

Using MikroTik in Docsis Provisioning

Case study showing how
to use a MikroTik router
to provision cable
modems



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Certifications



Overview

In this case study I'll demonstrate how I used a MikroTik router as a provisioning server for cable modems.

ISSUES TO OVERCOME

I needed to be able to deploy high speed internet to a number of apartments over an existing coax cable network.

Total end users would not exceed 200 per location

Rewiring the infrastructure with fiber and copper Ethernet was cost-prohibitive.

Client had an existing coax network which he used to provide local broadcast TV

Cost was a major factor

SOLUTION

Client added a low cost CMTS (Cable Modem Termination System)
with necessary amplifiers to update coax system

MikroTik CCR router added as edge router

CCR configured to replace the need for additional modem
provisioning servers

Untitled Map

Write a description for your map.

Legend

Google Earth

©2018 Europa Technologies

©2018 Google

3094

300 ft

Forum Dr



Untitled Map

Write a description for your map.

Legend

N32.5332°

Google Earth

© 2018 Google

3094

N Heame Ave

300 ft



apartments

- Legend
- canal
 - Feature 1

W93.78°

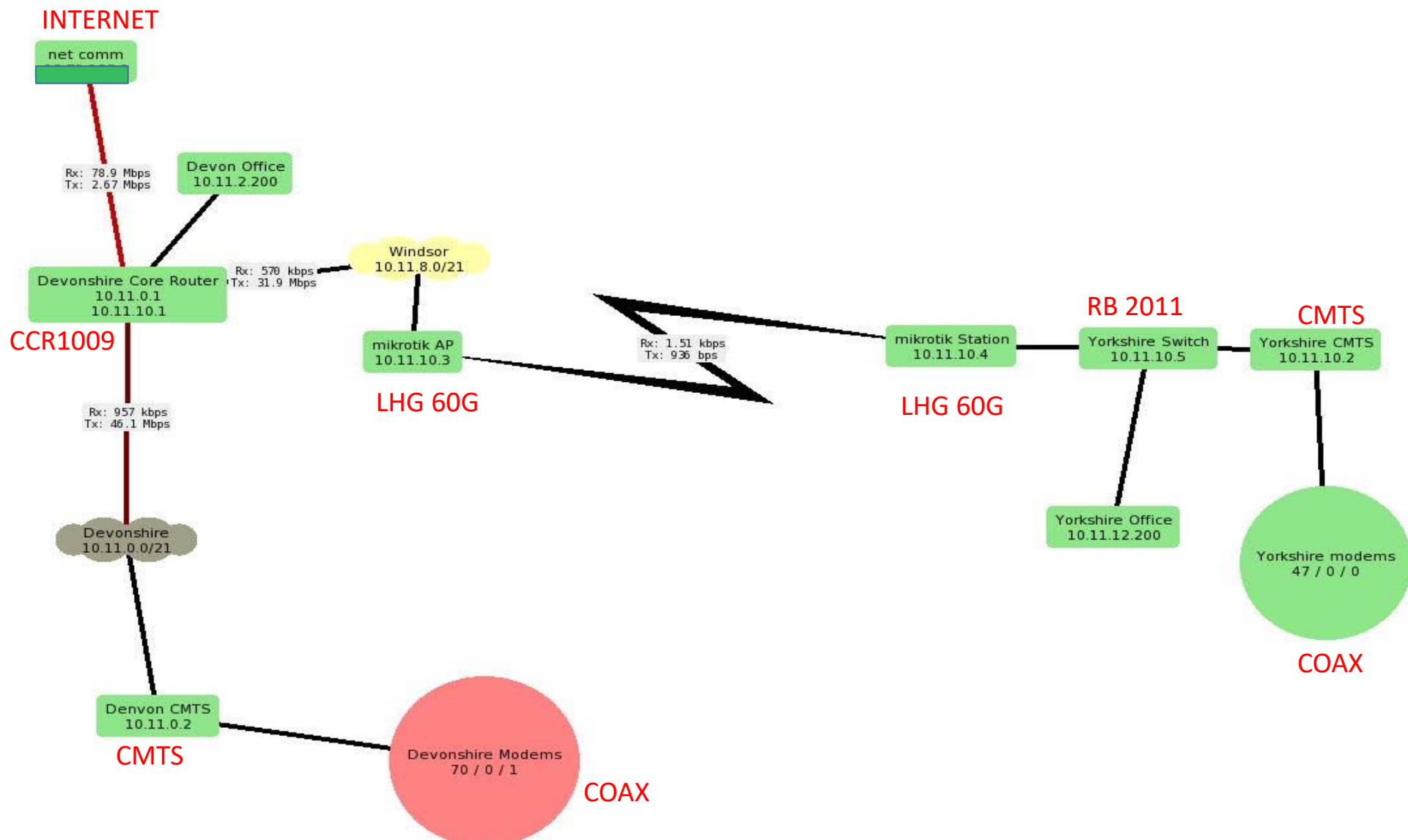
N32.5332°

Google Earth

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800 ft





CABLE MODEM OPERATION

Four Steps

1. Downstream Channel Search and Lock

Basically layer one establishment over the RF on coax cable

2. DHCP

