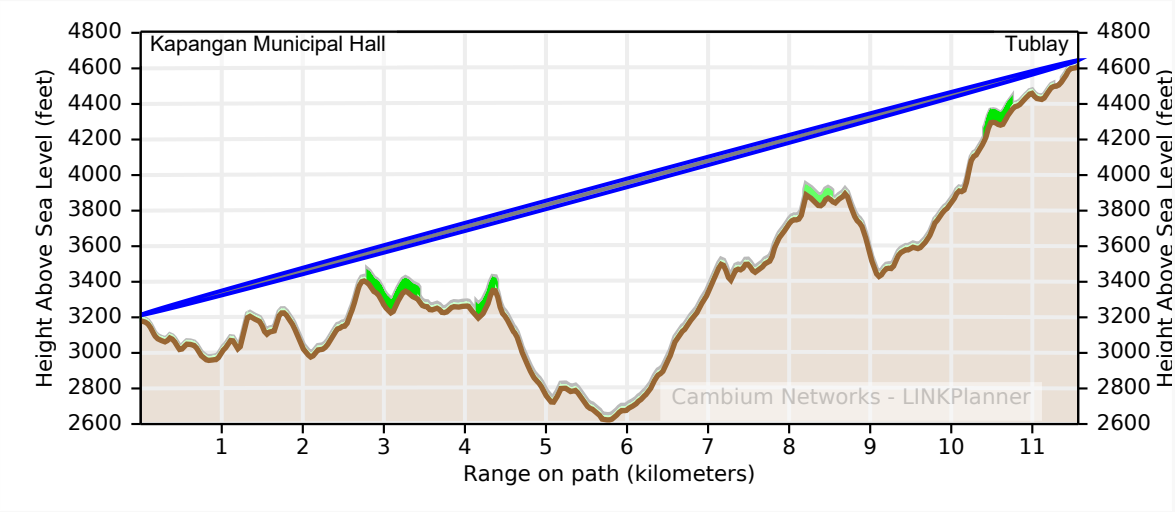
Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Kabayan Relay - Link B			Kabayan - Link B		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS6 (64QAM 0.75 Dual)	198.78	99.39	16.80	99.9995	0.0000	17.80	99.9995	0.0000
MCS5 (64QAM 0.67 Dual)	176.18	88.09	19.80	99.9995	0.0000	19.80	99.9995	0.0000
MCS4 (16QAM 0.75 Dual)	135.52	67.76	23.80	99.9995	0.0000	23.80	99.9995	0.0000
MCS3 (16QAM 0.5 Dual)	90.36	45.18	25.80	99.9995	0.0000	26.80	99.9995	0.0000
MCS2 (QPSK 0.75 Dual)	67.76	33.88	29.80	99.9995	0.0000	30.80	99.9995	0.0000
MCS1 (QPSK 0.5 Dual)	45.18	22.59	30.80	99.9995	0.0000	31.80	99.9995	0.0000
MCS9 (256QAM 0.83 Sngl)	149.08	74.54	9.80	0.0005	0.0005	11.80	0.0005	0.0005
MCS8 (256QAM 0.75 Sngl)	135.52	67.76	12.80	0.0005	0.0000	13.80	0.0005	0.0000
MCS7 (64QAM 0.83 Sngl)	112.94	56.47	15.80	0.0005	0.0000	18.80	0.0005	0.0000
MCS6 (64QAM 0.75 Sngl)	99.38	49.69	18.80	0.0005	0.0000	20.80	0.0005	0.0000
MCS5 (64QAM 0.67 Sngl)	90.36	45.18	21.80	0.0005	0.0000	22.80	0.0005	0.0000
MCS4 (16QAM 0.75 Sngl)	67.76	33.88	25.80	0.0005	0.0000	26.80	0.0005	0.0000
MCS3 (16QAM 0.5 Sngl)	45.18	22.59	27.80	0.0005	0.0000	28.80	0.0005	0.0000
MCS2 (QPSK 0.75 Sngl)	31.62	15.81	29.80	0.0005	0.0000	30.80	0.0005	0.0000
MCS1 (QPSK 0.5 Sngl)	22.58	11.29	32.80	100.0000	0.0000	32.80	100.0000	0.0000

* Multipath availability calculated using ITU-R P.530-17

7. Kapangan Municipal Hall to Tublay

Summary	
Link Name	Kapangan Municipal Hall to Tublay
Customer Company Name	DICT CAR
Profile Type	Line-of-Sight
Equipment Type	PTP670
Fresnel Zone Clearance	14.2 feet
Link Distance	11.566 kilometers
Free Space Path Loss	128.96 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate	Aggregate 413.94 Mbps assuming PTP-670 Series running the 670-03-60 software
RF Frequency Band	5.8 GHz (5725 to 5850 MHz)
RF Channel Bandwidth	45 MHz

Path Profile



Link Configuration	
Precise Network Timing	Disabled
Bandwidth	45 MHz
E1/T1	None
Optimization	IP
Sync	Disabled
Symmetry	Adaptive
Dual Payload	Enabled
Highest Mod Mode	256QAM 0.81
Lowest Ethernet Mode	BPSK 0.63 Sngl
Master	Kapangan Municipal Hall

Link Configuration (continued)	
Slave	Tublay

Bill of Materials		
Part Number	Qty	Description
01010419001	4	Coaxial Cable Grounding Kits for 1/4" and 3/8" Cable
AR-E4PT6XX-WW	2	PTP 670 All Risks Advance Replacement, 4 additional years (per END)
C000065L007	2	LPU and Grounding Kit (1 kit per ODU)
C050067H010	2	PTP 670 Integrated 23dBi END with AC+DC Enhanced Supply (ROW - U.S. Line Cord). Kit includes ODU, power supply, mounting bracket and US line cord
WB3176	1	328 ft (100 m) Reel Outdoor Copper Clad CAT5E (Recommended for PTP)

Physical Installation Notes for Kapangan Municipal Hall	
Link Name	Kapangan Municipal Hall to Tublay
Latitude	16.57591N
Longitude	120.60550E
Site Elevation	3213 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	2.1° (uptilt)
Bearing to Tublay	165.47° from True North 168.57° from Magnetic North
Magnetic Declination	3.10° W ±0.28° changing by 0.10° W per year

Physical Installation Notes for Tublay	
Link Name	Kapangan Municipal Hall to Tublay
Latitude	16.47474N
Longitude	120.63268E
Site Elevation	4645 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	-2.2° (downtilt)
Bearing to Kapangan Municipal Hall	345.48° from True North 348.55° from Magnetic North

Physical Installation Notes for Tublay (continued)	
Magnetic Declination	3.08° W ±0.28° changing by 0.10° W per year

Radio Commissioning Notes for Kapangan Municipal Hall (Primary)	
Link Name	Kapangan Municipal Hall to Tublay
Site Name	Kapangan Municipal Hall
Latitude	16.57591N
Longitude	120.60550E
Altitude	3213 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Master
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Link Symmetry	Adaptive
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-56 dBm ± 5 dB
Predicted Link Loss	129.05 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Tublay (Primary)	
Link Name	Kapangan Municipal Hall to Tublay
Site Name	Tublay
Latitude	16.47474N
Longitude	120.63268E
Altitude	4645 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Slave
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl

Radio Commissioning Notes for Tublay (Primary) (continued)	
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-56 dBm ± 5 dB
Predicted Link Loss	129.05 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Country	Argentina (Private)
Band	5.8 GHz
Region Code	44
Max EIRP	50.0 dBm
Output Power	27.0 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 disarm check that the mean value for the link loss is as predicted (129.05 dB ± 5.00 dB). Also check that the received power is not greater than -35dBm.

Kapangan Municipal Hall Performance *	
Mean IP Throughput Predicted	206.97 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Tublay Performance *	
Mean IP Throughput Predicted	206.97 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps

Tublay Performance * (continued)	
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

* Multipath availability calculated using ITU-R P.530-17

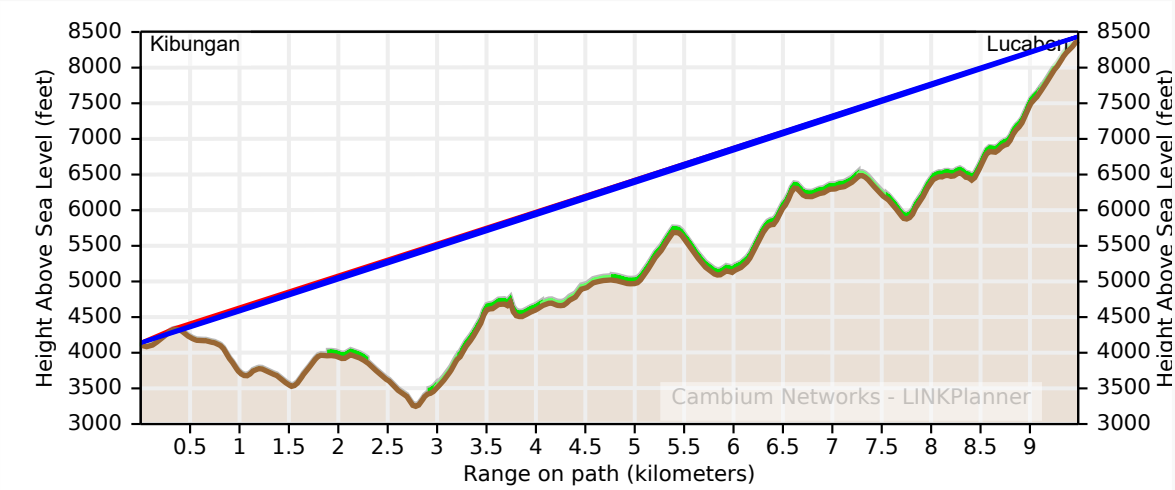
Mode	Max Aggregate User IP Throughput (Mbps)	Kapangan Municipal Hall				Tublay			
		Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
256QAM 0.81 Dual	446.12	223.06	0.21	54.2203	54.2203	223.06	0.21	54.2203	54.2203
64QAM 0.92 Dual	375.87	187.94	4.94	99.9677	45.7474	187.94	4.94	99.9677	45.7474
64QAM 0.75 Dual	307.16	153.58	9.07	99.9993	0.0316	153.58	9.07	99.9993	0.0316
16QAM 0.87 Dual	238.96	119.48	13.19	99.9995	0.0002	119.48	13.19	99.9995	0.0002
16QAM 0.63 Dual	171.78	85.89	16.82	99.9995	0.0000	85.89	16.82	99.9995	0.0000
256QAM 0.81 Sngl	223.06	111.53	3.87	0.0005	0.0005	111.53	3.87	0.0005	0.0005
64QAM 0.92 Sngl	187.93	93.97	8.24	0.0005	0.0000	93.97	8.24	0.0005	0.0000
64QAM 0.75 Sngl	153.58	76.79	12.19	0.0005	0.0000	76.79	12.19	0.0005	0.0000
16QAM 0.87 Sngl	119.48	59.74	16.26	0.0005	0.0000	59.74	16.26	0.0005	0.0000
16QAM 0.63 Sngl	85.89	42.94	20.77	100.0000	0.0000	42.94	20.77	100.0000	0.0000
QPSK 0.87 Sngl	59.74	29.87	24.09	100.0000	0.0000	29.87	24.09	100.0000	0.0000
QPSK 0.63 Sngl	42.94	21.47	28.11	100.0000	0.0000	21.47	28.11	100.0000	0.0000
BPSK 0.63 Sngl	21.47	10.73	32.22	100.0000	0.0000	10.73	32.22	100.0000	0.0000

* Multipath availability calculated using ITU-R P.530-17

8. Kibungan to Lucaben

Summary	
Link Name	Kibungan to Lucaben
Customer Company Name	DICT CAR
Profile Type	Non Line-of-Sight
Equipment Type	PTP670
Fresnel Zone Clearance	-56.1 feet
Link Distance	9.488 kilometers
Free Space Path Loss	127.24 dB
Excess Path Loss	37.07 dB
User IP Throughput Expectation Aggregate	Aggregate 1.10 Mbps assuming PTP-670 Series running the 670-03-60 software
RF Frequency Band	5.8 GHz (5725 to 5850 MHz)
RF Channel Bandwidth	45 MHz

Path Profile



Link Configuration	
Precise Network Timing	Disabled
Bandwidth	45 MHz
E1/T1	None
Optimization	IP
Sync	Disabled
Symmetry	Adaptive
Dual Payload	Enabled
Highest Mod Mode	256QAM 0.81
Lowest Ethernet Mode	BPSK 0.63 Sngl
Master	Kibungan

Link Configuration (continued)	
Slave	Lucaben

Bill of Materials		
Part Number	Qty	Description
01010419001	4	Coaxial Cable Grounding Kits for 1/4" and 3/8" Cable
AR-E4PT6XX-WW	2	PTP 670 All Risks Advance Replacement, 4 additional years (per END)
C000065L007	2	LPU and Grounding Kit (1 kit per ODU)
C050067H010	2	PTP 670 Integrated 23dBi END with AC+DC Enhanced Supply (ROW - U.S. Line Cord). Kit includes ODU, power supply, mounting bracket and US line cord
WB3176	1	328 ft (100 m) Reel Outdoor Copper Clad CAT5E (Recommended for PTP)

Physical Installation Notes for Kibungan	
Link Name	Kibungan to Lucaben
Latitude	16.69365N
Longitude	120.65299E
Site Elevation	4139 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	10.3° (uptilt)
Bearing to Lucaben	73.33° from True North 76.45° from Magnetic North
Magnetic Declination	3.13° W ±0.28° changing by 0.10° W per year

Physical Installation Notes for Lucaben	
Link Name	Kibungan to Lucaben
Latitude	16.71823N
Longitude	120.73822E
Site Elevation	8437 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	60.0 feet AGL
Antenna Tilt Angle	-7.8° (downtilt)
Bearing to Kibungan	253.35° from True North 256.49° from Magnetic North

Physical Installation Notes for Lucaben (continued)	
Magnetic Declination	3.14° W ±0.28° changing by 0.10° W per year

Radio Commissioning Notes for Kibungan (Primary)	
Link Name	Kibungan to Lucaben
Site Name	Kibungan
Latitude	16.69365N
Longitude	120.65299E
Altitude	4139 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Master
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Link Symmetry	Adaptive
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-91 dBm ± 16 dB
Predicted Link Loss	164.38 dB ± 16.12 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Lucaben (Primary)	
Link Name	Kibungan to Lucaben
Site Name	Lucaben
Latitude	16.71823N
Longitude	120.73822E
Altitude	8437 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Slave
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl

Radio Commissioning Notes for Lucaben (Primary) (continued)	
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-91 dBm ± 16 dB
Predicted Link Loss	164.38 dB ± 16.12 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Country	Argentina (Private)
Band	5.8 GHz
Region Code	44
Max EIRP	50.0 dBm
Output Power	27.0 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 disarm check that the mean value for the link loss is as predicted (164.38 dB ± 16.12 dB). Also check that the received power is not greater than -46dBm.

Kibungan Performance *	
Mean IP Throughput Predicted	0.55 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	5.1315% (unavailable for 346.3 days/year)

Lucaben Performance *	
Mean IP Throughput Predicted	0.55 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps

Lucaben Performance * (continued)	
Minimum IP Throughput Availability Predicted	5.1315% (unavailable for 346.3 days/year)

* Multipath availability calculated using ITU-R P.530-17

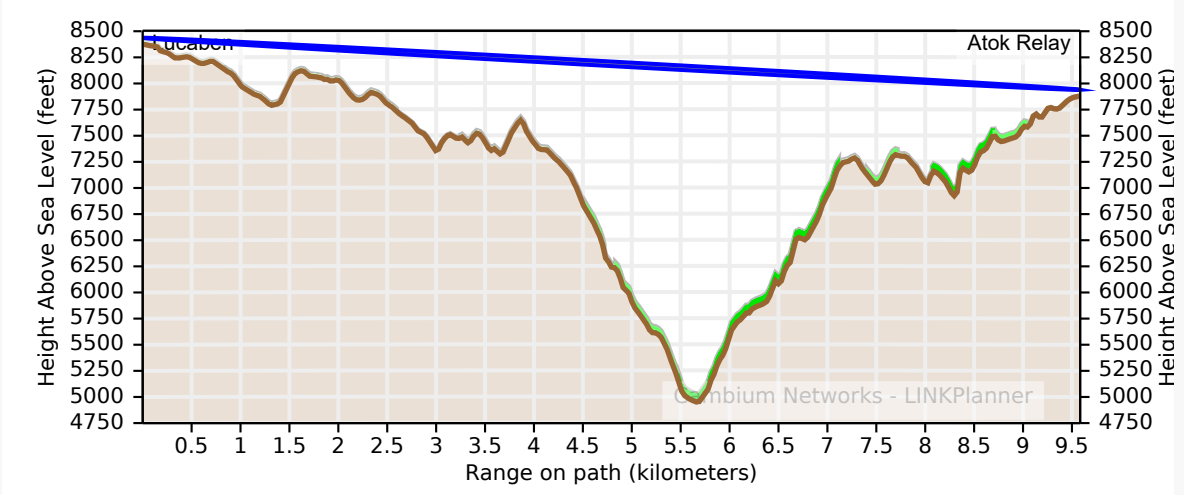
Mode	Max Aggregate User IP Throughput (Mbps)	Kibungan				Lucaben			
		Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
256QAM 0.81 Dual	447.13	223.56	-35.11	0.0000	0.0000	223.56	-35.11	0.0000	0.0000
64QAM 0.92 Dual	376.72	188.36	-30.38	0.0000	0.0000	188.36	-30.38	0.0000	0.0000
64QAM 0.75 Dual	307.85	153.92	-26.25	0.0000	0.0000	153.92	-26.25	0.0000	0.0000
16QAM 0.87 Dual	239.50	119.75	-22.13	0.0000	0.0000	119.75	-22.13	0.0000	0.0000
16QAM 0.63 Dual	172.17	86.08	-18.50	0.0000	0.0000	86.08	-18.50	0.0000	0.0000
256QAM 0.81 Sngl	223.56	111.78	-31.45	0.0000	0.0000	111.78	-31.45	0.0000	0.0000
64QAM 0.92 Sngl	188.36	94.18	-27.08	0.0000	0.0000	94.18	-27.08	0.0000	0.0000
64QAM 0.75 Sngl	153.92	76.96	-23.13	0.0000	0.0000	76.96	-23.13	0.0000	0.0000
16QAM 0.87 Sngl	119.75	59.87	-19.06	0.0000	0.0000	59.87	-19.06	0.0000	0.0000
16QAM 0.63 Sngl	86.08	43.04	-14.55	0.0000	0.0000	43.04	-14.55	0.0000	0.0000
QPSK 0.87 Sngl	59.87	29.94	-11.23	0.0000	0.0000	29.94	-11.23	0.0000	0.0000
QPSK 0.63 Sngl	43.04	21.52	-7.21	0.0008	0.0008	21.52	-7.21	0.0008	0.0008
BPSK 0.63 Sngl	21.52	10.76	-3.10	5.1315	5.1306	10.76	-3.10	5.1315	5.1306

