

Administración Remota de varias redes WISP con Mikrotik

JAFICA
Telecomunicaciones

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Presentación Personal

- Figueroa Castañeda Jaime Armando
- Redes y Telecomunicaciones
- Certificaciones



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Principales redes WISP que administramos

- 4 redes con mas de 100 domicilios cada una
- 2 a 5 dispositivos por CPE
- Mas de 1200 hosts gestionados
- Redes separadas geográficamente por mas de 400km

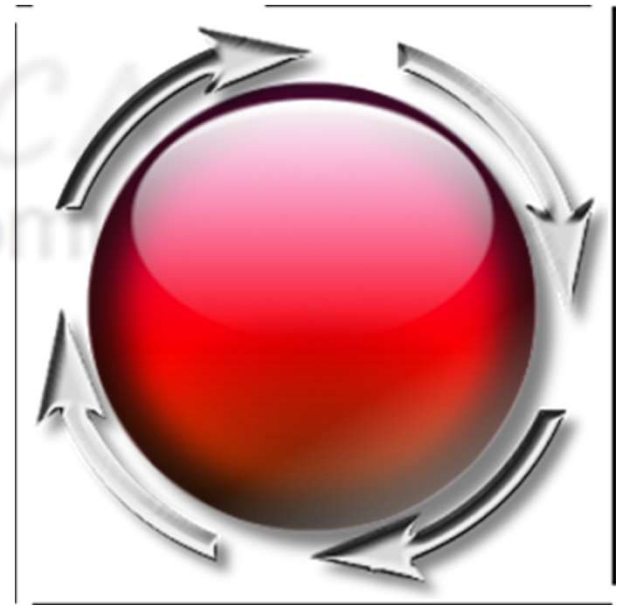
Necesidades

- Monitoreo de la red
- Económico
- Avanzado
- Fácil de usar
- Acceso remoto
- Notificaciones en tiempo real
- Registro (log)

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The dude

- Diagramas de la red
- SNMP
- Estado en tiempo real
- Notificaciones por Telegram
- Graficas de trafico
- Logs propios y remotos



Desventajas de tener The dude dentro de la red

- Depende de hardware propio
- Si pierde internet, perdemos comunicación.
- No se podía garantizar el monitoreo de otros sitios

Ventajas en un VPS

- Disponibilidad de conexión a internet
- 99.9% de SLA
- Ancho de banda alto
- Baja latencia
- Libre de Mantenimiento

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¿Que es un CHR?

- Cloud Hosted Router
- Es una versión RouterOS destinado a correr como una máquina virtual

System Requirements

Minimal requirements:

- 64bit CPU with virtualisation support
- 128 MB or more RAM for the CHR instance
- 128 MB disk space for the CHR virtual hard drive

CHR has been tested on the following platforms:

- VirtualBox 5 on Linux and OS X
- VMWare Fusion 7 and 8 on OS X
- Qemu 2.4.0.1 on OS X

Ventajas de un CHR

- Ip publicas
- Servidor VPN
- Servidor para btest
- Soporte para DUDE
- Hardware independiente del nuestro
- Siempre activo
- Siempre conectado a internet
- Seguridad

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Resources

Uptime: 23:09:33

Free Memory: 1863.8 MiB

Total Memory: 1935.3 MiB

CPU: Intel

CPU Count: 1

CPU Frequency: 2394 MHz

CPU Load: 4 %

Free HDD Space: 9.9 GiB

Total HDD Size: 9.9 GiB

Sector Writes Since Reboot: 11 680 944

Total Sector Writes: 11 680 945

Architecture Name: x86_64

Board Name: CHR

Version: 6.39.1 (stable)

Build Time: May/03/2017 08:17:10

Package List

Name	Version	Build Time	Status
dude	6.39.1	May/03/2017 08:17:10	
routeros-x86	6.39.1	May/03/2017 08:17:10	
advanced+	6.39.1	May/03/2017 08:17:10	
dhcp	6.39.1	May/03/2017 08:17:10	
hotspot	6.39.1	May/03/2017 08:17:10	
ipv6	6.39.1	May/03/2017 08:17:10	
mpls	6.39.1	May/03/2017 08:17:10	
ppp	6.39.1	May/03/2017 08:17:10	
routing	6.39.1	May/03/2017 08:17:10	
security	6.39.1	May/03/2017 08:17:10	
system	6.39.1	May/03/2017 08:17:10	
ups	6.39.1	May/03/2017 08:17:10	
wireless	6.39.1	May/03/2017 08:17:10	
user-manager	6.39.1	May/03/2017 08:17:10	

jaime@chr.jafica.com (chr.jafica.com) - WinBox v6.39.1 on CHR (x86_64)

Session Settings Dashboard

Session: chr.jafica.com

- Quick Set
- CAPsMAN
- Interfaces
- Wireless
- Bridge
- PPP
- Mesh
- IP
- IPv6
- MPLS
- Routing
- System
- Queues
- Files
- Log
- Radius
- Tools
- New Terminal
- Dude
- Make Supout.rif
- Manual
- New WinBox
- Exit

Name	Type	Actual MTU	L2 MTU
DR <<2tp-cuautla-1>	L2TP Server Binding	1450	
DR <<2tp-miriam>	L2TP Server Binding	1450	
DR <<2tp-papagayos>	L2TP Server Binding	1450	
DR <<pptp-abuelito_mk>	PPTP Server Binding	1450	
DR <<pptp-cuautla2>	PPTP Server Binding	1450	
DR <<pptp-integral>	PPTP Server Binding	1450	
DR <<pptp-netmetalcuema>	PPTP Server Binding	1450	
DR <<pptp-pungarabato>	PPTP Server Binding	1450	
DR <<pptp-rey>	PPTP Server Binding	1450	
DR <<pptp-snwf>	PPTP Server Binding	1450	
R <<ether1>	Ethernet	1500	

Instalación The dude en un CHR

- Descargar el paquete
- Subirlo al Equipo (ftp,sftp,winbox,webig)
- Reiniciar.
- verificar

Verificar en Package List

The screenshot shows the Mikrotik WinBox interface. On the left, the 'System' menu item is highlighted in the main sidebar. A secondary sidebar on the right of the main sidebar shows a list of system-related options, with 'Packages' highlighted. The 'Package List' window is open, displaying a table of installed packages. The table has four columns: Name, Version, Build Time, and Scheduled. The 'dude' package is highlighted in the first row. Other packages listed include routeros-x86, advanced-tools, dhcp, hotspot, ipv6, mpls, ppp, routing, security, system, ups, wireless, and user-manager. All packages are at version 6.39.1 and were built on May/03/2017 at 08:17:10.

Name	Version	Build Time	Scheduled
dude	6.39.1	May/03/2017 08:17:10	
routeros-x86	6.39.1	May/03/2017 08:17:10	
advanced-tools	6.39.1	May/03/2017 08:17:10	
dhcp	6.39.1	May/03/2017 08:17:10	
hotspot	6.39.1	May/03/2017 08:17:10	
ipv6	6.39.1	May/03/2017 08:17:10	
mpls	6.39.1	May/03/2017 08:17:10	
ppp	6.39.1	May/03/2017 08:17:10	
routing	6.39.1	May/03/2017 08:17:10	
security	6.39.1	May/03/2017 08:17:10	
system	6.39.1	May/03/2017 08:17:10	
ups	6.39.1	May/03/2017 08:17:10	
wireless	6.39.1	May/03/2017 08:17:10	
user-manager	6.39.1	May/03/2017 08:17:10	

Conexión de las redes al CHR

PPTP

- Fácil de implementar
- No requiere hardware
- Bloqueo por parte de operadores móviles
- Bajo nivel de seguridad

L2TP IPSEC

- Fácil de implementar
- Compatible con la mayoría de dispositivos móviles
- Requiere mas pasos en la configuración
- Mayor seguridad
- Permite el uso de VPN en equipos Apple

