



## BIENVENIDOS A SANTA CRUZ - BOLIVIA



# Agenda

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- Necesidad
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Ing. José A. García D.  
MUM-BOLIVIA 2014



# Presentación

## José Alfredo García D.

*Ing. Redes y Telecomunicaciones*

- ❖ Consultor MikroTik
- ❖ Certificaciones: MTCNA-MTCTCE-MTCWE-MTCUME-MTCRE-MTCINE
- ❖ Trainer Academia MikroTik (UDABOL, UTEPSA, UDI), ACTR0076
- ❖ Experiencia en RouterOS desde 2011

## Writel Bolivia S.R.L , CEO y FOUNDER

- ❖ Máster Distribuidor MikroTik
- ❖ Partner Academy Xperts , desde Enero 2013
- ❖ Centro de Entrenamiento
- ❖ Soporte
- ❖ Consultoría



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# Necesidad

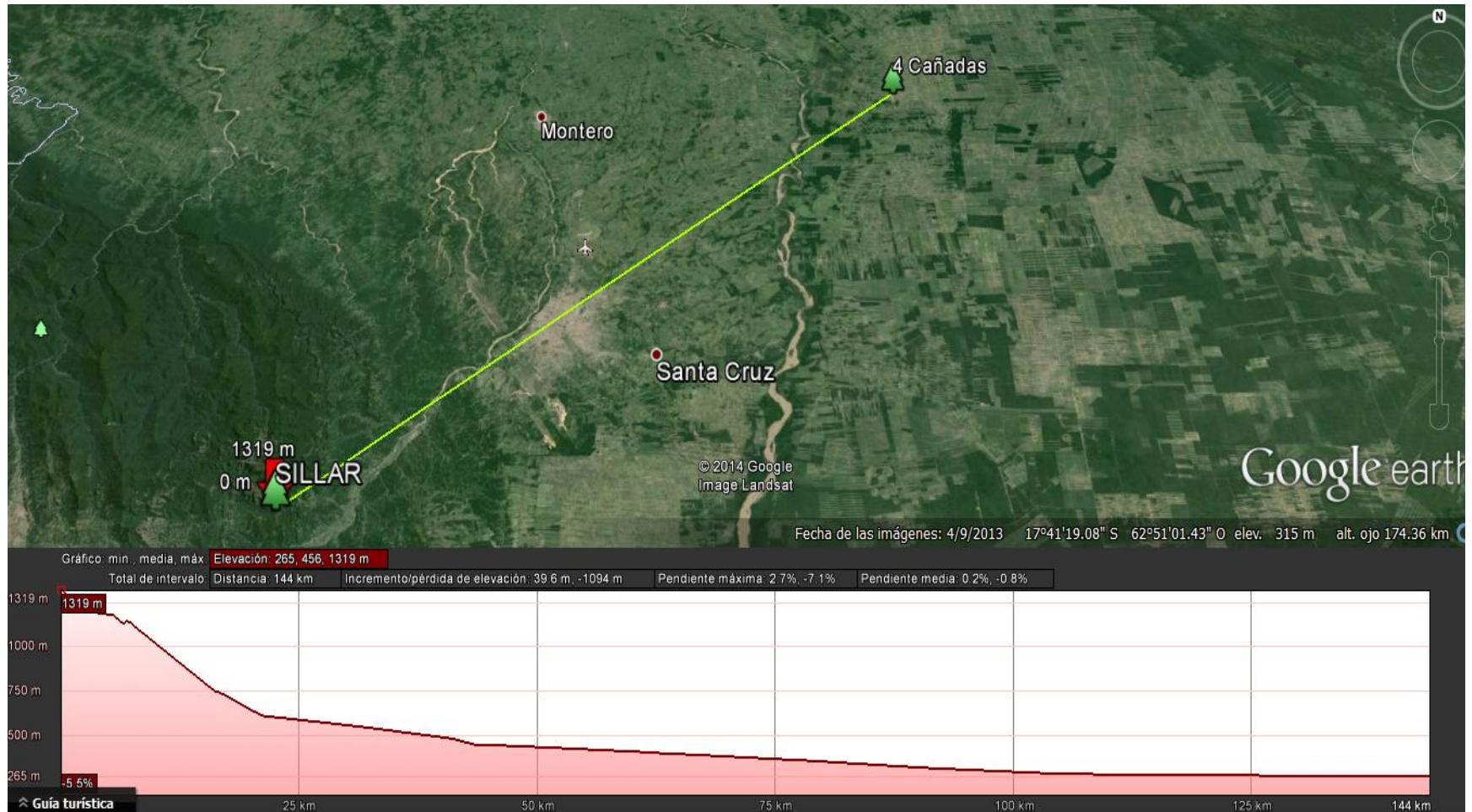
- La Cooperativa Xsus , desea interconectar su red de datos y telefonía a través de un Enlace Troncal desde la ciudad de Sucre hasta el Municipio de 4 Cañadas Ubicada en la provincia Ñuflo de Chávez(Santa Cruz).
- Se tiene una Repetidora en el Cerro del Sillar que interconectan varias localidades de El Torno , Angostura , Samaipata, etc.Esto está ubicado en el DPTO de Santa Cruz , Municipio de El Torno.
- El ancho de Banda requerido es de 4 MB.
- Soporte 24/7

