



UNIONE EUROPEA
Fondo europeo di sviluppo regionale



Agenzia per la
Coesione Territoriale



COMUNE DI NAPOLI

Comune di Napoli Municipalità 6 (Ponticelli, Barra e San Giovanni a Teduccio)

Via Atripaldi, 64 - 80146 - Napoli (NA)



PROGETTO ESECUTIVO

“Fondo per il sistema integrato della sorveglianza stradale” istituito con Delibera di Giunta regionale della Campania n. 672 del 30 dicembre 2019, in attuazione all’art. 6 della Legge Regionale della Campania n. 3/2017.

IL PROGETTISTA



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(Direttore Tecnico Italiantech Srl)

ELABORATO

Relazione Specialistica Verifiche Hiperlan

REVISIONE	DATA	AGGIORNAMENTI
0	03/11/2022	=====
1	30/11/2022	Infrastruttura di Rete

	DATA	FIRMA
REDATTO	30/11/2022	Ing. Guido Gallo
VERIFICATO	30/11/2022	Ing. Pasquale Del Sorbo
APPROVATO		
DATA	30/11/2022	Cod. Univoco Progetto B69J21005530002
SCALA	=====	ELABORATO
NOME FILE	MU6_PE_B.02	B.02

Il progettista si riserva la proprietà del documento vietandone la riproduzione e la divulgazione senza autorizzazione ai sensi delle vigenti leggi

Comune di Napoli
Data: 17/01/2023, DETDI/2023/0000021

Project Verifiche Hiperlan LINKPlanner Proposal Report

30 November 2022

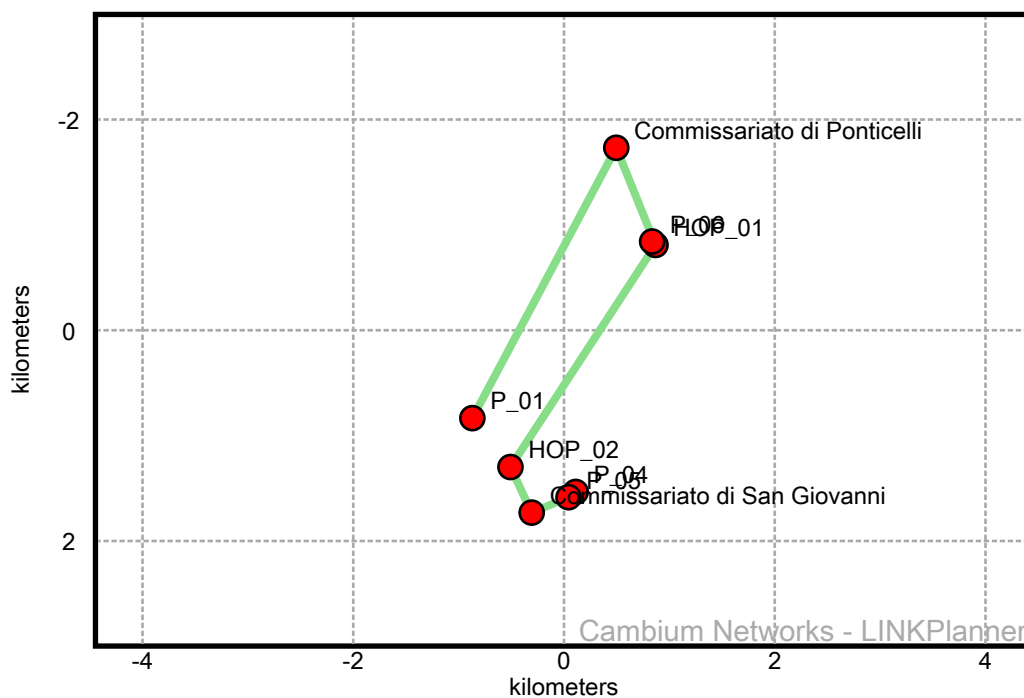
Guido

Organization: Italteltech Srl

Phone: 0810128396



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Comune di Napoli
Data: 17/01/2023, DETDI/2023/00000021

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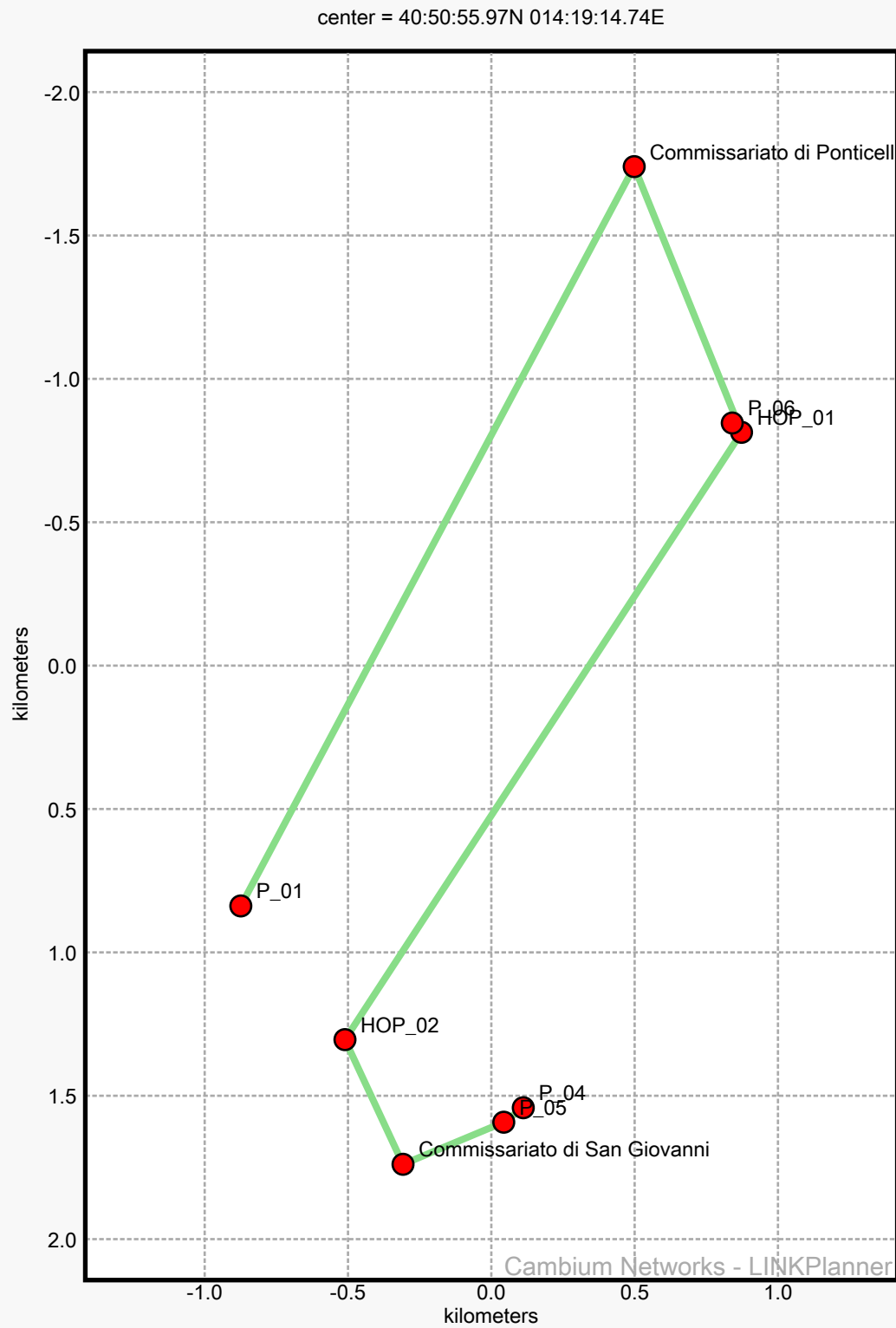
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1. Project Summary

