



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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Ing. Pasquale Del Sorbo
(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

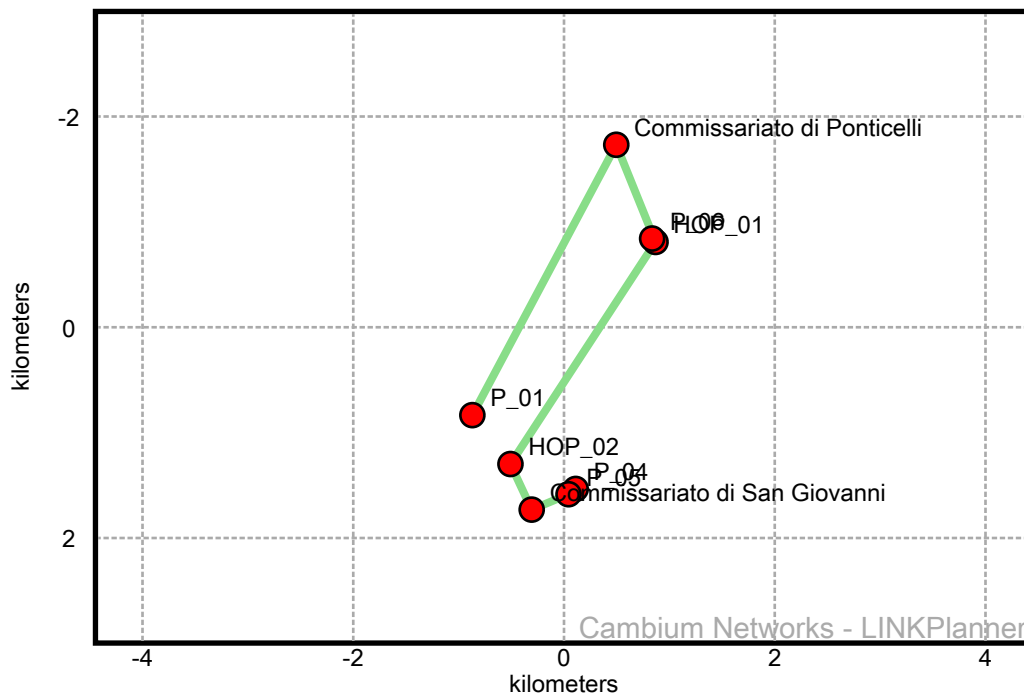
Guido

Organization: Italiantech Srl

Phone: 0810128396



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

Table of Contents

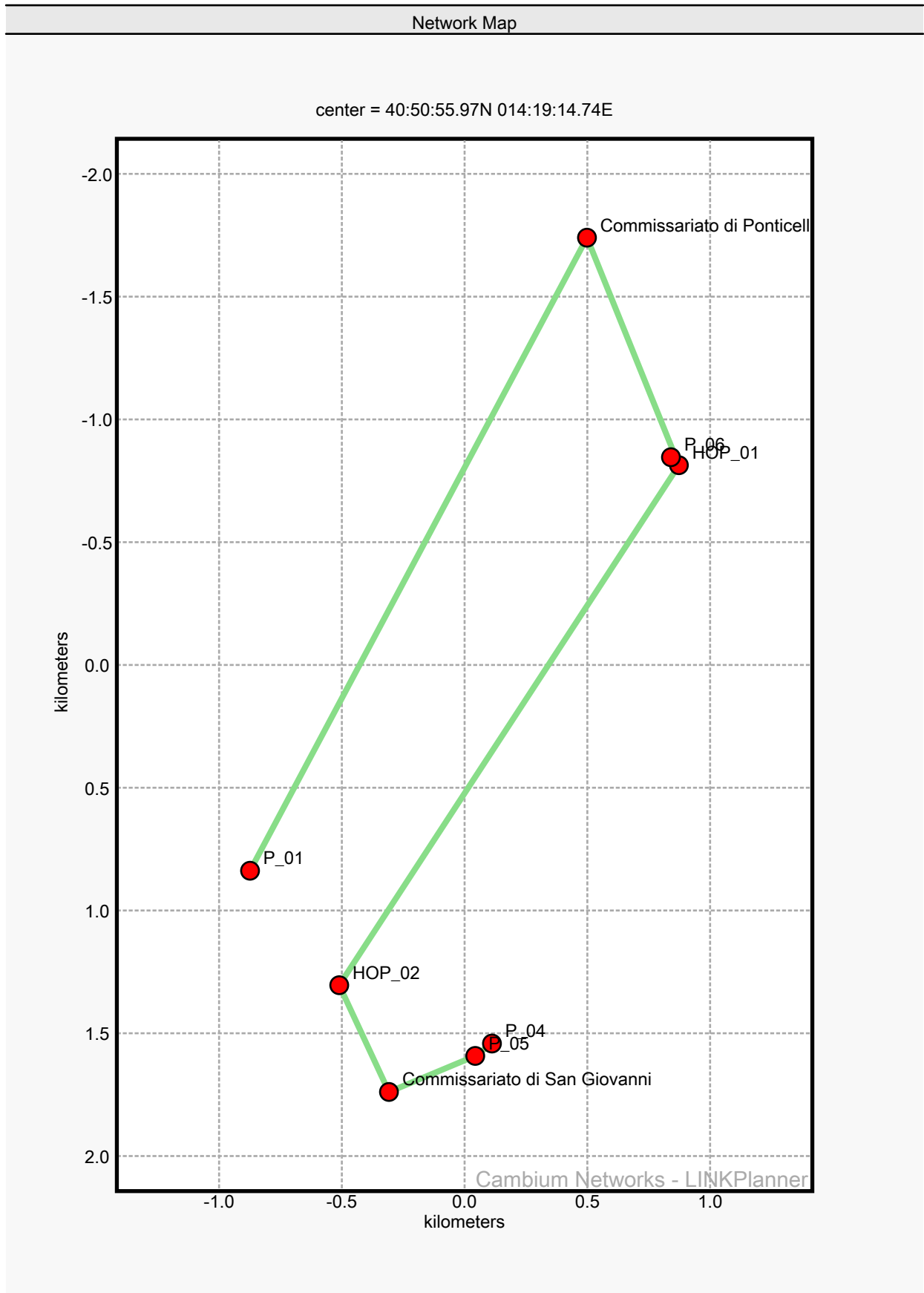
1. Project Summary	3
2. Commissariato di San Giovanni to HOP_02	6
3. Commissariato di San Giovanni to P_05	8
4. HOP_01 to Commissariato di Ponticelli	10
5. HOP_02 to HOP_01	12
6. P_01 to Commissariato di Ponticelli	14
7. P_04 to P_05	16
8. P_06 to HOP_01	18
Disclaimer	20

1. Project Summary

Project: Verifiche Hiperlan

General Information	
Customer Name	
Company Name	
Address	
Phone	
Cell Phone	
Email	

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



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

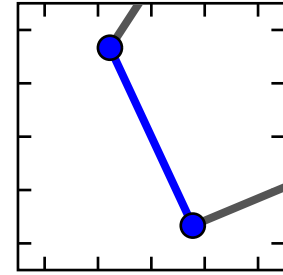
Link name	Product	Local antenna	Remote antenna	Max aggregate IP throughput
Commissariato di San Giovanni to HOP_02	ePMP Force 200	Cambium Networks ePMP Force 200	Cambium Networks ePMP Force 200	276.78 Mbps
Commissariato di San Giovanni to P_05	ePMP Force 200	Cambium Networks ePMP Force 200	Cambium Networks 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

