



# ClickMobile

tecnologia e mobilidade



8 dicas para o ponto a ponto perfeito

# Dica 1 Planejamento do Enlace

- Sinal - potência



- Variáveis Rádio Frequência

# Dica 1 Planejamento do Enlace

**Antena  
G1: + 25  
dBi**



**Perda espaço livre  
5.8 Ghz - 10 Km  
L: 128 dB**

$$\text{Tx} + \text{G1} - \text{L} + \text{G2} = \text{RX}$$

**Radio 1  
Tx: +  
20dBm**

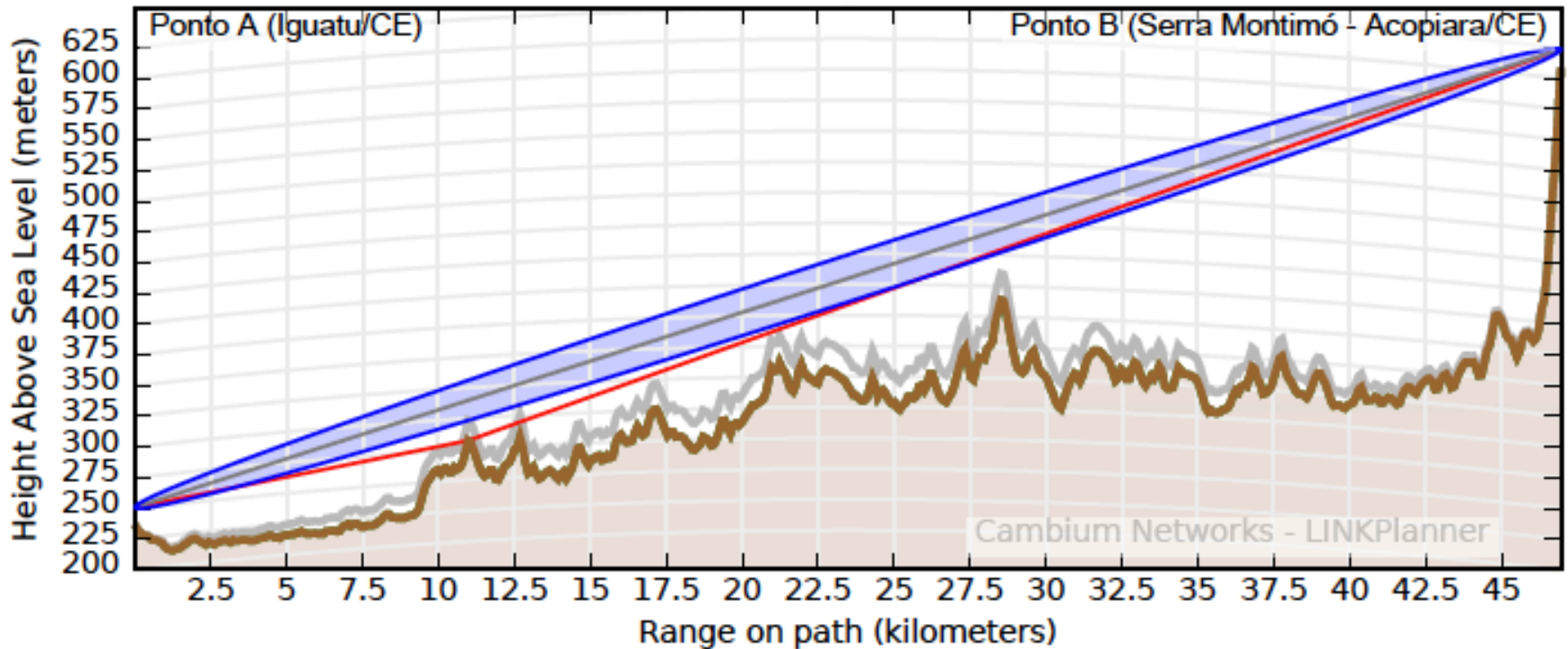


**Antena  
G2: +  
25dBi**

**Radio 2  
Rx: - 58 dBm**

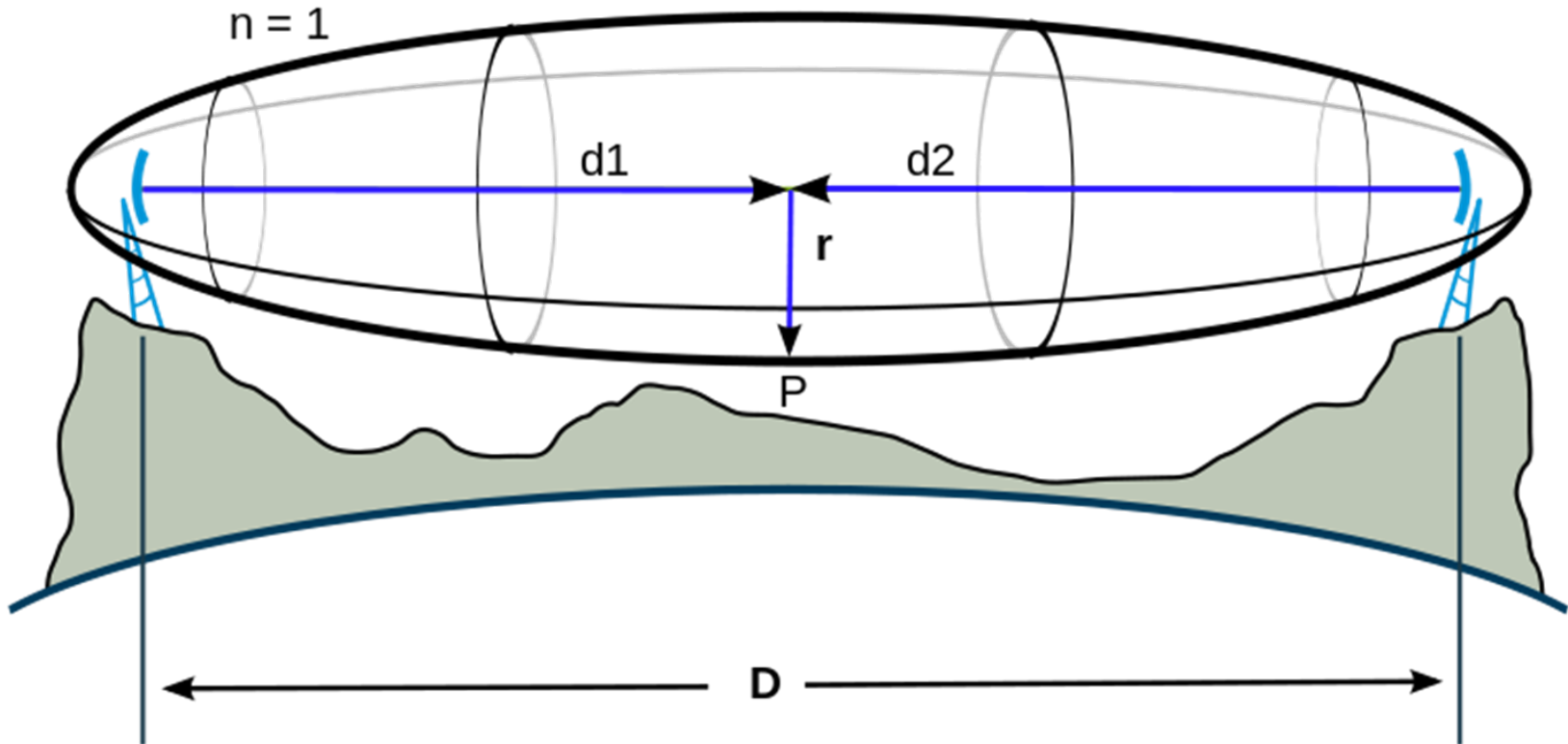
Tipicamente para rádios em 5.8 GHz em 802.11 N é necessário um sinal melhor que -60 dBm para a máxima capacidade de transmissão do rádio

# Dica 1 Planejamento do Enlace



Sabendo qual sinal devemos encontrar é a guia para o alinhamento correto!