VPN

PPP

Interface PPPoE Servers Secrets Profiles Active Connections L2TP Secrets

PPP Scanner PPTP Server SSTP Server L2TP Server OVPN Server PPPoE Scan

	Name	Type	Actual MTU	L2 MTU	Tx	Rx	Tx Packet (s)
DR	<<12tp-cuautla>	L2TP Server Binding	1450		16.6 kbps	17.2 kbps	
DR	<<12tp-miriam>	L2TP Server Binding	1450		0 bps	0 bps	
DR	<<12tp-papagayos>	L2TP Server Binding	1450		29.5 kbps	339.4 kbps	
DR	<<pptp-abuelito_mk>	PPTP Server Binding	1450		0 bps	0 bps	
DR	<<pptp-cuautla2>	PPTP Server Binding	1450		288 bps	256 bps	
DR	<<pptp-integral>	PPTP Server Binding	1450			3.1 kbps	
DR	<<pptp-netmetalcuema>	PPTP Server Binding	1450			0 bps	
DR	<<pptp-pungarabato>	PPTP Server Binding	1450			0 bps	
DR	<<pptp-rey>	PPTP Server Binding	1450			0 bps	
DR	<<pptp-snwf>	PPTP Server Binding	1450		1152 bps	1024 bps	
DR	<<pptp-uni-durango>	PPTP Server Binding	1450		0 bps	0 bps	

CHR

PPP

Interface PPPoE Servers Secrets Profiles Active C

PPP Scanner

	Name	Type
R	<<chr.jafica.com	PPTP C
R	<<jafica.com	PPTP C

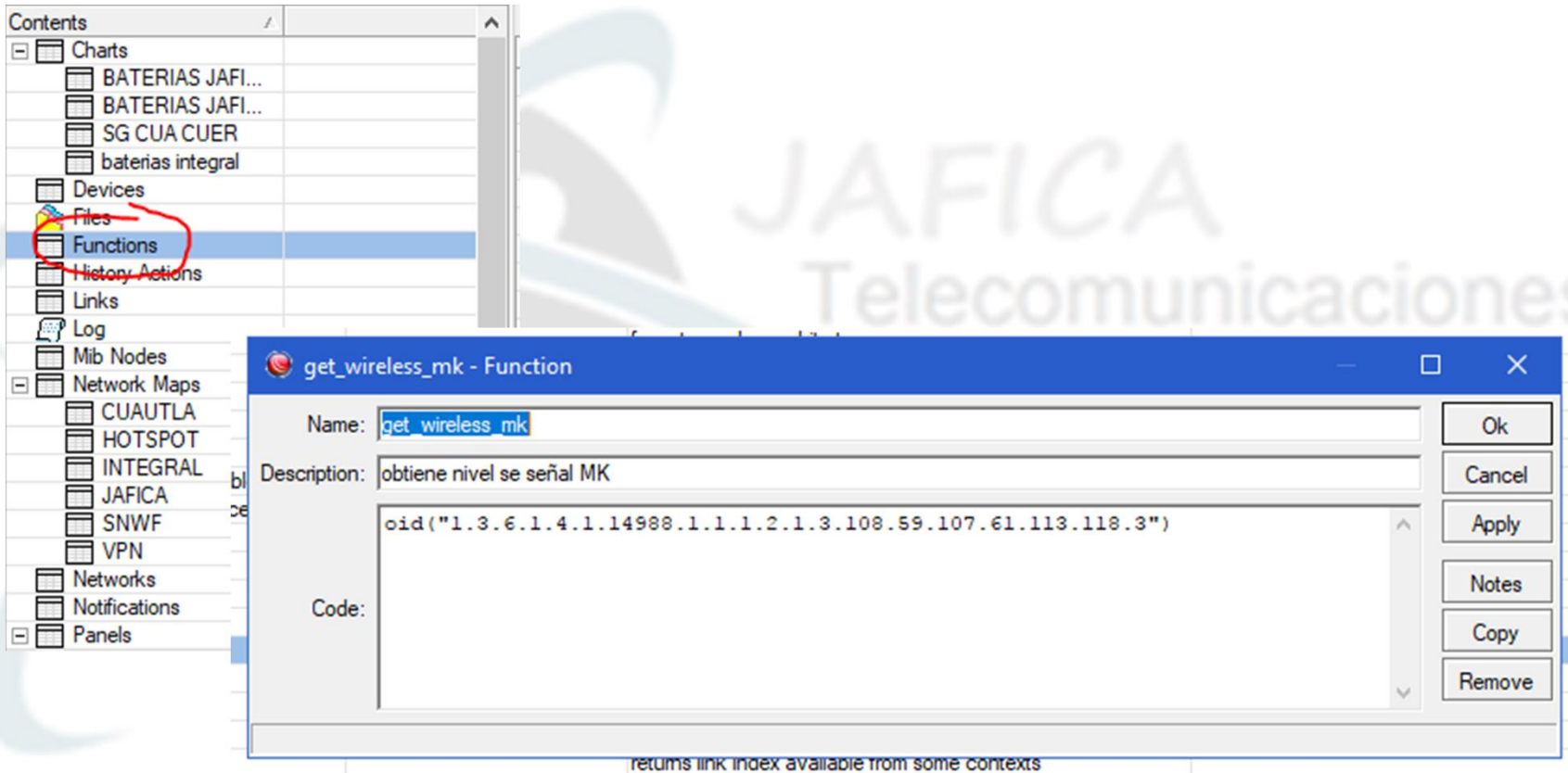
ROUTER DE BORDE

Monitoreo del estado de un enlace

- SNMP activado en el equipo
- Obtener el valor OID

```
[jaime@NETMETAL CUERNAVACA] /interface wireless> print oid
0 tx-rate=.1.3.6.1.4.1.14988.1.1.1.3.1.2.3 rx-rate=.1.3.6.1.4.1.14988.1.1.1.3.1.3.3
  ssid=.1.3.6.1.4.1.14988.1.1.1.3.1.4.3 bssid=.1.3.6.1.4.1.14988.1.1.1.3.1.5.3
  client-count=.1.3.6.1.4.1.14988.1.1.1.3.1.6.3 frequency=.1.3.6.1.4.1.14988.1.1.1.3.1.7.3
  band=.1.3.6.1.4.1.14988.1.1.1.3.1.8.3 noise-floor=.1.3.6.1.4.1.14988.1.1.1.3.1.9.3
  overall-ccq=.1.3.6.1.4.1.14988.1.1.1.3.1.10.3
```

Creación de función en dude



Creación del Origen de datos

The screenshot shows a network management interface with a 'Contents' sidebar on the left and a main panel on the right. The 'Contents' sidebar has a 'Charts' folder highlighted with a red circle. The main panel has a 'Charts' tab and a 'Data Sources' tab, with the latter selected and also circled in red. A red arrow points from the 'Charts' folder in the sidebar to the 'Data Sources' tab. The 'Data Sources' tab has a toolbar with a '+' icon circled in red. Below the toolbar is a table of data sources.