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



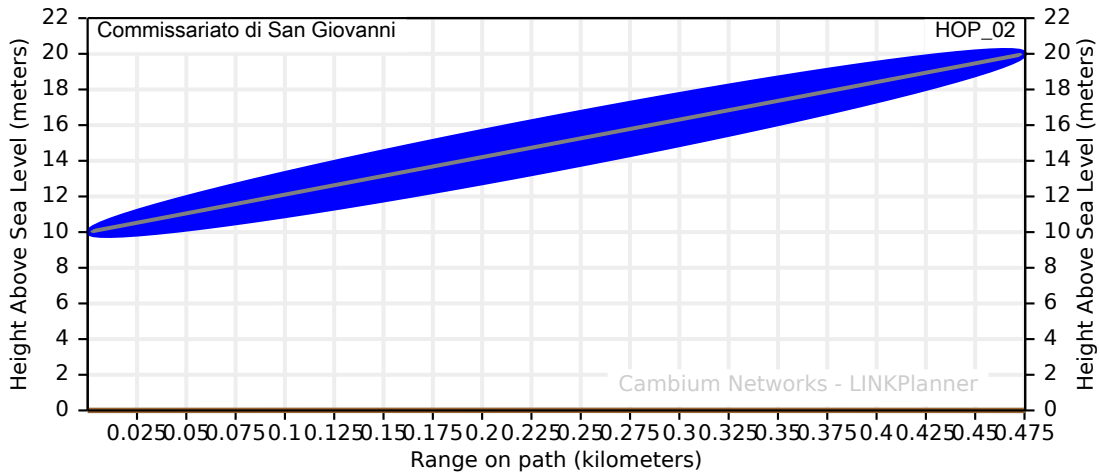
Commissariato di San Giovanni to HOP_02



Equipment: Cambium Networks ePMP Force 200 Integrated

Cambium Networks ePMP Force 200 @ 10 m

Cambium Networks ePMP Force 200 @ 20 m

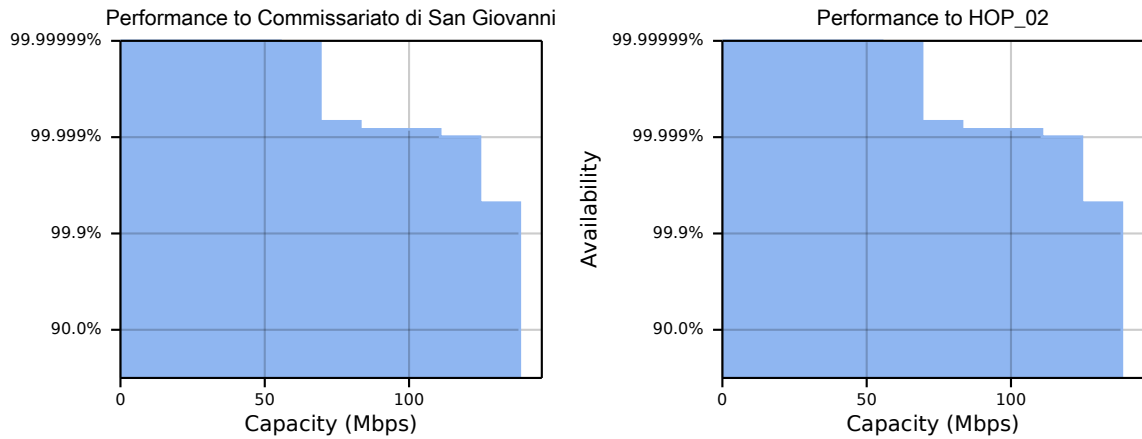


	Performance to Commissariato di San Giovanni	Performance to HOP_02
Mean IP	138.37 Mbps	138.42 Mbps
IP Availability	100.0000 % for 1.0 Mbps	100.0000 % for 1.0 Mbps