Project: Verifiche Hiperlan

General Information	
Customer Name	
Company Name	
Address	
Phone	
Cell Phone	
Email	

Network Map

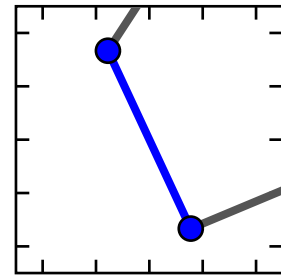


Link name	Product	Local antenna	Remote antenna	Max aggregate IP throughput
Commissariato di San Giovanni to HOP_02	ePMP Force 200	Cambium Networks ePMP Force 200	Cambium Networks ePMP Force 200	276.78 Mbps
Commissariato di San Giovanni to P_05	ePMP Force 200	Cambium Networks ePMP Force 200	Cambium Networks ePMP Force 200	276.85 Mbps
HOP_01 to Commissariato di Ponticelli	ePMP Force 200	Cambium Networks ePMP Force 200	Cambium Networks ePMP Force 200	276.53 Mbps
HOP_02 to HOP_01	ePMP Force 200	Cambium Networks ePMP Force 200	Cambium Networks ePMP Force 200	275.20 Mbps
P_01 to Commissariato di Ponticelli	ePMP Force 200	Cambium Networks ePMP Force 200	Cambium Networks ePMP Force 200	271.64 Mbps
P_04 to P_05	ePMP Force 200	Cambium Networks ePMP Force 200	Cambium Networks ePMP Force 200	276.95 Mbps
P_06 to HOP_01	ePMP Force 200	Cambium Networks ePMP Force 200	Cambium Networks ePMP Force 200	276.93 Mbps

Bill of Materials : PTP Network		
Part Number	Qty	Description
C000000L065	14	Gigabit Surge Suppressor (30V)
C050900C261	14	ePMP 1000: 5 GHz Force 200AR5-25 High Gain Radio (ROW) (EU cord). Kit includes radio with antenna, power supply, line cord and mounting bracket
EW-E2EPF200-WW	14	ePMP Force 200 Extended Warranty, 2 Addl Years