* Multipath availability calculated using ITU-R P.530-17

9. Lucaben to Atok Relay

Summary	
Link Name	Lucaben to Atok Relay
Customer Company Name	DICT CAR
Profile Type	Line-of-Sight
Equipment Type	PTP550
Fresnel Zone Clearance	43.3 feet
Link Distance	9.584 kilometers
Free Space Path Loss	127.33 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate Paths	Aggregate 538.89 Mbps assuming PTP-550 Series running the 4.7 software
RF Frequency Band (Link A)	5.8 GHz (5725 to 5850 MHz)
RF Frequency Band (Link B)	5.8 GHz (5725 to 5850 MHz)
RF Channel Bandwidth (Link A)	40 MHz
RF Channel Bandwidth (Link B)	40 MHz

Path Profile



Link Configuration	
Link Type	2+0
Bandwidth (Link A)	40 MHz
Bandwidth (Link B)	40 MHz
DL/UL Ratio	50/50
Frame Period	5 ms
Maximum Mod Mode (Link A)	MCS9 (256QAM 0.83 Dual)
Maximum Mod Mode (Link B)	MCS9 (256QAM 0.83 Dual)
Master	Lucaben

Link Configuration (continued)	
Slave	Atok Relay

Bill of Materials		
Part Number	Qty	Description
C000000L033	4	Gigabit Surge Suppressor (56V), 10/100/1000 BaseT
C050055H010	2	PTP 550 Integrated 5 GHz (ROW) with US Line Cord. Kit includes radio with antenna, power supply, line cord and mounting bracket
EW-E2PT550-WW	2	PTP 550 Extended Warranty, 2 Additional years (per END)

Physical Installation Notes for Lucaben	
Link Name	Lucaben to Atok Relay
Latitude	16.71823N
Longitude	120.73822E
Site Elevation	8437 feet AMSL
Equipment Type	PTP550
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	60.0 feet AGL
Antenna Tilt Angle	-0.9° (downtilt)
Bearing to Atok Relay	162.68° from True North 165.82° from Magnetic North
Magnetic Declination	3.14° W ±0.28° changing by 0.10° W per year

Physical Installation Notes for Atok Relay	
Link Name	Lucaben to Atok Relay
Latitude	16.63555N
Longitude	120.76496E
Site Elevation	7940 feet AMSL
Equipment Type	PTP550
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	60.0 feet AGL
Antenna Tilt Angle	0.9° (uptilt)
Bearing to Lucaben	342.69° from True North 345.81° from Magnetic North
Magnetic Declination	3.12° W ±0.28° changing by 0.10° W per year

Radio Commissioning Notes for Lucaben	
Radio Mode	Master
Driver Mode	TDD PTP
Country	Argentina
Channel Bonding	Enabled
Max Range	10 kilometers
Range Unit	kilometers
Link Name	Lucaben
Antenna Gain	23 dBi
Slave Module Target Receive Level	-58 dBm
Downlink/Uplink Ratio	50/50
Channel Bandwidth Radio 1 (Link A)	40 MHz
Frequency Carrier Radio 1 (Link A)	Unknown
Transmitter Power Radio 1 (Link A)	23.0 dBm
Downlink Max Rate Radio 1 (Link A)	MCS9 (256QAM 0.83 Dual)
Channel Bandwidth Radio 2 (Link B)	40 MHz
Frequency Carrier Radio 2 (Link B)	Unknown
Transmitter Power Radio 2 (Link B)	23.0 dBm
Downlink Max Rate Radio 2 (Link B)	MCS9 (256QAM 0.83 Dual)
Frame Size	5 ms
Synchronization Source	Internal
Device Latitude (degrees)	16.71823N
Device Longitude (degrees)	120.73822E
Device Height (meters)	2571.5 m (8436.7 ft) AMSL
Predicted Receive Power	-58 dBm ± 5 dB
Predicted Link Loss	127.38 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Atok Relay	
Radio Mode	Slave
Driver Mode	TDD
Country Code	Argentina
Channel Bonding	Enabled
Max Tx Power	Manual
Antenna Gain	23 dBi
Transmitter Power Radio 1 (Link A)	23.0 dBm
Uplink Max Rate Radio 1 (Link A)	MCS9 (256QAM 0.83 Dual)
Transmitter Power Radio 2 (Link B)	23.0 dBm
Uplink Max Rate Radio 2 (Link B)	MCS9 (256QAM 0.83 Dual)
Device Name	Atok Relay
Device Latitude (degrees)	16.63555N
Device Longitude (degrees)	120.76496E
Device Height (meters)	2420.0 m (7939.5 ft) AMSL
Predicted Receive Power	-58 dBm ± 5 dB

Radio Commissioning Notes for Atok Relay (continued)	
Predicted Link Loss	127.38 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Regulation	Argentina
Band (Link A)	5.8 GHz
Band (Link B)	5.8 GHz
Max EIRP (Link A)	46.0 dBm
Max EIRP (Link B)	46.0 dBm
Output Power (Link A)	23.0 dBm
Output Power (Link B)	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 disarm check that the mean value for the link loss is as predicted (127.38 dB ± 5.00 dB). Also check that the received power is not greater than -30dBm.

Lucaben Performance (Link A) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	132.05 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Atok Relay Performance (Link A) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	137.40 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Lucaben Performance (Link B) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	132.05 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Atok Relay Performance (Link B) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	137.40 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

* Multipath availability calculated using ITU-R P.530-17

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Lucaben - Link A			Atok Relay - Link A		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS9 (256QAM 0.83 Dual)	293.64	146.82	-1.38	9.6556	9.6556	-0.38	34.9962	34.9962
MCS8 (256QAM 0.75 Dual)	266.54	133.27	1.62	88.7984	79.1428	2.62	97.2902	62.2940
MCS7 (64QAM 0.83 Dual)	221.36	110.68	5.62	99.9884	11.1900	6.62	99.9975	2.7074
MCS6 (64QAM 0.75 Dual)	198.78	99.39	8.62	99.9992	0.0108	9.62	99.9994	0.0018
MCS5 (64QAM 0.67 Dual)	176.18	88.09	11.62	99.9995	0.0003	11.62	99.9995	0.0001
MCS4 (16QAM 0.75 Dual)	131.02	65.51	15.62	99.9995	0.0000	15.62	99.9995	0.0000
MCS3 (16QAM 0.5 Dual)	85.84	42.92	17.62	99.9995	0.0000	18.62	99.9995	0.0000
MCS2 (QPSK 0.75 Dual)	63.24	31.62	21.62	99.9995	0.0000	22.62	99.9995	0.0000

(continued)

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Lucaben - Link A			Atok Relay - Link A		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS1 (QPSK 0.5 Dual)	40.66	20.33	22.62	99.9995	0.0000	23.62	99.9995	0.0000
MCS9 (256QAM 0.83 Sngl)	144.56	72.28	1.62	0.0004	0.0004	3.62	0.0005	0.0005
MCS8 (256QAM 0.75 Sngl)	131.02	65.51	4.62	0.0005	0.0000	5.62	0.0005	0.0000
MCS7 (64QAM 0.83 Sngl)	108.42	54.21	7.62	0.0005	0.0000	10.62	0.0005	0.0000
MCS6 (64QAM 0.75 Sngl)	99.38	49.69	10.62	0.0005	0.0000	12.62	0.0005	0.0000
MCS5 (64QAM 0.67 Sngl)	85.84	42.92	13.62	0.0005	0.0000	14.62	0.0005	0.0000
MCS4 (16QAM 0.75 Sngl)	63.24	31.62	17.62	0.0005	0.0000	18.62	0.0005	0.0000
MCS3 (16QAM 0.5 Sngl)	40.66	20.33	19.62	0.0005	0.0000	20.62	0.0005	0.0000
MCS2 (QPSK 0.75 Sngl)	31.62	15.81	21.62	0.0005	0.0000	22.62	0.0005	0.0000
MCS1 (QPSK 0.5 Sngl)	18.08	9.04	24.62	100.0000	0.0000	24.62	100.0000	0.0000

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Lucaben - Link B			Atok Relay - Link B		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS9 (256QAM 0.83 Dual)	293.64	146.82	-1.38	9.6556	9.6556	-0.38	34.9962	34.9962
MCS8 (256QAM 0.75 Dual)	266.54	133.27	1.62	88.7984	79.1428	2.62	97.2902	62.2940
MCS7 (64QAM 0.83 Dual)	221.36	110.68	5.62	99.9884	11.1900	6.62	99.9975	2.7074

(continued)

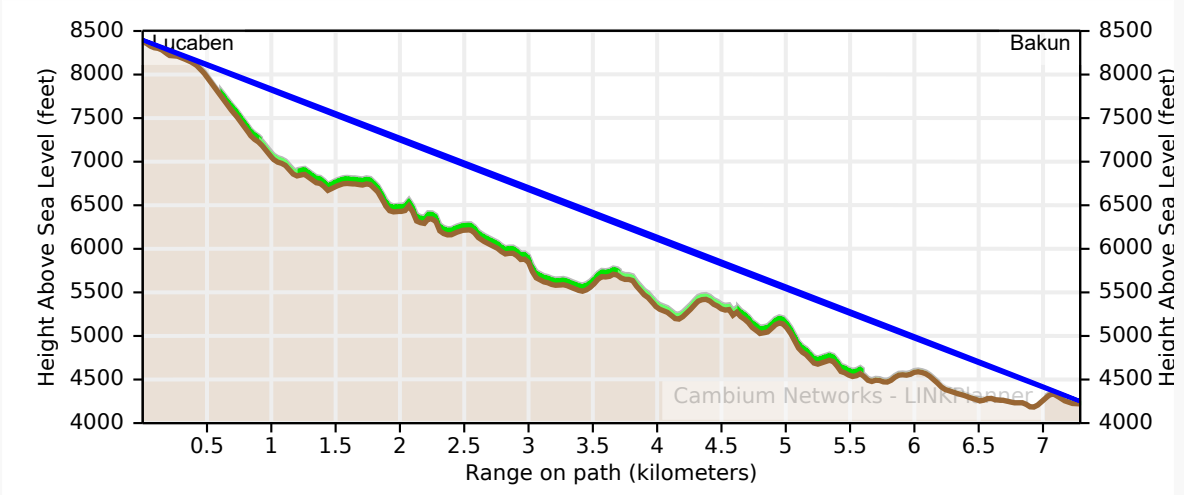
Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Lucaben - Link B			Atok Relay - Link B		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS6 (64QAM 0.75 Dual)	198.78	99.39	8.62	99.9992	0.0108	9.62	99.9994	0.0018
MCS5 (64QAM 0.67 Dual)	176.18	88.09	11.62	99.9995	0.0003	11.62	99.9995	0.0001
MCS4 (16QAM 0.75 Dual)	131.02	65.51	15.62	99.9995	0.0000	15.62	99.9995	0.0000
MCS3 (16QAM 0.5 Dual)	85.84	42.92	17.62	99.9995	0.0000	18.62	99.9995	0.0000
MCS2 (QPSK 0.75 Dual)	63.24	31.62	21.62	99.9995	0.0000	22.62	99.9995	0.0000
MCS1 (QPSK 0.5 Dual)	40.66	20.33	22.62	99.9995	0.0000	23.62	99.9995	0.0000
MCS9 (256QAM 0.83 Sngl)	144.56	72.28	1.62	0.0004	0.0004	3.62	0.0005	0.0005
MCS8 (256QAM 0.75 Sngl)	131.02	65.51	4.62	0.0005	0.0000	5.62	0.0005	0.0000
MCS7 (64QAM 0.83 Sngl)	108.42	54.21	7.62	0.0005	0.0000	10.62	0.0005	0.0000
MCS6 (64QAM 0.75 Sngl)	99.38	49.69	10.62	0.0005	0.0000	12.62	0.0005	0.0000
MCS5 (64QAM 0.67 Sngl)	85.84	42.92	13.62	0.0005	0.0000	14.62	0.0005	0.0000
MCS4 (16QAM 0.75 Sngl)	63.24	31.62	17.62	0.0005	0.0000	18.62	0.0005	0.0000
MCS3 (16QAM 0.5 Sngl)	40.66	20.33	19.62	0.0005	0.0000	20.62	0.0005	0.0000
MCS2 (QPSK 0.75 Sngl)	31.62	15.81	21.62	0.0005	0.0000	22.62	0.0005	0.0000
MCS1 (QPSK 0.5 Sngl)	18.08	9.04	24.62	100.0000	0.0000	24.62	100.0000	0.0000

* Multipath availability calculated using ITU-R P.530-17

10. Lucaben to Bakun

Summary	
Link Name	Lucaben to Bakun
Customer Company Name	DICT CAR
Profile Type	Line-of-Sight
Equipment Type	PTP550
Fresnel Zone Clearance	3.0 feet
Link Distance	7.289 kilometers
Free Space Path Loss	124.95 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate Paths	Aggregate 580.15 Mbps assuming PTP-550 Series running the 4.7 software
RF Frequency Band (Link A)	5.8 GHz (5725 to 5850 MHz)
RF Frequency Band (Link B)	5.8 GHz (5725 to 5850 MHz)
RF Channel Bandwidth (Link A)	40 MHz
RF Channel Bandwidth (Link B)	40 MHz

Path Profile



Link Configuration	
Link Type	2+0
Bandwidth (Link A)	40 MHz
Bandwidth (Link B)	40 MHz
DL/UL Ratio	50/50
Frame Period	5 ms
Maximum Mod Mode (Link A)	MCS9 (256QAM 0.83 Dual)
Maximum Mod Mode (Link B)	MCS9 (256QAM 0.83 Dual)
Master	Lucaben

Link Configuration (continued)	
Slave	Bakun

Bill of Materials		
Part Number	Qty	Description
C000000L033	4	Gigabit Surge Suppressor (56V), 10/100/1000 BaseT
C050055H010	2	PTP 550 Integrated 5 GHz (ROW) with US Line Cord. Kit includes radio with antenna, power supply, line cord and mounting bracket
EW-E2PT550-WW	2	PTP 550 Extended Warranty, 2 Additional years (per END)

Physical Installation Notes for Lucaben	
Link Name	Lucaben to Bakun
Latitude	16.71823N
Longitude	120.73822E
Site Elevation	8397 feet AMSL
Equipment Type	PTP550
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	20.0 feet AGL
Antenna Tilt Angle	-9.9° (downtilt)
Bearing to Bakun	351.04° from True North 354.18° from Magnetic North
Magnetic Declination	3.14° W ±0.28° changing by 0.10° W per year

Physical Installation Notes for Bakun	
Link Name	Lucaben to Bakun
Latitude	16.78329N
Longitude	120.72757E
Site Elevation	4251 feet AMSL
Equipment Type	PTP550
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	30.0 feet AGL
Antenna Tilt Angle	9.8° (uptilt)
Bearing to Lucaben	171.04° from True North 174.19° from Magnetic North
Magnetic Declination	3.15° W ±0.28° changing by 0.10° W per year

Radio Commissioning Notes for Lucaben	
Radio Mode	Master
Driver Mode	TDD PTP
Country	Argentina
Channel Bonding	Enabled
Max Range	8 kilometers
Range Unit	kilometers
Link Name	Lucaben
Antenna Gain	23 dBi
Slave Module Target Receive Level	-56 dBm
Downlink/Uplink Ratio	50/50
Channel Bandwidth Radio 1 (Link A)	40 MHz
Frequency Carrier Radio 1 (Link A)	Unknown
Transmitter Power Radio 1 (Link A)	23.0 dBm
Downlink Max Rate Radio 1 (Link A)	MCS9 (256QAM 0.83 Dual)
Channel Bandwidth Radio 2 (Link B)	40 MHz
Frequency Carrier Radio 2 (Link B)	Unknown
Transmitter Power Radio 2 (Link B)	23.0 dBm
Downlink Max Rate Radio 2 (Link B)	MCS9 (256QAM 0.83 Dual)
Frame Size	5 ms
Synchronization Source	Internal
Device Latitude (degrees)	16.71823N
Device Longitude (degrees)	120.73822E
Device Height (meters)	2559.3 m (8396.7 ft) AMSL
Predicted Receive Power	-56 dBm ± 5 dB
Predicted Link Loss	125.00 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Bakun	
Radio Mode	Slave
Driver Mode	TDD
Country Code	Argentina
Channel Bonding	Enabled
Max Tx Power	Manual
Antenna Gain	23 dBi
Transmitter Power Radio 1 (Link A)	23.0 dBm
Uplink Max Rate Radio 1 (Link A)	MCS9 (256QAM 0.83 Dual)
Transmitter Power Radio 2 (Link B)	23.0 dBm
Uplink Max Rate Radio 2 (Link B)	MCS9 (256QAM 0.83 Dual)
Device Name	Bakun
Device Latitude (degrees)	16.78329N
Device Longitude (degrees)	120.72757E
Device Height (meters)	1295.6 m (4250.6 ft) AMSL
Predicted Receive Power	-56 dBm ± 5 dB

Radio Commissioning Notes for Bakun (continued)	
Predicted Link Loss	125.00 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Regulation	Argentina
Band (Link A)	5.8 GHz
Band (Link B)	5.8 GHz
Max EIRP (Link A)	46.0 dBm
Max EIRP (Link B)	46.0 dBm
Output Power (Link A)	23.0 dBm
Output Power (Link B)	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 disarm check that the mean value for the link loss is as predicted (125.00 dB ± 5.00 dB). Also check that the received power is not greater than -30dBm.