# Dica 2 : Fresnel x altura de torres



# Dica 2 : Fresnel x altura de torres



Distancia do enlace (km)	Fresnel @ 1 Km	Fresnel ponto médio do enlace (m)	60% Fresnel ponto médio: Visada mínima (m)
10	6,82	11,37	6,82
20	7,01	16,08	9,65
30	7,07	19,70	11,82
40	7,10	22,74	13,65
50	7,12	25,43	15,26
60	7,13	27,85	16,71
70	7,14	30,09	18,05
80	7,15	32,16	19,30
90	7,15	34,11	20,47
100	7,16	35,96	21,58

# Dica 3 : Antenas

**PS-5800-22-03-DP**



**Até 10 Km**



**PS-5800-29-06-DP**



**Até 35 km**



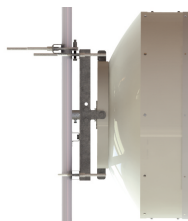
**PS-5800-32-09-DP**



**Até 55 km**



**PS-5800-34-12-DP**



**Até 80 km**

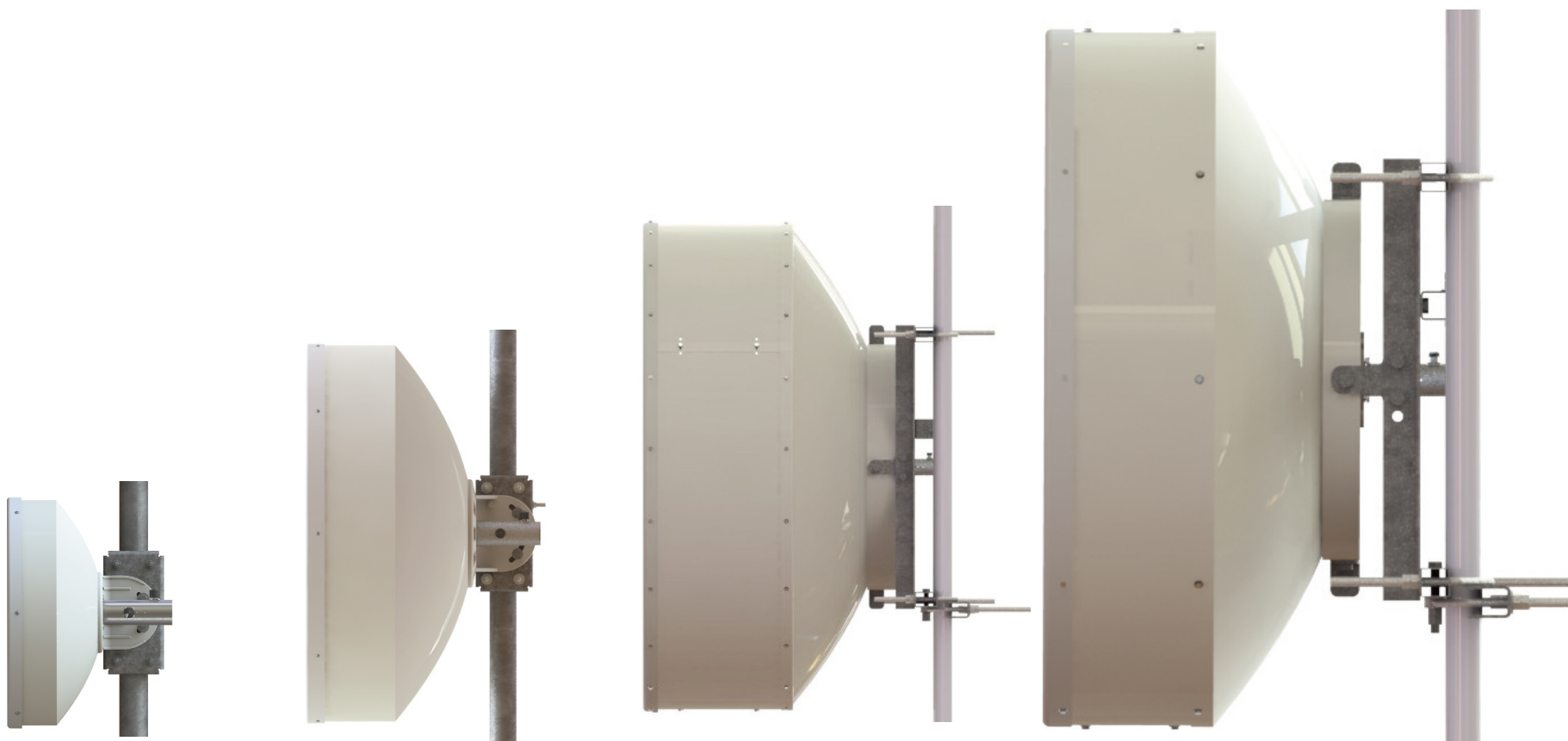