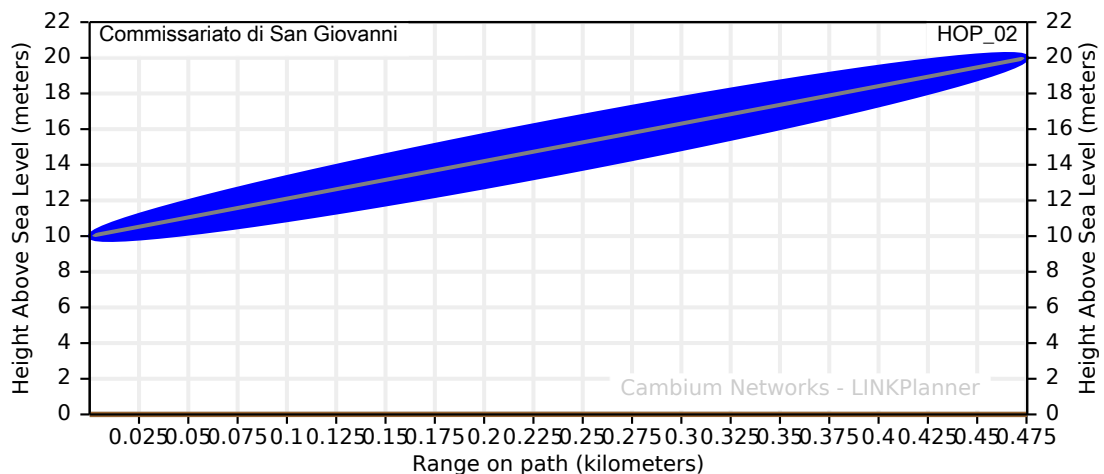
Commissariato di San Giovanni to HOP_02



Equipment: Cambium Networks ePMP Force 200 Integrated

Cambium Networks ePMP Force 200 @ 10 m

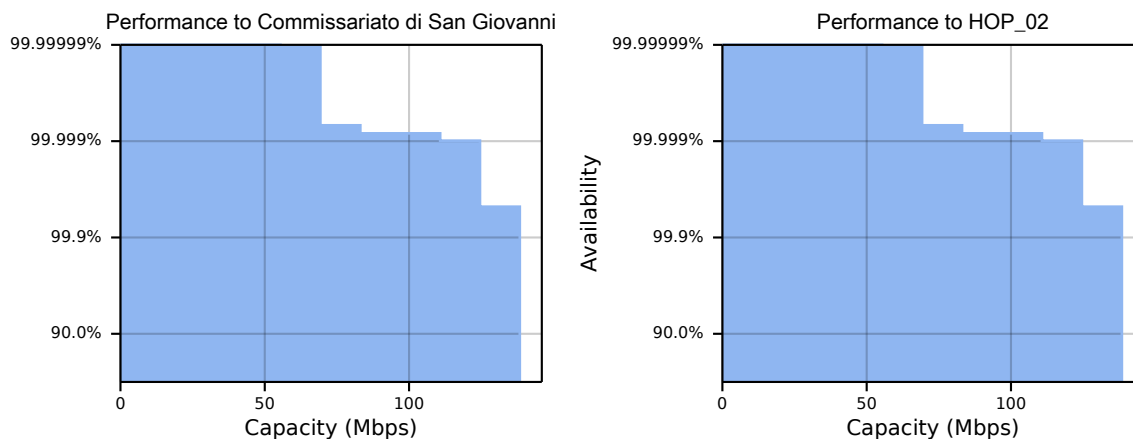
Cambium Networks ePMP Force 200 @ 20 m



	Performance to Commissariato di San Giovanni	Performance to HOP_02
Mean IP	138.37 Mbps	138.42 Mbps
IP Availability	100.0000 % for 1.0 Mbps	100.0000 % for 1.0 Mbps

Link Summary			
Link Length	0.475 km	System Gain Margin	23.07 dB
Band	5.8 GHz	Mean Aggregate Data Rate	276.78 Mbps
Regulation	Other	Annual Link Availability	100.0000 %
Modulation	Adaptive	Annual Link Unavailability	1 secs/year
Bandwidth	40 MHz	Frame Size	1518 Bytes
Total Path Loss	101.26 dB	Prediction Model	ITU-R P.530-17
System Gain	124.33 dB		

Performance Charts



Climatic Factors, Losses and Standards

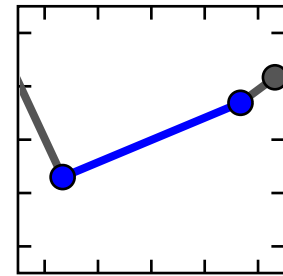
dN/dH not exceeded for 1% of time	-374.46 N units/km	Free Space Path Loss	101.26 dB
Area roughness 110x110km	282.17 metre	Gaseous Absorption Loss	0.00 dB
Geoclimatic factor	3.00e-05	Link Type	No Profile
Fade Occurrence Factor (P0)	3.97e-09	Excess Path Loss	0.00 dB
Path inclination	21.04 mr	Atmospheric Gasses	ITU-R P.676-12, ITU-R P.835-6
Value of K Exceeded for 99.99% (ke)	0.40	Diffraction Loss	ITU-R P.526-15
Excess Path Loss at ke	0.00 dB	Propagation	ITU-R P.530-17
0.01% Rain rate	36.53 mm/hr	Rain Rate	ITU-R P.837-7
Rain Attenuation	0.12 dB/km	Refractivity Index	ITU-R P.453-14

Bill of Materials

Part Number	Qty	Description
C000000L065	2	Gigabit Surge Suppressor (30V)
C050900C261	2	ePMP 1000: 5 GHz Force 200AR5-25 High Gain Radio (ROW) (EU cord). Kit includes radio with antenna, power supply, line cord and mounting bracket
EW-E2EPF200-WW	2	ePMP Force 200 Extended Warranty, 2 Addl Years



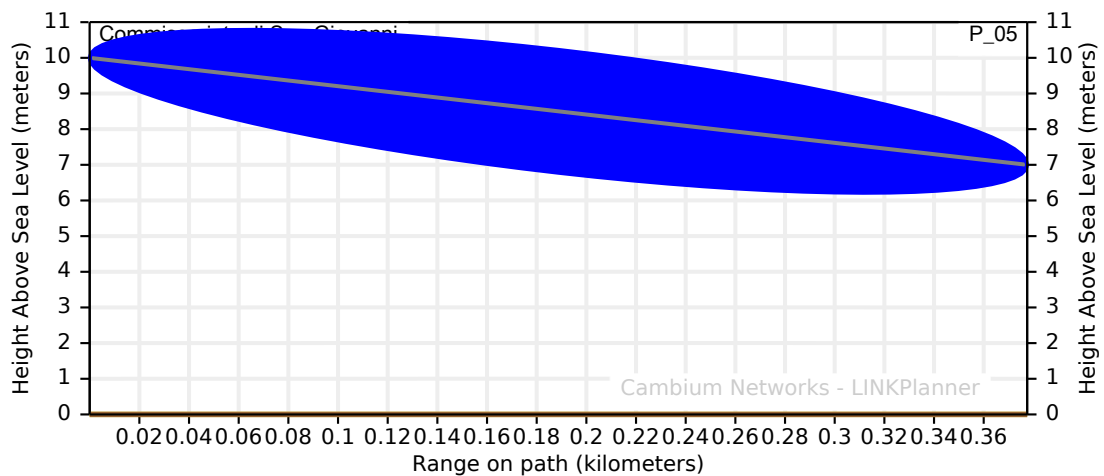
Commissariato di San Giovanni to P_05



Equipment: Cambium Networks ePMP Force 200 Integrated

Cambium Networks ePMP Force 200 @ 10 m

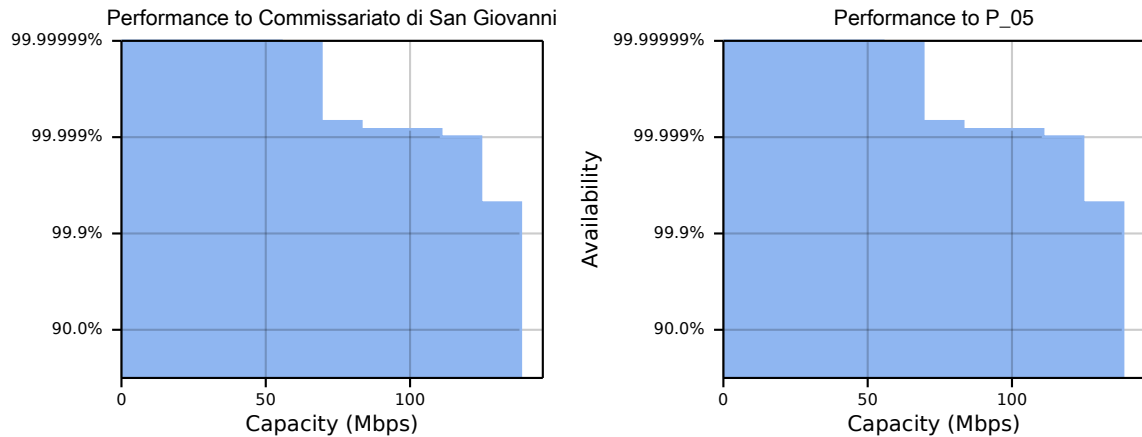
Cambium Networks ePMP Force 200 @ 7 m



	Performance to Commissariato di San Giovanni	Performance to P_05
Mean IP	138.37 Mbps	138.49 Mbps
IP Availability	100.0000 % for 1.0 Mbps	100.0000 % for 1.0 Mbps