Name	Type	Last Value	Notes
@ SNWF tx	builtin		
@ SNWF rx	builtin		
ping @ MASTER JUNTAS	builtin	0.162428	
JUNTAS_ENVIA @ JARIO/SANTACRUZ tx	builtin	2.27906E+07	
@ SNWF rx	builtin		
@ SNWF tx	builtin		
jafica.com @ INTEGRAL rx	builtin	0	
@ SNWF rx	builtin		
@ SNWF tx	builtin		
jafica.com @ INTEGRAL tx	builtin	0	
chr.jafica.com @ CUAUTLA rx	builtin		
jafica.com @ CORE CUAUTLA tx	builtin	140	
jafica.com @ CUAUTLA tx	builtin		
jafica.com @ CUAUTLA rx	builtin		
@ SNWF rx	builtin		
WAN @ LA LAJA rx	builtin	3.35336E+06	

Origen de datos

enlac_cuerna - Data Source

General Chart

☒ Enabled

Name: enlac_cuerna

Unit: dbm

Device: NETMETAL CUERNAVACA

Code: get_wireless_mk()

Interval: 00:00:05

Last Value Time: 17:52:23

Last Value: -51

Settings that control how much detail is stored for how long time

Raw Value Keep Time: default

10 Min Value Keep Time: default

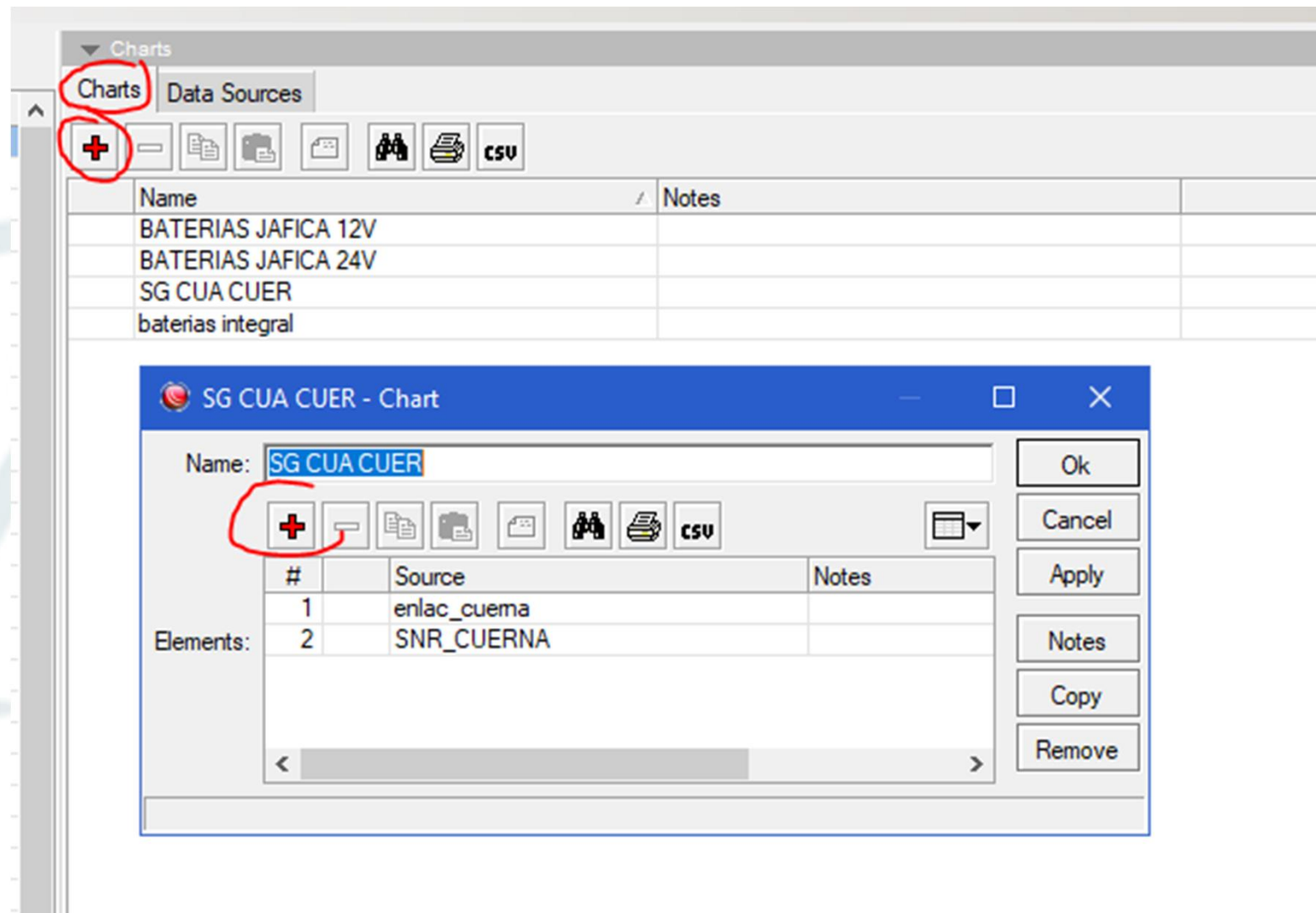
2 Hour Value Keep Time: default

1 Day Value Keep Time: default

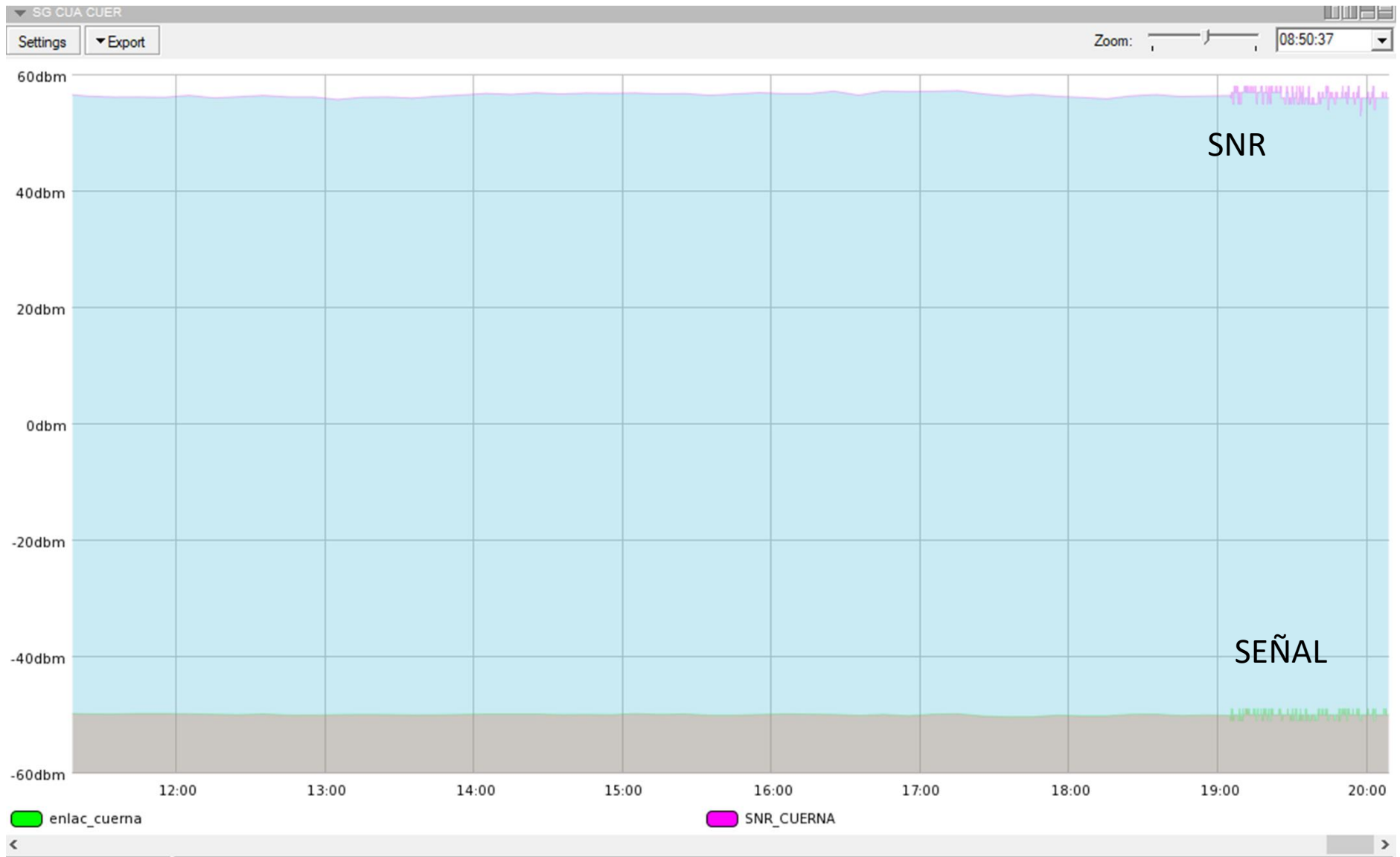
Approximate Storage Size: 28.8 kB

Ok Cancel Apply Notes Remove

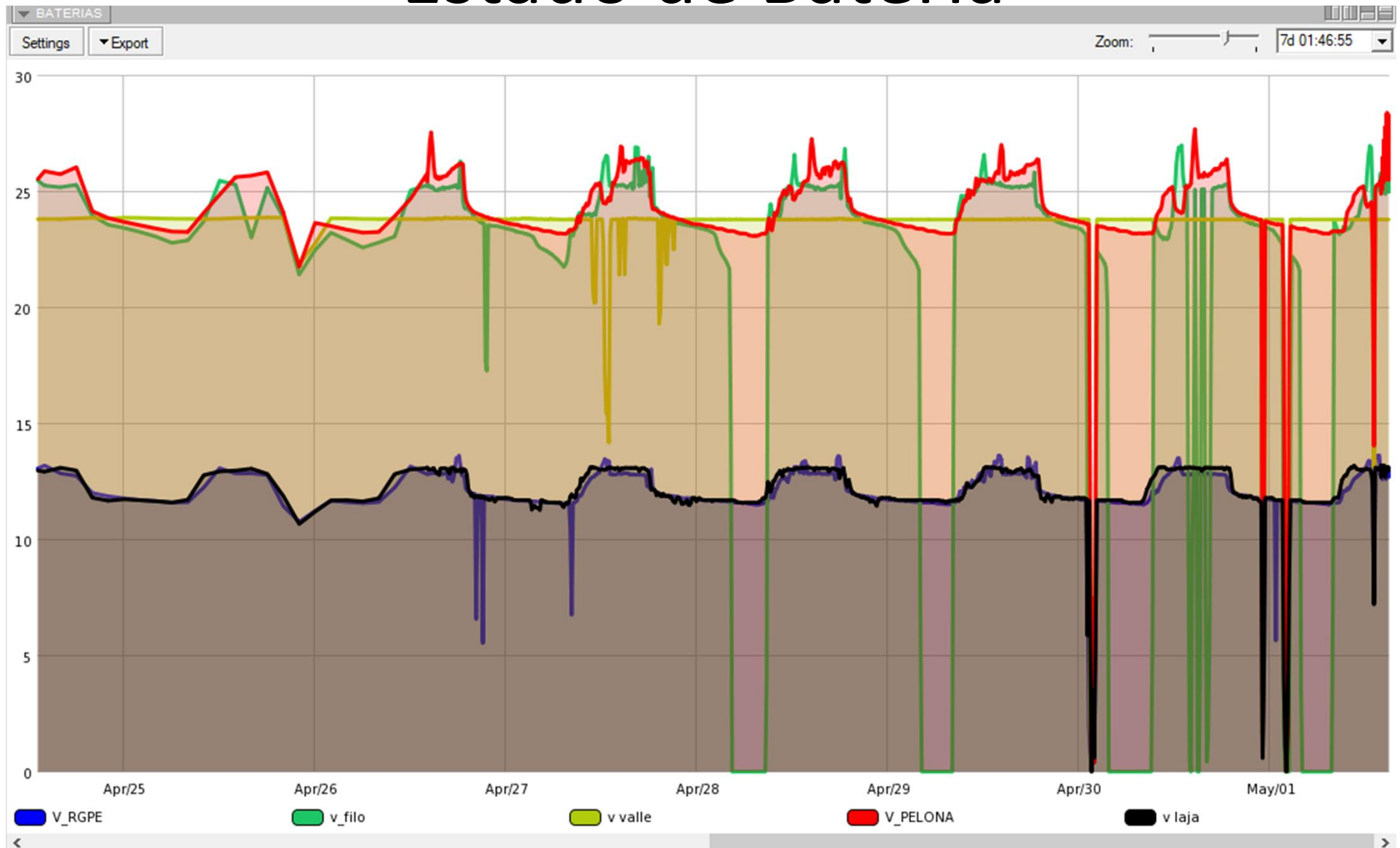
Creación de la Grafica



Grafica del enlace

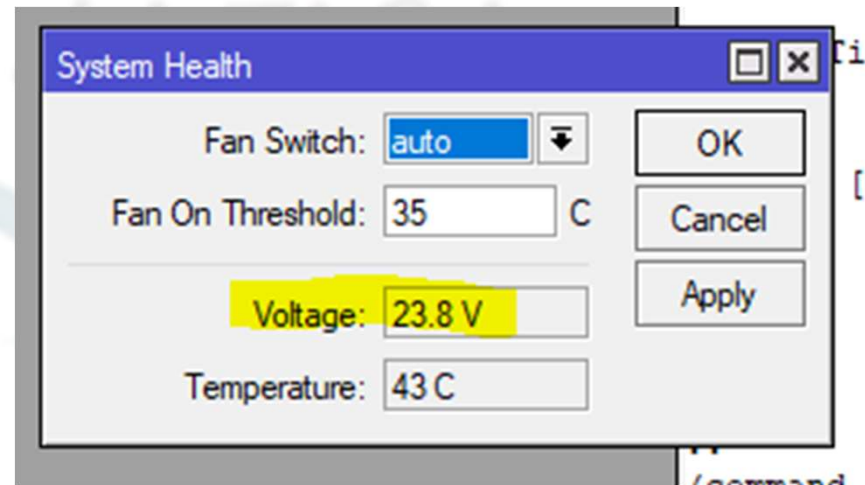


Estado de Bateria



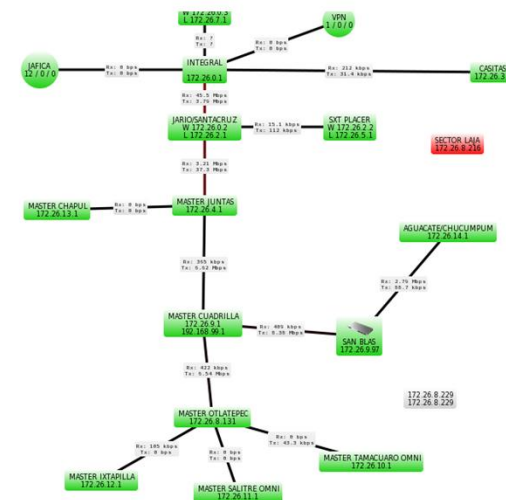
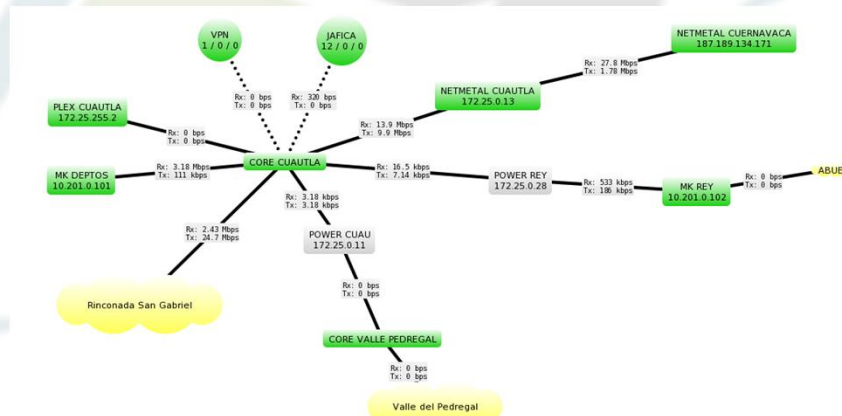
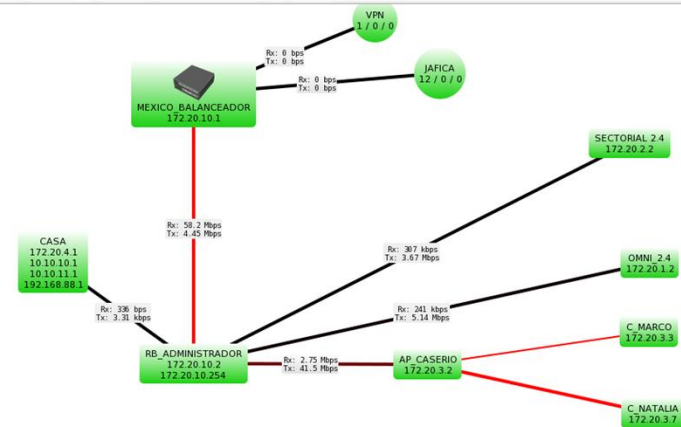
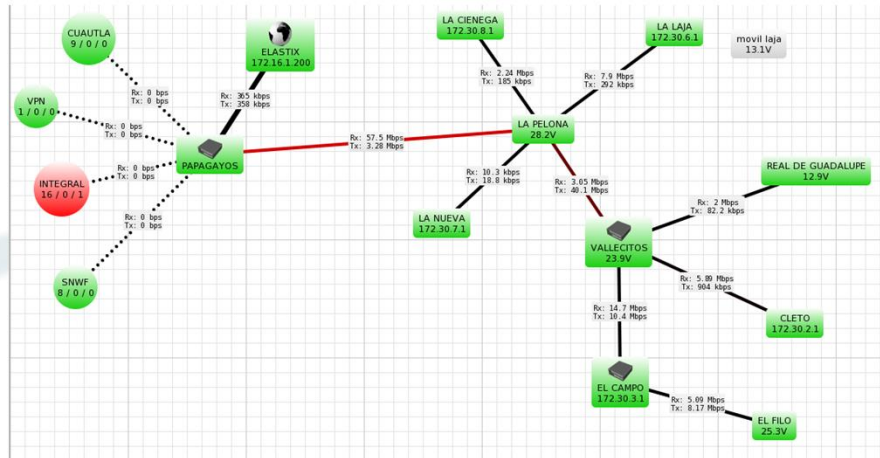
Requisitos para Monitorear Baterías