## Dica 3 : Antenas SEM radome

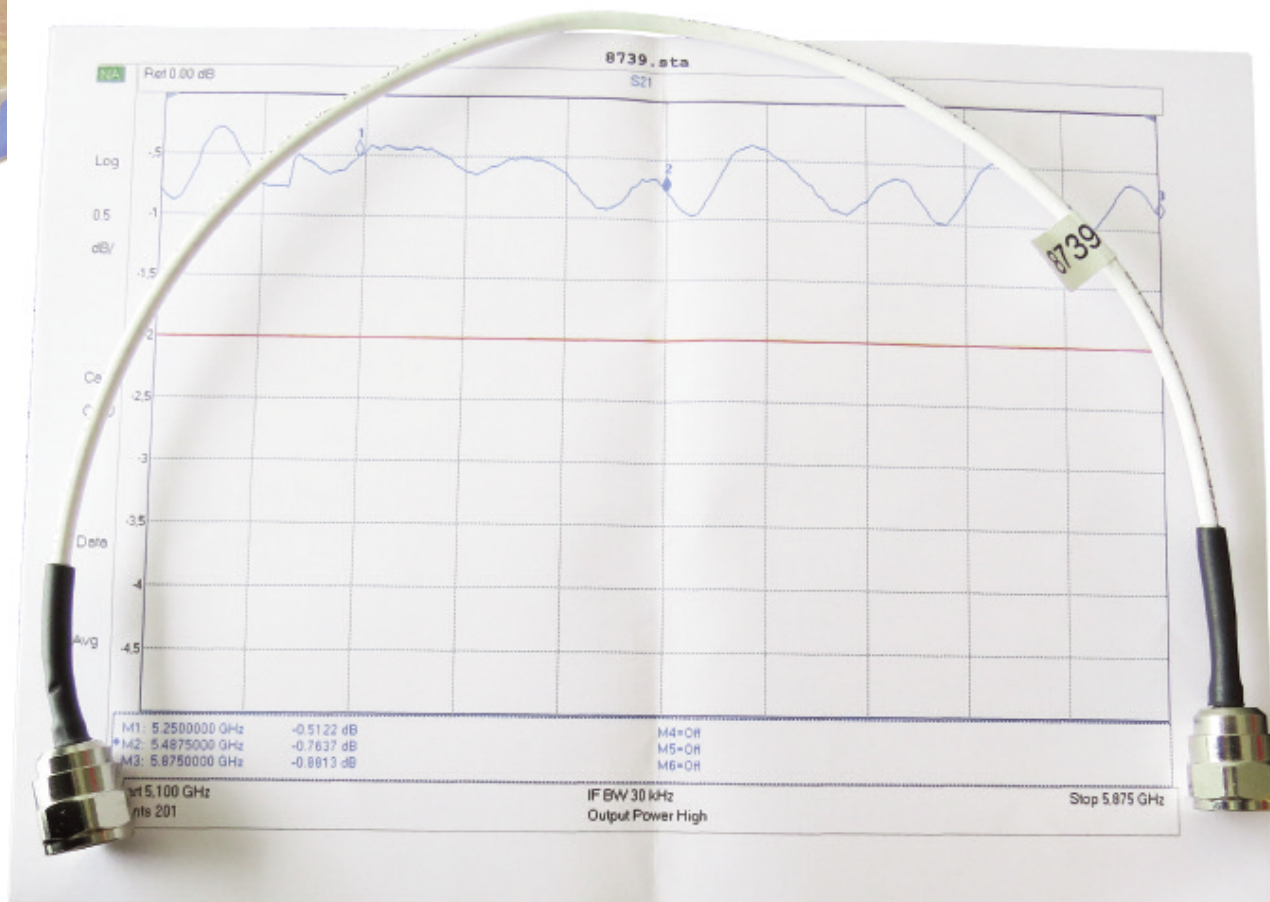




# Dica 3 : Antenas DIFERENTES



# Dica 4 : Pigtails certificados



# Dica 5 : Configuração Mikrotik

Interface <wlan1>

General Wireless Data Rates Advanced HT HT MCS WDS Natreme NV2 Tx Power Curve

Mode: bridge

Band: 5GHz-only-AC

Channel Width: 20/40/80MHz eeCe

Frequency: 6060

SSID: PD5\_PMA\_MGC\_JPB

Radio Name: D4CA6DB8823D

Scan List: default

Wireless Protocol: nv2

Security Profile: Security

Frequency Mode: superchannel

Country: no\_country\_set

Antenna Gain: 0

DFS Mode: none

Proprietary Extensions: post-2.9.25

Bridge Mode: enabled

VLAN Mode: no tag

VLAN ID: 1

Default AP Tx Rate:

Default Client Tx Rate:

Default Authenticate

Default Forward

Multicast Helper: default

# Dica 5 : Configuração Mikrotik

Interface <wlan1>

General Wireless Data Rates Advanced HT HT MCS WDS Ntreme NV2 Tx Power Current Tx Power Status Traffic

Tx Chains:  chain0  chain1  
Rx Chains:  chain0  chain1

AMSDU Limit: 8192  
AMSDU Threshold: 8192

Guard Interval: any

- AMPDU Priorities

<input checked="" type="checkbox"/> 0	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input checked="" type="checkbox"/> 3
<input checked="" type="checkbox"/> 4	<input checked="" type="checkbox"/> 5	<input checked="" type="checkbox"/> 6	<input checked="" type="checkbox"/> 7

Interface <wlan1>

General Wireless Data Rates Advanced HT HT MCS WDS Ntreme NV2 Tx Power Current Tx Power Status Traffic

WDS Mode: dynamic

WDS Default Bridge: brd-wds

WDS Default Cost: 100  
WDS Cost Range: 50-150

WDS Ignore SSID

## Dica 6 : 802.11 AC

300 M de banda é possível!

- Interface wireless já está madura
- Necessidade de maior nível de sinal
- Travamentos de porta Lan:
  - Watchdog
  - SPF

# Dica 7 : SFP

Wireless Tables

Interfaces Nstreme Dual Access List Registration Connect List Security Profiles Channels

CAP Scanner Freq. Usage Alignment Wireless Sniffer Wireless Snooper

Name	Type	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)
RS wlan1	Wireless (Atheros AR9...	1600	222.4 Mbps	39.7 Mbps	25 636	16 898
DRS wds9	WDS	1600	222.4 Mbps	39.7 Mbps	25 635	16 898

Interface List

Interface Ethernet EoIP Tunnel IP Tunnel GRE Tunnel VLAN VRRP Bonding LTE

Name	Type	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)
R brd-wds	Bridge	1600	45.0 kbps	4.2 kbps	9	7
ether1	Ethernet	1600	0 bps	0 bps	0	0
RS sfp1	Ethernet	1600	39.8 Mbps	222.4 Mbps	16 905	25 639
RS wlan1	Wireless (Atheros AR9...	1600	222.4 Mbps	39.7 Mbps	25 636	16 898
DRS wds9	WDS	1600	222.4 Mbps	39.7 Mbps	25 635	16 898

5 items (1 selected)

sent=700 received=628 packet-loss=10% min-rtt=1ms avg-rtt=14ms

Interface <sfp1>

General SFP Ethernet Overall Stats Rx Stats ...

SFP Rate Select: **high**

Module Present  
 Rx Lose  
 Tx Fault

Connector Type: LC

Link Length Sum: 20000 m

Link Length 50um:

Link Length 62um:

Link Length Copper:

Vendor Name: Mikrotik

Vendor Part Number: S-35LC200

Vendor Revision:

Vendor Serial: SG35241700694

Manufacturing Date: 14-05-27

Wavelength: 131000 nm

Temperature: 66 C

Supply Voltage: 3.266 V

Tx Bias Current: 25 mA

Tx Power: -5 dBm

Rx Power: -10 dBm

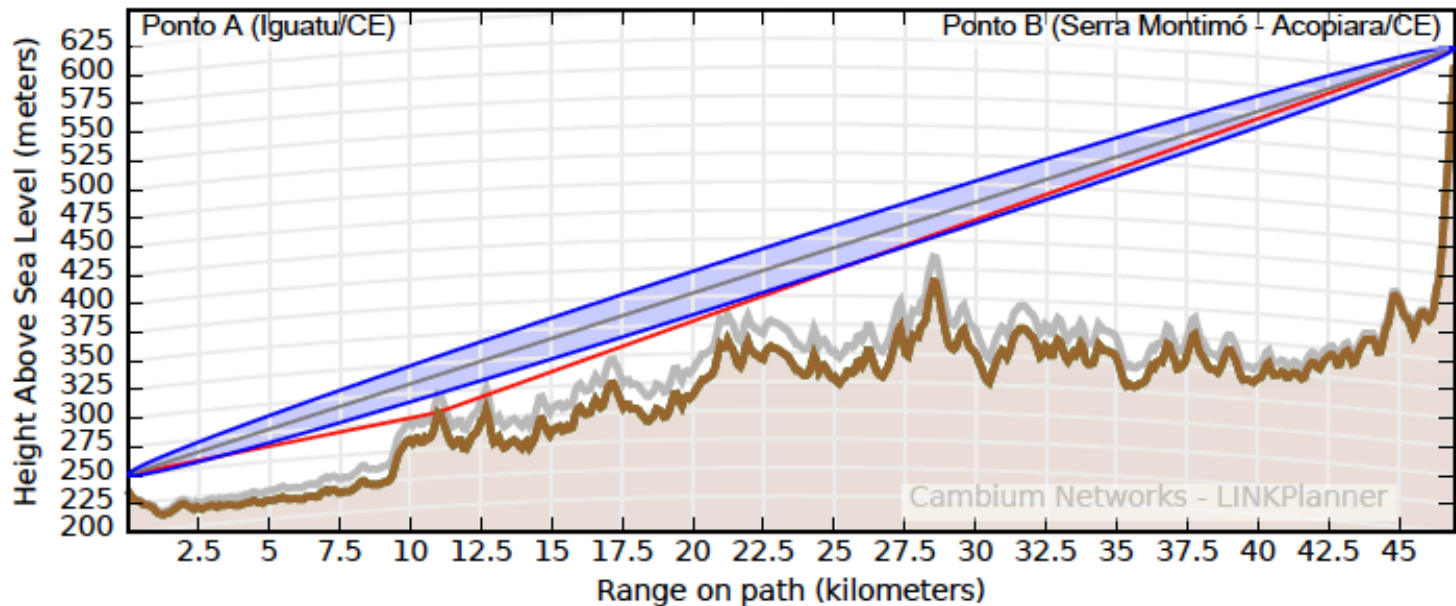
enabled running slave link ok

## Dica 8: SNR

- 802.11 N – SNR melhor que 30 dB
- 802.11 AC – SNR melhor que 40 dB

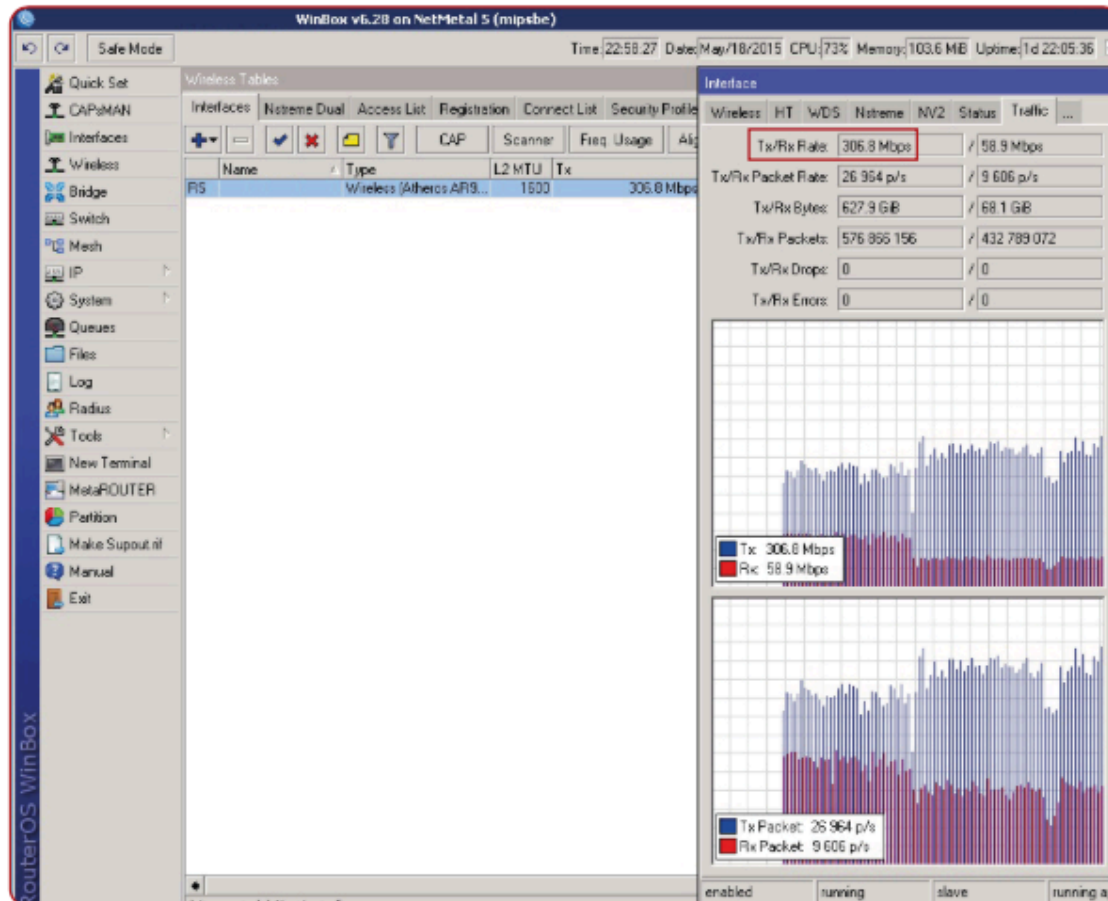
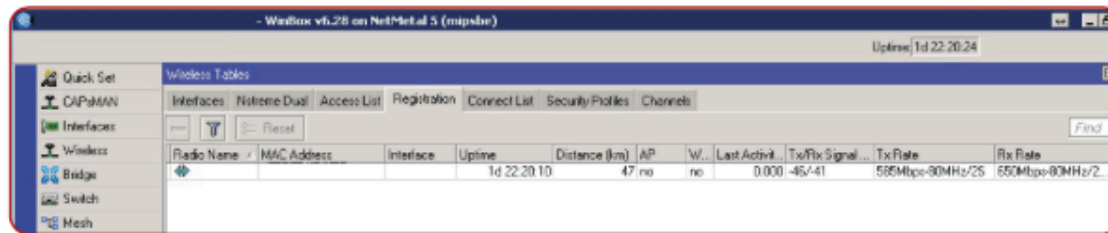
# Resultados

- Provenet Ceará 300 M @ 50 KM
- Antena ALGCom 1.2 M – 35.8 Dbi + RB922
- Porta SFP





- Provenet  
Ceará  
350 M @  
50 KM



- IDC 350 M @ 11 KM
- Local EXTREMAMENTE ruidoso
- ALGcom 90 cm + RB922



- IDC 350 M @ 10 KM

Wireless Tables

Interfaces Nstreme Dual Access List Registration Connect List Security Profiles Channels

+ - ✓ ✗ 📄 🗑️ CAP Scanner Freq. Usage Alignment Wireless Sniffer Wireless Snooper

	Name	Type	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s)	MU
RS	wlan1	Wireless (Atheros AR9...	1600	346.2 Mbps	45.6 Mbps	35 885	23 925 D4	