Lucaben Performance (Link A) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	143.99 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Bakun Performance (Link A) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	146.08 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Lucaben Performance (Link B) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	143.99 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Bakun Performance (Link B) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	146.08 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

* Multipath availability calculated using ITU-R P.530-17

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Lucaben - Link A			Bakun - Link A		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS9 (256QAM 0.83 Dual)	293.64	146.82	1.00	79.4159	79.4159	2.00	94.6015	94.6015
MCS8 (256QAM 0.75 Dual)	266.54	133.27	4.00	99.8327	20.4168	5.00	99.9757	5.3742
MCS7 (64QAM 0.83 Dual)	221.36	110.68	8.00	99.9990	0.1663	9.00	99.9993	0.0236
MCS6 (64QAM 0.75 Dual)	198.78	99.39	11.00	99.9995	0.0005	12.00	99.9995	0.0002
MCS5 (64QAM 0.67 Dual)	176.18	88.09	14.00	99.9995	0.0000	14.00	99.9995	0.0000
MCS4 (16QAM 0.75 Dual)	133.27	67.76	18.00	99.9995	0.0000	18.00	99.9995	0.0000
MCS3 (16QAM 0.5 Dual)	88.10	45.18	20.00	99.9995	0.0000	21.00	99.9995	0.0000
MCS2 (QPSK 0.75 Dual)	65.50	33.88	24.00	99.9995	0.0000	25.00	99.9995	0.0000

(continued)

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Lucaben - Link A			Bakun - Link A		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS1 (QPSK 0.5 Dual)	42.92	22.59	25.00	99.9995	0.0000	26.00	99.9995	0.0000
MCS9 (256QAM 0.83 Sngl)	149.08	74.54	4.00	0.0005	0.0005	6.00	0.0005	0.0005
MCS8 (256QAM 0.75 Sngl)	133.27	67.76	7.00	0.0005	0.0000	8.00	0.0005	0.0000
MCS7 (64QAM 0.83 Sngl)	110.68	56.47	10.00	0.0005	0.0000	13.00	0.0005	0.0000
MCS6 (64QAM 0.75 Sngl)	99.38	49.69	13.00	0.0005	0.0000	15.00	0.0005	0.0000
MCS5 (64QAM 0.67 Sngl)	88.10	45.18	16.00	0.0005	0.0000	17.00	0.0005	0.0000
MCS4 (16QAM 0.75 Sngl)	65.50	33.88	20.00	0.0005	0.0000	21.00	0.0005	0.0000
MCS3 (16QAM 0.5 Sngl)	42.92	22.59	22.00	0.0005	0.0000	23.00	0.0005	0.0000
MCS2 (QPSK 0.75 Sngl)	31.62	15.81	24.00	0.0005	0.0000	25.00	0.0005	0.0000
MCS1 (QPSK 0.5 Sngl)	20.33	11.29	27.00	100.0000	0.0000	27.00	100.0000	0.0000

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Lucaben - Link B			Bakun - Link B		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS9 (256QAM 0.83 Dual)	293.64	146.82	1.00	79.4159	79.4159	2.00	94.6015	94.6015
MCS8 (256QAM 0.75 Dual)	266.54	133.27	4.00	99.8327	20.4168	5.00	99.9757	5.3742
MCS7 (64QAM 0.83 Dual)	221.36	110.68	8.00	99.9990	0.1663	9.00	99.9993	0.0236

(continued)

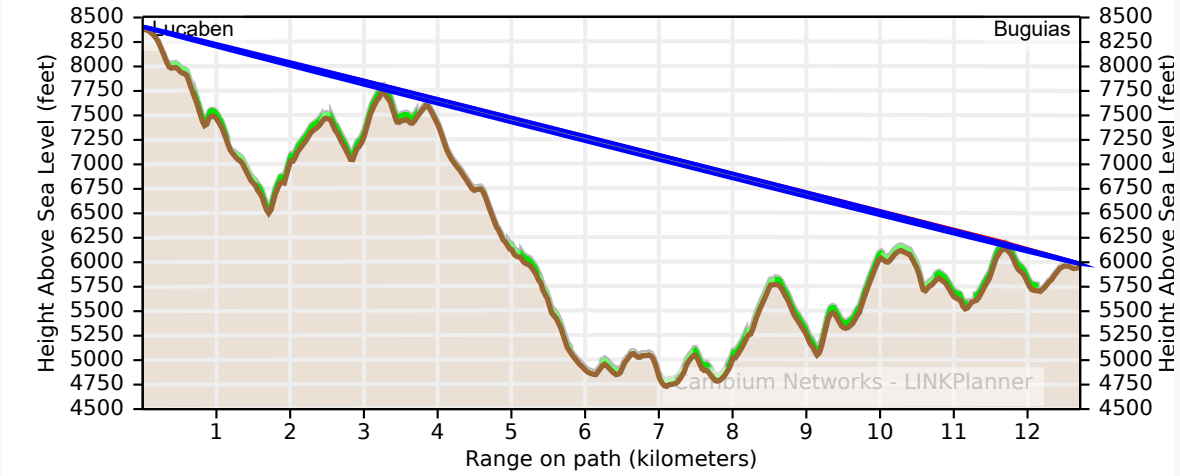
Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Lucaben - Link B			Bakun - Link B		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS6 (64QAM 0.75 Dual)	198.78	99.39	11.00	99.9995	0.0005	12.00	99.9995	0.0002
MCS5 (64QAM 0.67 Dual)	176.18	88.09	14.00	99.9995	0.0000	14.00	99.9995	0.0000
MCS4 (16QAM 0.75 Dual)	133.27	67.76	18.00	99.9995	0.0000	18.00	99.9995	0.0000
MCS3 (16QAM 0.5 Dual)	88.10	45.18	20.00	99.9995	0.0000	21.00	99.9995	0.0000
MCS2 (QPSK 0.75 Dual)	65.50	33.88	24.00	99.9995	0.0000	25.00	99.9995	0.0000
MCS1 (QPSK 0.5 Dual)	42.92	22.59	25.00	99.9995	0.0000	26.00	99.9995	0.0000
MCS9 (256QAM 0.83 Sngl)	149.08	74.54	4.00	0.0005	0.0005	6.00	0.0005	0.0005
MCS8 (256QAM 0.75 Sngl)	133.27	67.76	7.00	0.0005	0.0000	8.00	0.0005	0.0000
MCS7 (64QAM 0.83 Sngl)	110.68	56.47	10.00	0.0005	0.0000	13.00	0.0005	0.0000
MCS6 (64QAM 0.75 Sngl)	99.38	49.69	13.00	0.0005	0.0000	15.00	0.0005	0.0000
MCS5 (64QAM 0.67 Sngl)	88.10	45.18	16.00	0.0005	0.0000	17.00	0.0005	0.0000
MCS4 (16QAM 0.75 Sngl)	65.50	33.88	20.00	0.0005	0.0000	21.00	0.0005	0.0000
MCS3 (16QAM 0.5 Sngl)	42.92	22.59	22.00	0.0005	0.0000	23.00	0.0005	0.0000
MCS2 (QPSK 0.75 Sngl)	31.62	15.81	24.00	0.0005	0.0000	25.00	0.0005	0.0000
MCS1 (QPSK 0.5 Sngl)	20.33	11.29	27.00	100.0000	0.0000	27.00	100.0000	0.0000

* Multipath availability calculated using ITU-R P.530-17

11. Lucaben to Buguias

Summary	
Link Name	Lucaben to Buguias
Customer Company Name	DICT CAR
Profile Type	Non Line-of-Sight
Equipment Type	PTP550
Fresnel Zone Clearance	-42.2 feet
Link Distance	12.714 kilometers
Free Space Path Loss	129.80 dB
Excess Path Loss	31.06 dB
User IP Throughput Expectation Aggregate Paths	Aggregate 50.64 Mbps assuming PTP-550 Series running the 4.7 software
RF Frequency Band (Link A)	5.8 GHz (5725 to 5875 MHz)
RF Frequency Band (Link B)	5.8 GHz (5725 to 5875 MHz)
RF Channel Bandwidth (Link A)	40 MHz
RF Channel Bandwidth (Link B)	40 MHz

Path Profile



Link Configuration	
Link Type	2+0
Bandwidth (Link A)	40 MHz
Bandwidth (Link B)	40 MHz
DL/UL Ratio	50/50
Frame Period	5 ms
Maximum Mod Mode (Link A)	MCS9 (256QAM 0.83 Dual)
Maximum Mod Mode (Link B)	MCS9 (256QAM 0.83 Dual)
Master	Lucaben

Link Configuration (continued)	
Slave	Buguias

Bill of Materials		
Part Number	Qty	Description
C000000L033	4	Gigabit Surge Suppressor (56V), 10/100/1000 BaseT
C050055H005	2	PTP 550 Connectorized 5 GHz (ROW) with EU Line Cord. Kit includes radio with power supply, line cord and mounting bracket
EW-E2PT550-WW	2	PTP 550 Extended Warranty, 2 Additional years (per END)
RDH4508C	2	High Performance 4.9-6 GHz, 2-FT (0.6M), DUAL-POL antenna with 2 x N-type Connector

Physical Installation Notes for Lucaben	
Link Name	Lucaben to Buguias
Latitude	16.71823N
Longitude	120.73822E
Site Elevation	8407 feet AMSL
Equipment Type	PTP550
Platform Variant	Connectorized
Antenna Type	Cambium Networks 2ft High Performance Dual-Polar Parabolic RDH4508C
Antenna Beamwidth	6.1°
Antenna Gain	29.12 dBi
Antenna Height	30.0 feet AGL
Antenna Tilt Angle	-3.3° (downtilt)
Bearing to Buguias	44.50° from True North 47.64° from Magnetic North
Magnetic Declination	3.14° W ±0.28° changing by 0.10° W per year
Cable Loss (Link A)	1.0 dB
Cable Loss (Link B)	1.0 dB

Physical Installation Notes for Buguias	
Link Name	Lucaben to Buguias
Latitude	16.80015N
Longitude	120.82182E
Site Elevation	5984 feet AMSL
Equipment Type	PTP550
Platform Variant	Connectorized
Antenna Type	Cambium Networks 2ft High Performance Dual-Polar Parabolic RDH4508C
Antenna Beamwidth	6.1°
Antenna Gain	29.12 dBi
Antenna Height	30.0 feet AGL
Antenna Tilt Angle	3.7° (uptilt)

Physical Installation Notes for Buguias (continued)	
Bearing to Lucaben	224.53° from True North 227.69° from Magnetic North
Magnetic Declination	3.16° W ±0.28° changing by 0.10° W per year
Cable Loss (Link A)	1.0 dB
Cable Loss (Link B)	1.0 dB

Radio Commissioning Notes for Lucaben	
Radio Mode	Master
Driver Mode	TDD PTP
Country	Other
Channel Bonding	Enabled
Max Range	13 kilometers
Range Unit	kilometers
Link Name	Lucaben
Antenna Gain	28 dBi
Slave Module Target Receive Level	-82 dBm
Downlink/Uplink Ratio	50/50
Channel Bandwidth Radio 1 (Link A)	40 MHz
Frequency Carrier Radio 1 (Link A)	Unknown
Transmitter Power Radio 1 (Link A)	23.0 dBm
Downlink Max Rate Radio 1 (Link A)	MCS9 (256QAM 0.83 Dual)
Channel Bandwidth Radio 2 (Link B)	40 MHz
Frequency Carrier Radio 2 (Link B)	Unknown
Transmitter Power Radio 2 (Link B)	23.0 dBm
Downlink Max Rate Radio 2 (Link B)	MCS9 (256QAM 0.83 Dual)
Frame Size	5 ms
Synchronization Source	Internal
Device Latitude (degrees)	16.71823N
Device Longitude (degrees)	120.73822E
Device Height (meters)	2562.4 m (8406.7 ft) AMSL
Predicted Receive Power	-82 dBm ± 14 dB
Predicted Link Loss	160.94 dB ± 14.32 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Buguias	
Radio Mode	Slave
Driver Mode	TDD
Country Code	Other
Channel Bonding	Enabled
Max Tx Power	Manual
Antenna Gain	28 dBi

Radio Commissioning Notes for Buguias (continued)	
Transmitter Power Radio 1 (Link A)	23.0 dBm
Uplink Max Rate Radio 1 (Link A)	MCS9 (256QAM 0.83 Dual)
Transmitter Power Radio 2 (Link B)	23.0 dBm
Uplink Max Rate Radio 2 (Link B)	MCS9 (256QAM 0.83 Dual)
Device Name	Buguias
Device Latitude (degrees)	16.80015N
Device Longitude (degrees)	120.82182E
Device Height (meters)	1823.8 m (5983.8 ft) AMSL
Predicted Receive Power	-82 dBm ± 14 dB
Predicted Link Loss	160.94 dB ± 14.32 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Regulation	Other
Band (Link A)	5.8 GHz
Band (Link B)	5.8 GHz
Max EIRP (Link A)	51.1 dBm
Max EIRP (Link B)	51.1 dBm
Output Power (Link A)	23.0 dBm
Output Power (Link B)	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 disarm check that the mean value for the link loss is as predicted (160.94 dB ± 14.32 dB). Also check that the received power is not greater than -39dBm.

Lucaben Performance (Link A) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	11.55 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	64.7851% (unavailable for 128.5 days/year)

Buguias Performance (Link A) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	13.77 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	64.7851% (unavailable for 128.5 days/year)

Lucaben Performance (Link B) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	11.55 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	64.7851% (unavailable for 128.5 days/year)

Buguias Performance (Link B) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	13.77 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	64.7851% (unavailable for 128.5 days/year)

* Multipath availability calculated using ITU-R P.530-17

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Lucaben - Link A			Buguias - Link A		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS9 (256QAM 0.83 Dual)	293.64	146.82	-24.70	0.0000	0.0000	-23.70	0.0000	0.0000
MCS8 (256QAM 0.75 Dual)	266.54	133.27	-21.70	0.0000	0.0000	-20.70	0.0000	0.0000
MCS7 (64QAM 0.83 Dual)	221.36	110.68	-17.70	0.0000	0.0000	-16.70	0.0000	0.0000
MCS6 (64QAM 0.75 Dual)	198.78	99.39	-14.70	0.0000	0.0000	-13.70	0.0000	0.0000
MCS5 (64QAM 0.67 Dual)	176.18	88.09	-11.70	0.0000	0.0000	-11.70	0.0000	0.0000

(continued)

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Lucaben - Link A			Buguias - Link A		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS4 (16QAM 0.75 Dual)	131.02	65.51	-7.70	0.0853	0.0853	-7.70	0.0853	0.0853
MCS3 (16QAM 0.5 Dual)	85.84	42.92	-5.70	1.3418	1.2565	-4.70	3.4596	3.3743
MCS2 (QPSK 0.75 Dual)	63.24	31.62	-1.70	19.6995	18.3577	-0.70	27.5367	24.0770
MCS1 (QPSK 0.5 Dual)	40.66	20.33	-0.70	27.5367	7.8372	0.30	35.5928	8.0561
MCS9 (256QAM 0.83 Sngl)	144.56	72.28	-21.70	0.0000	0.0000	-19.70	0.0000	0.0000
MCS8 (256QAM 0.75 Sngl)	131.02	65.51	-18.70	0.0000	0.0000	-17.70	0.0000	0.0000
MCS7 (64QAM 0.83 Sngl)	108.42	54.21	-15.70	0.0000	0.0000	-12.70	0.0000	0.0000
MCS6 (64QAM 0.75 Sngl)	99.38	49.69	-12.70	0.0000	0.0000	-10.70	0.0000	0.0000
MCS5 (64QAM 0.67 Sngl)	85.84	42.92	-9.70	0.0000	0.0000	-8.70	0.0000	0.0000
MCS4 (16QAM 0.75 Sngl)	63.24	31.62	-5.70	0.0064	0.0064	-4.70	0.0579	0.0579
MCS3 (16QAM 0.5 Sngl)	40.66	20.33	-3.70	0.3050	0.2986	-2.70	1.0470	0.9891
MCS2 (QPSK 0.75 Sngl)	31.62	15.81	-1.70	2.5590	2.2540	-0.70	4.7989	3.7519
MCS1 (QPSK 0.5 Sngl)	18.08	9.04	1.30	64.7851	34.6894	1.30	64.7851	24.3934