- Solamente es posible en equipos con Monitor de voltaje.
- RB750up
- Powerbox
- Mantbox
- RB Metal

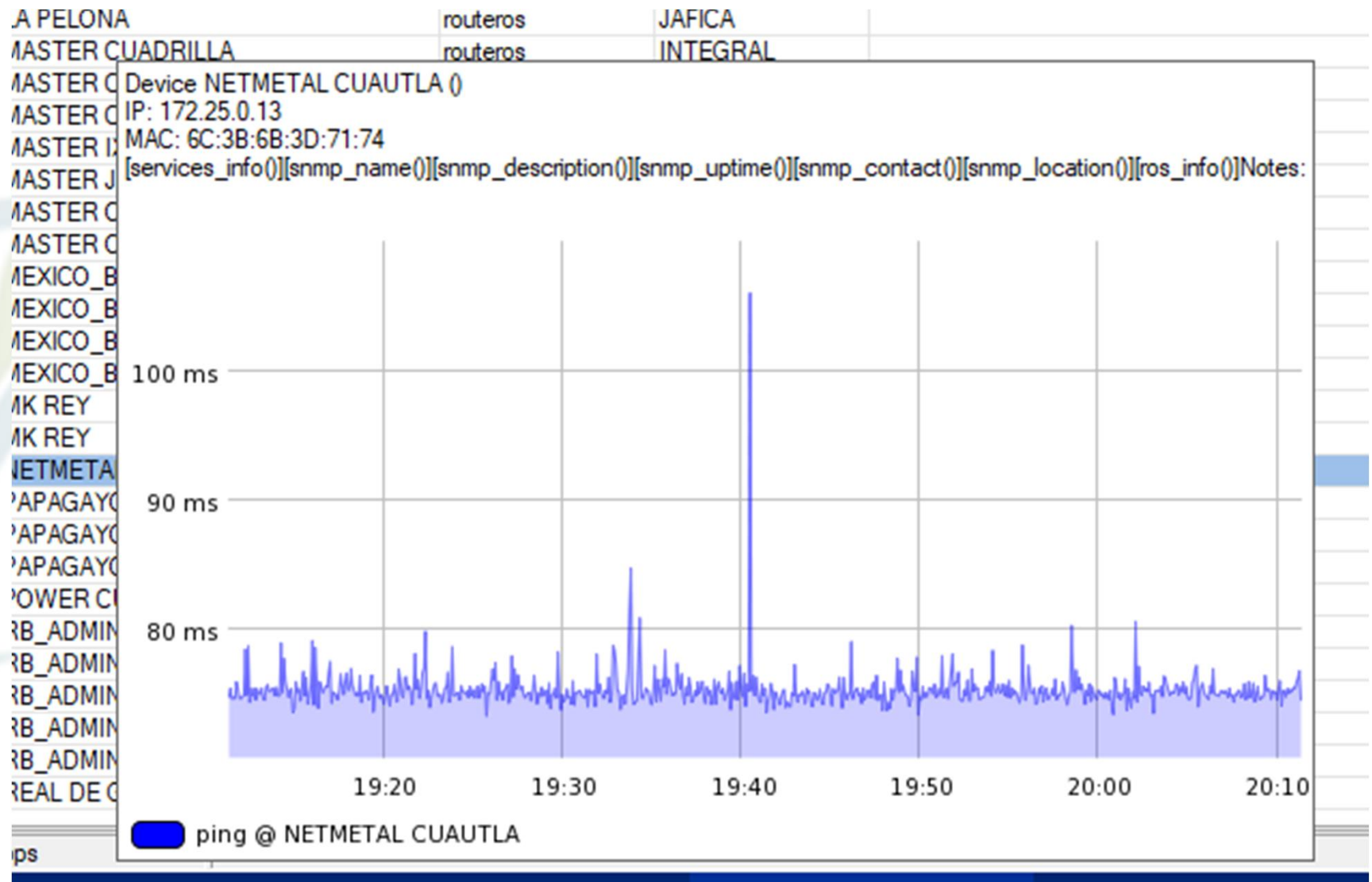


Supported input voltage	9 V - 30 V
PoE in	Yes
Voltage Monitor	Yes
PCB temperature monitor	Yes
Dimensions	177x44x44mm, 193g

Diagramas de la red



Estado de Ping a dispositivos



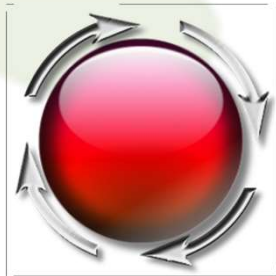
Registros del LOG

Apr/26 21:55:28	syslog: Service ping on AGUACATE/CHUCUMPUM is now down (timeout)
Apr/26 21:56:40	syslog: Service ping on AGUACATE/CHUCUMPUM is now up ()
Apr/27 12:53:18	syslog: Service bajo Voltaje 24 on VALLECITOS is now down (statement 121 > 200 not true)
Apr/27 12:54:03	syslog: Service bajo Voltaje 24 on VALLECITOS is now up ()
Apr/27 12:59:33	syslog: Service bajo Voltaje 24 on VALLECITOS is now down (statement 115 > 200 not true)
Apr/27 12:59:48	syslog: Service bajo Voltaje 24 on VALLECITOS is now up ()
Apr/27 19:17:33	syslog: Service bajo Voltaje 24 on VALLECITOS is now down (statement 109 > 200 not true)
Apr/27 19:17:53	syslog: Service bajo Voltaje 24 on VALLECITOS is now up ()
Apr/28 04:19:44	syslog: Service ping on EL FILO is now down (ICMP error received (6)TTL exceeded)
Apr/28 08:45:43	syslog: Service ping on EL FILO is now up ()
Apr/29 00:01:19	syslog: Service ping on AGUACATE/CHUCUMPUM is now down (timeout)