# Caso de Éxito.: Parte 1

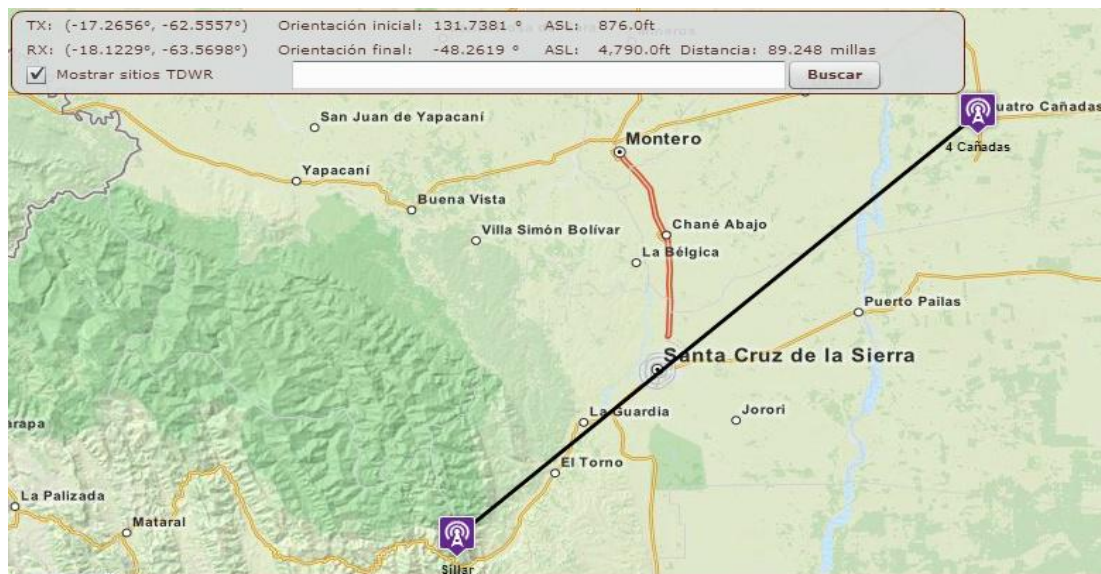
Como hacer 144Km de Radio Enlace  
con Routerboard, antena mANT 30 PA  
y antena parabólica offset 0,9mts



# Sitios







# Configuraciones mínimas del Routerboard

- ❖ 4C.: Modo Station WDS
- ❖ Sillar.: Modo Bridge
- ❖ Band.: 5Ghz-A/N
- ❖ Channel Width.: 20Mhz
- ❖ Frecuencia.: 5420 Mhz
- ❖ Nstreme
- ❖ Tx Power default(17dbm)
- ❖ Bridge en ambos extremos
- ❖



# Procedimiento = Prueba 1

- Combinación Inicial 1:



Antena mANT 30 PA Dish,  
RB921UAGS-5SHPaC

Antena Parabólica Offset  
0,9mts , RB SXT G-5HPnD r2

*Distancia= 144 Km Aprox.*

# 1er Resultado

- Radio Enlace no estable ,pero tráfico soportado hasta 2MB, distancia 144Km.

