Project Trabalho, Link IFMT to Casa
LINKPlanner Installation Report

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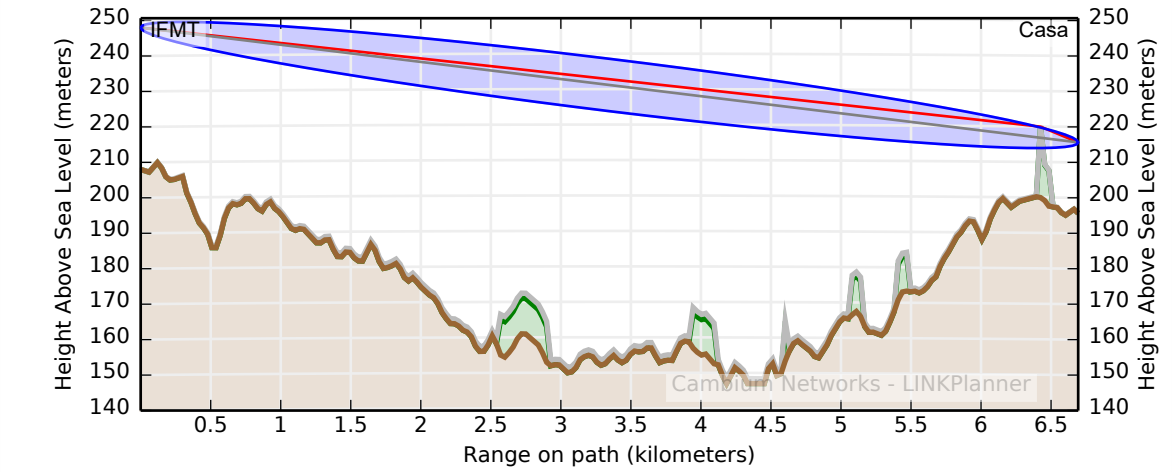
PEDRO FELIPE GONÇALVES DE ARRUDA
Organization: IFMT
Phone: +5565992427002
Email: pedrofelipega@gmail.com

Summary	
Link Name	IFMT to Casa
Customer Company Name	Arruda
Profile Type	Non Line-of-Sight
Equipment Type	PTP670
Maximum Obstruction	20 meters
Link Distance	6.694 kilometers
Free Space Path Loss	123.92 dB
Excess Path Loss	21.94 dB
User IP Throughput Expectation Aggregate	Aggregate 99.39 Mbps assuming PTP-670 Series running the 670-02-60 software
RF Frequency Band	5.4 GHz (5470 to 5725 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	IFMT
Slave	Casa

Bill of Materials

Part Number	Qty	Description
01010419001	9	Coaxial Cable Grounding Kits for 1/4" and 3/8" Cable
C000065L007	2	LPU and Grounding Kit (1 kit per ODU)
C050067H008	2	PTP 670 Connectorized END with AC+DC Enhanced Supply (ROW - U.S. Line Cord). Kit includes ODU, power supply, mounting bracket and US line cord
EW-E4PT6XX-WW	2	PTP 650/670 Extended Warranty, 4 additional years (per END)
RDH4507	2	5.25-5.85 GHZ, 8-FT (2.4M), DUAL-POL, H-POL & V-POL
WB3176	1	328 ft (100 m) Reel Outdoor Copper Clad CAT5E (Recommended for PTP)

Physical Installation Notes for IFMT	
Link Name	IFMT to Casa
Latitude	15.59237S

Physical Installation Notes for IFMT (continued)	
Longitude	056.09889W
Site Elevation	248 meters AMSL
Equipment Type	PTP670
Platform Variant	Connectorized
Antenna Type	Cambium Networks 8ft Dual-Polar Parabolic RDH4507
Antenna Beamwidth	1.5°
Antenna Gain	40.93 dBi
Antenna Height	40.0 meters AGL
Antenna Tilt angle	-0.3° (downtilt)
Bearing to Casa	210.27° from True North 227.93° from Magnetic North
Magnetic Declination	17.66° W ±0.35° changing by 0.16° W per year
Cable Loss	1.0 dB

Physical Installation Notes for Casa	
Link Name	IFMT to Casa
Latitude	15.64461S
Longitude	056.13036W
Site Elevation	216 meters AMSL
Equipment Type	PTP670
Platform Variant	Connectorized
Antenna Type	Cambium Networks 8ft Dual-Polar Parabolic RDH4507
Antenna Beamwidth	1.5°
Antenna Gain	40.93 dBi
Antenna Height	20.0 meters AGL
Antenna Tilt angle	0.9° (uptilt)
Bearing to IFMT	30.28° from True North 47.91° from Magnetic North
Magnetic Declination	17.63° W ±0.35° changing by 0.16° W per year
Cable Loss	1.0 dB