IP address/mask /gateway

3. TOD (Time of Day)

4. TFTP

Config File Download

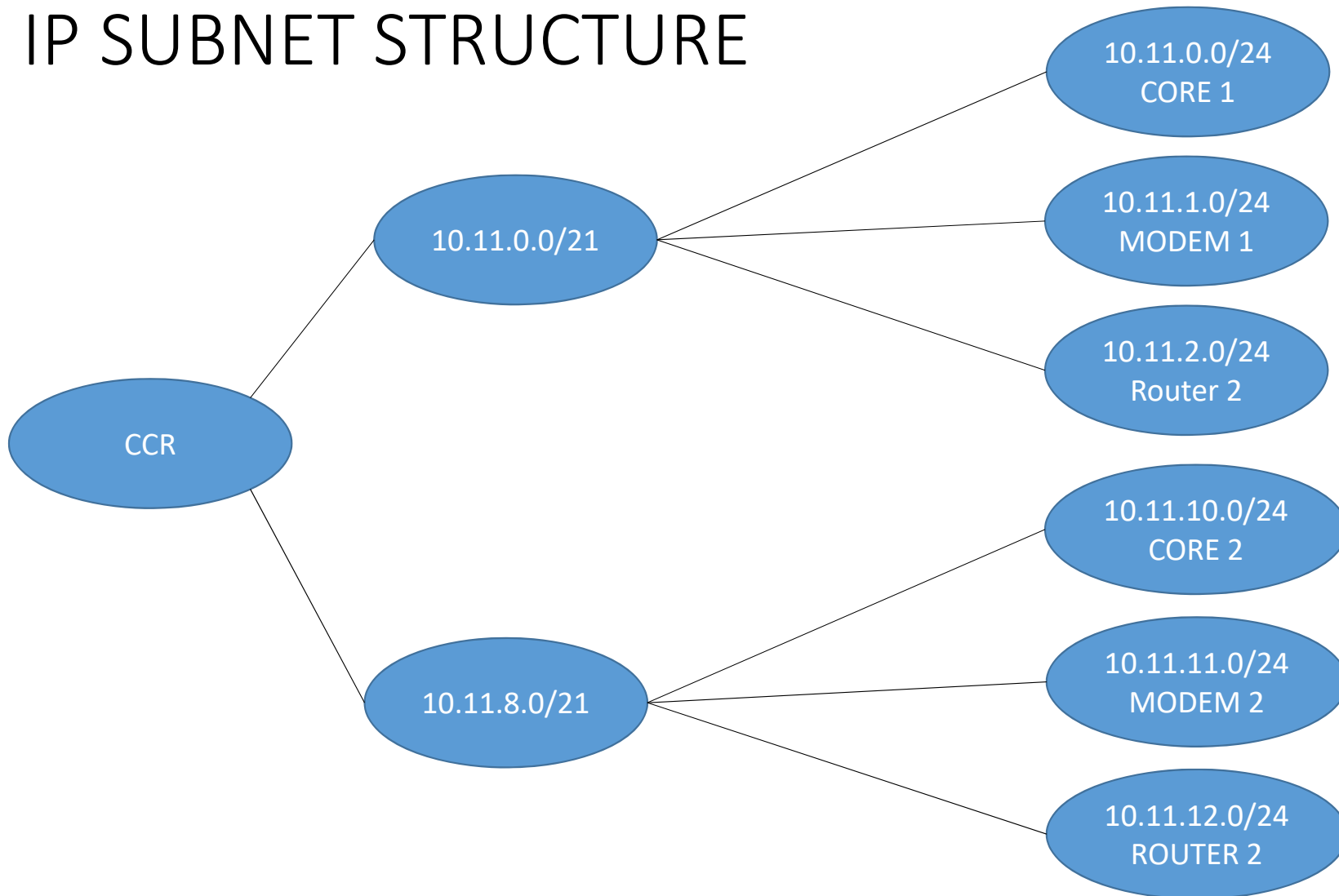
Client Router Operation

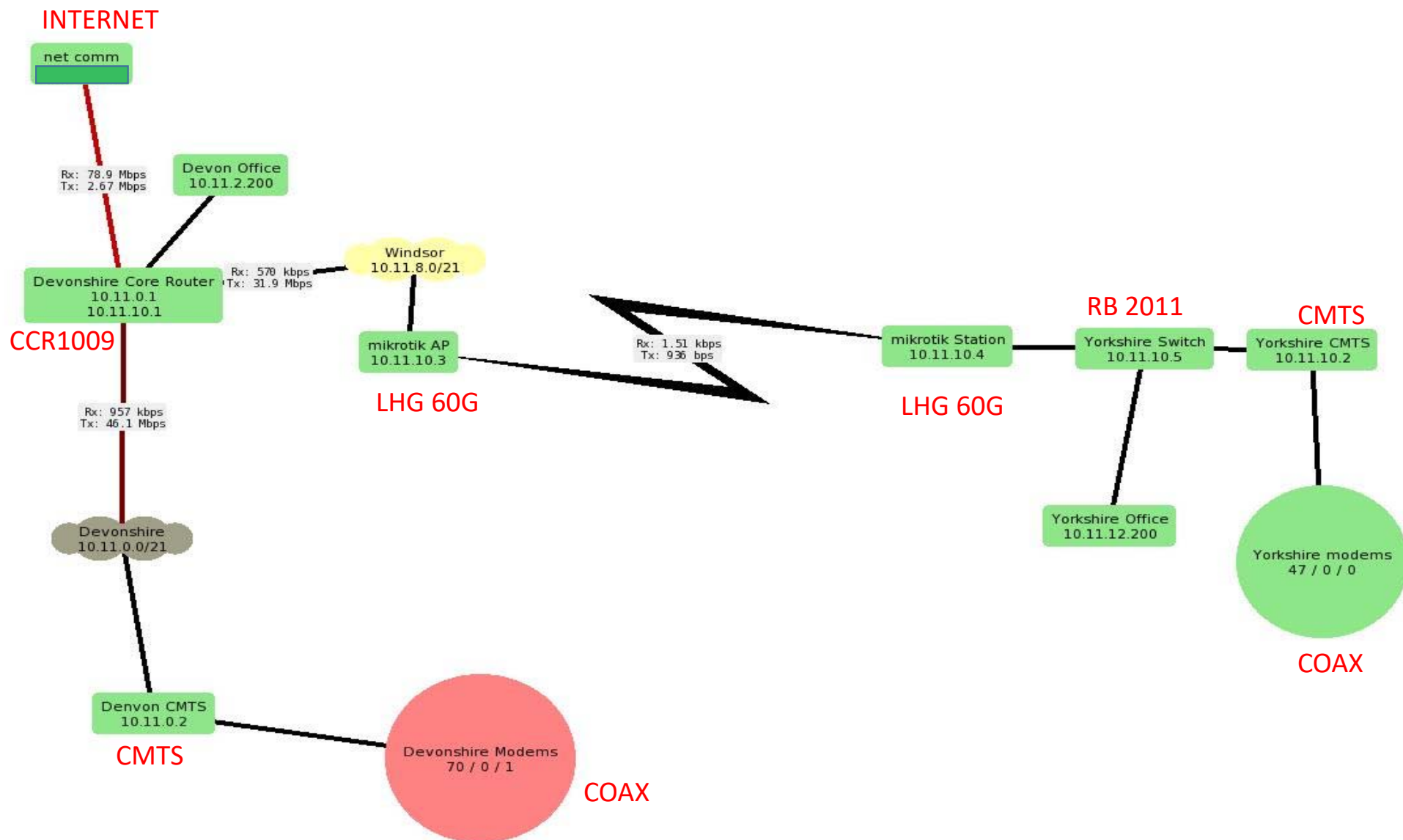
Most “modems” are actually a combination of cable modem and client wifi router

Once Modem “side” is online and operational the router “side” must be given its configuration

We accomplish this with a second ‘DHCP server’ to give out normal IP address, gateway, mask, and DNS server

IP SUBNET STRUCTURE





Session Settings Dashboard

↶

↷

Safe Mode

Session: 00:0C:42:FC:F3:25

■

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- RouterOS WinBox
- Quick Set
 - CAPsMAN
 - Interfaces
 - Wireless
 - Bridge
 - PPP
 - Switch
 - Mesh
 - IP
 - IPv6
 - MPLS
 - OpenFlow
 - Routing
 - System
 - Queues
 - Files
 - Log
 - RADIUS
 - Tools
 - New Terminal
 - TR069
 - LCD
 - Partition
 - Make Supout.tif
 - Manual
 - New WinBox

Address List

+

−

✓

✗

📄

🔍

Find

Address	Network	Interface	Comment	
10.11.0.1/24	10.11.0.0	devon/berk/ke...	devon core	
10.11.1.1/24	10.11.1.0	devon/berk/ke...	devom modem	
10.11.2.1/24	10.11.2.0	devon/berk/ke...	devon gateway	
10.11.10.1/24	10.11.10.0	windsor/yorkshire	windsor core	
10.11.11.1/24	10.11.11.0	windsor/yorkshire	windsor modem	
10.11.12.1/24	10.11.12.0	windsor/yorkshire	windsor gateway	
10.101.0.241/...	10.101.0.0	ether1-wan		

7 items

MikroTik DHCP Server Config

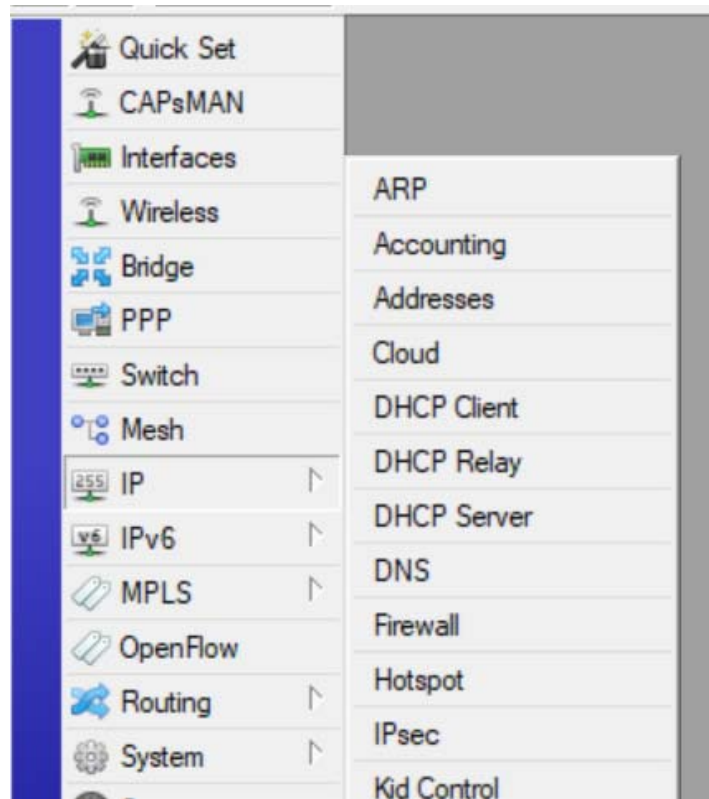
We need to have the MikroTik router provide several parameters to the modem