AP Client <4C:5E:0C:57:18:BF>

General802.1xSignalNstremeNV2Statistics

Last Activity: 0.010 s

Tx/Rx Signal Strength: -65/-62 dBm

Tx/Rx Signal Strength Ch0: -69/-69 dBm

Tx/Rx Signal Strength Ch1: -68/-64 dBm

Tx/Rx Signal Strength Ch2:

Signal To Noise: 41 dB

Tx/Rx CCQ: 60/39 %

P Throughput: 66669 kbps

Signal Strengths

Rate	Strength	Last Measured	
9Mbps	-71	00:09:58.34	
12Mbps	-71	00:09:09.60	
HT20-7	-67	00:00:00.02	
54Mbps	-65	00:00:07.01	
48Mbps	-64	00:00:11.78	
HT20-6	-64	00:00:00.01	
18Mbps	-63	00:01:55.40	
HT20-0	-63	00:02:04.14	
HT20-2	-63	00:00:05.53	
6Mbps	-62	00:00:00	
HT20-1	-62	00:00:05.94	

OK

Remove

Reset

Copy to Access List

Copy to Connect List

Ping

MAC Ping

Telnet

MAC Telnet

Torch

interface <wlan1>

Current Tx PowerStatusAdvanced StatusTraffic...

Channel: 5260/20/an

Wireless Protocol: nstreme

Tx Rate: 104Mbps-20MHz/2S

Rx Rate: 130Mbps-20MHz/2S/SGI

SSID: ARNET-4CC

BSSID: 4C:5E:0C:57:18:BF

Radio Name: 4C5E0C5718BF

Tx/Rx Signal Strength: -65/-61 dBm

Tx/Rx Signal Strength Ch0: -69/-68 dBm

Tx/Rx Signal Strength Ch1: -68/-62 dBm

Tx/Rx Signal Strength Ch2:

Noise Floor: -103 dBm

Signal To Noise: 42 dB

Tx/Rx CCQ: 60/39 %

Overall Tx CCQ: 60 %

Distance:

RouterOS Version: 6.21.1

OK

Cancel

Apply

Disable

Comment

Torch

Scan...

Freq. Usage...

Align...

Sniff...

Snooper...