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Lucaben - Link B			Buguias - Link B		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS9 (256QAM 0.83 Dual)	293.64	146.82	-24.70	0.0000	0.0000	-23.70	0.0000	0.0000
MCS8 (256QAM 0.75 Dual)	266.54	133.27	-21.70	0.0000	0.0000	-20.70	0.0000	0.0000
MCS7 (64QAM 0.83 Dual)	221.36	110.68	-17.70	0.0000	0.0000	-16.70	0.0000	0.0000
MCS6 (64QAM 0.75 Dual)	198.78	99.39	-14.70	0.0000	0.0000	-13.70	0.0000	0.0000
MCS5 (64QAM 0.67 Dual)	176.18	88.09	-11.70	0.0000	0.0000	-11.70	0.0000	0.0000
MCS4 (16QAM 0.75 Dual)	131.02	65.51	-7.70	0.0853	0.0853	-7.70	0.0853	0.0853
MCS3 (16QAM 0.5 Dual)	85.84	42.92	-5.70	1.3418	1.2565	-4.70	3.4596	3.3743
MCS2 (QPSK 0.75 Dual)	63.24	31.62	-1.70	19.6995	18.3577	-0.70	27.5367	24.0770
MCS1 (QPSK 0.5 Dual)	40.66	20.33	-0.70	27.5367	7.8372	0.30	35.5928	8.0561
MCS9 (256QAM 0.83 Sngl)	144.56	72.28	-21.70	0.0000	0.0000	-19.70	0.0000	0.0000
MCS8 (256QAM 0.75 Sngl)	131.02	65.51	-18.70	0.0000	0.0000	-17.70	0.0000	0.0000
MCS7 (64QAM 0.83 Sngl)	108.42	54.21	-15.70	0.0000	0.0000	-12.70	0.0000	0.0000
MCS6 (64QAM 0.75 Sngl)	99.38	49.69	-12.70	0.0000	0.0000	-10.70	0.0000	0.0000
MCS5 (64QAM 0.67 Sngl)	85.84	42.92	-9.70	0.0000	0.0000	-8.70	0.0000	0.0000
MCS4 (16QAM 0.75 Sngl)	63.24	31.62	-5.70	0.0064	0.0064	-4.70	0.0579	0.0579
MCS3 (16QAM 0.5 Sngl)	40.66	20.33	-3.70	0.3050	0.2986	-2.70	1.0470	0.9891

(continued)

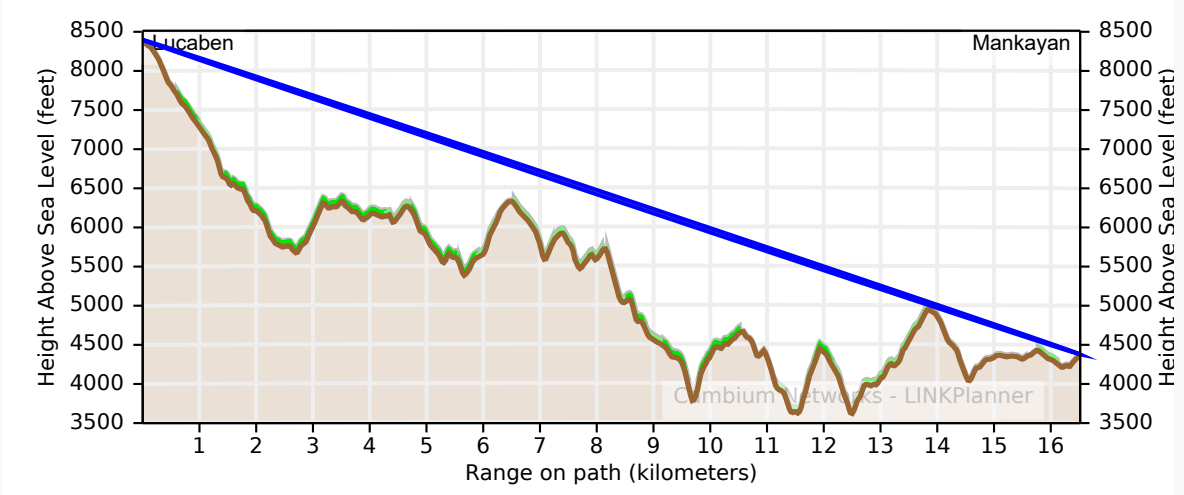
Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Lucaben - Link B			Buguias - Link B		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS2 (QPSK 0.75 Sngl)	31.62	15.81	-1.70	2.5590	2.2540	-0.70	4.7989	3.7519
MCS1 (QPSK 0.5 Sngl)	18.08	9.04	1.30	64.7851	34.6894	1.30	64.7851	24.3934

* Multipath availability calculated using ITU-R P.530-17

12. Lucaben to Mankayan

Summary	
Link Name	Lucaben to Mankayan
Customer Company Name	DICT CAR
Profile Type	Line-of-Sight
Equipment Type	PTP550E
Fresnel Zone Clearance	3.6 feet
Link Distance	16.518 kilometers
Free Space Path Loss	132.06 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate Paths	Aggregate 665.19 Mbps assuming PTP-550E Series running the 4.7 software
RF Frequency Band (Link A)	5.8 GHz (5725 to 5850 MHz)
RF Frequency Band (Link B)	5.8 GHz (5725 to 5850 MHz)
RF Channel Bandwidth (Link A)	80 MHz
RF Channel Bandwidth (Link B)	40 MHz

Path Profile



Link Configuration	
Link Type	2+0
Bandwidth (Link A)	80 MHz
Bandwidth (Link B)	40 MHz
DL/UL Ratio	50/50
Frame Period	5 ms
Maximum Mod Mode (Link A)	MCS9 (256QAM 0.83 Dual)
Maximum Mod Mode (Link B)	MCS9 (256QAM 0.83 Dual)
Master	Lucaben

Link Configuration (continued)	
Slave	Mankayan

Bill of Materials		
Part Number	Qty	Description
C000000L033	4	Gigabit Surge Suppressor (56V), 10/100/1000 BaseT
C050055H019	2	PTP 550E Integrated including 4.9 GHz (ROW) with US Line Cord. Kit includes radio with antenna, power supply, line cord and mounting bracket
EW-E2PT550-WW	2	PTP 550 Extended Warranty, 2 Additional years (per END)

Physical Installation Notes for Lucaben	
Link Name	Lucaben to Mankayan
Latitude	16.71823N
Longitude	120.73822E
Site Elevation	8397 feet AMSL
Equipment Type	PTP550E
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	20.0 feet AGL
Antenna Tilt Angle	-4.3° (downtilt)
Bearing to Mankayan	20.92° from True North 24.06° from Magnetic North
Magnetic Declination	3.14° W ±0.28° changing by 0.10° W per year

Physical Installation Notes for Mankayan	
Link Name	Lucaben to Mankayan
Latitude	16.85764N
Longitude	120.79357E
Site Elevation	4379 feet AMSL
Equipment Type	PTP550E
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	20.0 feet AGL
Antenna Tilt Angle	4.2° (uptilt)
Bearing to Lucaben	200.94° from True North 204.11° from Magnetic North
Magnetic Declination	3.17° W ±0.28° changing by 0.10° W per year

Radio Commissioning Notes for Lucaben	
Radio Mode	Master
Driver Mode	TDD PTP
Country	Argentina
Channel Bonding	Enabled
Max Range	17 kilometers
Range Unit	kilometers
Link Name	Lucaben
Antenna Gain	23 dBi
Slave Module Target Receive Level	-63 dBm
Downlink/Uplink Ratio	50/50
Channel Bandwidth Radio 1 (Link A)	80 MHz
Frequency Carrier Radio 1 (Link A)	Unknown
Transmitter Power Radio 1 (Link A)	23.0 dBm
Downlink Max Rate Radio 1 (Link A)	MCS9 (256QAM 0.83 Dual)
Channel Bandwidth Radio 2 (Link B)	40 MHz
Frequency Carrier Radio 2 (Link B)	Unknown
Transmitter Power Radio 2 (Link B)	23.0 dBm
Downlink Max Rate Radio 2 (Link B)	MCS9 (256QAM 0.83 Dual)
Frame Size	5 ms
Synchronization Source	Internal
Device Latitude (degrees)	16.71823N
Device Longitude (degrees)	120.73822E
Device Height (meters)	2559.3 m (8396.7 ft) AMSL
Predicted Receive Power	-63 dBm ± 5 dB
Predicted Link Loss	132.16 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Mankayan	
Radio Mode	Slave
Driver Mode	TDD
Country Code	Argentina
Channel Bonding	Enabled
Max Tx Power	Manual
Antenna Gain	23 dBi
Transmitter Power Radio 1 (Link A)	23.0 dBm
Uplink Max Rate Radio 1 (Link A)	MCS9 (256QAM 0.83 Dual)
Transmitter Power Radio 2 (Link B)	23.0 dBm
Uplink Max Rate Radio 2 (Link B)	MCS9 (256QAM 0.83 Dual)
Device Name	Mankayan
Device Latitude (degrees)	16.85764N
Device Longitude (degrees)	120.79357E
Device Height (meters)	1334.7 m (4378.8 ft) AMSL
Predicted Receive Power	-63 dBm ± 5 dB

Radio Commissioning Notes for Mankayan (continued)	
Predicted Link Loss	132.16 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Regulation	Argentina
Band (Link A)	5.8 GHz
Band (Link B)	5.8 GHz
Max EIRP (Link A)	46.0 dBm
Max EIRP (Link B)	46.0 dBm
Output Power (Link A)	23.0 dBm
Output Power (Link B)	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 disarm check that the mean value for the link loss is as predicted (132.16 dB ± 5.00 dB). Also check that the received power is not greater than -30dBm.

Lucaben Performance (Link A) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	211.57 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Mankayan Performance (Link A) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	236.65 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Lucaben Performance (Link B) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	105.89 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Mankayan Performance (Link B) *	
Frame Size	1518 Bytes
Mean IP Throughput Predicted	111.08 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

* Multipath availability calculated using ITU-R P.530-17

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Lucaben - Link A			Mankayan - Link A		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS9 (256QAM 0.83 Dual)	650.54	325.27	-10.16	0.0000	0.0000	-6.16	0.0007	0.0007
MCS8 (256QAM 0.75 Dual)	587.29	298.16	-7.16	0.0003	0.0003	-3.16	0.0292	0.0285
MCS7 (64QAM 0.83 Dual)	487.90	243.95	-2.16	1.2913	1.2910	0.84	74.1959	74.1667
MCS6 (64QAM 0.75 Dual)	433.68	216.84	0.84	74.1959	72.9046	2.84	98.2409	24.0450
MCS5 (64QAM 0.67 Dual)	397.54	198.77	2.84	98.2409	24.0450	5.84	99.9929	1.7520
MCS4 (16QAM 0.75 Dual)	289.12	144.56	7.84	99.9989	1.7580	9.84	99.9994	0.0065
MCS3 (16QAM 0.5 Dual)	198.78	99.39	9.84	99.9994	0.0005	13.84	99.9995	0.0002
MCS2 (QPSK 0.75 Dual)	144.56	72.28	14.84	99.9995	0.0002	15.84	99.9995	0.0000

(continued)

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Lucaben - Link A			Mankayan - Link A		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS1 (QPSK 0.5 Dual)	90.36	45.18	14.84	99.9995	0.0000	17.84	99.9995	0.0000
MCS9 (256QAM 0.83 Sngl)	325.26	162.63	-7.16	0.0000	0.0000	-4.16	0.0000	0.0000
MCS8 (256QAM 0.75 Sngl)	289.12	144.56	-4.16	0.0000	0.0000	-1.16	0.0000	0.0000
MCS7 (64QAM 0.83 Sngl)	234.92	117.46	-0.16	0.0002	0.0002	2.84	0.0005	0.0004
MCS6 (64QAM 0.75 Sngl)	216.84	108.42	2.84	0.0005	0.0003	5.84	0.0005	0.0000
MCS5 (64QAM 0.67 Sngl)	198.78	99.39	5.84	0.0005	0.0000	7.84	0.0005	0.0000
MCS4 (16QAM 0.75 Sngl)	144.56	72.28	10.84	0.0005	0.0000	13.84	0.0005	0.0000
MCS3 (16QAM 0.5 Sngl)	90.36	45.18	12.84	0.0005	0.0000	15.84	0.0005	0.0000
MCS2 (QPSK 0.75 Sngl)	72.28	36.14	16.84	0.0005	0.0000	17.84	0.0005	0.0000
MCS1 (QPSK 0.5 Sngl)	36.14	18.07	18.84	100.0000	0.0000	19.84	100.0000	0.0000

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Lucaben - Link B			Mankayan - Link B		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS9 (256QAM 0.83 Dual)	289.12	144.56	-7.16	0.0003	0.0003	-4.16	0.0068	0.0068
MCS8 (256QAM 0.75 Dual)	262.02	131.01	-4.16	0.0068	0.0065	-1.16	12.5177	12.5108
MCS7 (64QAM 0.83 Dual)	216.84	108.42	0.84	74.1959	74.1891	2.84	98.2409	85.7233

(continued)

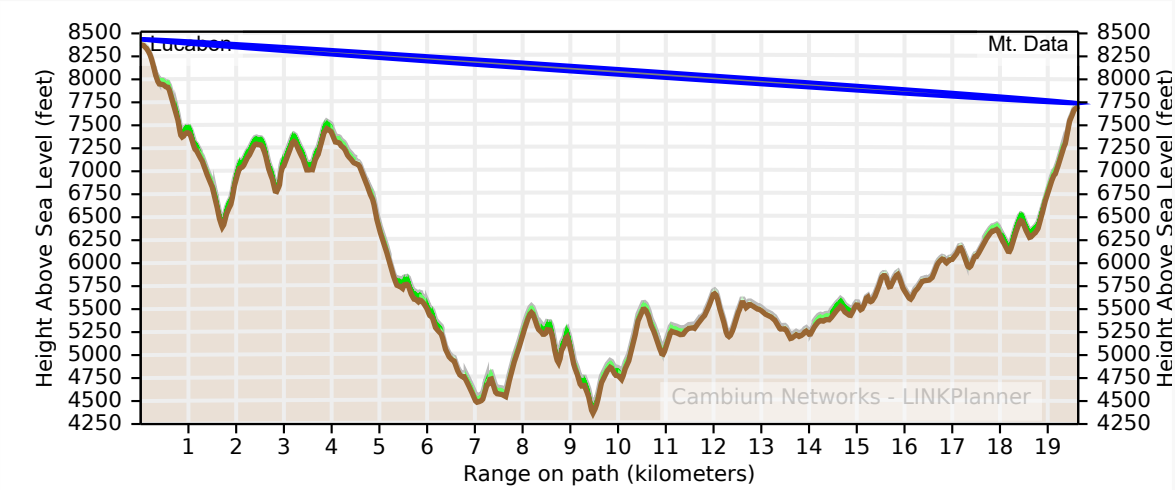
Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Lucaben - Link B			Mankayan - Link B		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
MCS6 (64QAM 0.75 Dual)	198.78	99.39	2.84	98.2409	24.0450	4.84	99.9523	1.7114
MCS5 (64QAM 0.67 Dual)	176.18	88.09	5.84	99.9929	1.7520	7.84	99.9989	0.0466
MCS4 (16QAM 0.75 Dual)	131.02	65.51	9.84	99.9994	0.0065	11.84	99.9995	0.0006
MCS3 (16QAM 0.5 Dual)	85.84	42.92	12.84	99.9995	0.0002	15.84	99.9995	0.0000
MCS2 (QPSK 0.75 Dual)	63.24	31.62	16.84	99.9995	0.0000	17.84	99.9995	0.0000
MCS1 (QPSK 0.5 Dual)	40.66	20.33	17.84	99.9995	0.0000	19.84	99.9995	0.0000
MCS9 (256QAM 0.83 Sngl)	144.56	72.28	-4.16	0.0000	0.0000	-2.16	0.0000	0.0000
MCS8 (256QAM 0.75 Sngl)	131.02	65.51	-1.16	0.0000	0.0000	0.84	0.0004	0.0004
MCS7 (64QAM 0.83 Sngl)	108.42	54.21	2.84	0.0005	0.0004	4.84	0.0005	0.0001
MCS6 (64QAM 0.75 Sngl)	99.38	49.69	5.84	0.0005	0.0000	7.84	0.0005	0.0000
MCS5 (64QAM 0.67 Sngl)	85.84	42.92	7.84	0.0005	0.0000	9.84	0.0005	0.0000
MCS4 (16QAM 0.75 Sngl)	63.24	31.62	13.84	0.0005	0.0000	15.84	0.0005	0.0000
MCS3 (16QAM 0.5 Sngl)	40.66	20.33	15.84	0.0005	0.0000	17.84	0.0005	0.0000
MCS2 (QPSK 0.75 Sngl)	31.62	15.81	18.84	0.0005	0.0000	19.84	0.0005	0.0000
MCS1 (QPSK 0.5 Sngl)	18.08	9.04	20.84	100.0000	0.0000	21.84	100.0000	0.0000

* Multipath availability calculated using ITU-R P.530-17

13. Lucaben to Mt. Data

Summary	
Link Name	Lucaben to Mt. Data
Customer Company Name	DICT CAR
Profile Type	Line-of-Sight
Equipment Type	PTP670
Fresnel Zone Clearance	25.1 feet
Link Distance	19.638 kilometers
Free Space Path Loss	133.56 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate	Aggregate 343.13 Mbps assuming PTP-670 Series running the 670-03-60 software
RF Frequency Band	5.8 GHz (5725 to 5850 MHz)
RF Channel Bandwidth	45 MHz

Path Profile



Link Configuration	
Precise Network Timing	Disabled
Bandwidth	45 MHz
E1/T1	None
Optimization	IP
Sync	Disabled
Symmetry	Adaptive
Dual Payload	Enabled
Highest Mod Mode	256QAM 0.81
Lowest Ethernet Mode	BPSK 0.63 Sngl
Master	Lucaben

Link Configuration (continued)	
Slave	Mt. Data

Bill of Materials		
Part Number	Qty	Description
01010419001	4	Coaxial Cable Grounding Kits for 1/4" and 3/8" Cable
AR-E4PT6XX-WW	2	PTP 670 All Risks Advance Replacement, 4 additional years (per END)
C000065L007	2	LPU and Grounding Kit (1 kit per ODU)
C050067H010	2	PTP 670 Integrated 23dBi END with AC+DC Enhanced Supply (ROW - U.S. Line Cord). Kit includes ODU, power supply, mounting bracket and US line cord
WB3176	1	328 ft (100 m) Reel Outdoor Copper Clad CAT5E (Recommended for PTP)

Physical Installation Notes for Lucaben	
Link Name	Lucaben to Mt. Data
Latitude	16.71823N
Longitude	120.73822E
Site Elevation	8437 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	60.0 feet AGL
Antenna Tilt Angle	-0.7° (downtilt)
Bearing to Mt. Data	40.15° from True North 43.29° from Magnetic North
Magnetic Declination	3.14° W ±0.28° changing by 0.10° W per year

Physical Installation Notes for Mt. Data	
Link Name	Lucaben to Mt. Data
Latitude	16.85382N
Longitude	120.85705E
Site Elevation	7739 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	0.6° (uptilt)
Bearing to Lucaben	220.19° from True North 223.36° from Magnetic North

Physical Installation Notes for Mt. Data (continued)	
Magnetic Declination	3.17° W ±0.28° changing by 0.10° W per year

Radio Commissioning Notes for Lucaben (Primary)	
Link Name	Lucaben to Mt. Data
Site Name	Lucaben
Latitude	16.71823N
Longitude	120.73822E
Altitude	8437 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Master
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Link Symmetry	Adaptive
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-61 dBm ± 5 dB
Predicted Link Loss	133.67 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Mt. Data (Primary)	
Link Name	Lucaben to Mt. Data
Site Name	Mt. Data
Latitude	16.85382N
Longitude	120.85705E
Altitude	7739 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Slave
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl

Radio Commissioning Notes for Mt. Data (Primary) (continued)	
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-61 dBm ± 5 dB
Predicted Link Loss	133.67 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Country	Argentina (Private)
Band	5.8 GHz
Region Code	44
Max EIRP	50.0 dBm
Output Power	27.0 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 disarm check that the mean value for the link loss is as predicted (133.67 dB ± 5.00 dB). Also check that the received power is not greater than -35dBm.