Link Summary			
Link Length	0.378 km	System Gain Margin	23.07 dB
Band	5.8 GHz	Mean Aggregate Data Rate	276.85 Mbps
Regulation	Other	Annual Link Availability	100.0000 %
Modulation	Adaptive	Annual Link Unavailability	1 secs/year
Bandwidth	40 MHz	Frame Size	1518 Bytes
Total Path Loss	99.26 dB	Prediction Model	ITU-R P.530-17
System Gain	122.33 dB		

Performance Charts



Climatic Factors, Losses and Standards

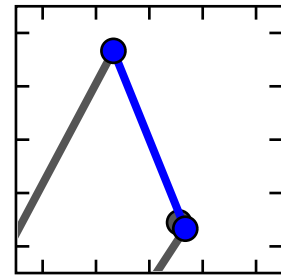
dN/dH not exceeded for 1% of time	-374.34 N units/km	Free Space Path Loss	99.25 dB
Area roughness 110x110km	282.43 metre	Gaseous Absorption Loss	0.00 dB
Geoclimatic factor	2.99e-05	Link Type	No Profile
Fade Occurrence Factor (P0)	4.60e-09	Excess Path Loss	0.00 dB
Path inclination	7.95 mr	Atmospheric Gasses	ITU-R P.676-12, ITU-R P.835-6
Value of K Exceeded for 99.99% (ke)	0.40	Diffraction Loss	ITU-R P.526-10
Excess Path Loss at ke	0.00 dB	Propagation	ITU-R P.530-17
0.01% Rain rate	36.52 mm/hr	Rain Rate	ITU-R P.837-7
Rain Attenuation	0.12 dB/km	Refractivity Index	ITU-R P.453-14

Bill of Materials

Part Number	Qty	Description
C000000L065	2	Gigabit Surge Suppressor (30V)
C050900C261	2	ePMP 1000: 5 GHz Force 200AR5-25 High Gain Radio (ROW) (EU cord). Kit includes radio with antenna, power supply, line cord and mounting bracket
EW-E2EPF200-WW	2	ePMP Force 200 Extended Warranty, 2 Addl Years



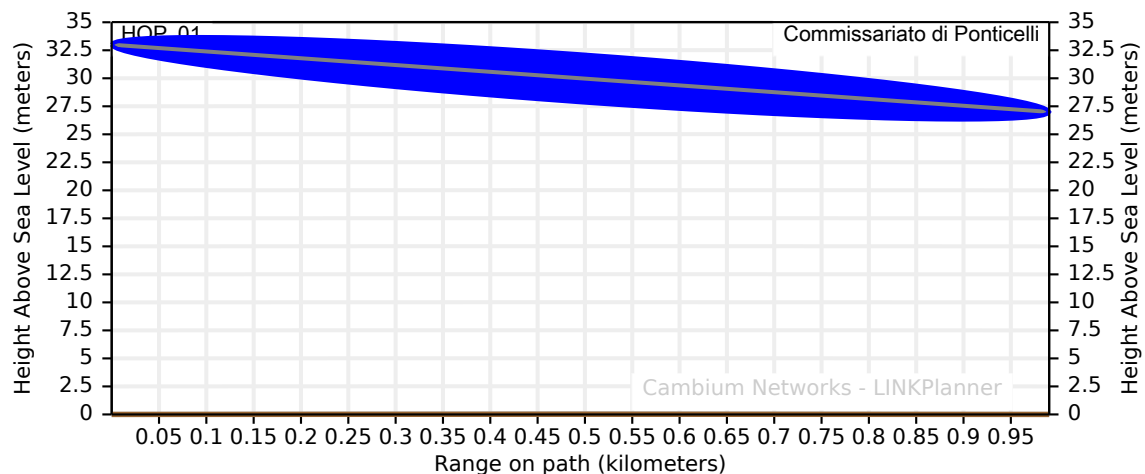
HOP_01 to Commissariato di Ponticelli



Equipment: Cambium Networks ePMP Force 200 Integrated

Cambium Networks ePMP Force 200 @ 33 m

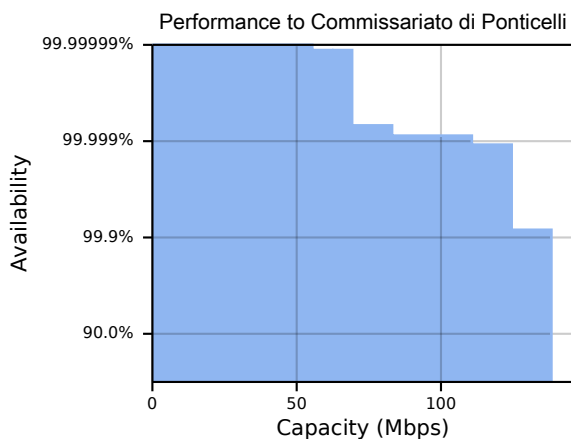
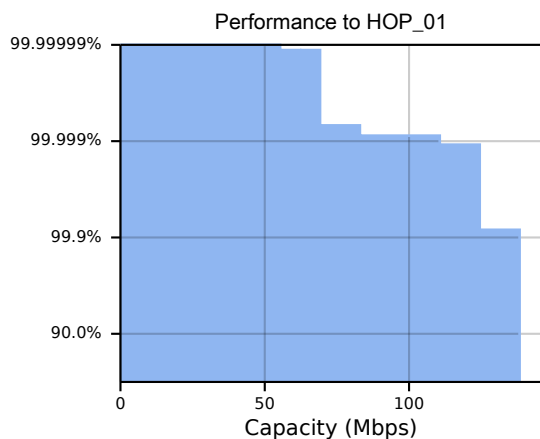
Cambium Networks ePMP Force 200 @ 27 m