Reset Configuration

Simple Mode

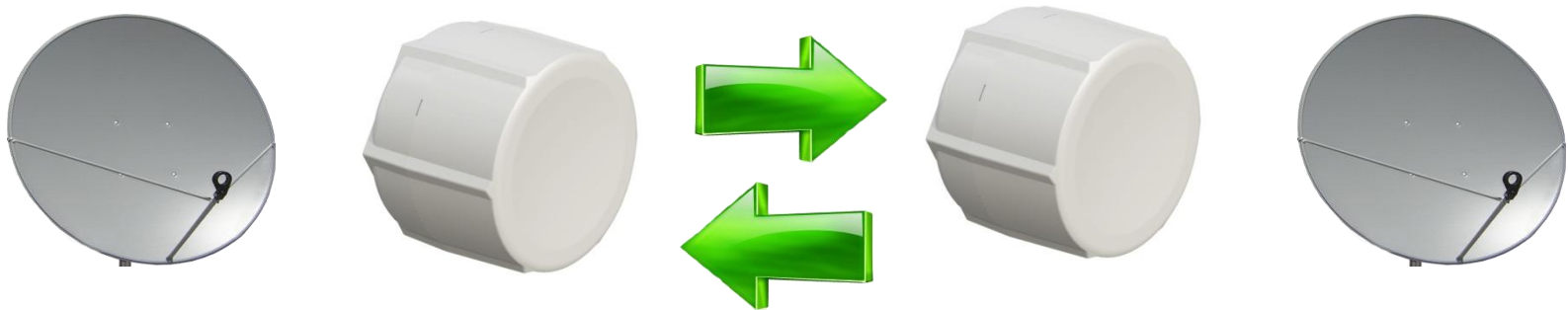
# 1er Resultado

The image displays the MikroTik WinBox interface with several configuration windows open. On the left is a sidebar menu with icons and labels for various system functions. The main area contains several overlapping windows:

- Identity**: Shows 'Identity: Silar SCZ a 4Cañadas' with OK, Cancel, and Apply buttons.
- License**: Displays 'Software ID: PB60-PZY5', 'Level: 4', and buttons for 'Paste Key', 'Import Key...', 'Export Key...', 'Update License Key', and 'Upgrade/Get New Key...'. It also has an 'OK' button.
- Resources**: Shows system statistics including 'Uptime: 1d 09:06:11', 'Free Memory: 107.9 MiB', 'Total Memory: 128.0 MiB', 'CPU: MIPS 74Kc V5.0', 'CPU Count: 1', 'CPU Frequency: 720 MHz', 'CPU Load: 5 %', 'Free HDD Space: 112.0 MiB', 'Total HDD Size: 128.0 MiB', 'Sector Writes Since Reboot: 403', 'Total Sector Writes: 6 632', 'Bad Blocks: 0.0 %', 'Architecture Name: mipsbe', and 'Board Name: RB921UAGS-5SHPaC'. It includes buttons for 'OK', 'PCI', 'USB', 'CPU', and 'IRQ'.
- System Health**: Shows 'Fan Mode: manual', 'Use Fan: auxiliary', 'Active Fan: auxiliary', 'Voltage: 12.3 V', and 'Temperature: 19 C'. It has 'OK', 'Cancel', and 'Apply' buttons.
- Routerboard**: Shows 'Model: 921UAGS-5SHPaC', 'Serial Number: 4E9B04DF6099', 'Current Firmware: 3.17', and 'Upgrade Firmware: 3.17'. It includes buttons for 'OK', 'Upgrade', 'Settings', and 'USB Power Reset'.
- Wireless**: Shows configuration for 'face wlan1' with tabs for 'General', 'Wireless', 'Data Rates', 'Advanced', and 'HT'. It includes fields for 'Mode: station wds', 'Band: 5GHz-A/N', 'Channel Width: 20/40MHz eC', 'Frequency: 5660 MHz', 'SSID: ARNET-4CC', 'Radio Name: 4C5E0C862BDA', 'Scan List: default', 'Wireless Protocol: any', 'Security Profile: default', 'Frequency Mode: manual-tpower', 'Country: czech republic', and 'Antenna Gain: 0 dBi'. It has buttons for 'OK', 'Cancel', 'Apply', 'Disable', 'Comment', 'Torch', 'Scan...', 'Freq. Usage...', 'Align...', 'Sniff...', 'Snooper...', and 'Reset Configuration'.
- AP Client <4C:5E:0C:57:18:BF>**: Shows tabs for 'General', '802.1x', 'Signal', 'Nstreme', 'NV2', and 'Statistics'. It includes fields for 'Last Activity: 0.040 s', 'Tx/Rx Signal Strength: -70/-68 dBm', 'Tx/Rx Signal Strength Ch0: -75/-73 dBm', 'Tx/Rx Signal Strength Ch1: -71/-68 dBm', 'Tx/Rx Signal Strength Ch2: ', 'Signal To Noise: 36 dB', 'Tx/Rx CCQ: 53/42 %', and 'P Throughput: 40242 kbps'. It has buttons for 'OK', 'Remove', 'Reset', 'Copy to Access List', 'Copy to Connect List', 'Ping', 'MAC Ping', and 'Telnet'.