1. IP address, mask, gateway
2. TFTP server address
3. Boot File Name

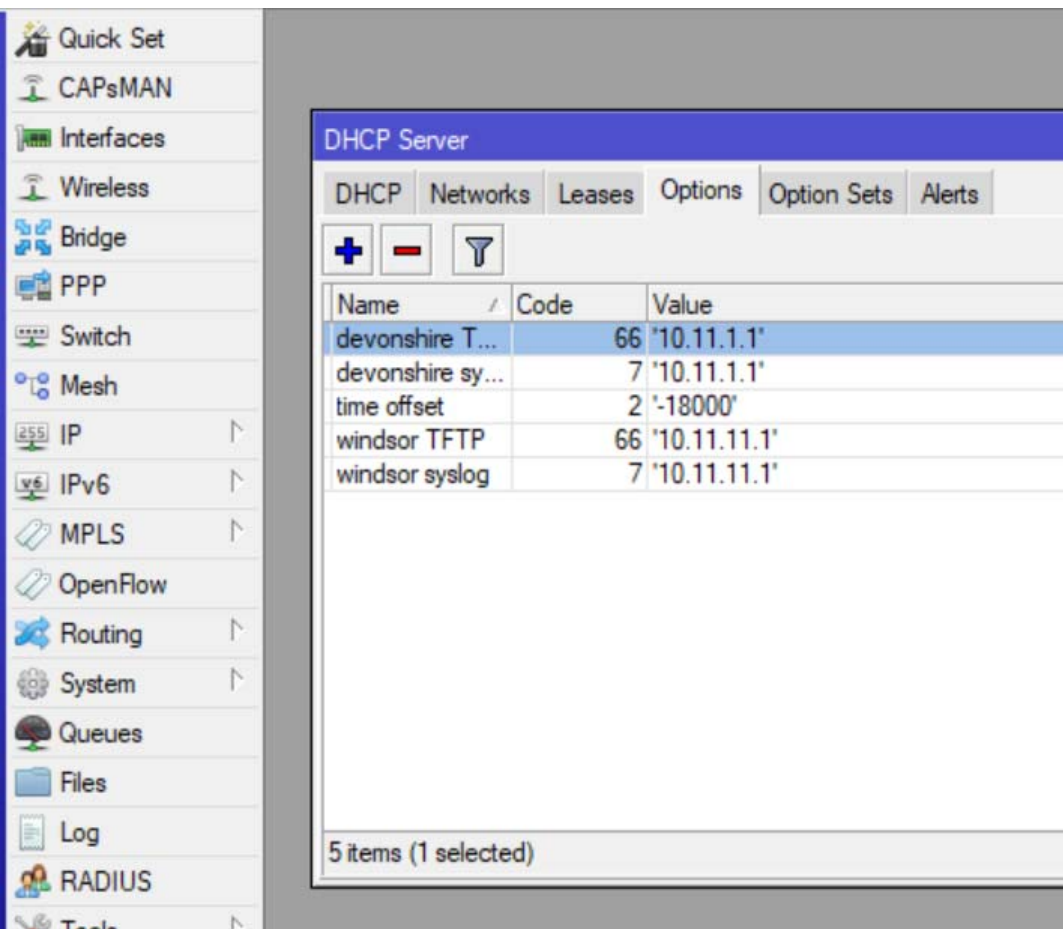
We also need to have the MikroTik provide parameters to the router

1. IP address
2. Subnet mask
3. Gateway
4. DNS server

IP DHCP SERVER



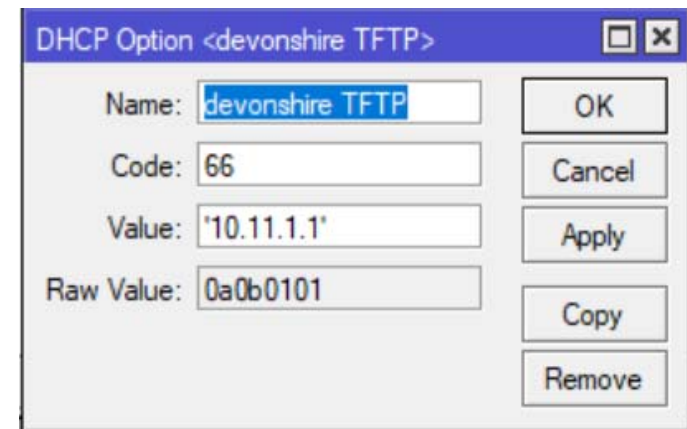
Set DHCP Options



The screenshot shows the Mikrotik WinBox interface for configuring a DHCP server. On the left is a sidebar with navigation icons for various services like Quick Set, CAPsMAN, Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, IPv6, MPLS, OpenFlow, Routing, System, Queues, Files, Log, RADIUS, and Tools. The main window is titled 'DHCP Server' and has several tabs: DHCP, Networks, Leases, Options, Option Sets, and Alerts. The 'Options' tab is currently selected. Below the tabs are three icons: a plus sign, a minus sign, and a funnel. A table lists the configured DHCP options:

Name	Code	Value
devonshire T...	66	'10.11.1.1'
devonshire sy...	7	'10.11.1.1'
time offset	2	'-18000'
windsor TFTP	66	'10.11.11.1'
windsor syslog	7	'10.11.11.1'

At the bottom of the window, it says '5 items (1 selected)'.

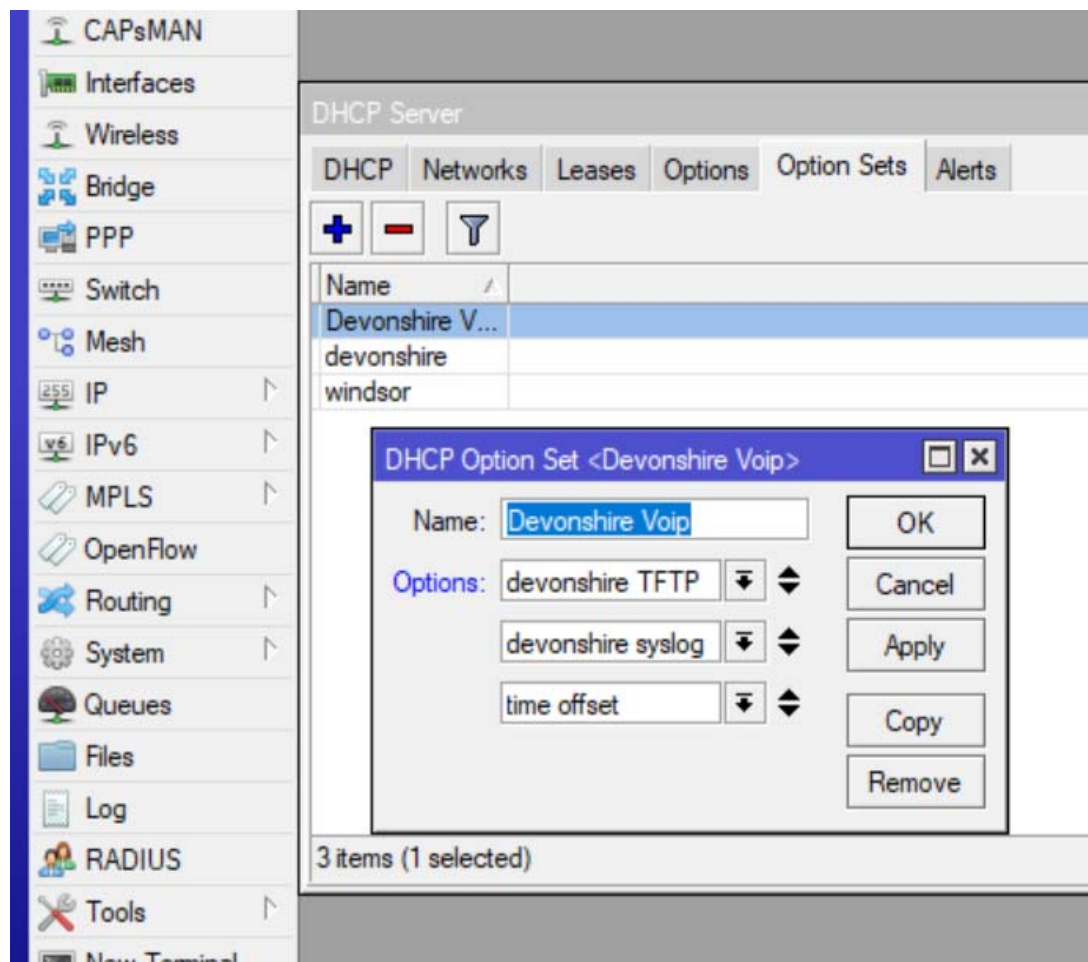


The screenshot shows a dialog box titled 'DHCP Option <devonshire TFTP>'. It contains four input fields and five buttons. The fields are:

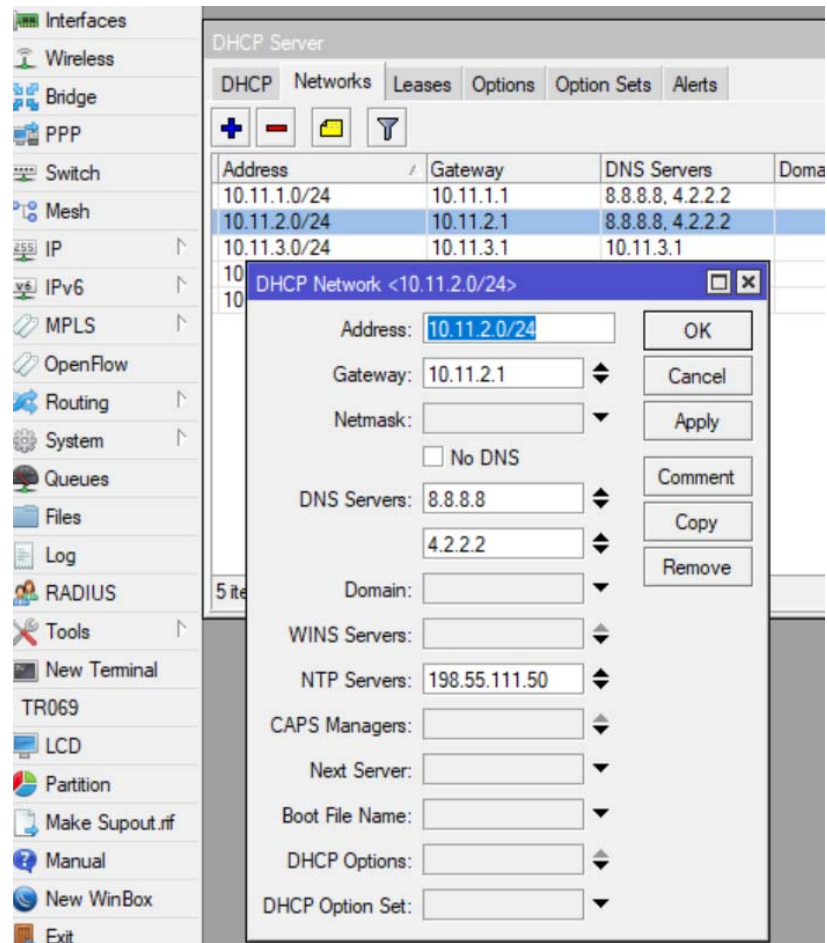
- Name: devonshire TFTP
- Code: 66
- Value: '10.11.1.1'
- Raw Value: 0a0b0101

The buttons are OK, Cancel, Apply, Copy, and Remove.