Lucaben Performance *	
Mean IP Throughput Predicted	171.57 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Mt. Data Performance *	
Mean IP Throughput Predicted	171.57 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps

Mt. Data Performance * (continued)	
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

* Multipath availability calculated using ITU-R P.530-17

Mode	Max Aggregate User IP Throughput (Mbps)	Lucaben				Mt. Data			
		Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
256QAM 0.81 Dual	441.16	220.58	-4.40	0.0064	0.0064	220.58	-4.40	0.0064	0.0064
64QAM 0.92 Dual	371.69	185.85	0.33	58.0672	58.0609	185.85	0.33	58.0672	58.0609
64QAM 0.75 Dual	303.74	151.87	4.46	99.8979	41.8307	151.87	4.46	99.8979	41.8307
16QAM 0.87 Dual	236.30	118.15	8.58	99.9989	0.1010	118.15	8.58	99.9989	0.1010
16QAM 0.63 Dual	169.87	84.94	12.21	99.9994	0.0005	84.94	12.21	99.9994	0.0005
256QAM 0.81 Sngl	220.58	110.29	-0.75	0.0001	0.0001	110.29	-0.75	0.0001	0.0001
64QAM 0.92 Sngl	185.84	92.92	3.63	0.0005	0.0004	92.92	3.63	0.0005	0.0004
64QAM 0.75 Sngl	151.87	75.94	7.58	0.0005	0.0000	75.94	7.58	0.0005	0.0000
16QAM 0.87 Sngl	118.15	59.07	11.65	0.0005	0.0000	59.07	11.65	0.0005	0.0000
16QAM 0.63 Sngl	84.93	42.47	16.15	100.0000	0.0001	42.47	16.15	100.0000	0.0001
QPSK 0.87 Sngl	59.07	29.54	19.48	100.0000	0.0000	29.54	19.48	100.0000	0.0000
QPSK 0.63 Sngl	42.47	21.23	23.50	100.0000	0.0000	21.23	23.50	100.0000	0.0000
BPSK 0.63 Sngl	21.23	10.62	27.61	100.0000	0.0000	10.62	27.61	100.0000	0.0000

* Multipath availability calculated using ITU-R P.530-17

14. Mt. Data to Sabangan

Summary	
Link Name	Mt. Data to Sabangan
Customer Company Name	DICT CAR
Profile Type	Non Line-of-Sight
Equipment Type	PTP670
Fresnel Zone Clearance	-1611.2 feet
Link Distance	18.186 kilometers
Free Space Path Loss	132.89 dB
Excess Path Loss	67.09 dB
User IP Throughput Expectation Aggregate	Aggregate 0.00 Mbps assuming PTP-670 Series running the 670-03-60 software
RF Frequency Band	5.8 GHz (5725 to 5850 MHz)
RF Channel Bandwidth	45 MHz

Path Profile

Link Configuration	
Precise Network Timing	Disabled
Bandwidth	45 MHz
E1/T1	None
Optimization	IP
Sync	Disabled
Symmetry	Adaptive
Dual Payload	Enabled
Highest Mod Mode	256QAM 0.81
Lowest Ethernet Mode	BPSK 0.63 Sngl
Master	Mt. Data

Link Configuration (continued)	
Slave	Sabangan

Bill of Materials		
Part Number	Qty	Description
01010419001	4	Coaxial Cable Grounding Kits for 1/4" and 3/8" Cable
AR-E4PT6XX-WW	2	PTP 670 All Risks Advance Replacement, 4 additional years (per END)
C000065L007	2	LPU and Grounding Kit (1 kit per ODU)
C050067H010	2	PTP 670 Integrated 23dBi END with AC+DC Enhanced Supply (ROW - U.S. Line Cord). Kit includes ODU, power supply, mounting bracket and US line cord
WB3176	1	328 ft (100 m) Reel Outdoor Copper Clad CAT5E (Recommended for PTP)

Physical Installation Notes for Mt. Data	
Link Name	Mt. Data to Sabangan
Latitude	16.85382N
Longitude	120.85705E
Site Elevation	7739 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	11.1° (uptilt)
Bearing to Sabangan	22.41° from True North 25.59° from Magnetic North
Magnetic Declination	3.17° W ±0.28° changing by 0.10° W per year

Physical Installation Notes for Sabangan	
Link Name	Mt. Data to Sabangan
Latitude	17.00572N
Longitude	120.92217E
Site Elevation	3677 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	8.3° (uptilt)
Bearing to Mt. Data	202.43° from True North 205.65° from Magnetic North

Physical Installation Notes for Sabangan (continued)	
Magnetic Declination	3.21° W ±0.28° changing by 0.10° W per year

Radio Commissioning Notes for Mt. Data (Primary)	
Link Name	Mt. Data to Sabangan
Site Name	Mt. Data
Latitude	16.85382N
Longitude	120.85705E
Altitude	7739 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Master
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Link Symmetry	Adaptive
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-127 dBm ± 25 dB
Predicted Link Loss	200.11 dB ± 25.13 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Sabangan (Primary)	
Link Name	Mt. Data to Sabangan
Site Name	Sabangan
Latitude	17.00572N
Longitude	120.92217E
Altitude	3677 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Slave
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl

Radio Commissioning Notes for Sabangan (Primary) (continued)	
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-127 dBm ± 25 dB
Predicted Link Loss	200.11 dB ± 25.13 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Country	Argentina (Private)
Band	5.8 GHz
Region Code	44
Max EIRP	50.0 dBm
Output Power	27.0 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 disarm check that the mean value for the link loss is as predicted (200.11 dB ± 25.13 dB). Also check that the received power is not greater than -55dBm.

Mt. Data Performance *	
Mean IP Throughput Predicted	0.00 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	0.0000% (unavailable for 365.0 days/year)

Sabangan Performance *	
Mean IP Throughput Predicted	0.00 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps

Sabangan Performance * (continued)	
Minimum IP Throughput Availability Predicted	0.0000% (unavailable for 365.0 days/year)

* Multipath availability calculated using ITU-R P.530-17

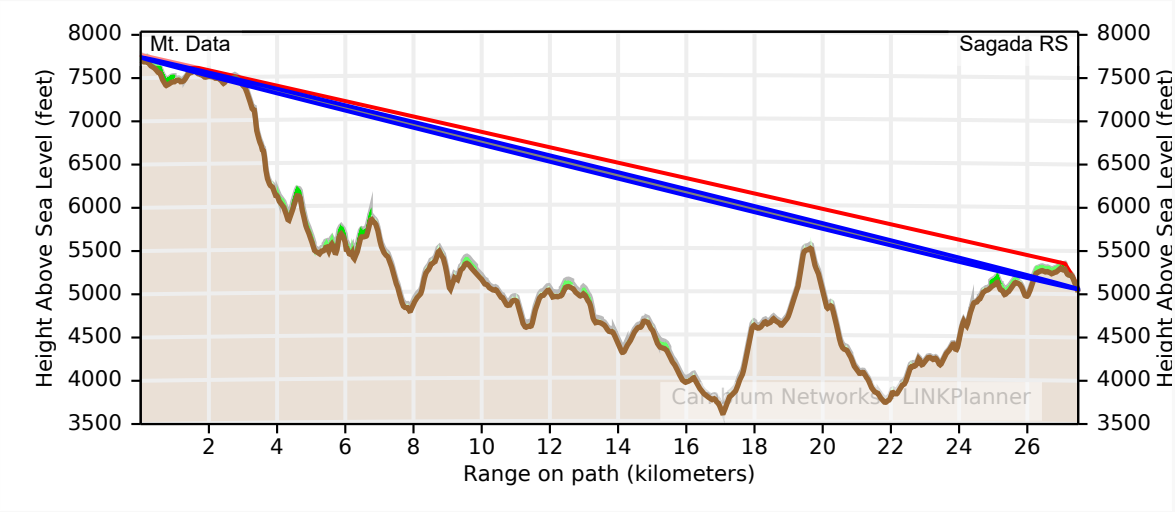
Mode	Max Aggregate User IP Throughput (Mbps)	Mt. Data				Sabangan			
		Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
256QAM 0.81 Dual	442.15	221.07	-70.85	0.0000	0.0000	221.07	-70.85	0.0000	0.0000
64QAM 0.92 Dual	372.52	186.26	-66.11	0.0000	0.0000	186.26	-66.11	0.0000	0.0000
64QAM 0.75 Dual	304.42	152.21	-61.99	0.0000	0.0000	152.21	-61.99	0.0000	0.0000
16QAM 0.87 Dual	236.83	118.41	-57.86	0.0000	0.0000	118.41	-57.86	0.0000	0.0000
16QAM 0.63 Dual	170.25	85.13	-54.24	0.0000	0.0000	85.13	-54.24	0.0000	0.0000
256QAM 0.81 Sngl	221.07	110.54	-67.19	0.0000	0.0000	110.54	-67.19	0.0000	0.0000
64QAM 0.92 Sngl	186.26	93.13	-62.82	0.0000	0.0000	93.13	-62.82	0.0000	0.0000
64QAM 0.75 Sngl	152.21	76.10	-58.86	0.0000	0.0000	76.10	-58.86	0.0000	0.0000
16QAM 0.87 Sngl	118.41	59.21	-54.80	0.0000	0.0000	59.21	-54.80	0.0000	0.0000
16QAM 0.63 Sngl	85.12	42.56	-50.29	0.0000	0.0000	42.56	-50.29	0.0000	0.0000
QPSK 0.87 Sngl	59.20	29.60	-46.96	0.0000	0.0000	29.60	-46.96	0.0000	0.0000
QPSK 0.63 Sngl	42.56	21.28	-42.94	0.0000	0.0000	21.28	-42.94	0.0000	0.0000
BPSK 0.63 Sngl	21.28	10.64	-38.84	0.0000	0.0000	10.64	-38.84	0.0000	0.0000

* Multipath availability calculated using ITU-R P.530-17

15. Mt. Data to Sagada RS

Summary	
Link Name	Mt. Data to Sagada RS
Customer Company Name	DICT CAR
Profile Type	Non Line-of-Sight
Equipment Type	PTP670
Fresnel Zone Clearance	-266.8 feet
Link Distance	27.492 kilometers
Free Space Path Loss	136.48 dB
Excess Path Loss	70.85 dB
User IP Throughput Expectation Aggregate	Aggregate 0.00 Mbps assuming PTP-670 Series running the 670-03-60 software
RF Frequency Band	5.8 GHz (5725 to 5850 MHz)
RF Channel Bandwidth	45 MHz

Path Profile



Link Configuration	
Precise Network Timing	Disabled
Bandwidth	45 MHz
E1/T1	None
Optimization	IP
Sync	Disabled
Symmetry	Adaptive
Dual Payload	Enabled
Highest Mod Mode	256QAM 0.81
Lowest Ethernet Mode	BPSK 0.63 Sngl
Master	Mt. Data

Link Configuration (continued)	
Slave	Sagada RS

Bill of Materials		
Part Number	Qty	Description
01010419001	4	Coaxial Cable Grounding Kits for 1/4" and 3/8" Cable
AR-E4PT6XX-WW	2	PTP 670 All Risks Advance Replacement, 4 additional years (per END)
C000065L007	2	LPU and Grounding Kit (1 kit per ODU)
C050067H010	2	PTP 670 Integrated 23dBi END with AC+DC Enhanced Supply (ROW - U.S. Line Cord). Kit includes ODU, power supply, mounting bracket and US line cord
WB3176	1	328 ft (100 m) Reel Outdoor Copper Clad CAT5E (Recommended for PTP)

Physical Installation Notes for Mt. Data	
Link Name	Mt. Data to Sagada RS
Latitude	16.85382N
Longitude	120.85705E
Site Elevation	7739 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	9.4° (uptilt)
Bearing to Sagada RS	12.59° from True North 15.77° from Magnetic North
Magnetic Declination	3.17° W ±0.28° changing by 0.10° W per year

Physical Installation Notes for Sagada RS	
Link Name	Mt. Data to Sagada RS
Latitude	17.09625N
Longitude	120.91337E
Site Elevation	5059 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	16.1° (uptilt)
Bearing to Mt. Data	192.61° from True North 195.84° from Magnetic North

Physical Installation Notes for Sagada RS (continued)	
Magnetic Declination	3.23° W ±0.28° changing by 0.10° W per year

Radio Commissioning Notes for Mt. Data (Primary)	
Link Name	Mt. Data to Sagada RS
Site Name	Mt. Data
Latitude	16.85382N
Longitude	120.85705E
Altitude	7739 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Master
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Link Symmetry	Adaptive
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-135 dBm ± 26 dB
Predicted Link Loss	207.51 dB ± 26.26 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Sagada RS (Primary)	
Link Name	Mt. Data to Sagada RS
Site Name	Sagada RS
Latitude	17.09625N
Longitude	120.91337E
Altitude	5059 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Slave
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl

Radio Commissioning Notes for Sagada RS (Primary) (continued)	
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-135 dBm ± 26 dB
Predicted Link Loss	207.51 dB ± 26.26 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Country	Argentina (Private)
Band	5.8 GHz
Region Code	44
Max EIRP	50.0 dBm
Output Power	27.0 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 disarm check that the mean value for the link loss is as predicted (207.51 dB ± 26.26 dB). Also check that the received power is not greater than -56dBm.

Mt. Data Performance *	
Mean IP Throughput Predicted	0.00 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	0.0000% (unavailable for 365.0 days/year)

Sagada RS Performance *	
Mean IP Throughput Predicted	0.00 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps

Sagada RS Performance * (continued)	
Minimum IP Throughput Availability Predicted	0.0000% (unavailable for 365.0 days/year)

* Multipath availability calculated using ITU-R P.530-17

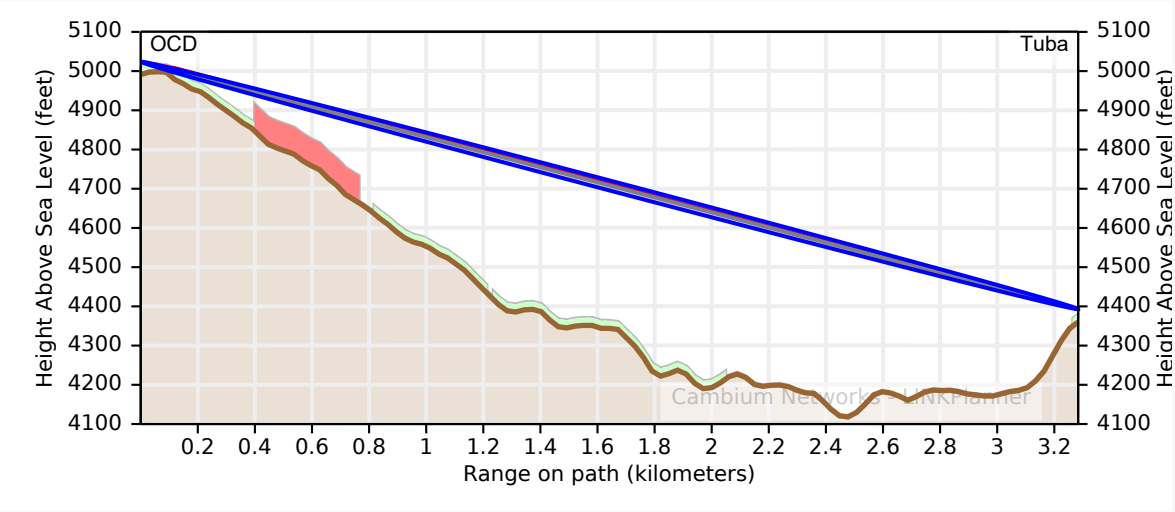
Mode	Max Aggregate User IP Throughput (Mbps)	Mt. Data				Sagada RS			
		Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
256QAM 0.81 Dual	436.79	218.39	-78.24	0.0000	0.0000	218.39	-78.24	0.0000	0.0000
64QAM 0.92 Dual	368.01	184.00	-73.51	0.0000	0.0000	184.00	-73.51	0.0000	0.0000
64QAM 0.75 Dual	300.73	150.37	-69.38	0.0000	0.0000	150.37	-69.38	0.0000	0.0000
16QAM 0.87 Dual	233.96	116.98	-65.26	0.0000	0.0000	116.98	-65.26	0.0000	0.0000
16QAM 0.63 Dual	168.19	84.09	-61.64	0.0000	0.0000	84.09	-61.64	0.0000	0.0000
256QAM 0.81 Sngl	218.39	109.20	-74.59	0.0000	0.0000	109.20	-74.59	0.0000	0.0000
64QAM 0.92 Sngl	184.00	92.00	-70.21	0.0000	0.0000	92.00	-70.21	0.0000	0.0000
64QAM 0.75 Sngl	150.37	75.18	-66.26	0.0000	0.0000	75.18	-66.26	0.0000	0.0000
16QAM 0.87 Sngl	116.98	58.49	-62.19	0.0000	0.0000	58.49	-62.19	0.0000	0.0000
16QAM 0.63 Sngl	84.09	42.05	-57.69	0.0000	0.0000	42.05	-57.69	0.0000	0.0000
QPSK 0.87 Sngl	58.49	29.24	-54.36	0.0000	0.0000	29.24	-54.36	0.0000	0.0000
QPSK 0.63 Sngl	42.04	21.02	-50.34	0.0000	0.0000	21.02	-50.34	0.0000	0.0000
BPSK 0.63 Sngl	21.02	10.51	-46.23	0.0000	0.0000	10.51	-46.23	0.0000	0.0000