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		

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

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

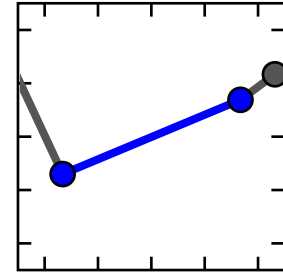
Bill of Materials

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

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



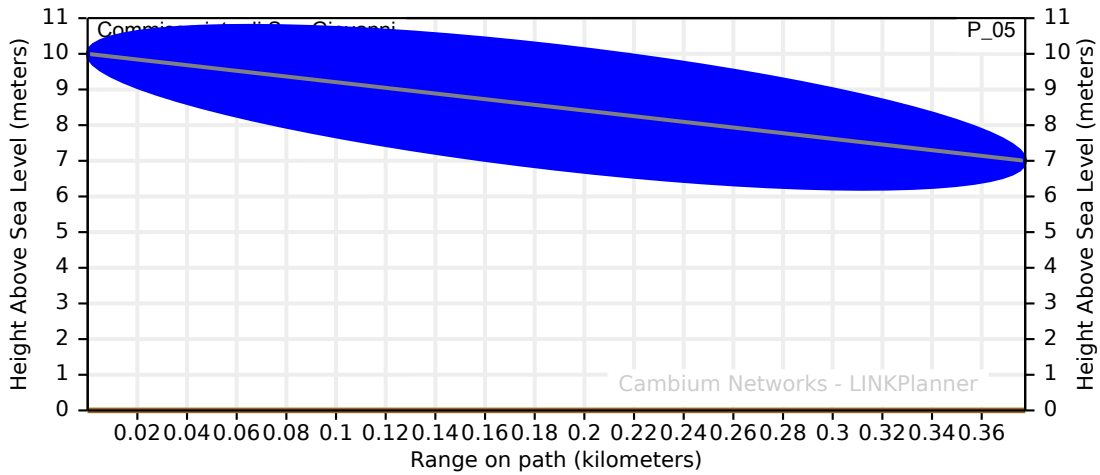
Commissariato di San Giovanni to P_05



Equipment: Cambium Networks ePMP Force 200 Integrated

Cambium Networks ePMP Force 200 @ 10 m

Cambium Networks ePMP Force 200 @ 7 m

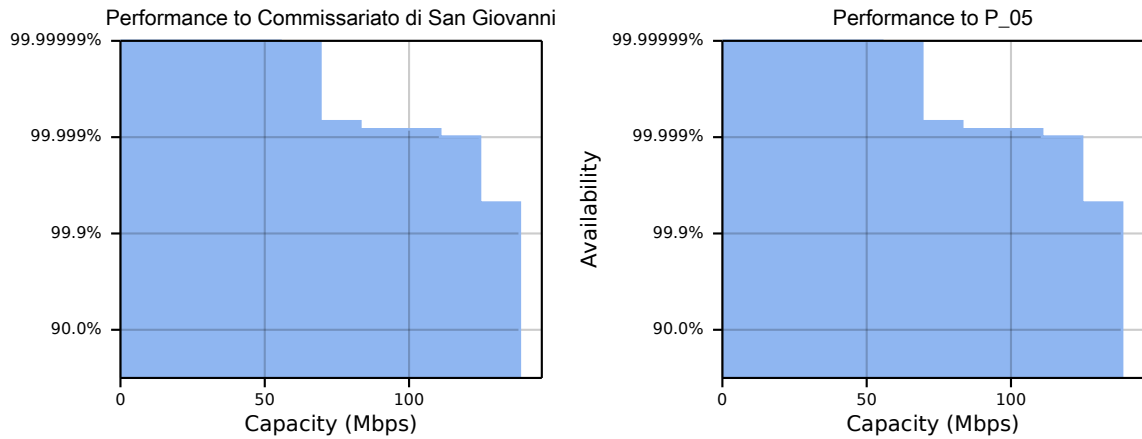


	Performance to Commissariato di San Giovanni	Performance to P_05
Mean IP	138.37 Mbps	138.49 Mbps
IP Availability	100.0000 % for 1.0 Mbps	100.0000 % for 1.0 Mbps