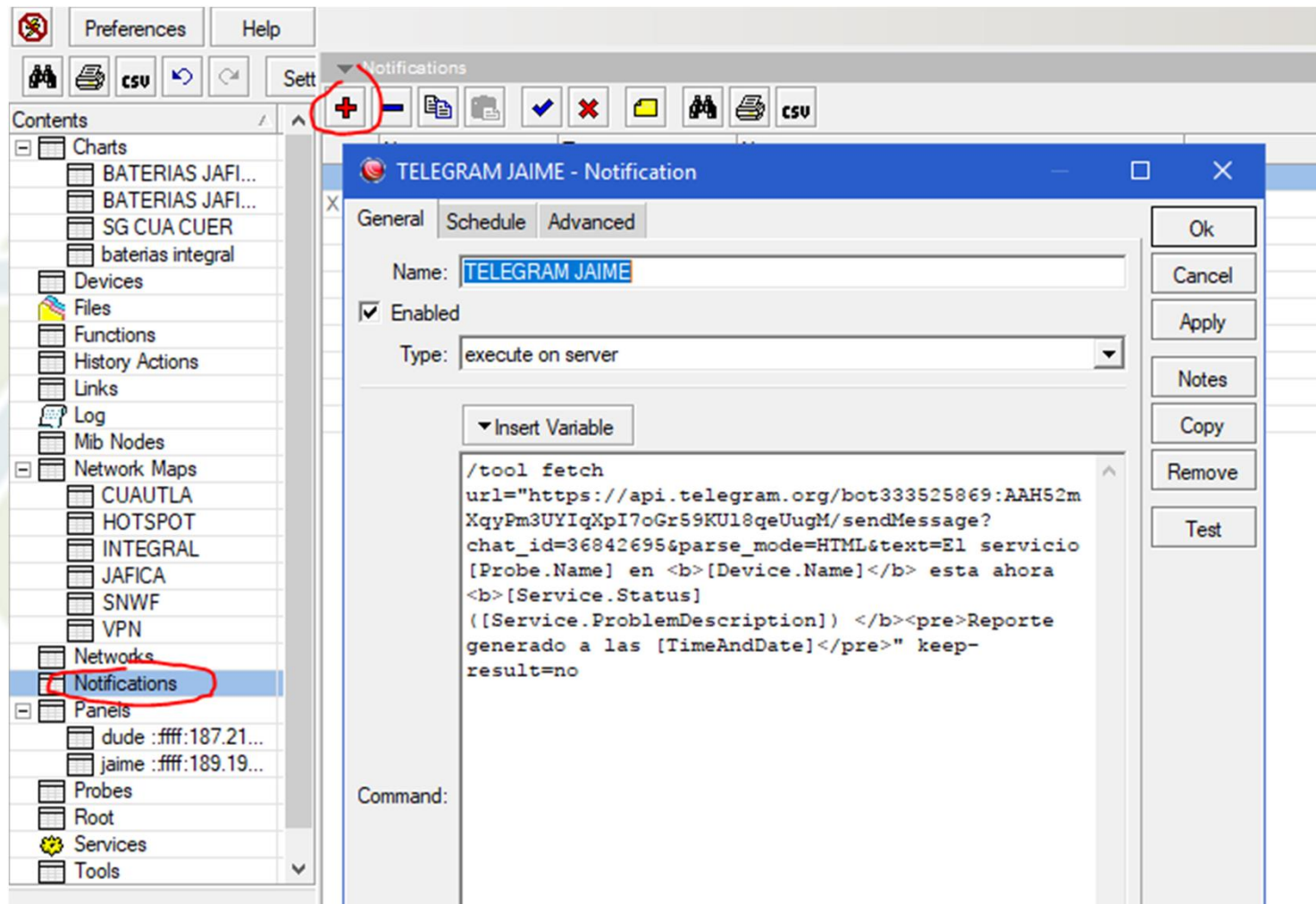
Apr/30 15:13:54	syslog: Service ping on EL FILO is now up ()
Apr/30 15:55:46	syslog: Service ping on EL FILO is now down (ICMP error received (6)TTL exceeded)
Apr/30 16:02:34	syslog: Service ping on EL FILO is now up ()
Apr/30 16:09:41	syslog: Service ping on EL FILO is now down (ICMP error received (6)TTL exceeded)
Apr/30 16:14:54	syslog: Service ping on EL FILO is now up ()
Apr/30 16:25:01	syslog: Service ping on EL FILO is now down (ICMP error received (6)TTL exceeded)
Apr/30 16:27:15	syslog: Service ping on EL FILO is now up ()

Notificaciones

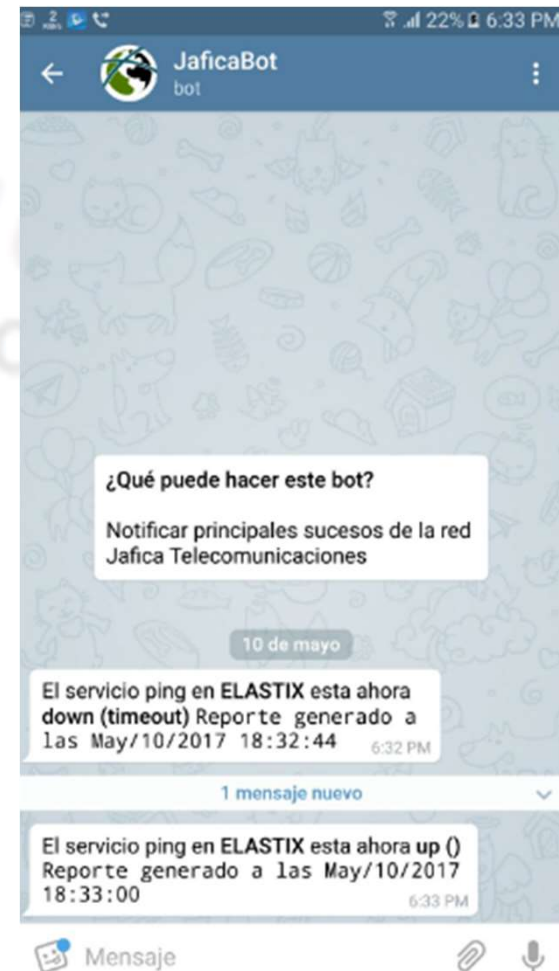
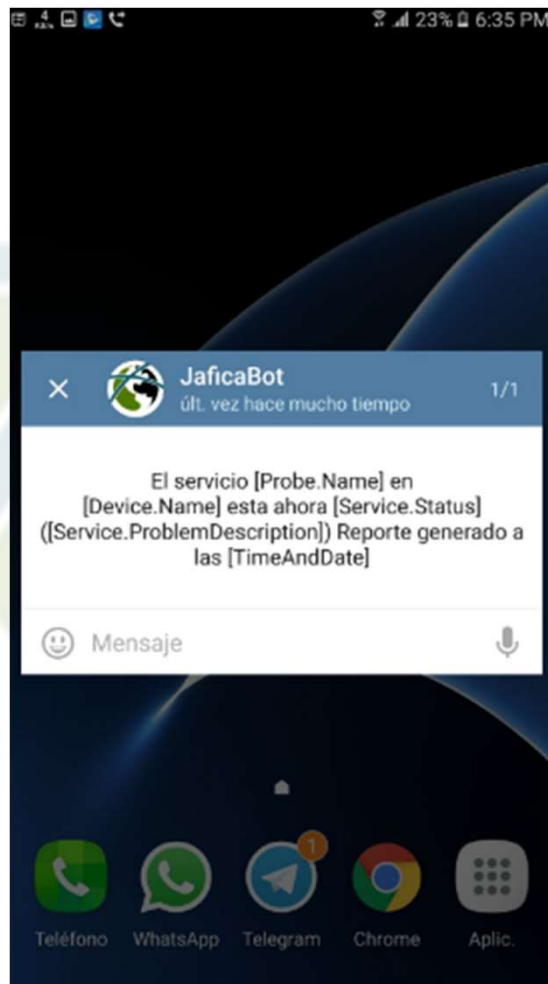
- Registros en el log
- Correos electrónicos
- Mensajes instantáneos por telegram