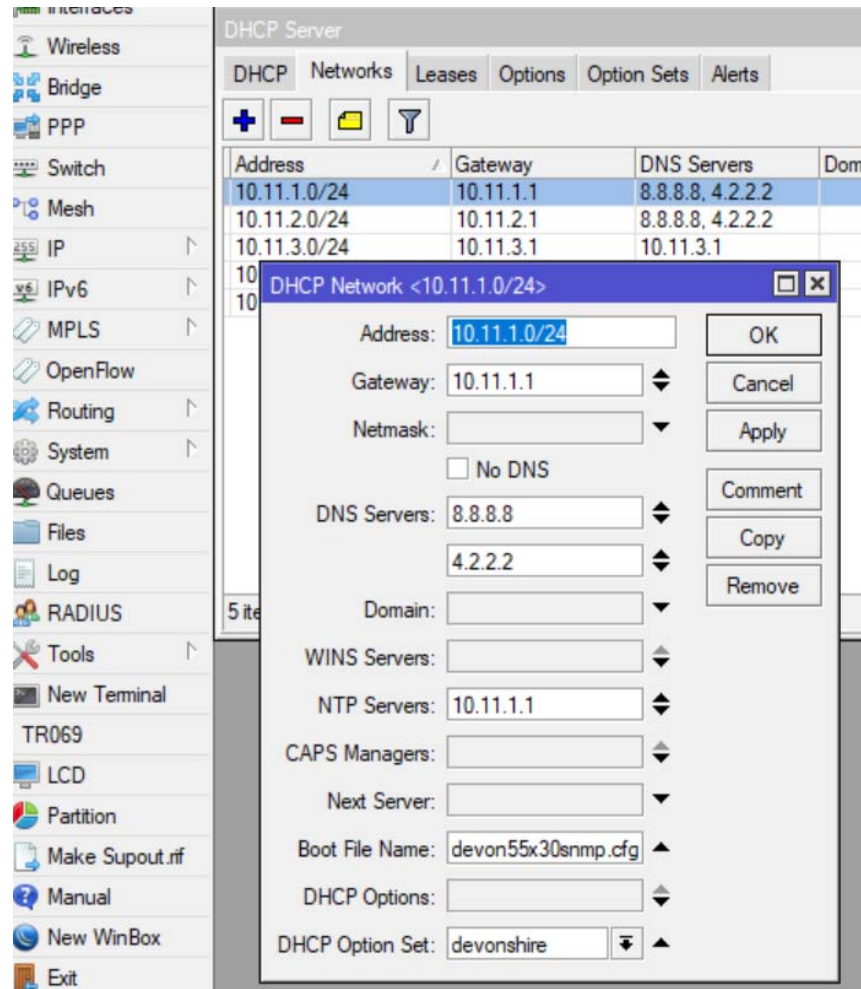
Set DHCP Option Set



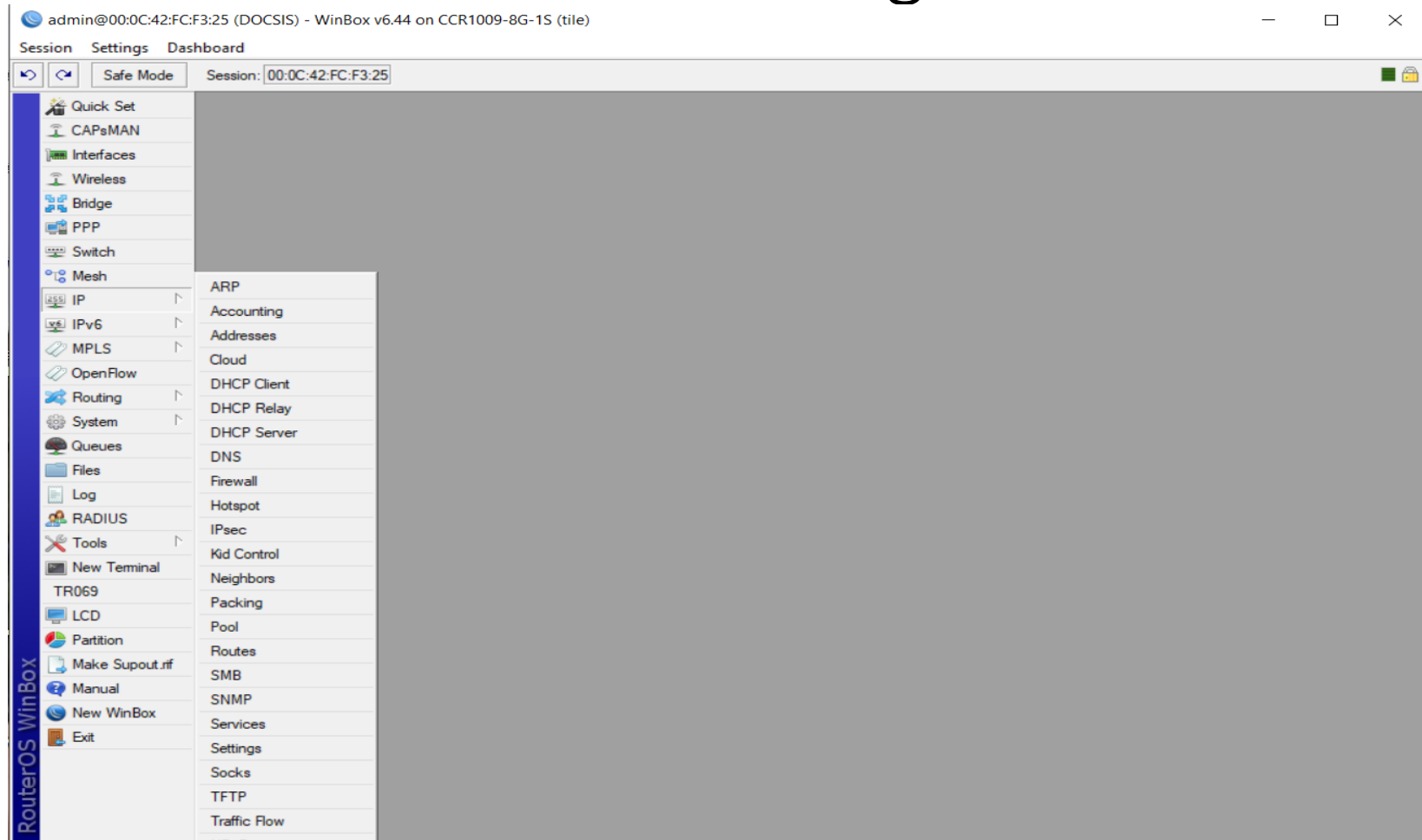
/IP DHCP SERVER/ NETWORK for routers



/IP DHCP SERVER/ NETWORK for modems



MikroTik TFTP SERVER Config



MikroTik IP TFTP Server

admin@00:0C:42:FC:F3:25 (DOCSIS) - WinBox v6.44 on CCR1009-8G-1S (tile)

Session Settings Dashboard

Safe Mode Session: 00:0C:42:FC:F3:25

TFTP

#	IP Addresses	Req. Filename	Real Filename	Allow	Read O...	Hit
0	10.11.1.20-10.11.1.254	devon55x30snmp.cfg	devon55x30snmp.cfg	yes	yes	
1	10.11.11.20-10.11.11.254	windsor55x30snmp.cfg	windsor55x30snmp.cfg	yes	yes	

2 items (1 selected)

TFTP <10.11.1.20-10.11.1.254>

IP Addresses: 10.11.1.20-10.11.1.254

Req. Filename: devon55x30snmp.cfg

Real Filename: devon55x30snmp.cfg

☒ Allow

☒ Read Only

Hits: 0

enabled

OK Cancel Apply Disable Copy Remove

Put Modem Config File in /files

admin@00:0C:42:FC:F3:25 (DOCSIS) - WinBox v6.44 on CCR1009-8G-1S (tile)