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		

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

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

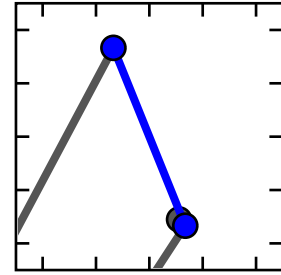
Bill of Materials

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

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



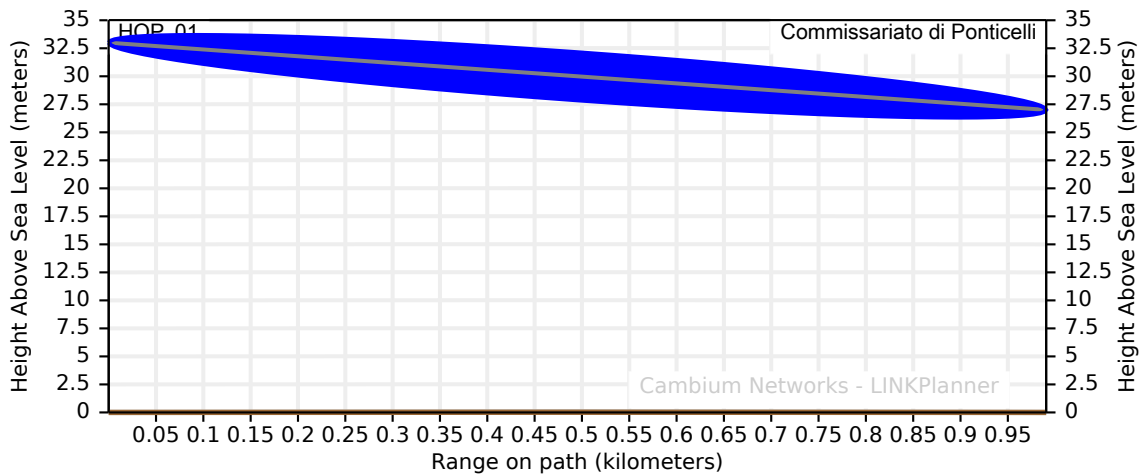
HOP_01 to Commissariato di Ponticelli



Equipment: Cambium Networks ePMP Force 200 Integrated

Cambium Networks ePMP Force 200 @ 33 m

Cambium Networks ePMP Force 200 @ 27 m

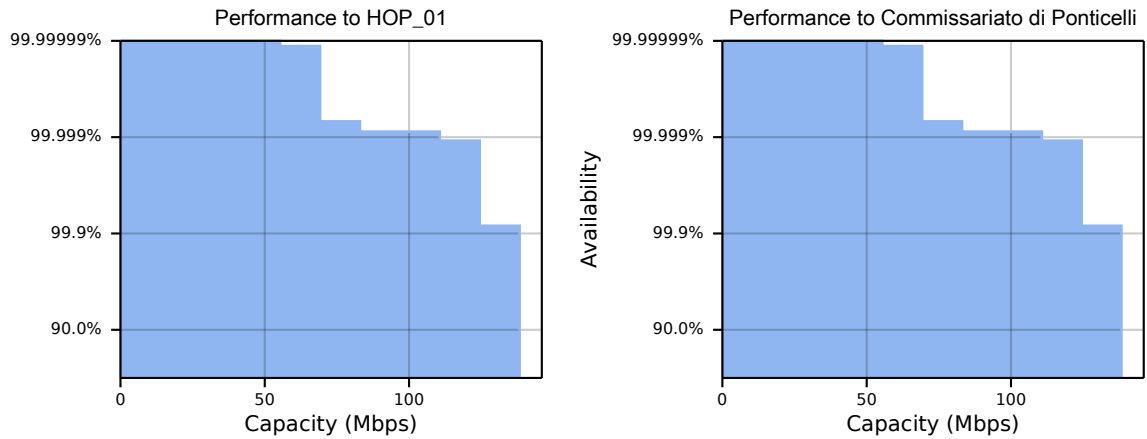


	Performance to HOP_01	Performance to Commissariato di Ponticelli
Mean IP	138.29 Mbps	138.24 Mbps
IP Availability	100.0000 % for 1.0 Mbps	100.0000 % for 1.0 Mbps