Radio Commissioning Notes for IFMT	
Link Name	IFMT to Casa
Site Name	IFMT
Latitude	15.59237S
Longitude	056.09889W
Altitude	248 meters
TDM Interface	None
Master Slave Mode	Master
Dual Payload	Enabled
Max Receive Modulation Mode	256QAM 0.81 Dual
Lowest Data Modulation Mode	BPSK 0.63 Sngl
Link Mode Optimization	IP Traffic

Radio Commissioning Notes for IFMT (continued)	
TDD Synchronization Mode	Disabled
Regulatory Band	41 - 5.4 GHz
Connectorized Antenna Type	Directional, 8ft parabolic
Channel Bandwidth	45 MHz
Link Symmetry	Symmetric
Antenna Gain	40.93 dBi
Cable Loss	1.0 dB
Maximum Transmit Power	-10 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-76 dBm ± 12 dB
Predicted Link Loss	145.94 dB ± 11.58 dB

Radio Commissioning Notes for Casa	
Link Name	IFMT to Casa
Site Name	Casa
Latitude	15.64461S
Longitude	056.13036W
Altitude	216 meters
TDM Interface	None
Master Slave Mode	Slave
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
Regulatory Band	41 - 5.4 GHz
Connectorized Antenna Type	Directional, 8ft parabolic
Channel Bandwidth	45 MHz
Link Symmetry	Symmetric
Antenna Gain	40.93 dBi
Cable Loss	1.0 dB
Maximum Transmit Power	-10 dBm
Ranging Mode	Auto 0 to 40 kilometers
Predicted Receive Power	-76 dBm ± 12 dB
Predicted Link Loss	145.94 dB ± 11.58 dB

Regulatory Conditions	
Country	Brazil
Band	5.4 GHz
Region Code	41
Max EIRP	29.9 dBm
Output Power	-10.0 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 (145.94 dB ± 11.58 dB). Also check that the received power is not greater than -52dBm.

IFMT Performance *	
Mean IP Throughput Predicted	49.70 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	100.00 Mbps
Minimum IP Throughput Availability Predicted	0.9025% (unavailable for 361.7 days/year)

Casa Performance *	
Mean IP Throughput Predicted	49.70 Mbps
Mean IP Throughput Required	5.00 Mbps
Minimum IP Throughput Required	100.00 Mbps
Minimum IP Throughput Availability Predicted	0.9025% (unavailable for 361.7 days/year)

* Multipath availability calculated using ITU-R

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	IFMT			Casa		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
256QAM 0.81 Dual	433.46	216.73	-15.51	0.0000	0.0000	-15.51	0.0000	0.0000
64QAM 0.92 Dual	365.20	182.60	-12.08	0.0000	0.0000	-12.08	0.0000	0.0000
64QAM 0.75 Dual	298.43	149.22	-8.11	0.0007	0.0007	-8.11	0.0007	0.0007
16QAM 0.87 Dual	232.17	116.09	-5.03	0.9025	0.9017	-5.03	0.9025	0.9017
16QAM 0.63 Dual	166.90	83.45	-1.43	22.6446	21.7421	-1.43	22.6446	21.7421
256QAM 0.81 Sngl	216.72	108.36	-12.04	0.0000	0.0000	-12.04	0.0000	0.0000

(continued)

Mode	Max Aggregate User IP Throughput (Mbps)	Max User IP Throughput in Either Direction (Mbps)	IFMT			Casa		
			Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)	Fade Margin (dB)	IP Throughput Availability (%) *	Receive time in Mode (%)
64QAM 0.92 Sngl	182.59	91.30	-8.86	0.0000	0.0000	-8.86	0.0000	0.0000
64QAM 0.75 Sngl	149.22	74.61	-5.01	0.0009	0.0008	-5.01	0.0009	0.0008
16QAM 0.87 Sngl	116.08	58.04	-1.98	0.7281	0.7272	-1.98	0.7281	0.7272
16QAM 0.63 Sngl	83.45	41.72	2.51	86.5672	63.1946	2.51	86.5672	63.1946
QPSK 0.87 Sngl	58.04	29.02	4.83	97.8395	11.2723	4.83	97.8395	11.2723
QPSK 0.63 Sngl	41.72	20.86	8.84	99.9318	2.0923	8.84	99.9318	2.0923
BPSK 0.63 Sngl	20.86	10.43	11.95	99.9950	0.0632	11.95	99.9950	0.0632

* Multipath availability calculated using ITU-R