Session Settings Dashboard

Safe Mode Session: 00:0C:42:FC:F3:25

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
Switch
Mesh
IP
IPv6
MPLS
OpenFlow
Routing
System
Queues
Files
Log
RADIUS

File List

File Name	Type	Size	Creation Time
windsor55x30snmp.cfg	.cfg file	127 B	Mar/01/2019 09:35:12
welsh.backup	backup	37.9 KiB	Jan/01/1970 18:21:32
user-manager	directory		Mar/01/2019 09:38:50
user-manager/sqlldb	file	80.0 KiB	Mar/01/2019 09:38:50
user-manager/logsqlldb	file	6.0 KiB	Mar/01/2019 09:38:49
um-before-migration.tar	.tar file	17.0 KiB	Mar/01/2019 09:38:50
skins	directory		Mar/01/2019 09:37:37
remote-19700123-1058.backup	backup	18.1 KiB	Jan/23/1970 04:58:07
moss.pub	ssh key	272 B	Jan/16/1970 09:55:27
moss bluff.backup	backup	37.6 KiB	Jan/01/1970 18:27:36
morganfield1-15-19.backup	backup	37.2 KiB	Jan/01/1970 18:06:36
jennings.backup	backup	42.7 KiB	Jan/02/1970 16:48:52
hwy14=1=15=19.backup	backup	35.5 KiB	Jan/01/1970 19:12:50
devon55x30snmp.cfg	.cfg file	127 B	Mar/01/2019 09:35:12
auto-before-reset.backup	backup	18.1 KiB	Jan/23/1970 05:05:45

20 items 46.5 MiB of 128.0 MiB used 63% free

Modem Config Files

Docsis config files provide the info needed to configure the cable modem.

The config file we place in /files must be in “Docusis” binary format

You will need a config file editor

<https://www.excentis.com/>

Some basic items would be:

- upstream max traffic flow

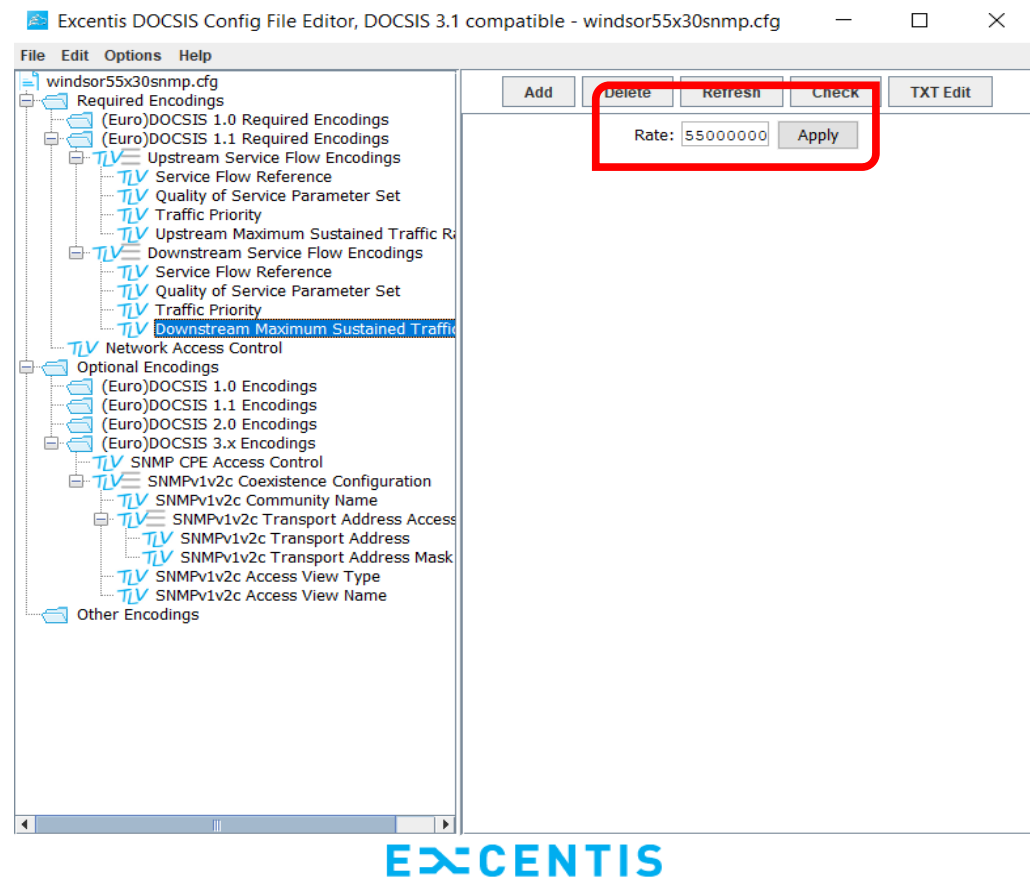
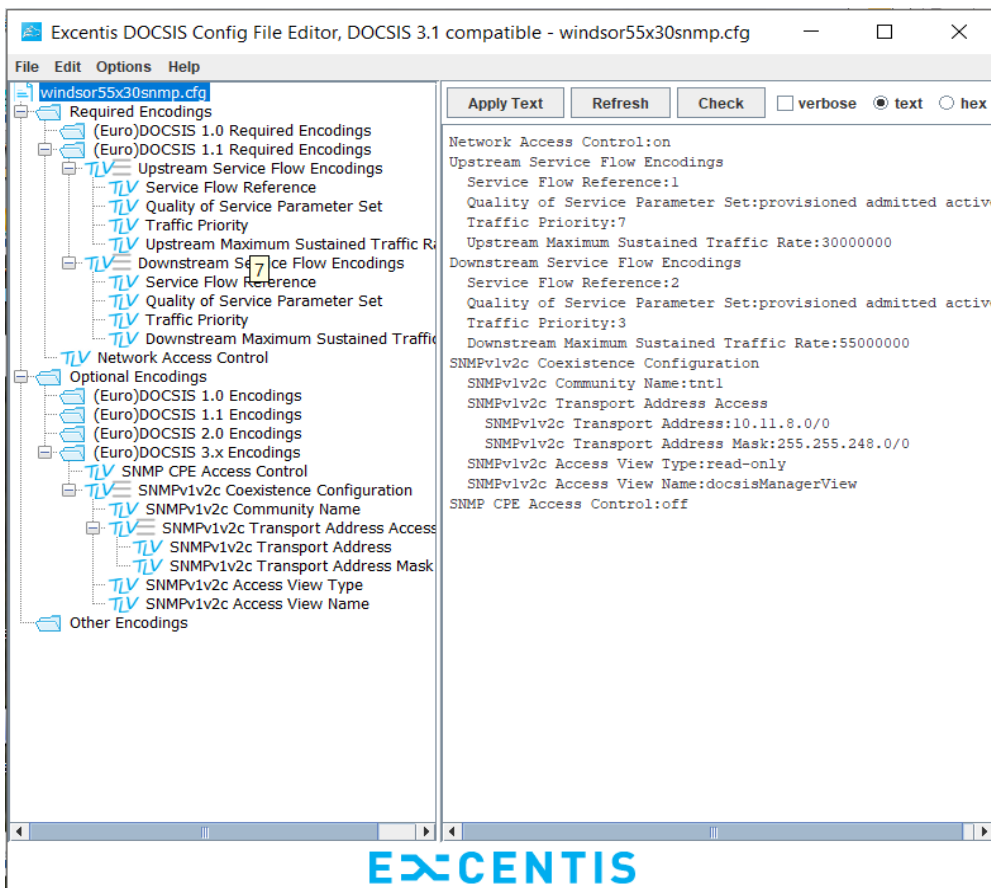
- downstream max traffic flow

- whether or not customer can access modem

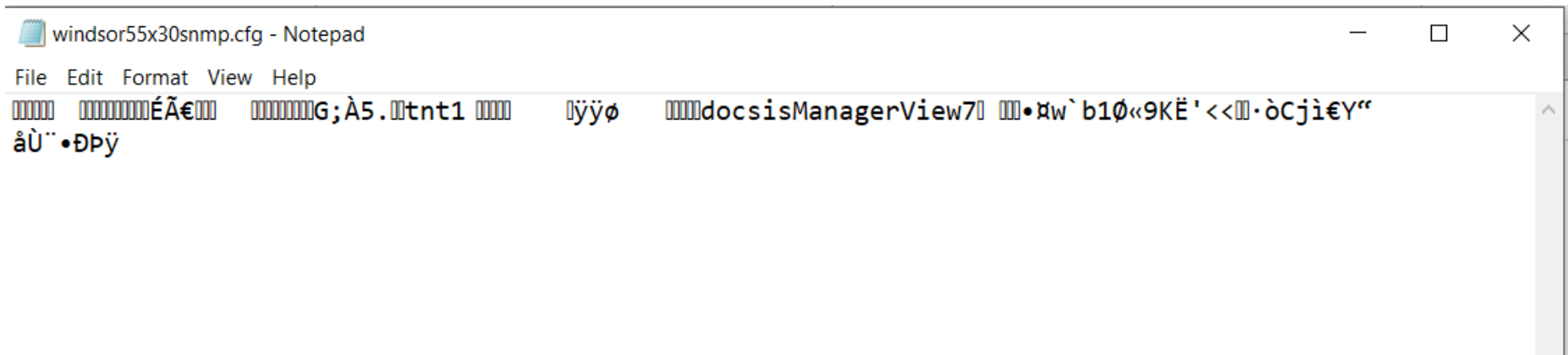
- SNMP community names

- address of SNMP server

Config file editor



File to upload



One or many config files?