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		

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

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

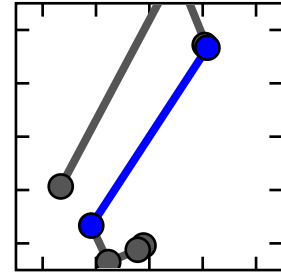
Bill of Materials

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

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



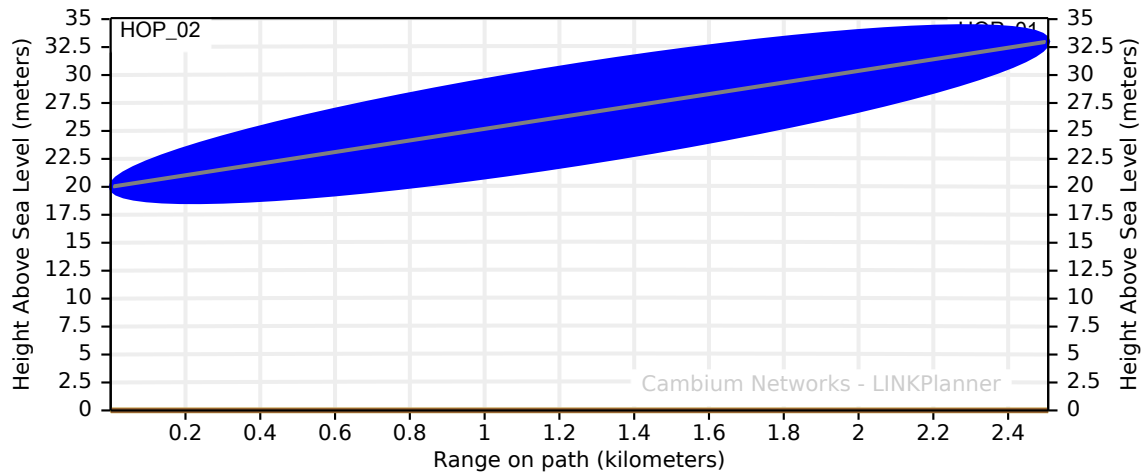
HOP_02 to HOP_01



Equipment: Cambium Networks ePMP Force 200 Integrated

Cambium Networks ePMP Force 200 @ 20 m

Cambium Networks ePMP Force 200 @ 33 m

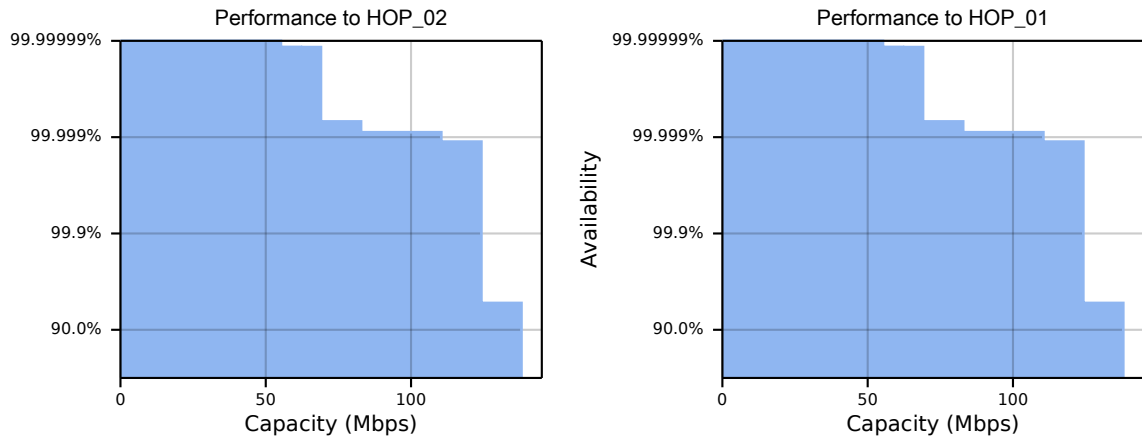


	Performance to HOP_02	Performance to HOP_01
Mean IP	137.62 Mbps	137.58 Mbps
IP Availability	100.0000 % for 1.0 Mbps	100.0000 % for 1.0 Mbps