	Performance to HOP_01	Performance to Commissariato di Ponticelli
Mean IP	138.29 Mbps	138.24 Mbps
IP Availability	100.0000 % for 1.0 Mbps	100.0000 % for 1.0 Mbps

Link Summary			
Link Length	0.990 km	System Gain Margin	22.69 dB
Band	5.8 GHz	Mean Aggregate Data Rate	276.53 Mbps
Regulation	Other	Annual Link Availability	100.0000 %
Modulation	Adaptive	Annual Link Unavailability	1 secs/year
Bandwidth	40 MHz	Frame Size	1518 Bytes
Total Path Loss	107.64 dB	Prediction Model	ITU-R P.530-17
System Gain	130.33 dB		

Performance Charts



Climatic Factors, Losses and Standards

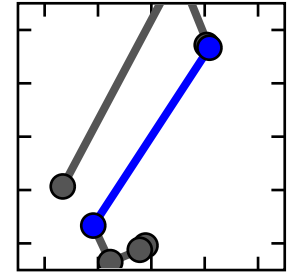
dN/dH not exceeded for 1% of time	-368.68 N units/km	Free Space Path Loss	107.63 dB
Area roughness 110x110km	290.39 metre	Gaseous Absorption Loss	0.01 dB
Geoclimatic factor	2.86e-05	Link Type	No Profile
Fade Occurrence Factor (P0)	1.44e-07	Excess Path Loss	0.00 dB
Path inclination	6.06 mr	Atmospheric Gasses	ITU-R P.676-12, ITU-R P.835-6
Value of K Exceeded for 99.99% (ke)	0.40	Diffraction Loss	ITU-R P.526-15
Excess Path Loss at ke	0.00 dB	Propagation	ITU-R P.530-17
0.01% Rain rate	36.54 mm/hr	Rain Rate	ITU-R P.837-7
Rain Attenuation	0.12 dB/km	Refractivity Index	ITU-R P.453-14

Bill of Materials

Part Number	Qty	Description
C000000L065	2	Gigabit Surge Suppressor (30V)
C050900C261	2	ePMP 1000: 5 GHz Force 200AR5-25 High Gain Radio (ROW) (EU cord). Kit includes radio with antenna, power supply, line cord and mounting bracket
EW-E2EPF200-WW	2	ePMP Force 200 Extended Warranty, 2 Addl Years



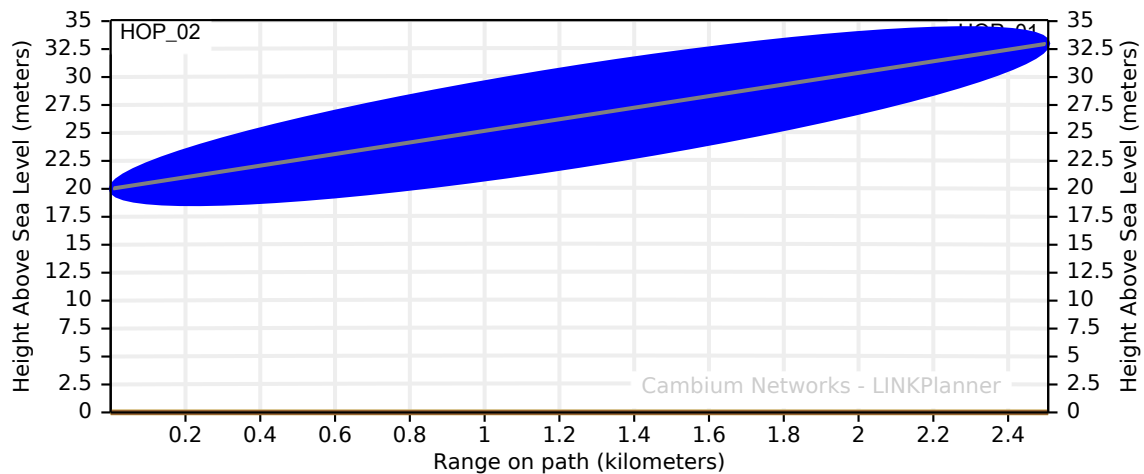
HOP_02 to HOP_01



Equipment: Cambium Networks ePMP Force 200 Integrated

Cambium Networks ePMP Force 200 @ 20 m

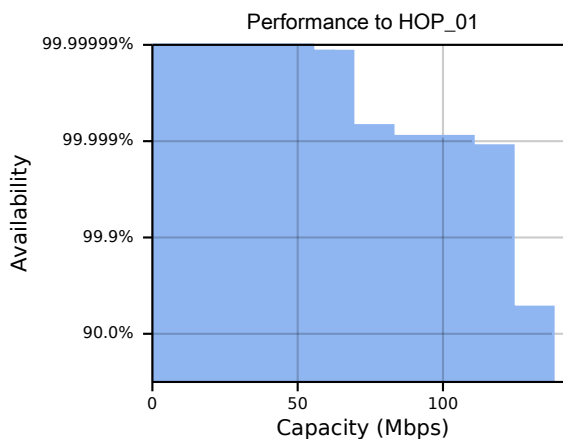
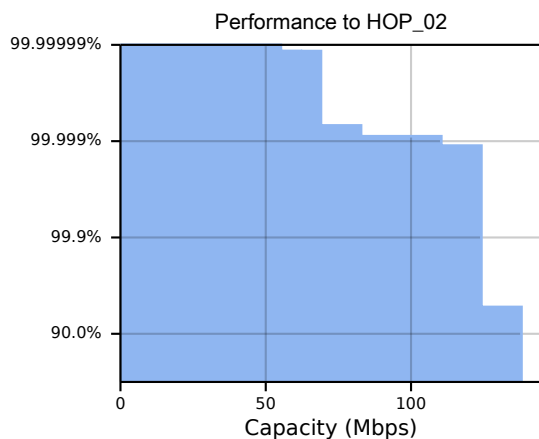
Cambium Networks ePMP Force 200 @ 33 m



	Performance to HOP_02	Performance to HOP_01
Mean IP	137.62 Mbps	137.58 Mbps
IP Availability	100.0000 % for 1.0 Mbps	100.0000 % for 1.0 Mbps

Link Summary			
Link Length	2.507 km	System Gain Margin	22.60 dB
Band	5.8 GHz	Mean Aggregate Data Rate	275.20 Mbps
Regulation	Other	Annual Link Availability	100.0000 %
Modulation	Adaptive	Annual Link Unavailability	1 secs/year
Bandwidth	40 MHz	Frame Size	1518 Bytes
Total Path Loss	115.72 dB	Prediction Model	ITU-R P.530-17
System Gain	138.33 dB		