In this case study, one config file is used for all modems with up and download speeds set at just over the maximum limits for the fastest service being sold.

Actual user bandwidth is controlled using address lists containing IP addresses of routers, not modems along with mangle rules and queue tree.

Another approach would be to control bandwidth at the modem with a different config file uploaded to modem for each speed package sold.

Still another would be a different config file for VOIP customers which would prioritize VOIP traffic at the modem.

Note that if you want to change a service by means of a different config file, you must reboot the selected modem for the new config file to be uploaded.

Numerous Deployment Options

ALL Dynamic Assignments

- Simple

- All same type modems

- All same services

- Example would be a hotel or student housing
with modems behind Hotspot

Static Leases Assignments

- Paid service

- Different Speeds and services

- Ability to suspend service for non payment

Separate Subnets for devices and services

Under all but the simplest dynamic deployment, you can separate device types and services into separate subnets.

In this case study all modems are placed in subnet 1, and all routers into subnet 2.

You can also separate different service levels into separate subnets by placing all routers with same bandwidth limit into one subnet and others with different bandwidth limit into a second. Or all VOIP customers in same subnet.

The reason for this is to control which modem config file gets delivered to a specific modem. Remember we have only one DHCP server per interface so config files are specified in the DHCP networks section as well as the TFTP server address list. We also need to write static dhcp leases.

It also becomes easier to control traffic flow based on subnet. For example you can block internet access for all modem subnets if not needed, restrict modem access to only what's needed, or Netmap different router subnets to different public IP's.

DHCP network and TFTP server

DHCP Networks Leases Options Option Sets Alerts

Address	Gateway	DNS Servers	Domain
10.11.1.0/24	10.11.1.1	8.8.8.8, 4.2.2.2	
10.11.2.0/24	10.11.2.1	8.8.8.8, 4.2.2.2	

DHCP Network <10.11.1.0/24>

Address: 10.11.1.0/24 OK

Gateway: 10.11.1.1 Cancel

Netmask: Apply

☐ No DNS

DNS Servers: 8.8.8.8 Comment

4.2.2.2 Copy

Domain: Remove

WINS Servers:

NTP Servers: 10.11.1.1

CAPS Managers:

Next Server:

Boot File Name: devon55x30snmp.cfg

DHCP Options:

DHCP Option Set: devonshire

+ - ✓ ✗

#	IP Addresses	Req. Filename	Real Filename	Allow
0	10.11.1.20-10.11.1.254	devon55x30snmp...	devon55x30snmp...	yes
1	10.11.11.20-10.11.11.254	windsor55x30snm...	windsor55x30snm...	yes

TFTP <10.11.1.20-10.11.1.254>

IP Addresses: 10.11.1.20-10.11.1.254 OK

Req. Filename: devon55x30snmp.cfg Cancel

Real Filename: devon55x30snmp.cfg Apply

☒ Allow

☒ Read Only

Disable

Copy

Remove

Hits: 0

enabled

Dynamic Assignment

When all users have the same modems, service levels, bandwidth limitations, etc...

Such as in hotels or student housing then just use IP pools instead of static leases.

The options sets remain the same but the routers will ignore what they don't need. For example the TFTP server address.

In the simplest case, the config file for the modem can rate limit users without the need for queuing on main MikroTik router.

Add IP pool to DHCP server

DHCP Server <devonshire>

Name: devonshire

Interface: devon/berk/kening

Relay:

Lease Time: 1d 00:00:00

Bootp Lease Time: forever

Address Pool: dhcp_pool0

DHCP Option Set:

Src. Address:

Delay Threshold:

Authoritative: yes

Bootp Support: static

☐ Always Broadcast

Insert Queue Before: first

OK
Cancel
Apply
Disable
Copy
Remove

IP Pool

Pools Used Addresses

+ - [icon] Find

Name	Addresses	Next Pool
dhcp_pool0	10.11.100.2-10.11.100.254	none

IP Pool <dhcp_pool0>

Name: dhcp_pool0

Addresses: 10.11.100.2-10.11

Next Pool: none

OK
Cancel
Apply
Comment
Copy
Remove

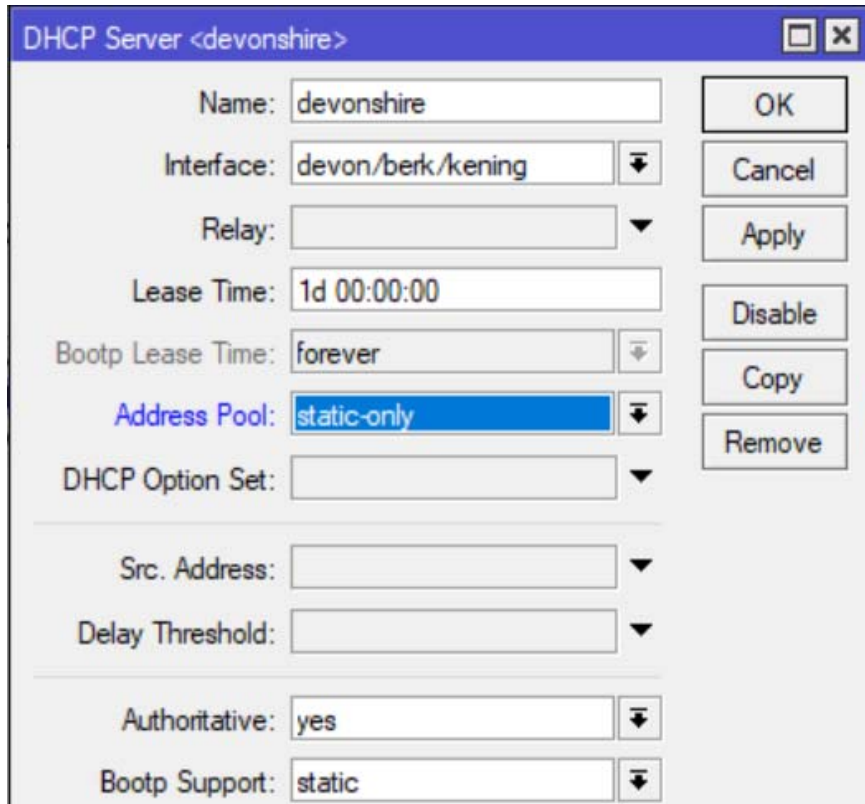
1 item (1 selected)

Static Lease Assignments

Various ways can be deployed to write static leases:

1. Manually enter the mac and IP address for each both modem and router
2. Integration of third party billing platforms either local, remote, or cloud based
3. Radius server (MikroTik Usermanager)

Write Leases Manually



The screenshot shows a window titled "DHCP Server <devonshire>". It contains several configuration fields and a column of action buttons on the right.

Field	Value
Name:	devonshire
Interface:	devon/berk/kening
Relay:	
Lease Time:	1d 00:00:00
Bootp Lease Time:	forever
Address Pool:	static-only
DHCP Option Set:	
Src. Address:	
Delay Threshold:	
Authoritative:	yes
Bootp Support:	static

Buttons on the right: OK, Cancel, Apply, Disable, Copy, Remove.

Add Modem

The screenshot shows the 'DHCP Server' application window with the 'Leases' tab selected. A 'DHCP Lease <10.11.1.20,0.0.0.0>' dialog box is open, displaying the 'General' tab. The dialog contains the following fields and controls:

- Address:** 10.11.1.20
- MAC Address:** 00:01:02:03:04:05
- ☐ Use Src. MAC Address
- Client ID:** (empty)
- Server:** devonshire
- Lease Time:** (empty)
- ☐ Block Access
- ☒ Allow Dual Stack Queue
- ☐ Always Broadcast
- DHCP Options:** (empty)
- DHCP Option Set:** devonshire
- Rate Limit:** (empty)
- Insert Queue Before:** first
- Address List:** (empty)

On the right side of the dialog, there are buttons for: OK, Cancel, Apply, Disable, Comment, Copy, Remove, and Check Status.