* Multipath availability calculated using ITU-R P.530-17

16. OCD to Tuba

Summary	
Link Name	OCD to Tuba
Customer Company Name	DICT CAR
Profile Type	Non Line-of-Sight
Equipment Type	PTP670
Fresnel Zone Clearance	-11.0 feet
Link Distance	3.284 kilometers
Free Space Path Loss	118.02 dB
Excess Path Loss	25.56 dB
User IP Throughput Expectation Aggregate	Aggregate 154.56 Mbps assuming PTP-670 Series running the 670-03-60 software
RF Frequency Band	5.8 GHz (5725 to 5850 MHz)
RF Channel Bandwidth	45 MHz

Path Profile



Link Configuration	
Precise Network Timing	Disabled
Bandwidth	45 MHz
E1/T1	None
Optimization	IP
Sync	Disabled
Symmetry	Adaptive
Dual Payload	Enabled
Highest Mod Mode	256QAM 0.81
Lowest Ethernet Mode	BPSK 0.63 Sngl
Master	OCD

Link Configuration (continued)	
Slave	Tuba

Bill of Materials		
Part Number	Qty	Description
01010419001	4	Coaxial Cable Grounding Kits for 1/4" and 3/8" Cable
AR-E4PT6XX-WW	2	PTP 670 All Risks Advance Replacement, 4 additional years (per END)
C000065L007	2	LPU and Grounding Kit (1 kit per ODU)
C050067H010	2	PTP 670 Integrated 23dBi END with AC+DC Enhanced Supply (ROW - U.S. Line Cord). Kit includes ODU, power supply, mounting bracket and US line cord
WB3176	1	328 ft (100 m) Reel Outdoor Copper Clad CAT5E (Recommended for PTP)

Physical Installation Notes for OCD	
Link Name	OCD to Tuba
Latitude	16.41531N
Longitude	120.58111E
Site Elevation	5024 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	-2.0° (downtilt)
Bearing to Tuba	220.98° from True North 224.05° from Magnetic North
Magnetic Declination	3.06° W ±0.28° changing by 0.10° W per year

Physical Installation Notes for Tuba	
Link Name	OCD to Tuba
Latitude	16.39291N
Longitude	120.56095E
Site Elevation	4393 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	3.4° (uptilt)
Bearing to OCD	40.98° from True North 44.04° from Magnetic North

Physical Installation Notes for Tuba (continued)	
Magnetic Declination	3.06° W ±0.28° changing by 0.10° W per year

Radio Commissioning Notes for OCD (Primary)	
Link Name	OCD to Tuba
Site Name	OCD
Latitude	16.41531N
Longitude	120.58111E
Altitude	5024 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Master
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Link Symmetry	Adaptive
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-71 dBm ± 13 dB
Predicted Link Loss	143.61 dB ± 12.67 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Tuba (Primary)	
Link Name	OCD to Tuba
Site Name	Tuba
Latitude	16.39291N
Longitude	120.56095E
Altitude	4393 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Slave
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl

Radio Commissioning Notes for Tuba (Primary) (continued)	
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-71 dBm ± 13 dB
Predicted Link Loss	143.61 dB ± 12.67 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Country	Argentina (Private)
Band	5.8 GHz
Region Code	44
Max EIRP	50.0 dBm
Output Power	27.0 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 disarm check that the mean value for the link loss is as predicted (143.61 dB ± 12.67 dB). Also check that the received power is not greater than -43dBm.

OCD Performance *	
Mean IP Throughput Predicted	77.28 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	99.9997% (unavailable for 1.7 mins/year)

Tuba Performance *	
Mean IP Throughput Predicted	77.28 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps

Tuba Performance * (continued)	
Minimum IP Throughput Availability Predicted	99.9997% (unavailable for 1.7 mins/year)

* Multipath availability calculated using ITU-R P.530-17

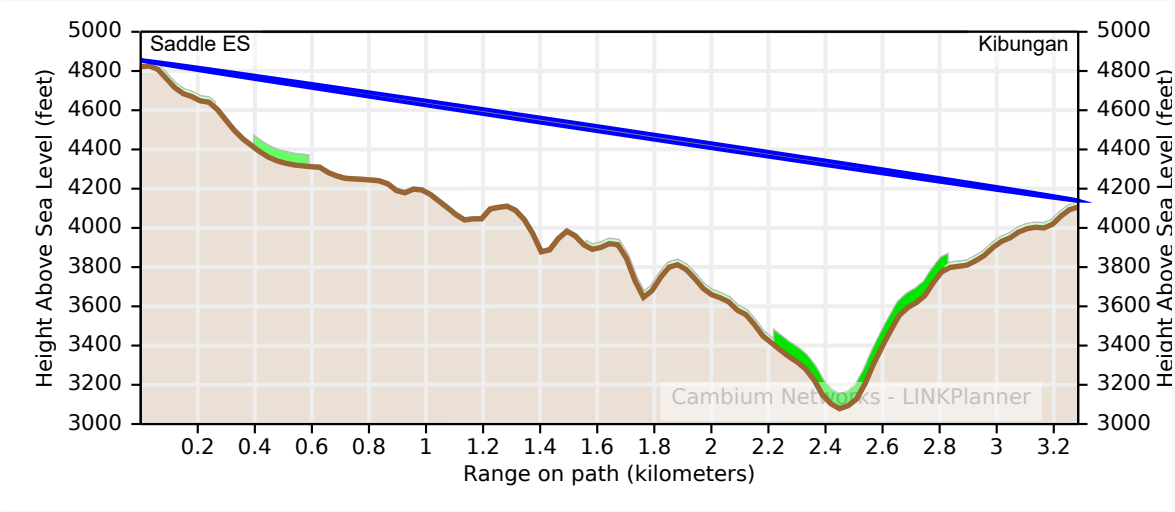
Mode	Max Aggregate User IP Throughput (Mbps)	OCD				Tuba			
		Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
256QAM 0.81 Dual	450.69	225.34	-14.35	0.0000	0.0000	225.34	-14.35	0.0000	0.0000
64QAM 0.92 Dual	379.71	189.86	-9.61	0.0001	0.0001	189.86	-9.61	0.0001	0.0001
64QAM 0.75 Dual	310.30	155.15	-5.49	1.0083	1.0082	155.15	-5.49	1.0083	1.0082
16QAM 0.87 Dual	241.40	120.70	-1.36	23.1356	22.1273	120.70	-1.36	23.1356	22.1273
16QAM 0.63 Dual	173.54	86.77	2.26	56.0083	32.8727	86.77	2.26	56.0083	32.8727
256QAM 0.81 Sngl	225.34	112.67	-10.69	0.0000	0.0000	112.67	-10.69	0.0000	0.0000
64QAM 0.92 Sngl	189.86	94.93	-6.32	0.0001	0.0001	94.93	-6.32	0.0001	0.0001
64QAM 0.75 Sngl	155.15	77.57	-2.36	0.8884	0.8884	77.57	-2.36	0.8884	0.8884
16QAM 0.87 Sngl	120.70	60.35	1.70	8.4503	7.5618	60.35	1.70	8.4503	7.5618
16QAM 0.63 Sngl	86.77	43.38	6.21	98.6643	34.2057	43.38	6.21	98.6643	34.2057
QPSK 0.87 Sngl	60.35	30.17	9.54	99.8828	1.2185	30.17	9.54	99.8828	1.2185
QPSK 0.63 Sngl	43.38	21.69	13.56	99.9938	0.1111	21.69	13.56	99.9938	0.1111
BPSK 0.63 Sngl	21.69	10.84	17.66	99.9997	0.0058	10.84	17.66	99.9997	0.0058

* Multipath availability calculated using ITU-R P.530-17

17. Saddle ES to Kibungan

Summary	
Link Name	Saddle ES to Kibungan
Customer Company Name	DICT CAR
Profile Type	Line-of-Sight
Equipment Type	PTP670
Fresnel Zone Clearance	3.9 feet
Link Distance	3.286 kilometers
Free Space Path Loss	118.03 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate	Aggregate 450.68 Mbps assuming PTP-670 Series running the 670-03-60 software
RF Frequency Band	5.8 GHz (5725 to 5850 MHz)
RF Channel Bandwidth	45 MHz

Path Profile



Link Configuration	
Precise Network Timing	Disabled
Bandwidth	45 MHz
E1/T1	None
Optimization	IP
Sync	Disabled
Symmetry	Adaptive
Dual Payload	Enabled
Highest Mod Mode	256QAM 0.81
Lowest Ethernet Mode	BPSK 0.63 Sngl
Master	Saddle ES

Link Configuration (continued)	
Slave	Kibungan

Bill of Materials		
Part Number	Qty	Description
01010419001	4	Coaxial Cable Grounding Kits for 1/4" and 3/8" Cable
AR-E4PT6XX-WW	2	PTP 670 All Risks Advance Replacement, 4 additional years (per END)
C000065L007	2	LPU and Grounding Kit (1 kit per ODU)
C050067H010	2	PTP 670 Integrated 23dBi END with AC+DC Enhanced Supply (ROW - U.S. Line Cord). Kit includes ODU, power supply, mounting bracket and US line cord
WB3176	1	328 ft (100 m) Reel Outdoor Copper Clad CAT5E (Recommended for PTP)

Physical Installation Notes for Saddle ES	
Link Name	Saddle ES to Kibungan
Latitude	16.66602N
Longitude	120.64172E
Site Elevation	4855 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	-3.8° (downtilt)
Bearing to Kibungan	21.46° from True North 24.58° from Magnetic North
Magnetic Declination	3.12° W ±0.28° changing by 0.10° W per year

Physical Installation Notes for Kibungan	
Link Name	Saddle ES to Kibungan
Latitude	16.69365N
Longitude	120.65299E
Site Elevation	4139 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	3.8° (uptilt)
Bearing to Saddle ES	201.46° from True North 204.59° from Magnetic North

Physical Installation Notes for Kibungan (continued)	
Magnetic Declination	3.13° W ±0.28° changing by 0.10° W per year

Radio Commissioning Notes for Saddle ES (Primary)	
Link Name	Saddle ES to Kibungan
Site Name	Saddle ES
Latitude	16.66602N
Longitude	120.64172E
Altitude	4855 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Master
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Link Symmetry	Adaptive
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-45 dBm ± 5 dB
Predicted Link Loss	118.05 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Kibungan (Primary)	
Link Name	Saddle ES to Kibungan
Site Name	Kibungan
Latitude	16.69365N
Longitude	120.65299E
Altitude	4139 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Slave
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl

Radio Commissioning Notes for Kibungan (Primary) (continued)	
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-45 dBm ± 5 dB
Predicted Link Loss	118.05 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Country	Argentina (Private)
Band	5.8 GHz
Region Code	44
Max EIRP	50.0 dBm
Output Power	27.0 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 disarm check that the mean value for the link loss is as predicted (118.05 dB ± 5.00 dB). Also check that the received power is not greater than -35dBm.

Saddle ES Performance *	
Mean IP Throughput Predicted	225.34 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Kibungan Performance *	
Mean IP Throughput Predicted	225.34 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps

Kibungan Performance * (continued)	
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

* Multipath availability calculated using ITU-R P.530-17

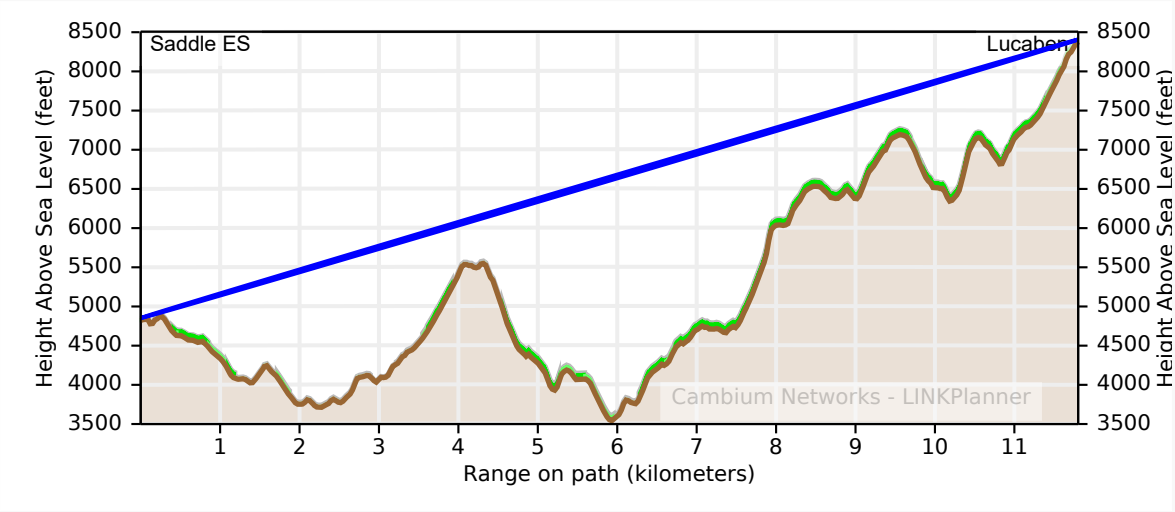
Mode	Max Aggregate User IP Throughput (Mbps)	Saddle ES				Kibungan			
		Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
256QAM 0.81 Dual	450.69	225.34	11.21	99.9995	99.9995	225.34	11.21	99.9995	99.9995
64QAM 0.92 Dual	379.71	189.86	15.94	99.9995	0.0000	189.86	15.94	99.9995	0.0000
64QAM 0.75 Dual	310.30	155.15	20.07	99.9995	0.0000	155.15	20.07	99.9995	0.0000
16QAM 0.87 Dual	241.40	120.70	24.19	99.9995	0.0000	120.70	24.19	99.9995	0.0000
16QAM 0.63 Dual	173.54	86.77	27.82	99.9995	0.0000	86.77	27.82	99.9995	0.0000
256QAM 0.81 Sngl	225.34	112.67	14.87	0.0005	0.0005	112.67	14.87	0.0005	0.0005
64QAM 0.92 Sngl	189.86	94.93	19.24	0.0005	0.0000	94.93	19.24	0.0005	0.0000
64QAM 0.75 Sngl	155.15	77.57	23.19	0.0005	0.0000	77.57	23.19	0.0005	0.0000
16QAM 0.87 Sngl	120.70	60.35	27.26	0.0005	0.0000	60.35	27.26	0.0005	0.0000
16QAM 0.63 Sngl	86.77	43.38	31.77	100.0000	0.0000	43.38	31.77	100.0000	0.0000
QPSK 0.87 Sngl	60.35	30.17	35.09	100.0000	0.0000	30.17	35.09	100.0000	0.0000
QPSK 0.63 Sngl	43.38	21.69	39.11	100.0000	0.0000	21.69	39.11	100.0000	0.0000
BPSK 0.63 Sngl	21.69	10.84	43.22	100.0000	0.0000	10.84	43.22	100.0000	0.0000

* Multipath availability calculated using ITU-R P.530-17

18. Saddle ES to Lucaben

Summary	
Link Name	Saddle ES to Lucaben
Customer Company Name	DICT CAR
Profile Type	Line-of-Sight
Equipment Type	PTP670
Fresnel Zone Clearance	8.9 feet
Link Distance	11.803 kilometers
Free Space Path Loss	129.14 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate	Aggregate 404.75 Mbps assuming PTP-670 Series running the 670-03-60 software
RF Frequency Band	5.8 GHz (5725 to 5850 MHz)
RF Channel Bandwidth	45 MHz

Path Profile



Link Configuration	
Precise Network Timing	Disabled
Bandwidth	45 MHz
E1/T1	None
Optimization	IP
Sync	Disabled
Symmetry	Adaptive
Dual Payload	Enabled
Highest Mod Mode	256QAM 0.81
Lowest Ethernet Mode	BPSK 0.63 Sngl
Master	Saddle ES

Link Configuration (continued)	
Slave	Lucaben

Bill of Materials		
Part Number	Qty	Description
01010419001	4	Coaxial Cable Grounding Kits for 1/4" and 3/8" Cable
AR-E4PT6XX-WW	2	PTP 670 All Risks Advance Replacement, 4 additional years (per END)
C000065L007	2	LPU and Grounding Kit (1 kit per ODU)
C050067H010	2	PTP 670 Integrated 23dBi END with AC+DC Enhanced Supply (ROW - U.S. Line Cord). Kit includes ODU, power supply, mounting bracket and US line cord
WB3176	1	328 ft (100 m) Reel Outdoor Copper Clad CAT5E (Recommended for PTP)

Physical Installation Notes for Saddle ES	
Link Name	Saddle ES to Lucaben
Latitude	16.66602N
Longitude	120.64172E
Site Elevation	4852 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	30.0 feet AGL
Antenna Tilt Angle	5.2° (uptilt)
Bearing to Lucaben	60.68° from True North 63.80° from Magnetic North
Magnetic Declination	3.12° W ±0.28° changing by 0.10° W per year

Physical Installation Notes for Lucaben	
Link Name	Saddle ES to Lucaben
Latitude	16.71823N
Longitude	120.73822E
Site Elevation	8407 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	30.0 feet AGL
Antenna Tilt Angle	-5.3° (downtilt)
Bearing to Saddle ES	240.71° from True North 243.84° from Magnetic North

Physical Installation Notes for Lucaben (continued)	
Magnetic Declination	3.14° W ±0.28° changing by 0.10° W per year

Radio Commissioning Notes for Saddle ES (Primary)	
Link Name	Saddle ES to Lucaben
Site Name	Saddle ES
Latitude	16.66602N
Longitude	120.64172E
Altitude	4852 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Master
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Link Symmetry	Adaptive
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-56 dBm ± 5 dB
Predicted Link Loss	129.21 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Lucaben (Primary)	
Link Name	Saddle ES to Lucaben
Site Name	Lucaben
Latitude	16.71823N
Longitude	120.73822E
Altitude	8407 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Slave
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl

Radio Commissioning Notes for Lucaben (Primary) (continued)	
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-56 dBm ± 5 dB
Predicted Link Loss	129.21 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Country	Argentina (Private)
Band	5.8 GHz
Region Code	44
Max EIRP	50.0 dBm
Output Power	27.0 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 disarm check that the mean value for the link loss is as predicted (129.21 dB ± 5.00 dB). Also check that the received power is not greater than -35dBm.