Performance Charts



Climatic Factors, Losses and Standards

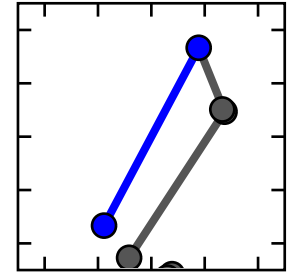
dN/dH not exceeded for 1% of time	-371.69 N units/km	Free Space Path Loss	115.70 dB
Area roughness 110x110km	286.13 metre	Gaseous Absorption Loss	0.02 dB
Geoclimatic factor	2.93e-05	Link Type	No Profile
Fade Occurrence Factor (P0)	4.02e-06	Excess Path Loss	0.00 dB
Path inclination	5.19 mr	Atmospheric Gasses	ITU-R P.676-12, ITU-R P.835-6
Value of K Exceeded for 99.99% (ke)	0.40	Diffraction Loss	ITU-R P.526-10
Excess Path Loss at ke	0.00 dB	Propagation	ITU-R P.530-17
0.01% Rain rate	36.53 mm/hr	Rain Rate	ITU-R P.837-7
Rain Attenuation	0.12 dB/km	Refractivity Index	ITU-R P.453-14

Bill of Materials

Part Number	Qty	Description
C000000L065	2	Gigabit Surge Suppressor (30V)
C050900C261	2	ePMP 1000: 5 GHz Force 200AR5-25 High Gain Radio (ROW) (EU cord). Kit includes radio with antenna, power supply, line cord and mounting bracket
EW-E2EPF200-WW	2	ePMP Force 200 Extended Warranty, 2 Addl Years



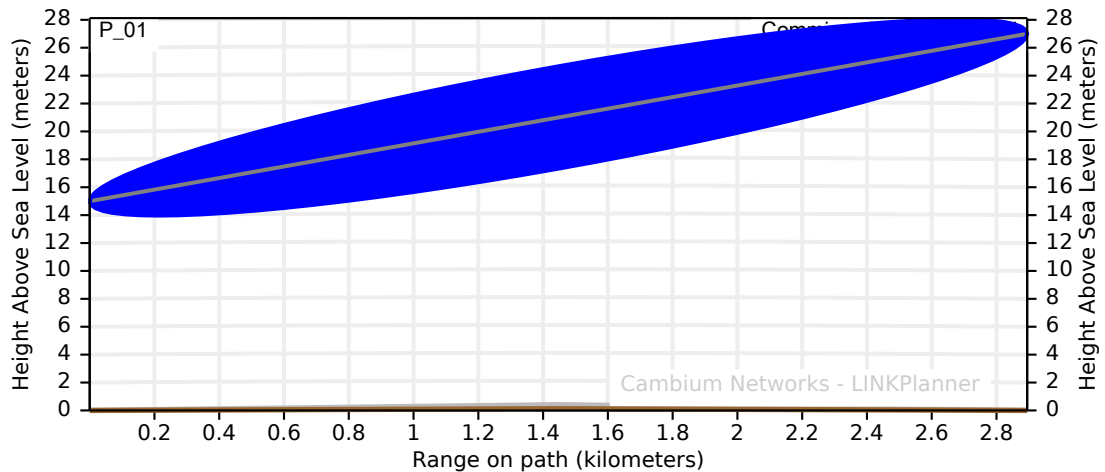
P_01 to Commissariato di Ponticelli



Equipment: Cambium Networks ePMP Force 200 Integrated

Cambium Networks ePMP Force 200 @ 15 m

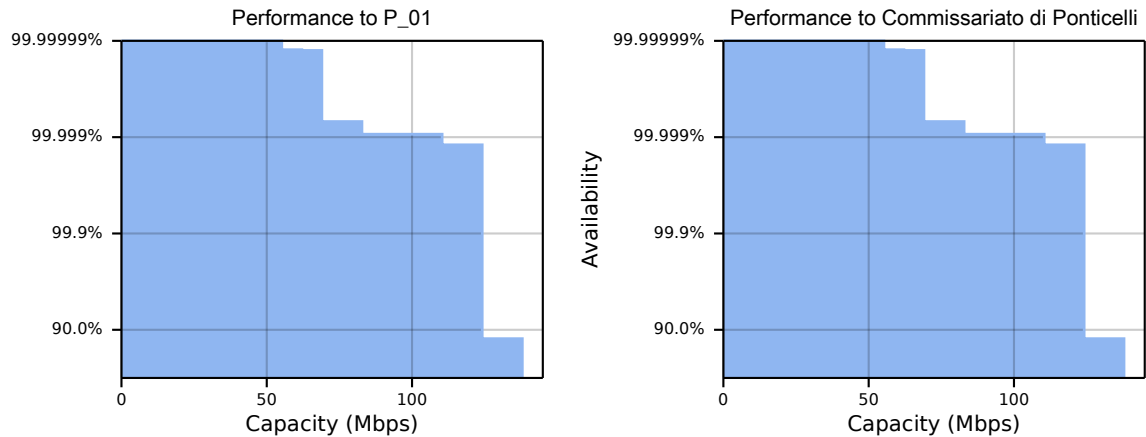
Cambium Networks ePMP Force 200 @ 27 m



	Performance to P_01	Performance to Commissariato di Ponticelli
Mean IP	135.85 Mbps	135.79 Mbps
IP Availability	100.0000 % for 1.0 Mbps	100.0000 % for 1.0 Mbps

Link Summary			
Link Length	2.895 km	System Gain Margin	22.35 dB
Band	5.8 GHz	Mean Aggregate Data Rate	271.64 Mbps
Regulation	Other	Annual Link Availability	100.0000 %
Modulation	Adaptive	Annual Link Unavailability	1 secs/year
Bandwidth	40 MHz	Frame Size	1518 Bytes
Total Path Loss	116.98 dB	Prediction Model	ITU-R P.530-17
System Gain	139.33 dB		