The sidebar menu on the left includes the following items: Quick Set, CAPsMAN, Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, MPLS, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, MetaROUTER, Partition, Make Supout.rf, Manual, and Exit.

# Procedimiento = Prueba 2



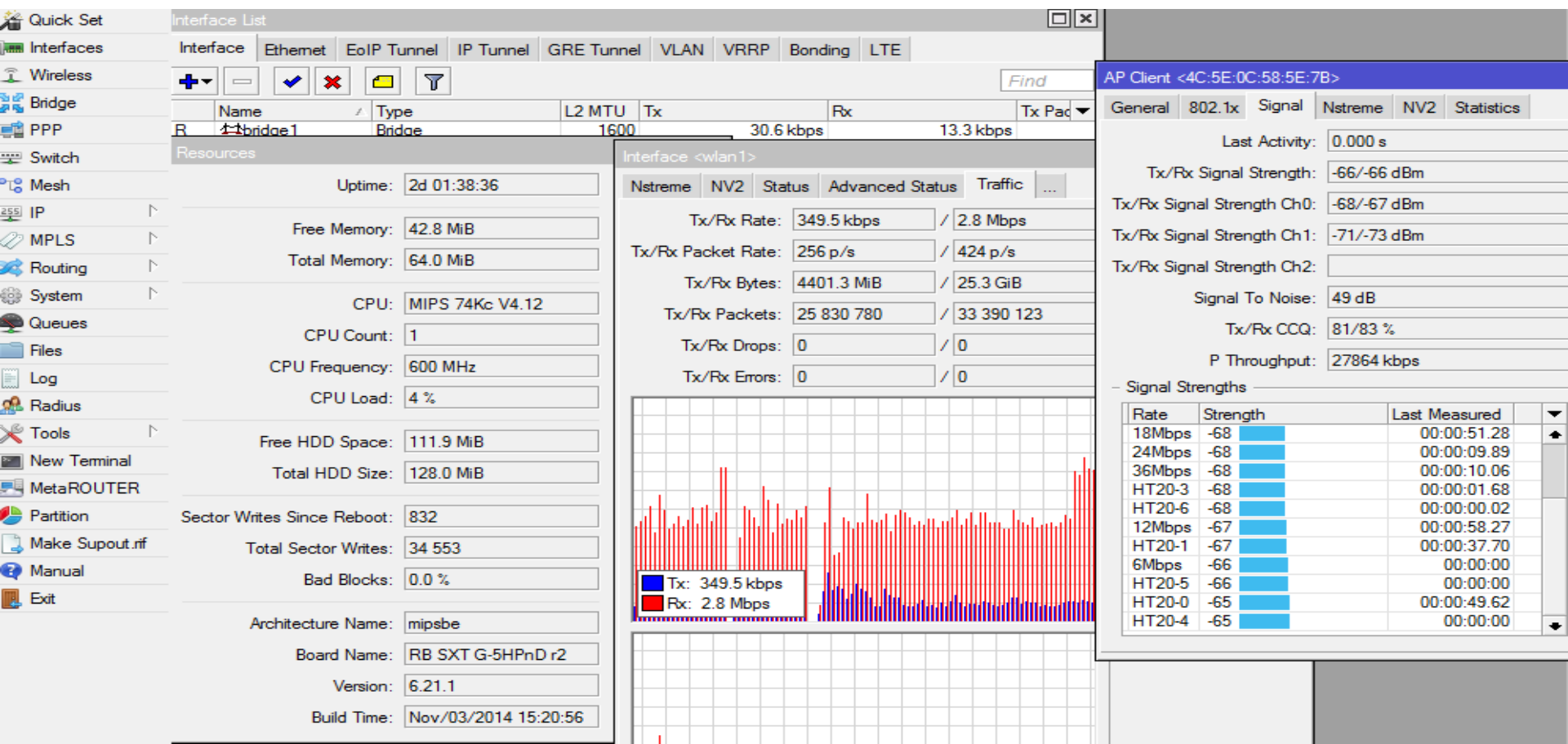
Antena Parabólica Offset  
0,9mts , RB SXT G-5HPnD r2

Antena Parabólica Offset  
0,9mts , RB SXT G-5HPnD r2

*Distancia= 144 Km Aprox.*

# Resultados

- Radio Enlace más estable , tráfico soportado hasta 6MB.
- CCQ aceptable por ahora.
- Menos perdida de Paquetes. Distancia 144km.