Saddle ES Performance *	
Mean IP Throughput Predicted	202.38 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Lucaben Performance *	
Mean IP Throughput Predicted	202.38 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps

Lucaben Performance * (continued)	
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

* Multipath availability calculated using ITU-R P.530-17

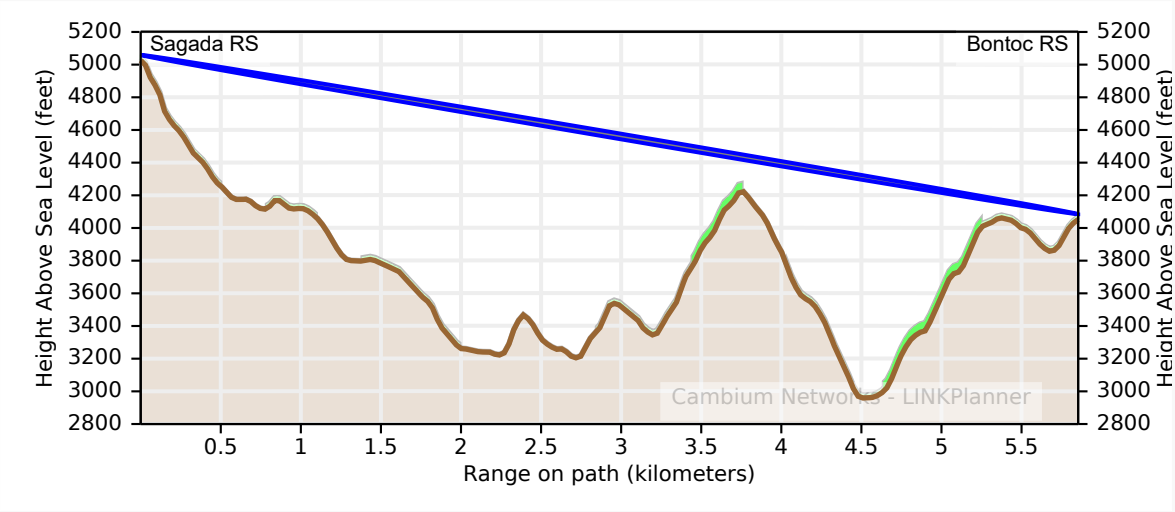
Mode	Max Aggregate User IP Throughput (Mbps)	Saddle ES				Lucaben			
		Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
256QAM 0.81 Dual	445.62	222.81	0.05	41.8123	41.8123	222.81	0.05	41.8123	41.8123
64QAM 0.92 Dual	375.45	187.72	4.79	99.9451	58.1329	187.72	4.79	99.9451	58.1329
64QAM 0.75 Dual	306.81	153.41	8.91	99.9993	0.0542	153.41	8.91	99.9993	0.0542
16QAM 0.87 Dual	238.69	119.34	13.04	99.9995	0.0002	119.34	13.04	99.9995	0.0002
16QAM 0.63 Dual	171.59	85.79	16.66	99.9995	0.0000	85.79	16.66	99.9995	0.0000
256QAM 0.81 Sngl	222.81	111.40	3.71	0.0005	0.0005	111.40	3.71	0.0005	0.0005
64QAM 0.92 Sngl	187.72	93.86	8.08	0.0005	0.0000	93.86	8.08	0.0005	0.0000
64QAM 0.75 Sngl	153.41	76.70	12.04	0.0005	0.0000	76.70	12.04	0.0005	0.0000
16QAM 0.87 Sngl	119.34	59.67	16.10	0.0005	0.0000	59.67	16.10	0.0005	0.0000
16QAM 0.63 Sngl	85.79	42.90	20.61	100.0000	0.0000	42.90	20.61	100.0000	0.0000
QPSK 0.87 Sngl	59.67	29.83	23.94	100.0000	0.0000	29.83	23.94	100.0000	0.0000
QPSK 0.63 Sngl	42.89	21.45	27.96	100.0000	0.0000	21.45	27.96	100.0000	0.0000
BPSK 0.63 Sngl	21.45	10.72	32.06	100.0000	0.0000	10.72	32.06	100.0000	0.0000

* Multipath availability calculated using ITU-R P.530-17

19. Sagada RS to Bontoc RS

Summary	
Link Name	Sagada RS to Bontoc RS
Customer Company Name	DICT CAR
Profile Type	Line-of-Sight
Equipment Type	PTP670
Fresnel Zone Clearance	16.4 feet
Link Distance	5.854 kilometers
Free Space Path Loss	123.05 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate	Aggregate 449.15 Mbps assuming PTP-670 Series running the 670-03-60 software
RF Frequency Band	5.8 GHz (5725 to 5850 MHz)
RF Channel Bandwidth	45 MHz

Path Profile



Link Configuration	
Precise Network Timing	Disabled
Bandwidth	45 MHz
E1/T1	None
Optimization	IP
Sync	Disabled
Symmetry	Adaptive
Dual Payload	Enabled
Highest Mod Mode	256QAM 0.81
Lowest Ethernet Mode	BPSK 0.63 Sngl
Master	Sagada RS

Link Configuration (continued)	
Slave	Bontoc RS

Bill of Materials		
Part Number	Qty	Description
01010419001	4	Coaxial Cable Grounding Kits for 1/4" and 3/8" Cable
AR-E4PT6XX-WW	2	PTP 670 All Risks Advance Replacement, 4 additional years (per END)
C000065L007	2	LPU and Grounding Kit (1 kit per ODU)
C050067H010	2	PTP 670 Integrated 23dBi END with AC+DC Enhanced Supply (ROW - U.S. Line Cord). Kit includes ODU, power supply, mounting bracket and US line cord
WB3176	1	328 ft (100 m) Reel Outdoor Copper Clad CAT5E (Recommended for PTP)

Physical Installation Notes for Sagada RS	
Link Name	Sagada RS to Bontoc RS
Latitude	17.09625N
Longitude	120.91337E
Site Elevation	5059 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	-2.9° (downtilt)
Bearing to Bontoc RS	91.47° from True North 94.70° from Magnetic North
Magnetic Declination	3.23° W ±0.28° changing by 0.10° W per year

Physical Installation Notes for Bontoc RS	
Link Name	Sagada RS to Bontoc RS
Latitude	17.09489N
Longitude	120.96835E
Site Elevation	4085 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	2.9° (uptilt)
Bearing to Sagada RS	271.48° from True North 274.72° from Magnetic North

Physical Installation Notes for Bontoc RS (continued)	
Magnetic Declination	3.24° W ±0.28° changing by 0.10° W per year

Radio Commissioning Notes for Sagada RS (Primary)	
Link Name	Sagada RS to Bontoc RS
Site Name	Sagada RS
Latitude	17.09625N
Longitude	120.91337E
Altitude	5059 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Master
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Link Symmetry	Adaptive
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-50 dBm ± 5 dB
Predicted Link Loss	123.09 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Bontoc RS (Primary)	
Link Name	Sagada RS to Bontoc RS
Site Name	Bontoc RS
Latitude	17.09489N
Longitude	120.96835E
Altitude	4085 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Slave
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl

Radio Commissioning Notes for Bontoc RS (Primary) (continued)	
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-50 dBm ± 5 dB
Predicted Link Loss	123.09 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Country	Argentina (Private)
Band	5.8 GHz
Region Code	44
Max EIRP	50.0 dBm
Output Power	27.0 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 disarm check that the mean value for the link loss is as predicted (123.09 dB ± 5.00 dB). Also check that the received power is not greater than -35dBm.

Sagada RS Performance *	
Mean IP Throughput Predicted	224.58 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Bontoc RS Performance *	
Mean IP Throughput Predicted	224.58 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps

Bontoc RS Performance * (continued)	
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

* Multipath availability calculated using ITU-R P.530-17

Mode	Max Aggregate User IP Throughput (Mbps)	Sagada RS				Bontoc RS			
		Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
256QAM 0.81 Dual	449.15	224.58	6.17	99.9964	99.9964	224.58	6.17	99.9964	99.9964
64QAM 0.92 Dual	378.42	189.21	10.91	99.9995	0.0031	189.21	10.91	99.9995	0.0031
64QAM 0.75 Dual	309.24	154.62	15.03	99.9995	0.0001	154.62	15.03	99.9995	0.0001
16QAM 0.87 Dual	240.58	120.29	19.16	99.9995	0.0000	120.29	19.16	99.9995	0.0000
16QAM 0.63 Dual	172.95	86.47	22.78	99.9995	0.0000	86.47	22.78	99.9995	0.0000
256QAM 0.81 Sngl	224.58	112.29	9.83	0.0005	0.0005	112.29	9.83	0.0005	0.0005
64QAM 0.92 Sngl	189.21	94.61	14.20	0.0005	0.0000	94.61	14.20	0.0005	0.0000
64QAM 0.75 Sngl	154.62	77.31	18.16	0.0005	0.0000	77.31	18.16	0.0005	0.0000
16QAM 0.87 Sngl	120.29	60.14	22.22	0.0005	0.0000	60.14	22.22	0.0005	0.0000
16QAM 0.63 Sngl	86.47	43.24	26.73	100.0000	0.0000	43.24	26.73	100.0000	0.0000
QPSK 0.87 Sngl	60.14	30.07	30.06	100.0000	0.0000	30.07	30.06	100.0000	0.0000
QPSK 0.63 Sngl	43.23	21.62	34.08	100.0000	0.0000	21.62	34.08	100.0000	0.0000
BPSK 0.63 Sngl	21.62	10.81	38.19	100.0000	0.0000	10.81	38.19	100.0000	0.0000

* Multipath availability calculated using ITU-R P.530-17

20. Sto Tomas to Kapangan Municipal Hall

Summary	
Link Name	Sto Tomas to Kapangan Municipal Hall
Customer Company Name	DICT CAR
Profile Type	Line-of-Sight
Equipment Type	PTP670
Fresnel Zone Clearance	16.4 feet
Link Distance	27.094 kilometers
Free Space Path Loss	136.36 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate	Aggregate 293.30 Mbps assuming PTP-670 Series running the 670-03-60 software
RF Frequency Band	5.8 GHz (5725 to 5850 MHz)
RF Channel Bandwidth	45 MHz

Path Profile

Link Configuration	
Precise Network Timing	Disabled
Bandwidth	45 MHz
E1/T1	None
Optimization	IP
Sync	Disabled
Symmetry	Adaptive
Dual Payload	Enabled
Highest Mod Mode	256QAM 0.81
Lowest Ethernet Mode	BPSK 0.63 Sngl
Master	Sto Tomas

Link Configuration (continued)	
Slave	Kapangan Municipal Hall

Bill of Materials		
Part Number	Qty	Description
01010419001	4	Coaxial Cable Grounding Kits for 1/4" and 3/8" Cable
AR-E4PT6XX-WW	2	PTP 670 All Risks Advance Replacement, 4 additional years (per END)
C000065L007	2	LPU and Grounding Kit (1 kit per ODU)
C050067H010	2	PTP 670 Integrated 23dBi END with AC+DC Enhanced Supply (ROW - U.S. Line Cord). Kit includes ODU, power supply, mounting bracket and US line cord
WB3176	1	328 ft (100 m) Reel Outdoor Copper Clad CAT5E (Recommended for PTP)

Physical Installation Notes for Sto Tomas	
Link Name	Sto Tomas to Kapangan Municipal Hall
Latitude	16.33479N
Longitude	120.56149E
Site Elevation	7376 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	-2.8° (downtilt)
Bearing to Kapangan Municipal Hall	9.98° from True North 13.03° from Magnetic North
Magnetic Declination	3.04° W ±0.28° changing by 0.10° W per year

Physical Installation Notes for Kapangan Municipal Hall	
Link Name	Sto Tomas to Kapangan Municipal Hall
Latitude	16.57591N
Longitude	120.60550E
Site Elevation	3213 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	2.6° (uptilt)
Bearing to Sto Tomas	190.00° from True North 193.09° from Magnetic North

Physical Installation Notes for Kapangan Municipal Hall (continued)	
Magnetic Declination	3.10° W ±0.28° changing by 0.10° W per year

Radio Commissioning Notes for Sto Tomas (Primary)	
Link Name	Sto Tomas to Kapangan Municipal Hall
Site Name	Sto Tomas
Latitude	16.33479N
Longitude	120.56149E
Altitude	7376 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Master
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Link Symmetry	Adaptive
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-64 dBm ± 5 dB
Predicted Link Loss	136.55 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Kapangan Municipal Hall (Primary)	
Link Name	Sto Tomas to Kapangan Municipal Hall
Site Name	Kapangan Municipal Hall
Latitude	16.57591N
Longitude	120.60550E
Altitude	3213 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Slave
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl

Radio Commissioning Notes for Kapangan Municipal Hall (Primary) (continued)	
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-64 dBm ± 5 dB
Predicted Link Loss	136.55 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Country	Argentina (Private)
Band	5.8 GHz
Region Code	44
Max EIRP	50.0 dBm
Output Power	27.0 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 disarm check that the mean value for the link loss is as predicted (136.55 dB ± 5.00 dB). Also check that the received power is not greater than -35dBm.

Sto Tomas Performance *	
Mean IP Throughput Predicted	146.65 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Kapangan Municipal Hall Performance *	
Mean IP Throughput Predicted	146.65 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps

Kapangan Municipal Hall Performance * (continued)	
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

* Multipath availability calculated using ITU-R P.530-17

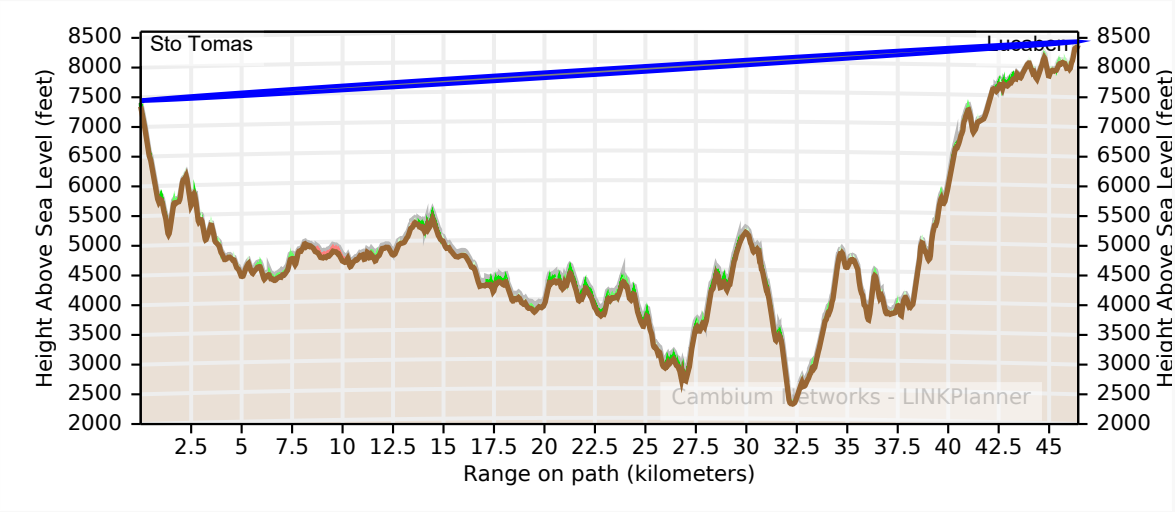
Mode	Max Aggregate User IP Throughput (Mbps)	Sto Tomas				Kapangan Municipal Hall			
		Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
256QAM 0.81 Dual	436.79	218.39	-7.28	0.0009	0.0009	218.39	-7.28	0.0009	0.0009
64QAM 0.92 Dual	368.01	184.00	-2.55	0.7112	0.7103	184.00	-2.55	0.7112	0.7103
64QAM 0.75 Dual	300.73	150.37	1.58	88.1679	87.4567	150.37	1.58	88.1679	87.4567
16QAM 0.87 Dual	233.96	116.98	5.70	99.9818	11.8140	116.98	5.70	99.9818	11.8140
16QAM 0.63 Dual	168.19	84.09	9.33	99.9984	0.0166	84.09	9.33	99.9984	0.0166
256QAM 0.81 Sngl	218.39	109.20	-3.63	0.0000	0.0000	109.20	-3.63	0.0000	0.0000
64QAM 0.92 Sngl	184.00	92.00	0.75	0.0004	0.0004	92.00	0.75	0.0004	0.0004
64QAM 0.75 Sngl	150.37	75.18	4.70	0.0005	0.0001	75.18	4.70	0.0005	0.0001
16QAM 0.87 Sngl	116.98	58.49	8.77	0.0005	0.0000	58.49	8.77	0.0005	0.0000
16QAM 0.63 Sngl	84.09	42.05	13.27	99.9998	0.0009	42.05	13.27	99.9998	0.0009
QPSK 0.87 Sngl	58.49	29.24	16.60	99.9999	0.0002	29.24	16.60	99.9999	0.0002
QPSK 0.63 Sngl	42.04	21.02	20.62	100.0000	0.0000	21.02	20.62	100.0000	0.0000
BPSK 0.63 Sngl	21.02	10.51	24.73	100.0000	0.0000	10.51	24.73	100.0000	0.0000