Performance Charts



Climatic Factors, Losses and Standards

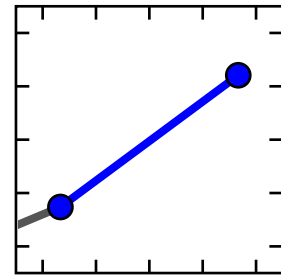
dN/dH not exceeded for 1% of time	-371.03 N units/km	Free Space Path Loss	116.95 dB
Area roughness 110x110km	286.92 metre	Gaseous Absorption Loss	0.03 dB
Geoclimatic factor	2.91e-05	Link Type	No Profile
Fade Occurrence Factor (P0)	7.95e-06	Excess Path Loss	0.00 dB
Path inclination	4.15 mr	Atmospheric Gasses	ITU-R P.676-12, ITU-R P.835-6
Value of K Exceeded for 99.99% (ke)	0.40	Diffraction Loss	ITU-R P.526-15
Excess Path Loss at ke	0.00 dB	Propagation	ITU-R P.530-17
0.01% Rain rate	36.56 mm/hr	Rain Rate	ITU-R P.837-7
Rain Attenuation	0.12 dB/km	Refractivity Index	ITU-R P.453-14

Bill of Materials

Part Number	Qty	Description
C000000L065	2	Gigabit Surge Suppressor (30V)
C050900C261	2	ePMP 1000: 5 GHz Force 200AR5-25 High Gain Radio (ROW) (EU cord). Kit includes radio with antenna, power supply, line cord and mounting bracket
EW-E2EPF200-WW	2	ePMP Force 200 Extended Warranty, 2 Addl Years



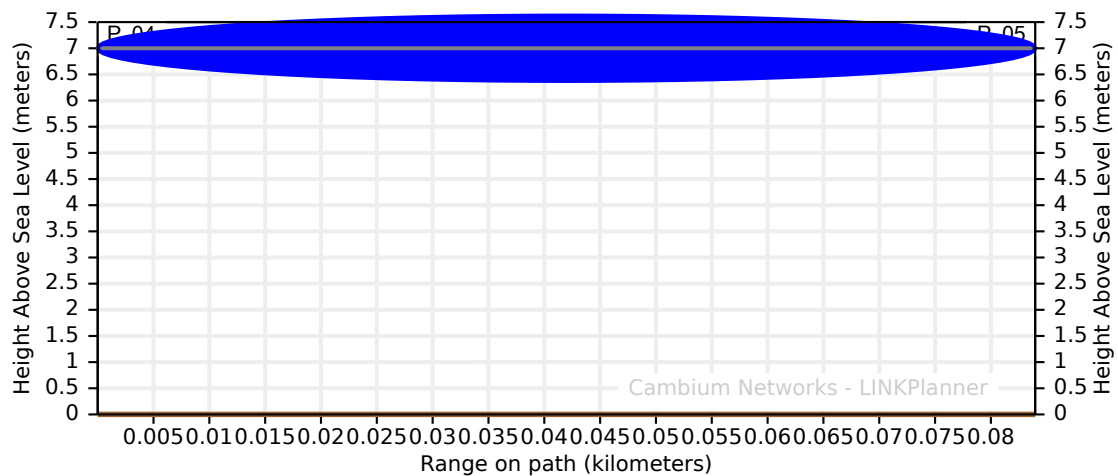
P_04 to P_05



Equipment: Cambium Networks ePMP Force 200 Integrated

Cambium Networks ePMP Force 200 @ 7 m

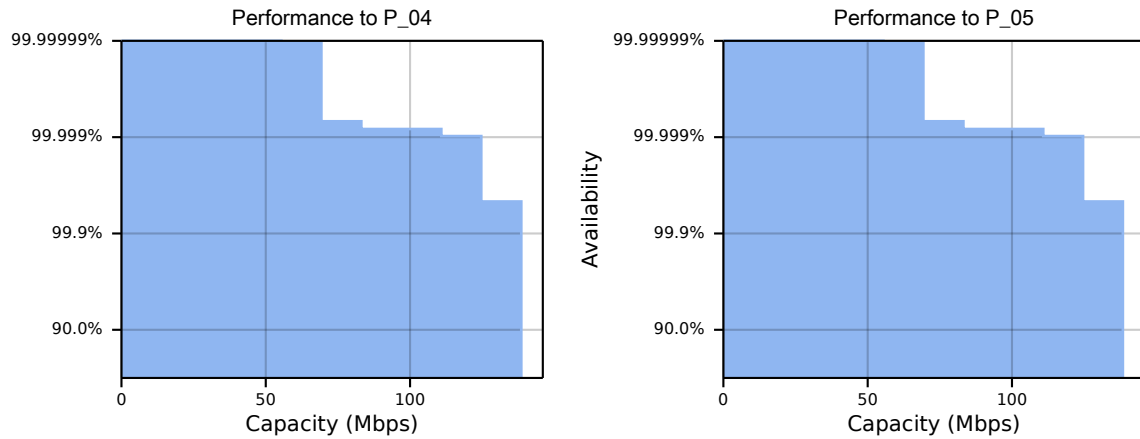
Cambium Networks ePMP Force 200 @ 7 m



	Performance to P_04	Performance to P_05
Mean IP	138.54 Mbps	138.42 Mbps
IP Availability	100.0000 % for 1.0 Mbps	100.0000 % for 1.0 Mbps

Link Summary			
Link Length	0.084 km	System Gain Margin	23.13 dB
Band	5.8 GHz	Mean Aggregate Data Rate	276.95 Mbps
Regulation	Other	Annual Link Availability	100.0000 %
Modulation	Adaptive	Annual Link Unavailability	1 secs/year
Bandwidth	40 MHz	Frame Size	1518 Bytes
Total Path Loss	86.20 dB	Prediction Model	ITU-R P.530-17
System Gain	109.33 dB		

Performance Charts



Climatic Factors, Losses and Standards

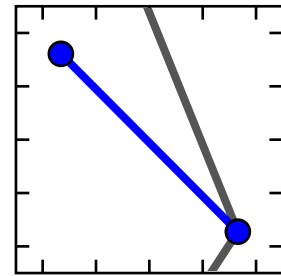
dN/dH not exceeded for 1% of time	-373.92 N units/km	Free Space Path Loss	86.20 dB
Area roughness 110x110km	283.07 metre	Gaseous Absorption Loss	0.00 dB
Geoclimatic factor	2.98e-05	Link Type	No Profile
Fade Occurrence Factor (P0)	2.64e-10	Excess Path Loss	0.00 dB
Path inclination	0.00 mr	Atmospheric Gasses	ITU-R P.676-12, ITU-R P.835-6
Value of K Exceeded for 99.99% (ke)	0.40	Diffraction Loss	ITU-R P.526-15
Excess Path Loss at ke	0.00 dB	Propagation	ITU-R P.530-17
0.01% Rain rate	36.52 mm/hr	Rain Rate	ITU-R P.837-7
Rain Attenuation	0.12 dB/km	Refractivity Index	ITU-R P.453-14