Notificaciones



Notificación en el Celular



Gestión de clientes residenciales

- Llevar un registro detallado de pagos
- Relación de equipo-cliente
- Cortar servicio a clientes morosos
- Activar servicio a clientes que ya pagaron

Configuración en Mikrotik

- Pool para clientes (básico, plus, morosos)
- Nodo principal tiene todos los DHCP servers
- Nodos secundarios hacen DHCP Relay
- Ventajas:
- Fácil de buscar leases en el Mikrotik de borde
- Address list para mensajes al cliente

Pools para servicios

IP Pool	
Pools	Used Addresses
+ - Y	
Name	Addresses
CAMP-BASICO	172.30.3.10-172.30.3.127
CAMP-MOROSO	172.30.3.240-172.30.3.254
CAMPO-PLUS	172.30.3.128-172.30.3.239
CLT-BASICO	172.30.2.10-172.30.2.127
CLT-MOROSO	172.30.2.240-172.30.2.254
CLT-PLUS	172.30.2.128-172.30.2.239
CNG-BASICO	172.30.8.10-172.30.8.127
CNG-MOROSO	172.30.8.240-172.30.8.254
CNG-PLUS	172.30.8.128-172.30.8.239
FILO-BASICO	172.30.5.10-172.30.5.127
FILO-MOROSO	172.30.5.240-172.30.5.254
FILO-PLUS	172.30.5.128-172.30.5.239
LAJA-BASICO	172.30.6.10-172.30.6.127
LAJA-MOROSO	172.30.6.240-172.30.6.254
LAJA-PLUS	172.30.6.128-172.30.6.239
LAN	172.30.0.10-172.30.0.30
LOCAL	172.30.0.34-172.30.0.62
NUEV-BASICO	172.30.7.10-172.30.7.127
NUEV-MOROSO	172.30.7.240-172.30.7.254
NUEV-PLUS	172.30.7.128-172.30.7.239
P1-VALLE	172.30.0.70-172.30.0.126
P2-laja-cienega	172.30.0.140-172.30.0.190
P3-la nueva	172.30.0.200-172.30.0.254
RDGPE-BASICO	172.30.4.10-172.30.4.127
RDGPE-MOROSO	172.30.4.240-172.30.4.254
RDGPE-PLUS	172.30.4.128-172.30.4.239
VALL-BASICO	172.30.1.11-172.30.1.127
VALL-MOROSO	172.30.1.240-172.30.1.254
VALL-PLUS	172.30.1.128-172.30.1.239

Servidores DHCP

DHCP Server						
DHCP Networks Leases Options Option Sets Alerts						
+ - ✓ ✗ ⌵ DHCP Config DHCP Setup						
Name	Interface	Relay	Lease Time	Address Pool	Add AR...	
CAMP	LAN	172.30.3.1	1d 00:00:00	CAMP-BASICO	no	
CLT	LAN	172.30.2.1	1d 00:00:00	CLT-BASICO	no	
CNG	LAN	172.30.8.1	1d 00:00:00	CNG-BASICO	no	
FILO	LAN	172.30.5.1	1d 00:00:00	FILO-BASICO	no	
LAJA	LAN	172.30.6.1	1d 00:00:00	LAJA-BASICO	no	
NUEV	LAN	172.30.7.1	1d 00:00:00	NUEV-BASICO	no	
P1-VALLE	LAN	172.30.0.65	5d 00:01:00	P1-VALLE	no	
P2-LAJA/CIENEGA	LAN	172.30.0.129	10d 00:01:00	P2-laja-cienega	no	
P3-nueva	LAN	172.30.0.193	10d 01:01:00	P3-la nueva	no	
RDGPE	LAN	172.30.4.1	1d 00:00:00	RDGPE-BASI...	no	
VALL	LAN	172.30.1.1	1d 00:00:00	VALL-BASICO	no	
server1	LAN		1d 00:01:00	LAN	yes	
server_hotspot	HOTSPOT		10d 00:00:00	pool_hotspot	no	
server_voip	VOIP		10d 00:10:00	voip	no	

Registro lease

DHCP Lease <VALL-BASICO,172.30.1.62>

General Active

Address: VALL-BASICO

MAC Address: 04:18:D6:84:AD:CD

☐ Use Src. MAC Address

Client ID: 1:4:18:d6:84:ad:cd

Server: VALL

Lease Time: 08:20:00

☐ Block Access

☐ Always Broadcast

DHCP Options:

DHCP Option Set:

Rate Limit:

Insert Queue Before: first

Address List: aviso

OK

Cancel

Apply

Disable

Comment

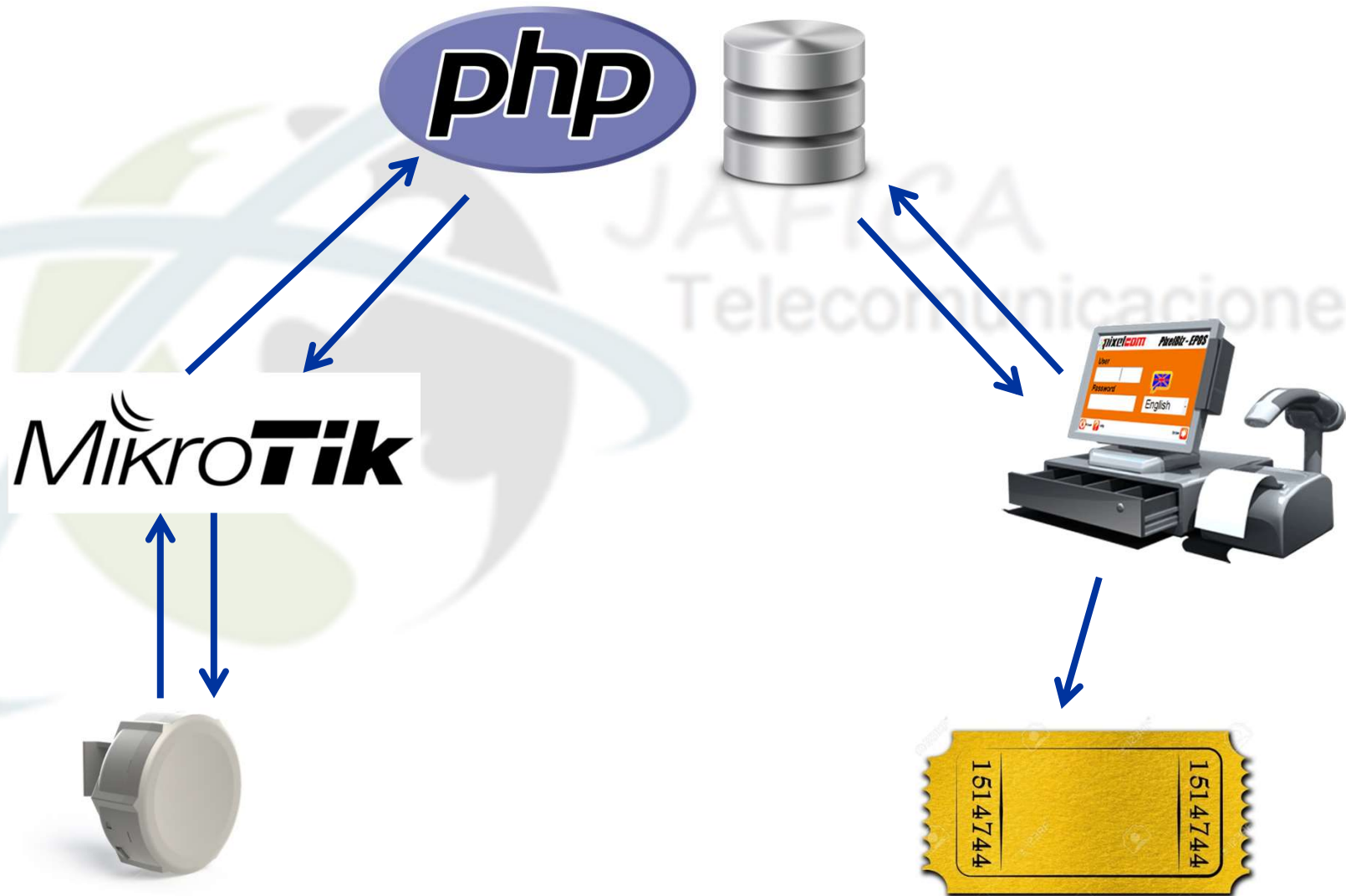
Copy

Remove

Check Status

enabled radius blocked bound

Diagrama de administración de Clientes



Script para DHCP

Script <DHCP>

Name:

Owner:

Policy:

☒ ftp	☐ reboot
☒ read	☒ write
☒ policy	☒ test
☒ password	☒ sniff
☒ sensitive	☒ romon
☐ dude	

Last Time Started:

Run Count:

Source:

```
# reload-dhcp
log warning DHCP
/tool fetch
url=http://172.16.1.200/jafica/servers/dhcpv
alle.php dst-path=dhcp.rsc
/import dhcp.rsc
log warning "DHCP FINALIZADO"
```

Buttons: OK, Cancel, Apply, Comment, Copy, Remove, Run Script

```
# dhcp lease setup
/ip dhcp-server lease

:log warning "ADRIAN ROJAS ANZURES sn luis 10";
:log error "44:D9:E7:BC:09:41";
:local item [find mac-address="44:D9:E7:BC:09:41"]; :if (($
item!="")) do={make-static [find mac-address=
"44:D9:E7:BC:09:41"]; set address="FSG-CUA-BASICO" server=
"FSG-CUA" comment="ADRIAN ROJAS ANZURES sn luis 10"
lease-time="30000" address-lists="aviso" numbers=$item} else
={

    add mac-address="44:D9:E7:BC:09:41" address=
"FSG-CUA-BASICO" lease-time="30000" server="FSG-CUA"
comment="ADRIAN ROJAS ANZURES sn luis 10" address-lists=
"aviso"}

:log warning "ADRIANA LUCERO PAZ SOSA SN FERNANDO 10";
:log error "44:D9:E7:C8:5C:63";
:local item [find mac-address="44:D9:E7:C8:5C:63"]; :if (($
item!="")) do={make-static [find mac-address=
"44:D9:E7:C8:5C:63"]; set address="FSG-CUA-BASICO" server=
"FSG-CUA" comment="ADRIANA LUCERO PAZ SOSA SN FERNANDO 10"
lease-time="90000" address-lists="" numbers=$item} else={
```

Mensajes a Usuarios a través de WebProxy, address list y firewall

- Próximo a vencer
- Ultimo de día de pago
- Servicio Suspendido
- Avisos Promocionales

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Configuración de Webproxy

Web Proxy Settings

General Status Lookups Inserts Refreshes

☒ Enabled

Src. Address: ::

Port: 8082

8081

8085

☐ Anonymous

Parent Proxy:

Parent Proxy Port:

Cache Administrator: webmaster

Max. Cache Size: none KB

Max Cache Object Size: 2048 KB

☐ Cache On Disk

Max. Client Connections: 600

Max. Server Connections: 600

Max Fresh Time: 3d 00:00:00

☐ Serialize Connections

☐ Always From Cache

Cache Hit DSCP (TOS): 4

Cache Path: web-proxy

passthrough

OK

Cancel

Apply

Clear Cache

Reset HTML

Access

Cache

Direct

Connections

Cache Contents

Web Proxy Access

+ - ✓ ✗ 📁 📏

00 Reset Counters 00 Reset All Counters

#	Src. Address	Dst. Address	Dst. Port	Local Port	Dst. Host
0	✓			8082	!172.16.1.200/jafica/servers/valle/ficha.php
1	✓			8081	!172.16.1.200/jafica/servers/valle/aviso.php
2	✓			8085	!172.16.1.200/jafica/error/no_pago.php

Web Proxy Rule <>

Src. Address:

Dst. Address:

Dst. Port: ☐

Local Port: ☐ 8085

Dst. Host: ! 172.16.1.200/jafica/error/no_pago.php

Path:

Method:

Action: deny

Redirect To: 172.16.1.200/jafica/error/no_pago.php

Hits: 220675

OK

Cancel

Apply

Disable

Comment

Copy

Remove

Reset Counters

Reset All Counters

enabled

Firewall Filter

... MOROSOS										
2	✓ accept	forward			1 (icmp)				720 B	12
3	✓ accept	forward			6 (tcp)	80			208 B	4
4	✓ accept	forward			17 (udp)	53			0 B	0
5	✓ accept	forward	172.16.1.200		6 (tcp)	8080,9080,21,22,8443,80,9081			9.3 KiB	31
6	✗ drop	forward							122.9 KiB	1 145

- Se acepta ping
- Acepta puerto 80 para proxy
- Acepta udp 53 dns
- se bloquean puertos

Firewall NAT

::: MOROSOS											
16	✓ accept	dstnat	172.16.1.200	6 (tcp)	80			morosos		2688.4 KiB	38 672
17	⇐ redirect	dstnat		6 (tcp)	80			morosos	8085	12.0 MiB	155 914
::: ULTIMO											
18	✓ accept	dstnat	172.16.1.200	6 (tcp)	80			ficha		60.3 KiB	860
19	⇐ redirect	dstnat		6 (tcp)	80			ficha	8082	755.0 KiB	8 811
::: AVISO											
20	✓ accept	dstnat	172.16.1.200	6 (tcp)	80			aviso		74.9 KiB	1 243
21	⇐ redirect	dstnat		6 (tcp)	80			aviso	8081	724.3 KiB	9 104

- Acepta el address lits con destino al servidor
- 80 => 8081,8082,8085

Firewall Mangle

#	Action	Chain	Src. Address	Dst. Address	Protocol	Src. P...	Dst. Port	In. Interf...	Out. Interface	Packet M...	C...	Src. Addre...	Per Connection ...	New Packe...	New
... aceptar para el webproxy															
3	✓ acc...	prerouting			6 (tcp)		80					morosos			
4	✓ acc...	prerouting			6 (tcp)		80					aviso			
5	✓ acc...	prerouting			6 (tcp)		80					ficha			

- Regla antes del Balanceo de conexiones.

Mensajes a los usuarios

172.25.255.2/servers/aviso.php



Estimado cliente, le informamos que la fecha limite del pago de su mensualidad esta por vencer

Recuerde enviar su pago al correo
pagos@jafica.com
y al whatsapp
Horario de atencion 9am - 9pm lun-vier



El aviso se cerrara automaticamente
Cerrar Aviso

172.25.255.2/servers/ultimo.php



**Estimado cliente
le informamos que hoy Viernes 05 de Mayo del 2017
es el ultimo dia de pago, sin que se corte su servicio**

No olvide, horario de atencion 9am a 9pm,
lunes a viernes.



El aviso se cerrara automaticamente
Cerrar Aviso

172.16.1.200/jafica/error/no_pago_



SERVICIO SUSPENDIDO



Estimado Cliente, su servicio ha sido suspendido por la falta de su pago, para seguir disfrutando de su servicio, le sugerimos realizar su pago a la brevedad.

Si ya realizo su pago, porfavor envie un mensaje en whatsapp al 700 000 6007

The logo features a stylized globe with green and grey segments, overlaid with a blue orbital path. To the right of the globe, the text "JAFICA" is written in a large, light blue font, and "Telecomunicaciones" is written below it in a smaller, grey font.

¿Preguntas?

Gracias



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