* Multipath availability calculated using ITU-R P.530-17

21. Sto Tomas to Lucaben

Summary	
Link Name	Sto Tomas to Lucaben
Customer Company Name	DICT CAR
Profile Type	Line-of-Sight
Equipment Type	PTP670
Fresnel Zone Clearance	34.4 feet
Link Distance	46.438 kilometers
Free Space Path Loss	141.02 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate	Aggregate 79.81 Mbps assuming PTP-670 Series running the 670-03-60 software
RF Frequency Band	5.8 GHz (5725 to 5825 MHz)
RF Channel Bandwidth	45 MHz

Path Profile



Link Configuration	
Precise Network Timing	Disabled
Bandwidth	45 MHz
E1/T1	None
Optimization	IP
Sync	Disabled
Symmetry	Symmetric
Dual Payload	Enabled
Highest Mod Mode	256QAM 0.81
Lowest Ethernet Mode	BPSK 0.63 Sngl
Master	Sto Tomas

Link Configuration (continued)	
Slave	Lucaben

Bill of Materials		
Part Number	Qty	Description
01010419001	5	Coaxial Cable Grounding Kits for 1/4" and 3/8" Cable
AR-E4PT6XX-WW	2	PTP 670 All Risks Advance Replacement, 4 additional years (per END)
C000065L007	2	LPU and Grounding Kit (1 kit per ODU)
C050067H016	2	PTP 670 Integrated 23dBi END with AC+DC Enhanced Supply (ROW - EU Line Cord). Kit includes ODU, power supply, mounting bracket and EU line cord
WB3176	1	328 ft (100 m) Reel Outdoor Copper Clad CAT5E (Recommended for PTP)

Physical Installation Notes for Sto Tomas	
Link Name	Sto Tomas to Lucaben
Latitude	16.33479N
Longitude	120.56149E
Site Elevation	7443 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	100.0 feet AGL
Antenna Tilt Angle	0.2° (uptilt)
Bearing to Lucaben	23.94° from True North 26.99° from Magnetic North
Magnetic Declination	3.04° W ±0.28° changing by 0.10° W per year

Physical Installation Notes for Lucaben	
Link Name	Sto Tomas to Lucaben
Latitude	16.71823N
Longitude	120.73822E
Site Elevation	8437 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	60.0 feet AGL
Antenna Tilt Angle	-0.5° (downtilt)
Bearing to Sto Tomas	204.00° from True North 207.13° from Magnetic North

Physical Installation Notes for Lucaben (continued)	
Magnetic Declination	3.14° W ±0.28° changing by 0.10° W per year

Radio Commissioning Notes for Sto Tomas (Primary)	
Link Name	Sto Tomas to Lucaben
Site Name	Sto Tomas
Latitude	16.33479N
Longitude	120.56149E
Altitude	7443 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Master
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	11 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Link Symmetry	Symmetric
Maximum Transmit Power	18 dBm
Ranging Mode	Auto 0 to 100 kilometers
Predicted Receive Power	-77 dBm ± 5 dB
Predicted Link Loss	141.28 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Lucaben (Primary)	
Link Name	Sto Tomas to Lucaben
Site Name	Lucaben
Latitude	16.71823N
Longitude	120.73822E
Altitude	8437 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Slave
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl

Radio Commissioning Notes for Lucaben (Primary) (continued)	
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	11 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Maximum Transmit Power	18 dBm
Ranging Mode	Auto 0 to 100 kilometers
Predicted Receive Power	-77 dBm ± 5 dB
Predicted Link Loss	141.28 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Country	Philippines
Band	5.8 GHz
Region Code	11
Max EIRP	41.0 dBm
Output Power	18.0 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 disarm check that the mean value for the link loss is as predicted (141.28 dB ± 5.00 dB). Also check that the received power is not greater than -35dBm.

Sto Tomas Performance *	
Mean IP Throughput Predicted	39.90 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	99.9983% (unavailable for 8.7 mins/year)

Lucaben Performance *	
Mean IP Throughput Predicted	39.90 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps

Lucaben Performance * (continued)	
Minimum IP Throughput Availability Predicted	99.9983% (unavailable for 8.7 mins/year)

* Multipath availability calculated using ITU-R P.530-17

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Sto Tomas			Lucaben		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
256QAM 0.81 Dual	418.40	209.20	-17.01	0.0000	0.0000	-17.01	0.0000	0.0000
64QAM 0.92 Dual	352.51	176.26	-13.28	0.0000	0.0000	-13.28	0.0000	0.0000
64QAM 0.75 Dual	288.07	144.04	-9.15	0.0006	0.0006	-9.15	0.0006	0.0006
16QAM 0.87 Dual	224.11	112.05	-6.03	0.0064	0.0058	-6.03	0.0064	0.0058
16QAM 0.63 Dual	161.11	80.55	-2.40	0.9322	0.9258	-2.40	0.9322	0.9258
256QAM 0.81 Sngl	209.20	104.60	-13.35	0.0000	0.0000	-13.35	0.0000	0.0000
64QAM 0.92 Sngl	176.26	88.13	-9.98	0.0000	0.0000	-9.98	0.0000	0.0000
64QAM 0.75 Sngl	144.04	72.02	-6.03	0.0000	0.0000	-6.03	0.0000	0.0000
16QAM 0.87 Sngl	112.05	56.03	-2.96	0.0000	0.0000	-2.96	0.0000	0.0000
16QAM 0.63 Sngl	80.55	40.28	1.55	94.0750	93.1428	1.55	94.0750	93.1428
QPSK 0.87 Sngl	56.02	28.01	3.87	99.7122	5.6372	3.87	99.7122	5.6372
QPSK 0.63 Sngl	40.27	20.14	7.89	99.9904	0.2782	7.89	99.9904	0.2782
BPSK 0.63 Sngl	20.14	10.07	11.00	99.9983	0.0079	11.00	99.9983	0.0079

* Multipath availability calculated using ITU-R P.530-17

22. Sto Tomas to Sablan

Summary	
Link Name	Sto Tomas to Sablan
Customer Company Name	DICT CAR
Profile Type	Line-of-Sight
Equipment Type	PTP670
Fresnel Zone Clearance	4.8 feet
Link Distance	19.715 kilometers
Free Space Path Loss	133.59 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate	Aggregate 341.54 Mbps assuming PTP-670 Series running the 670-03-60 software
RF Frequency Band	5.8 GHz (5725 to 5850 MHz)
RF Channel Bandwidth	45 MHz

Path Profile

Link Configuration	
Precise Network Timing	Disabled
Bandwidth	45 MHz
E1/T1	None
Optimization	IP
Sync	Disabled
Symmetry	Adaptive
Dual Payload	Enabled
Highest Mod Mode	256QAM 0.81
Lowest Ethernet Mode	BPSK 0.63 Sngl
Master	Sto Tomas

Link Configuration (continued)	
Slave	Sablan

Bill of Materials		
Part Number	Qty	Description
01010419001	4	Coaxial Cable Grounding Kits for 1/4" and 3/8" Cable
AR-E4PT6XX-WW	2	PTP 670 All Risks Advance Replacement, 4 additional years (per END)
C000065L007	2	LPU and Grounding Kit (1 kit per ODU)
C050067H010	2	PTP 670 Integrated 23dBi END with AC+DC Enhanced Supply (ROW - U.S. Line Cord). Kit includes ODU, power supply, mounting bracket and US line cord
WB3176	1	328 ft (100 m) Reel Outdoor Copper Clad CAT5E (Recommended for PTP)

Physical Installation Notes for Sto Tomas	
Link Name	Sto Tomas to Sablan
Latitude	16.33479N
Longitude	120.56149E
Site Elevation	7392 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	49.2 feet AGL
Antenna Tilt Angle	-4.8° (downtilt)
Bearing to Sablan	336.13° from True North 339.17° from Magnetic North
Magnetic Declination	3.04° W ±0.28° changing by 0.10° W per year

Physical Installation Notes for Sablan	
Link Name	Sto Tomas to Sablan
Latitude	16.49769N
Longitude	120.48677E
Site Elevation	2047 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	4.7° (uptilt)
Bearing to Sto Tomas	156.11° from True North 159.18° from Magnetic North

Physical Installation Notes for Sablan (continued)	
Magnetic Declination	3.07° W ±0.28° changing by 0.10° W per year

Radio Commissioning Notes for Sto Tomas (Primary)	
Link Name	Sto Tomas to Sablan
Site Name	Sto Tomas
Latitude	16.33479N
Longitude	120.56149E
Altitude	7392 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Master
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Link Symmetry	Adaptive
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-61 dBm ± 5 dB
Predicted Link Loss	133.74 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Sablan (Primary)	
Link Name	Sto Tomas to Sablan
Site Name	Sablan
Latitude	16.49769N
Longitude	120.48677E
Altitude	2047 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Slave
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl

Radio Commissioning Notes for Sablan (Primary) (continued)	
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	44 - 5.8 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-61 dBm ± 5 dB
Predicted Link Loss	133.74 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Country	Argentina (Private)
Band	5.8 GHz
Region Code	44
Max EIRP	50.0 dBm
Output Power	27.0 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 disarm check that the mean value for the link loss is as predicted (133.74 dB ± 5.00 dB). Also check that the received power is not greater than -35dBm.

Sto Tomas Performance *	
Mean IP Throughput Predicted	170.77 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

Sablan Performance *	
Mean IP Throughput Predicted	170.77 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps

Sablan Performance * (continued)	
Minimum IP Throughput Availability Predicted	100.0000% (unavailable for 1 secs/year)

* Multipath availability calculated using ITU-R P.530-17

Mode	Max Aggregate User IP Throughput (Mbps)	Sto Tomas				Sablan			
		Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Max User IP Throughput (Mbps)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
256QAM 0.81 Dual	441.16	220.58	-4.48	0.0077	0.0077	220.58	-4.48	0.0077	0.0077
64QAM 0.92 Dual	371.69	185.85	0.26	55.7276	55.7199	185.85	0.26	55.7276	55.7199
64QAM 0.75 Dual	303.74	151.87	4.38	99.8874	44.1598	151.87	4.38	99.8874	44.1598
16QAM 0.87 Dual	236.30	118.15	8.51	99.9986	0.1112	118.15	8.51	99.9986	0.1112
16QAM 0.63 Dual	169.87	84.94	12.13	99.9994	0.0007	84.94	12.13	99.9994	0.0007
256QAM 0.81 Sngl	220.58	110.29	-0.82	0.0001	0.0001	110.29	-0.82	0.0001	0.0001
64QAM 0.92 Sngl	185.84	92.92	3.55	0.0005	0.0004	92.92	3.55	0.0005	0.0004
64QAM 0.75 Sngl	151.87	75.94	7.51	0.0005	0.0000	75.94	7.51	0.0005	0.0000
16QAM 0.87 Sngl	118.15	59.07	11.57	0.0005	0.0000	59.07	11.57	0.0005	0.0000
16QAM 0.63 Sngl	84.93	42.47	16.08	100.0000	0.0002	42.47	16.08	100.0000	0.0002
QPSK 0.87 Sngl	59.07	29.54	19.41	100.0000	0.0000	29.54	19.41	100.0000	0.0000
QPSK 0.63 Sngl	42.47	21.23	23.43	100.0000	0.0000	21.23	23.43	100.0000	0.0000
BPSK 0.63 Sngl	21.23	10.62	27.53	100.0000	0.0000	10.62	27.53	100.0000	0.0000

* Multipath availability calculated using ITU-R P.530-17

23. Sto Tomas to Saddle ES

Summary	
Link Name	Sto Tomas to Saddle ES
Customer Company Name	DICT CAR
Profile Type	Line-of-Sight
Equipment Type	PTP670
Fresnel Zone Clearance	16.4 feet
Link Distance	37.643 kilometers
Free Space Path Loss	139.43 dB
Excess Path Loss	0.00 dB
User IP Throughput Expectation Aggregate	Aggregate 224.45 Mbps assuming PTP-670 Series running the 670-03-60 software
RF Frequency Band	5.9 GHz (5825 to 6050 MHz)
RF Channel Bandwidth	45 MHz

Path Profile

Link Configuration	
Precise Network Timing	Disabled
Bandwidth	45 MHz
E1/T1	None
Optimization	IP
Sync	Disabled
Symmetry	Symmetric
Dual Payload	Enabled
Highest Mod Mode	256QAM 0.81
Lowest Ethernet Mode	BPSK 0.63 Sngl
Master	Sto Tomas

Link Configuration (continued)	
Slave	Saddle ES

Bill of Materials		
Part Number	Qty	Description
01010419001	4	Coaxial Cable Grounding Kits for 1/4" and 3/8" Cable
AR-E4PT6XX-WW	2	PTP 670 All Risks Advance Replacement, 4 additional years (per END)
C000065L007	2	LPU and Grounding Kit (1 kit per ODU)
C050067H016	2	PTP 670 Integrated 23dBi END with AC+DC Enhanced Supply (ROW - EU Line Cord). Kit includes ODU, power supply, mounting bracket and EU line cord
WB3176	1	328 ft (100 m) Reel Outdoor Copper Clad CAT5E (Recommended for PTP)

Physical Installation Notes for Sto Tomas	
Link Name	Sto Tomas to Saddle ES
Latitude	16.33479N
Longitude	120.56149E
Site Elevation	7376 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	-1.3° (downtilt)
Bearing to Saddle ES	13.14° from True North 16.19° from Magnetic North
Magnetic Declination	3.04° W ±0.28° changing by 0.10° W per year

Physical Installation Notes for Saddle ES	
Link Name	Sto Tomas to Saddle ES
Latitude	16.66602N
Longitude	120.64172E
Site Elevation	4855 feet AMSL
Equipment Type	PTP670
Platform Variant	Integrated Antenna
Antenna Type	Cambium Networks High Gain Integrated
Antenna Beamwidth	10.0°
Antenna Gain	23.0 dBi
Antenna Height	32.8 feet AGL
Antenna Tilt Angle	1.0° (uptilt)
Bearing to Sto Tomas	193.16° from True North 196.28° from Magnetic North

Physical Installation Notes for Saddle ES (continued)	
Magnetic Declination	3.12° W ±0.28° changing by 0.10° W per year

Radio Commissioning Notes for Sto Tomas (Primary)	
Link Name	Sto Tomas to Saddle ES
Site Name	Sto Tomas
Latitude	16.33479N
Longitude	120.56149E
Altitude	7376 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Master
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	16 - 5.9 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Link Symmetry	Symmetric
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-67 dBm ± 5 dB
Predicted Link Loss	139.69 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Radio Commissioning Notes for Saddle ES (Primary)	
Link Name	Sto Tomas to Saddle ES
Site Name	Saddle ES
Latitude	16.66602N
Longitude	120.64172E
Altitude	4855 feet
TDM Interface	None
Wireless Topology	Point to Point
Master Slave Mode	Slave
Protection Mode	Disabled
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl

Radio Commissioning Notes for Saddle ES (Primary) (continued)	
Link Mode Optimization	IP Traffic
TDD Synchronization Mode	Disabled
Antenna Selection	Integrated
Regulatory Band	16 - 5.9 GHz
Connectorized Antenna Type	Directional, Integrated flat plate
Channel Bandwidth	45 MHz
Maximum Transmit Power	27 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-67 dBm ± 5 dB
Predicted Link Loss	139.69 dB ± 5.00 dB
Horizontal Accuracy	
MSN	
Vertical Accuracy	

Regulatory Conditions	
Country	Other
Band	5.9 GHz
Region Code	16
Max EIRP	50.0 dBm
Output Power	27.0 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 disarm check that the mean value for the link loss is as predicted (139.69 dB ± 5.00 dB). Also check that the received power is not greater than -35dBm.

Sto Tomas Performance *	
Mean IP Throughput Predicted	112.22 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps
Minimum IP Throughput Availability Predicted	99.9999% (unavailable for 16 secs/year)

Saddle ES Performance *	
Mean IP Throughput Predicted	112.22 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	1.00 Mbps

Saddle ES Performance * (continued)	
Minimum IP Throughput Availability Predicted	99.9999% (unavailable for 16 secs/year)

* Multipath availability calculated using ITU-R P.530-17

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	Sto Tomas			Saddle ES		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
256QAM 0.81 Dual	423.99	212.00	-11.74	0.0001	0.0001	-11.74	0.0001	0.0001
64QAM 0.92 Dual	357.22	178.61	-6.51	0.0032	0.0031	-6.51	0.0032	0.0031
64QAM 0.75 Dual	291.92	145.96	-2.18	1.2590	1.2558	-2.18	1.2590	1.2558
16QAM 0.87 Dual	227.10	113.55	2.00	94.6060	93.3470	2.00	94.6060	93.3470
16QAM 0.63 Dual	163.26	81.63	5.66	99.9625	5.3565	5.66	99.9625	5.3565
256QAM 0.81 Sngl	211.99	106.00	-7.78	0.0000	0.0000	-7.78	0.0000	0.0000
64QAM 0.92 Sngl	178.61	89.31	-3.12	0.0000	0.0000	-3.12	0.0000	0.0000
64QAM 0.75 Sngl	145.96	72.98	0.97	0.0004	0.0004	0.97	0.0004	0.0004
16QAM 0.87 Sngl	113.55	56.77	5.08	0.0005	0.0001	5.08	0.0005	0.0001
16QAM 0.63 Sngl	81.63	40.81	9.62	99.9977	0.0348	9.62	99.9977	0.0348
QPSK 0.87 Sngl	56.77	28.39	12.95	99.9992	0.0016	12.95	99.9992	0.0016
QPSK 0.63 Sngl	40.81	20.41	16.98	99.9998	0.0006	16.98	99.9998	0.0006
BPSK 0.63 Sngl	20.40	10.20	21.09	99.9999	0.0002	21.09	99.9999	0.0002

* Multipath availability calculated using ITU-R P.530-17

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