DRS	wds9	WDS	1600	346.2 Mbps	45.6 Mbps	35 884	23 925 D4	

Terminal

```

610 10.155.0.115          56 64 12ms
611 10.155.0.115          56 64 10ms
612 10.155.0.115          56 64 7ms
613 10.155.0.115          56 64 5ms
614 10.155.0.115          56 64 4ms
615 10.155.0.115          56 64 6ms
616 10.155.0.115          56 64 5ms
617 10.155.0.115          56 64 3ms
618 10.155.0.115          56 64 5ms
619 10.155.0.115          56 64 3ms
    sent=620 received=553 packet-loss=10% min-rtt=1ms avg-rtt=15ms
    max-rtt=663ms
SEQ HOST                SIZE TTL TIME  STATUS
620 10.155.0.115        56 64 5ms
621 10.155.0.115        56 64 13ms
622 10.155.0.115        56 64 5ms
623 10.155.0.115        56 64 3ms
624 10.155.0.115        56 64 4ms
625 10.155.0.115        56 64 4ms
626 10.155.0.115        56 64 4ms
627 10.155.0.115        56 64 4ms
628 10.155.0.115        56 64 4ms
629 10.155.0.115        56 64 3ms
  
```

2 items out of 5 (1 selected)

# Quer ajuda no seu planejamento?

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100 % Gratuito