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		

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

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

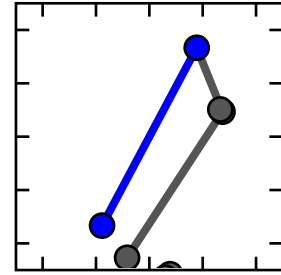
Bill of Materials

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

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



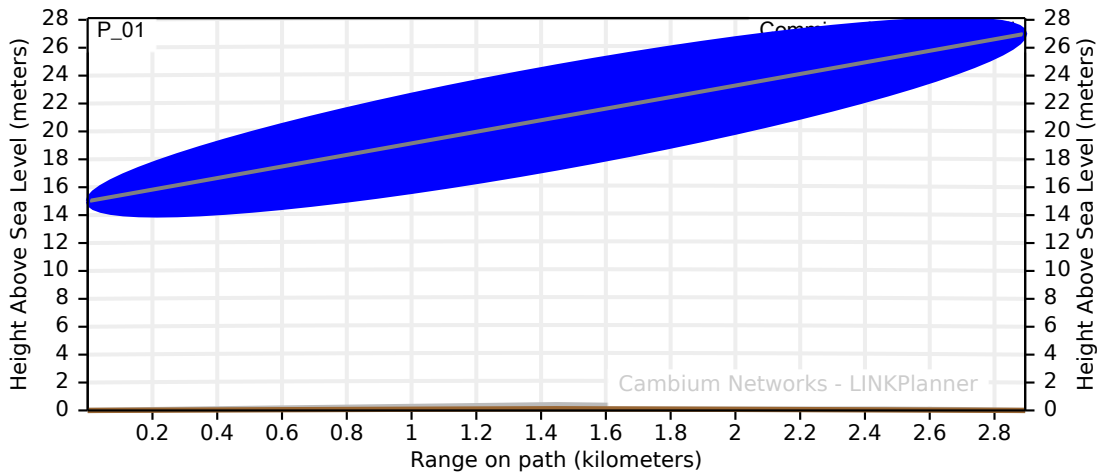
P_01 to Commissariato di Ponticelli



Equipment: Cambium Networks ePMP Force 200 Integrated

Cambium Networks ePMP Force 200 @ 15 m

Cambium Networks ePMP Force 200 @ 27 m

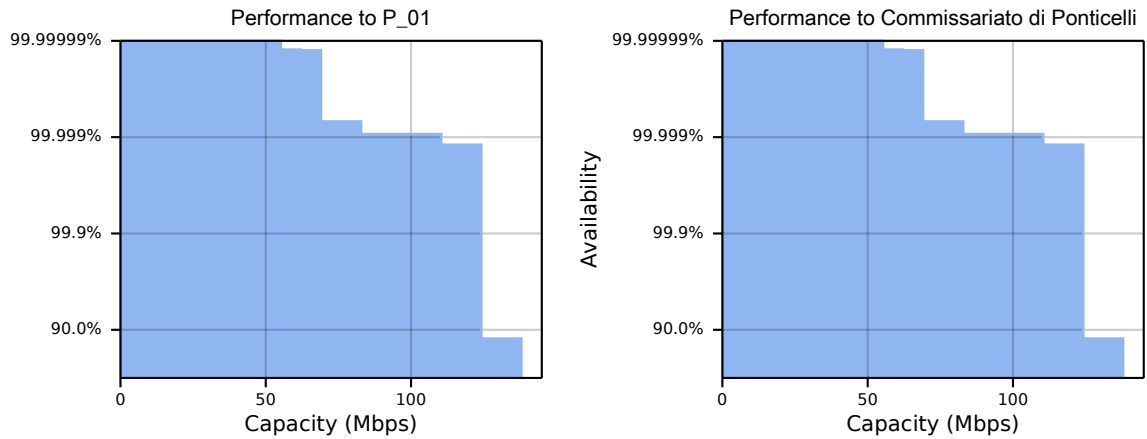


	Performance to P_01	Performance to Commissariato di Ponticelli
Mean IP	135.85 Mbps	135.79 Mbps
IP Availability	100.0000 % for 1.0 Mbps	100.0000 % for 1.0 Mbps