# Como Estación

The screenshot displays the MikroTik WinBox interface. On the left is a sidebar with various configuration menus. The main area shows the 'Wireless Tables' window with a table of wireless interfaces. Overlaid on this is the 'Address List' window, which shows a single IP address configuration. In the foreground is the 'Ping (Running)' window, showing the results of a ping test to 10.15.20.213.

**Wireless Tables**

Radio Name	MAC Address	Interface	Uptime	AP	W...	Last Activit...	Tx/Rx Signal ...	Tx/Rx Rate
Co. Sillar SCZ a 4 Cañadas								
WRITEL1	4C:5E:0C:57:18:BF	wlan1	00:03:17	no	yes	0.000	-67/-69	86.6Mbps/86.6Mbps

**Address List**

Address	Network	Interface
10.15.20.215/...	10.15.16.0	bridge1

**Ping (Running)**

General | Advanced

Ping To: 10.15.20.213

Interface: [Dropdown]

☐ ARP Ping

Packet Count: [Dropdown]

Timeout: 1000 ms

Buttons: Start, Stop, Close, New Window

Seq #	Host	Time	Reply Size	TTL	Status
0	10.15.20.213	21ms	50	64	
1	10.15.20.213	1ms	50	64	
2	10.15.20.213	2ms	50	64	
3	10.15.20.213	3ms	50	64	
4	10.15.20.213	5ms	50	64	
5	10.15.20.213	3ms	50	64	



# Como AP

**Wireless Tables**

Radio Name	MAC Address	Interface	Uptime	AP	W...	Last Activit...	Tx/Rx Signal ...	Tx/Rx Rate
WRITEL1	4C:5E:0C:57:18:BF	wlan1	00:01:50	no	yes	0.000	-67/-70	57.7Mbps/86.6Mbps

**Resources**

Uptime: 2d 02:23:06

Free Memory: 46.5 MiB

Total Memory: 64.0 MiB

CPU: MIPS 74Kc V4.12

CPU Count: 1

CPU Frequency: 600 MHz

CPU Load: 11 %

Free HDD Space: 111.9 MiB

Total HDD Size: 128.0 MiB

Sector Writes Since Reboot: 868

Total Sector Writes: 93 777

Bad Blocks: 0.0 %

Architecture Name: mipsbe

Board Name: RB SXT G-5HPnD r2

Version: 6.21.1

**AP Client <4C:5E:0C:57:18:BF>**

Last Activity: 0.000 s

Tx/Rx Signal Strength: -67/-70 dBm

Tx/Rx Signal Strength Ch0: -69/-73 dBm

Tx/Rx Signal Strength Ch1: -73/-73 dBm

Tx/Rx Signal Strength Ch2:

Signal To Noise: 43 dB

Tx/Rx CCQ: 51/89 %

P Throughput: 25695 kbps

**Signal Strengths**

Rate	Strength	Last Measured
54Mbps	-73	
9Mbps	-72	
HT20-0	-72	
HT20-1	-72	
HT20-6	-72	
HT20-7	-72	
12Mbps	-71	
18Mbps	-71	
48Mbps	-71	
6Mbps	-70	
HT20-3	-70	

**Routerboard**

☒ Routerboard

Model: SXT G-5HPnD...

Serial Number: 4646040E6C...

Current Firmware: 3.19

Upgrade Firmware: 3.19

# Lo que se viene.: Parte 2



*CONTINUARA....*

# mum

MikroTik User Meeting  
Bolivia. November 2014



## GRACIAS