Bill of Materials

Part Number	Qty	Description
C000000L065	2	Gigabit Surge Suppressor (30V)
C050900C261	2	ePMP 1000: 5 GHz Force 200AR5-25 High Gain Radio (ROW) (EU cord). Kit includes radio with antenna, power supply, line cord and mounting bracket
EW-E2EPF200-WW	2	ePMP Force 200 Extended Warranty, 2 Addl Years



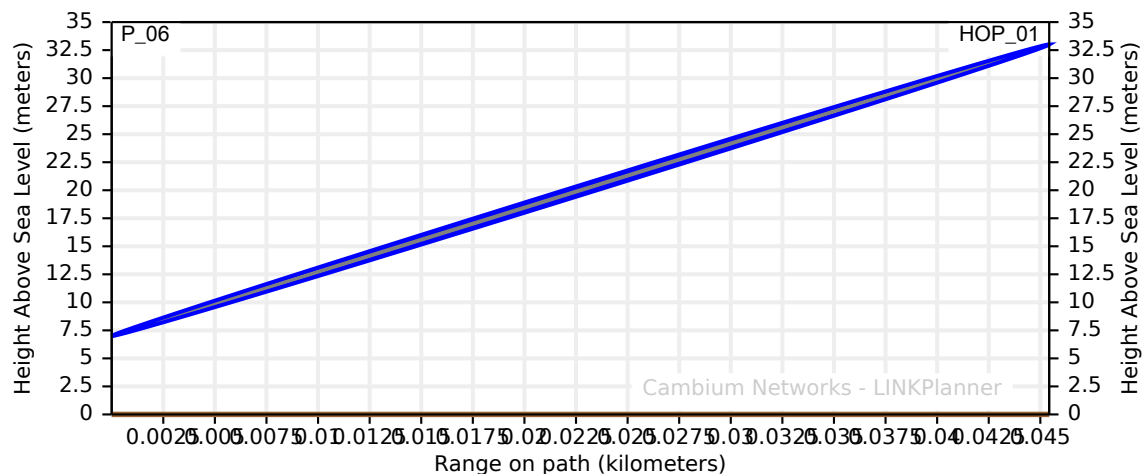
P_06 to HOP_01



Equipment: Cambium Networks ePMP Force 200 Integrated

Cambium Networks ePMP Force 200 @ 7 m

Cambium Networks ePMP Force 200 @ 33 m

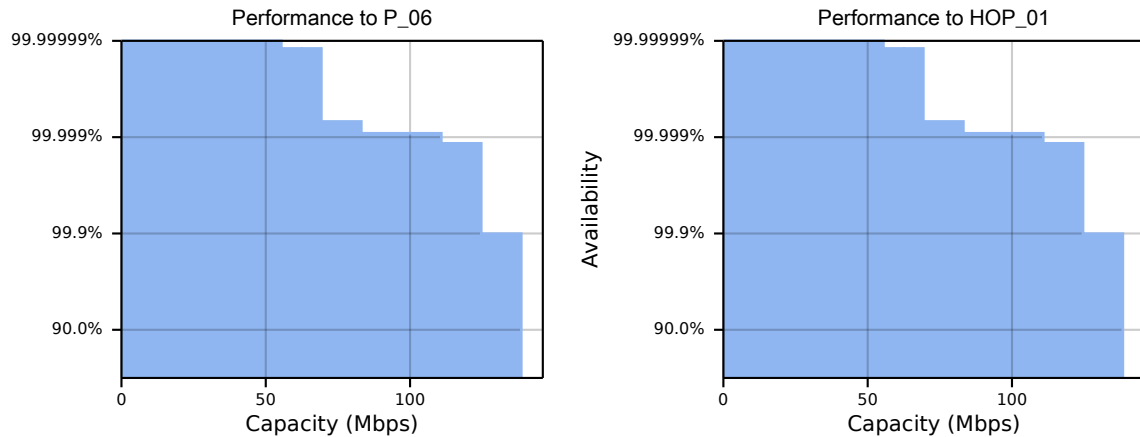


	Performance to P_06	Performance to HOP_01
Mean IP	138.53 Mbps	138.41 Mbps
IP Availability	100.0000 % for 1.0 Mbps	100.0000 % for 1.0 Mbps

Link Summary			
Link Length	0.045 km	System Gain Margin	22.47 dB
Band	5.8 GHz	Mean Aggregate Data Rate	276.93 Mbps
Regulation	Other	Annual Link Availability	100.0000 %
Modulation	Adaptive	Annual Link Unavailability	1 secs/year
Bandwidth	40 MHz	Frame Size	1518 Bytes
Total Path Loss	80.86 dB	Prediction Model	ITU-R P.530-17
System Gain	103.33 dB		



Performance Charts



Climatic Factors, Losses and Standards

dN/dH not exceeded for 1% of time	-369.18 N units/km	Free Space Path Loss	80.86 dB
Area roughness 110x110km	289.76 metre	Gaseous Absorption Loss	0.00 dB
Geoclimatic factor	2.87e-05	Link Type	No Profile
Fade Occurrence Factor (P0)	4.54e-14	Excess Path Loss	0.00 dB
Path inclination	572.33 mr	Atmospheric Gasses	ITU-R P.676-12, ITU-R P.835-6
Value of K Exceeded for 99.99% (ke)	0.40	Diffraction Loss	ITU-R P.526-15
Excess Path Loss at ke	0.00 dB	Propagation	ITU-R P.530-17
0.01% Rain rate	36.53 mm/hr	Rain Rate	ITU-R P.837-7
Rain Attenuation	0.12 dB/km	Refractivity Index	ITU-R P.453-14

Bill of Materials

Part Number	Qty	Description
C000000L065	2	Gigabit Surge Suppressor (30V)
C050900C261	2	ePMP 1000: 5 GHz Force 200AR5-25 High Gain Radio (ROW) (EU cord). Kit includes radio with antenna, power supply, line cord and mounting bracket
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