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		

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

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

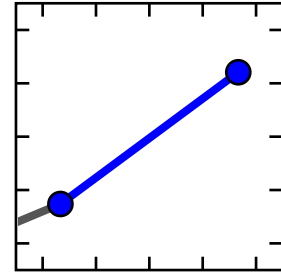
Bill of Materials

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

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



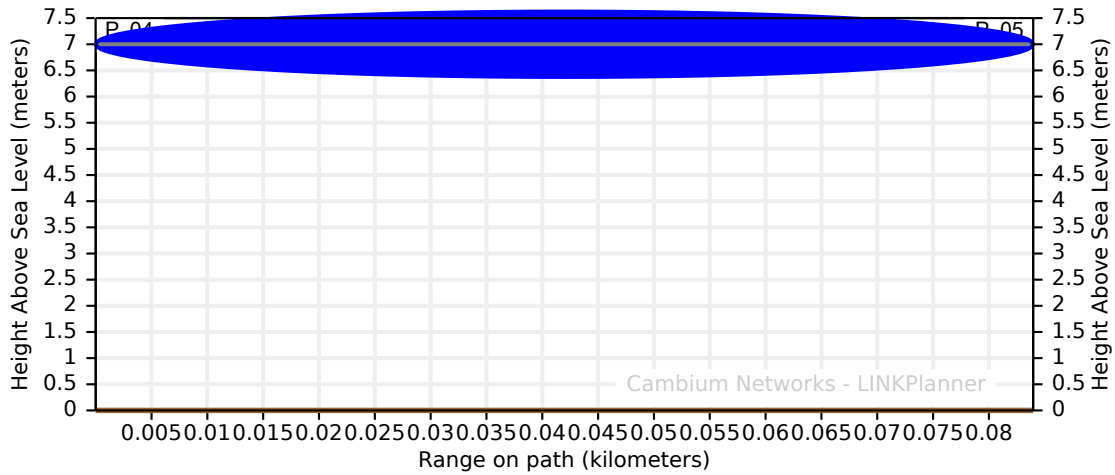
P_04 to P_05



Equipment: Cambium Networks ePMP Force 200 Integrated

Cambium Networks ePMP Force 200 @ 7 m

Cambium Networks ePMP Force 200 @ 7 m

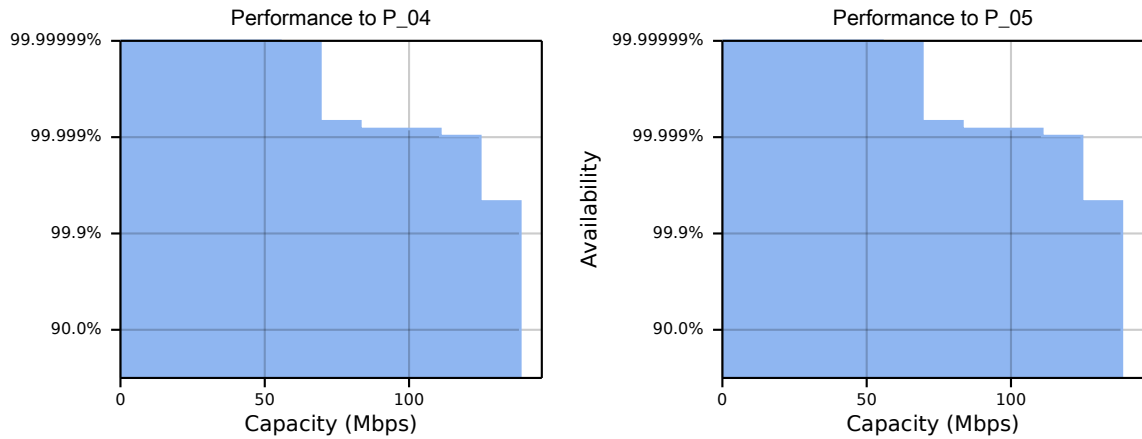


	Performance to P_04	Performance to P_05
Mean IP	138.54 Mbps	138.42 Mbps
IP Availability	100.0000 % for 1.0 Mbps	100.0000 % for 1.0 Mbps

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		

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

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

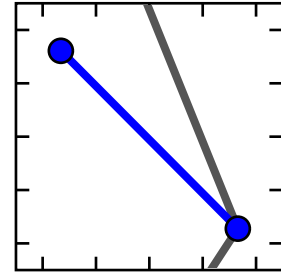
Bill of Materials

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

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



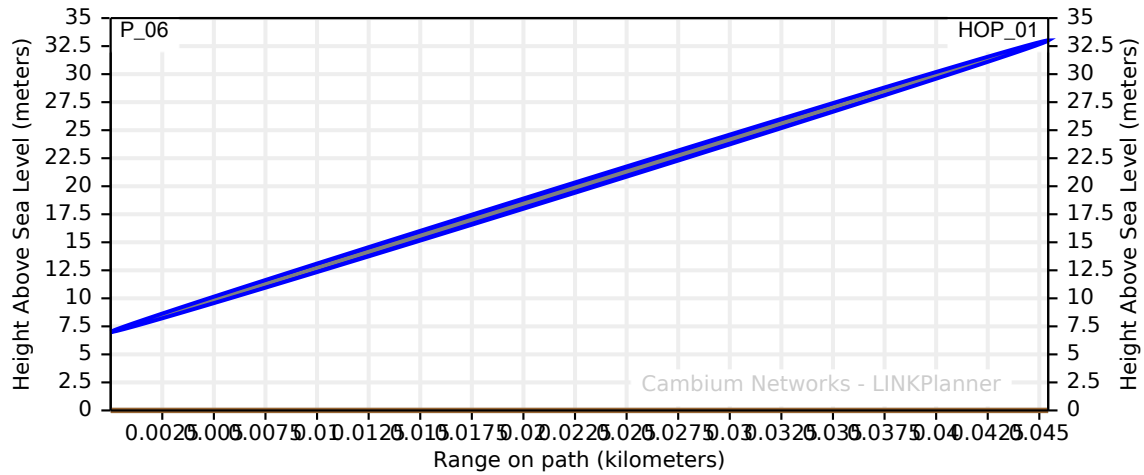
P_06 to HOP_01



Equipment: Cambium Networks ePMP Force 200 Integrated

Cambium Networks ePMP Force 200 @ 7 m

Cambium Networks ePMP Force 200 @ 33 m

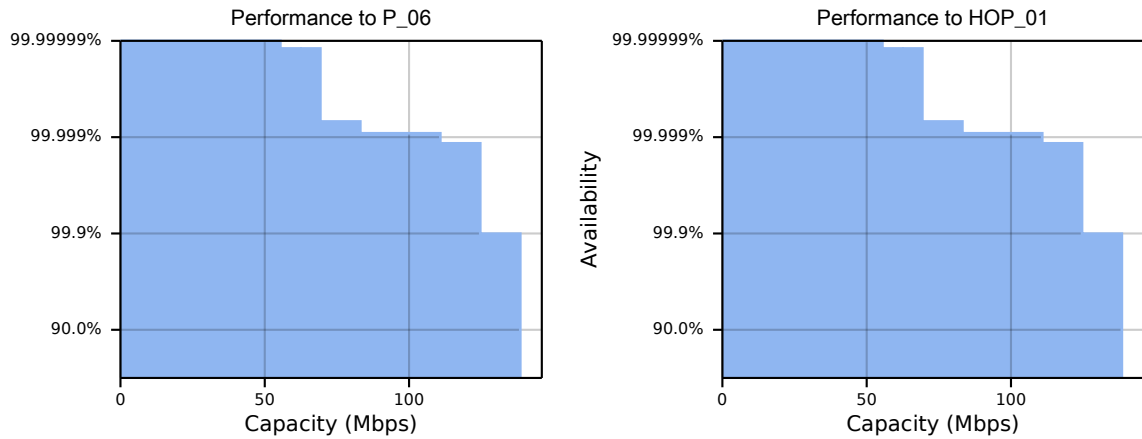


	Performance to P_06	Performance to HOP_01
Mean IP	138.53 Mbps	138.41 Mbps
IP Availability	100.0000 % for 1.0 Mbps	100.0000 % for 1.0 Mbps

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		

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

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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