Add first modem's mac address, IP address, and option set

All Modem IP address will be issued from one subnet

Add Router

The screenshot shows the 'DHCP Server' configuration window with the 'Leases' tab selected. A 'DHCP Lease <10.11.2.20,0.0.0.0>' dialog is open, displaying the 'General' tab. The dialog contains the following fields and options:

- Address:** 10.11.2.20
- MAC Address:** 01:02:03:04:05:06
- ☐ Use Src. MAC Address
- Client ID:** (empty dropdown)
- Server:** devonshire
- Lease Time:** (empty dropdown)
- ☐ Block Access
- ☒ Allow Dual Stack Queue
- ☐ Always Broadcast
- DHCP Options:** (empty dropdown)
- DHCP Option Set:** (empty dropdown)
- Rate Limit:** (empty dropdown)
- Insert Queue Before:** first
- Address List:** (empty dropdown)

On the right side of the dialog, there are buttons for: OK, Cancel, Apply, Disable, Comment, Copy, Remove, and Check Status.

Add first router's mac address and IP address,
All router IP addresses will be issued from separate subnet

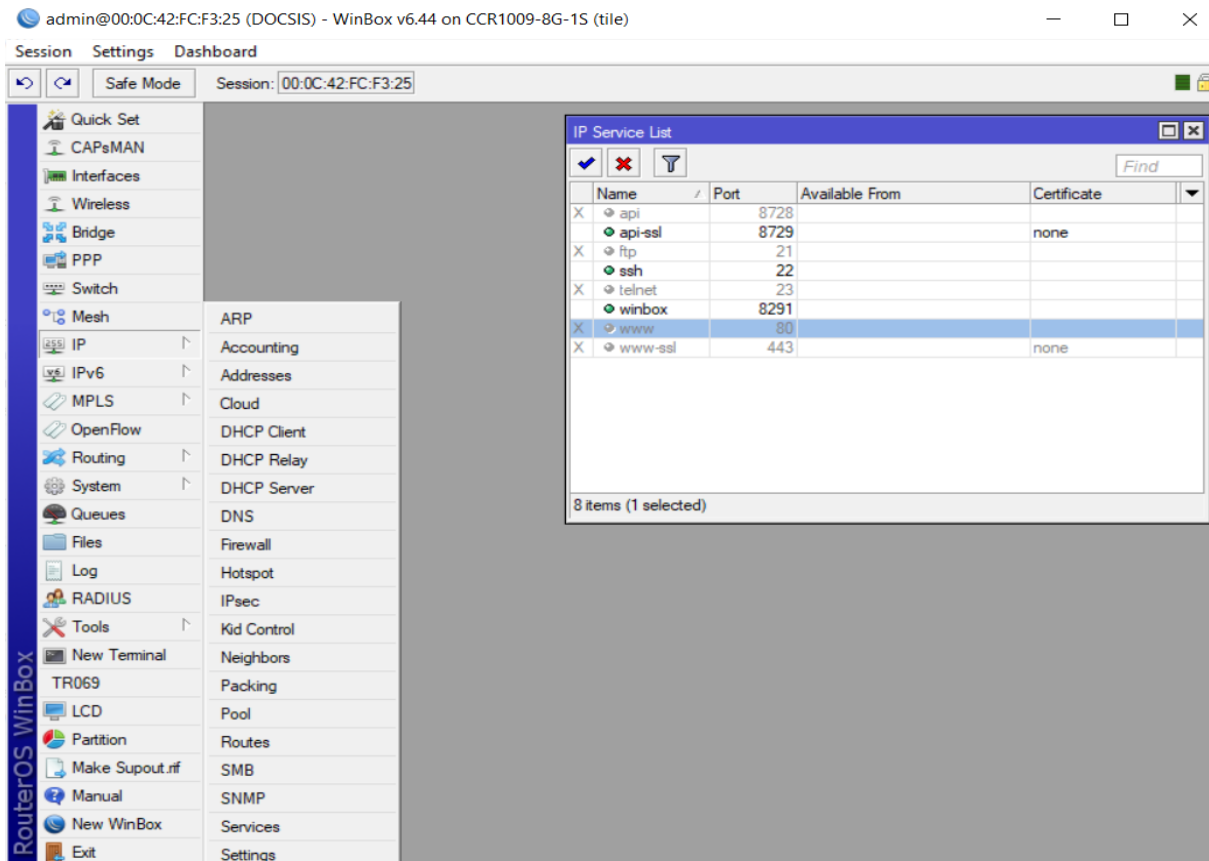
Third party cloud based

Mac addresses for both modem and router are entered and associated with a customer and IP addresses are assigned.

A service is also associated with the customer indicating bandwidth limits

Router is updated via API and static leases are written as well as address list entries

Enable API Service



Enable API service

Make sure to allow access only from authorized IP address and create certificate if using API-SSL

Static Leases written

admin@00:0C:42:FC:F3:25 (DOCSIS) - WinBox v6.44 on CCR1009-8G-1S (tile)

Session Settings Dashboard

Safe Mode Session: 00:0C:42:FC:F3:25

RouterOS WinBox

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
Switch
Mesh
IP
IPv6
MPLS
OpenFlow
Routing
System
Queues
Files
Log
RADIUS
Tools
New Terminal
TR069
LCD
Partition
Make Supout.rf
Manual
New WinBox
Exit

DHCP Server

DHCP Networks Leases Options Option Sets Alerts

+ - ✓ ✕ [icon] [icon] Check Status Find

Address	MAC Address	Client ID	Server	Ac...	A	A	Expires After	Status	Comment
10.11.1.20	00:01:02:03:04:05		devonshire					waiting	brk 603
10.11.2.20	01:02:03:04:05:06		devonshire					waiting	berk 603
10.11.2.21	A8:11:FC:6F:9A:C1		devonshire					waiting	Kensington 803
10.11.10.2	FC:E8:92:A0:1B:D5		windsor					waiting	
10.11.11.20	04:4E:5A:F6:E0:E2		windsor					waiting	york 1203
10.11.12.20	04:4E:5A:F6:E0:E3		windsor					waiting	york 1203

6 items

Address list updated

admin@00:0C:42:FC:F3:25 (DOCSIS) - WinBox v6.44 on CCR1009-8G-1S (tile)

Session Settings Dashboard

Safe Mode Session: 00:0C:42:FC:F3:25

Firewall

Filter Rules NAT Mangle Raw Service Ports Connections Address Lists Layer7 Protocols

Find all

Name	Address	Timeout	Creation Time	Comment
DNS_Accept	8.8.8.8		Mar/01/2019 08:...	
DNS_Accept	4.2.2.2		Mar/01/2019 08:...	
DNS_Accept	10.11.0.0/21		Mar/01/2019 08:...	
DNS_Accept	10.11.8.0/21		Mar/01/2019 08:...	
Delinquent	10.11.2.26		Mar/01/2019 08:...	Devonshire 604 (74)
Delinquent Whitelist	1.2.3.4		Mar/01/2019 08:...	
Devonshire_25x10	10.11.1.20		Mar/01/2019 08:...	Berkshire 603 (80)
Devonshire_40x20	10.11.2.38		Mar/01/2019 08:...	Devonshire 603 (106)
Devonshire_50x25	10.11.2.200		Mar/01/2019 08:...	Devonshire Office (65)
Devonshire_50x25	10.11.1.34		Mar/01/2019 08:...	Kensington 901 (87)
Inactive	10.11.1.26		Mar/01/2019 08:...	Devonshire 604 (74)
Windsor_25x10	10.11.11.30		Mar/01/2019 08:...	Yorkshire 104 (129)
Windsor_40x20	10.11.12.21		Mar/01/2019 08:...	Yorkshire 1704 (84)
Windsor_40x20	10.11.11.21		Mar/01/2019 08:...	Yorkshire 1704 (84)
Windsor_40x20	10.11.11.28		Mar/01/2019 08:...	Yorkshire 902 (118)
Windsor_50x25	10.11.12.200		Mar/01/2019 08:...	Yorkshire Office (78)

16 items

outerOS WinBox

- Quick Set
- CAPsMAN
- Interfaces
- Wireless
- Bridge
- PPP
- Switch
- Mesh
- IP
- IPv6
- MPLS
- OpenFlow
- Routing
- System
- Queues
- Files
- Log
- RADIUS
- Tools
- New Terminal
- TR069
- LCD
- Partition
- Make Supout.tif
- Manual
- New WinBox

Mangle and Queue Tree Based on address lists

admin@00:0C:42:FC:F3:25 (DOCSIS) - WinBox v6.44 on CCR1009-8G-1S (tile)

Session Settings Dashboard

Safe Mode Session: 00:0C:42:FC:F3:25

Quick Set CAPsMAN Interfaces Wireless Bridge PPP Switch Mesh IP IPv6 MPLS OpenFlow Routing System Queues Files Log RADIUS Tools New Terminal TR069 LCD Partition Make Supout.tif Manual New WinBox

24 items (1 selected)

Firewall Filter Rules NAT Mangle Raw Service Ports

Mangle Rule

General Advanced Extra Action Statistics

Src. Address List: Windsor_25x10

Dst. Address List:

Layer7 Protocol:

Content:

Connection Bytes:

Connection Rate:

Per Connection Classifier:

Src. MAC Address:

Out. Bridge Port:

In. Bridge Port:

In. Bridge Port List:

Out. Bridge Port List:

IPsec Policy:

TLS Host:

Ingress Priority:

Priority:

DSCP (TOS):

TCP MSS:

OK Cancel Apply Disable Comment Copy Remove Reset Counters Reset All Counters

#	Action	Chain
0	mark connection	forward
1	mark connection	forward
2	mark connection	forward
3	mark packet	forward
4	mark packet	forward
5	mark connection	forward
6	mark connection	forward
7	mark packet	forward
8	mark packet	forward
9	mark connection	forward
10	mark connection	forward
11	mark packet	forward
12	mark packet	forward
13	mark connection	forward
14	mark packet	forward
15	mark packet	forward
16	mark connection	forward
17	mark connection	forward
18	mark packet	forward
19	mark packet	forward
20	mark connection	forward
21	mark connection	forward
22	mark packet	forward
23	mark packet	forward

admin@00:0C:42:FC:F3:25 (DOCSIS) - WinBox v6.44 on CCR1009-8G-1S (tile)

Session Settings Dashboard

Safe Mode Session: 00:0C:42:FC:F3:25

Quick Set CAPsMAN Interfaces Wireless Bridge PPP Switch Mesh IP IPv6 MPLS OpenFlow Routing System Queues Files Log RADIUS Tools New Terminal TR069 LCD Partition Make Supout.tif Manual New WinBox

Queue List

Simple Queues Interface Queues Queue Tree Queue Types

00 Reset Counters 00 Reset All Counters Find

Name	Parent	Packet ...	Limit At b...	Max Limit ...	Avg. R...	Queued Bytes
Devonshire_25x10_download	devon/berk/...	Devon...			0 bps	0 B
Devonshire_25x10_upload	ether1-wan	Devon...			0 bps	0 B
Devonshire_40x20_download	devon/berk/...	Devon...			0 bps	0 B
Devonshire_40x20_upload	ether1-wan	Devon...			0 bps	0 B
Devonshire_50x25_download	devon/berk/...	Devon...			0 bps	0 B
Devonshire_50x25_upload	ether1-wan	Devon...			0 bps	0 B
Windsor_25x10_download	windsor/yorks...	Windsor...			0 bps	0 B
Windsor_25x10_upload	ether1-wan	Windsor...			0 bps	0 B
Windsor_40x10_download	windsor/yorks...	Windsor...			0 bps	0 B
Windsor_40x10_upload	ether1-wan	Windsor...			0 bps	0 B
Windsor_50x25_download	windsor/yorks...	Windsor...			0 bps	0 B
Windsor_50x25_upload	ether1-wan	Windsor...			0 bps	0 B

12 items 0 B queued 0 packets queued

Redirect for non payment

admin@00:0C:42:FC:F3:25 (DOCSIS) - WinBox v6.44 on CCR1009-8G-1S (tile)

Session Settings Dashboard

Safe Mode Session: 00:0C:42:FC:F3:25

RouterOS WinBox

Quick Set
CAPsMAN
Interfaces
Wireless
Bridge
PPP
Switch
Mesh
IP
IPv6
MPLS
OpenFlow
Routing
System
Queues
Files
Log
RADIUS
Tools
New Terminal
TR069
LCD
Partition
Make Supout.rf
Manual
New WinBox
Exit

Firewall

Filter Rules NAT Mangle Raw Service Ports Connections Address Lists Layer7 Protocols

00 Reset Counters 00 Reset All Counters

#	Action	Chain	Proto	Src. Port	Dst. Port	In	Out	Src. Address List	Dst. Address List	Bytes	Packets	Comment
0	✓ acc...	forward						Delinquent	DNS_Accept	0 B		0 allow dns for delinquent
1	✓ acc...	forward						Delinquent	Delinquent Whitelist	0 B		0 allow delinquent to d
2	✗ drop	forward	6 (tcp)		!80			Delinquent		0 B		0 drop all tcp none wel
3	✗ drop	forward	17 (u...					Delinquent		0 B		0 drop all udp from deli
4	✗ drop	forward						Inactive		0 B		0 drop all from inactive

5 items (1 selected)

Redirect for non payment

admin@00:0C:42:FC:F3:25 (DOCSIS) - WinBox v6.44 on CCR1009-8G-1S (tile)

Session Settings Dashboard

Safe Mode Session: 00:0C:42:FC:F3:25

RouterOS WinBox

Quick Set
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Make Supout.rtf
Manual
New WinBox
Exit

Firewall

Filter Rules NAT Mangle Raw Service Ports Connections Address Lists Layer7 Protocols

+ - ✓ ✗ [icon] [icon] 00 Reset Counters 00 Reset All Counters Find all

#	Action	Chain	Src. Address	Dst. Address	Proto...	Src. Port	Dst. Port	In. Inter...	Out. Int...	In. Inter...	Out. Int...	Src. Ad...	Dst. Ad...	Bytes
0	dst-nat	dstnat			6 (tcp)		80					Delinqu...		0 B

NAT Rule <80>

General Advanced Extra Action Statistics

Action: dst-nat

☒ Log

Log Prefix: delinquent

To Addresses: 1.2.3.4

To Ports: 80

OK
Cancel
Apply
Disable
Comment
Copy
Remove
Reset Counters
Reset All Counters

1 item

Inactive or Suspended

admin@00:0C:42:FC:F3:25 (DOCSIS) - WinBox v6.44 on CCR1009-8G-1S (tile)

Session Settings Dashboard

Safe Mode Session: 00:0C:42:FC:F3:25

RouterOS WinBox

Quick Set
CAPsMAN
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Files
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RADIUS
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Make Supout.tif
Manual
New WinBox
Exit

Firewall

Filter Rules NAT Mangle Raw Service Ports Connections Address Lists Layer7 Protocols

16 items

Name	Address	Timeout	Creation Time	Comment
DNS_Accept	8.8.8.8		Mar/01/2019 08:...	
DNS_Accept	4.2.2.2		Mar/01/2019 08:...	
DNS_Accept	10.11.0.0/21		Mar/01/2019 08:...	
DNS_Accept	10.11.8.0/21		Mar/01/2019 08:...	
Delinquent	10.11.2.26		Mar/01/2019 08:...	Devonshire 604 (74)
Delinquent Whitelist	1.2.3.4		Mar/01/2019 08:...	
Devonshire_25x10	10.11.1.20		Mar/01/2019 08:...	Berkshire 603 (80)
Devonshire_40x20	10.11.2.38		Mar/01/2019 08:...	Devonshire 603 (106)
Devonshire_50x25	10.11.2.200		Mar/01/2019 08:...	Devonshire Office (65)
Devonshire_50x25	10.11.1.34		Mar/01/2019 08:...	Kensington 901 (87)
Inactive	10.11.1.26		Mar/01/2019 08:...	Devonshire 604 (74)
Windsor_25x10	10.11.11.30		Mar/01/2019 08:...	Yorkshire 104 (129)
Windsor_40x20	10.11.12.21		Mar/01/2019 08:...	Yorkshire 1704 (84)
Windsor_40x20	10.11.11.21		Mar/01/2019 08:...	Yorkshire 1704 (84)
Windsor_40x20	10.11.11.28		Mar/01/2019 08:...	Yorkshire 902 (118)
Windsor_50x25	10.11.12.200		Mar/01/2019 08:...	Yorkshire Office (78)

UserManager

We could use the built in Usermanager to write static DHCP leases with mac address as username then add profiles and limitations

Add User

MikroTik
Mikrotik User Manager

Add Edit Generate

1 2 3 4 page 1 of 4

Users

Router

Users

Sessions

Customers

Logs

Payments

Profiles

Settings

Reports

7 A sessions

6 A users

Advanced search

Maintenance

Logout

☐	▼ Last name	
☐		
☐		
☐	Vanwagner	19.
☐	Hoffman	20.
☐	Corbin	
☐	Jones	16.
☐	Oakley	36.
☐		12.
☐		
☐		
☐		636

User details

▲ Main

Username: 12:34:56:78:90:11

Password:

Disabled: ☐

Owner: admin

▲ Constraints

IP address: 0.0.0.0

Caller ID: ☒ Bind on first use

Shared users: 1 ▼

▼ Wireless

▼ Private information

Assign profile: default ▼

Add

Userman profile and limitation

The screenshot displays the MikroTik User Manager web interface. On the left is a sidebar menu with options: Routers, Users, Sessions, Customers, Logs, Payments, Profiles (highlighted), Settings, Reports, 7 A sessions, 6 A users, Advanced search, Maintenance, and Logout. The main content area has two tabs: 'Profiles' and 'Limitations'. The 'Profiles' tab is active, showing a form for creating or editing a profile. The 'default' profile is selected. Fields include 'Profile:' (dropdown), 'Name:' (text), 'Name for users:' (text), and 'Owner:' (text, set to 'admin'). A 'Profile part' dialog box is open, showing a 'Period' section with days of the week (all checked) and a 'Time' range from 0:00:00 to 23:59:59. Below this is a 'Limits' section with buttons for 'New limit', 'Cancel', and 'Add'. To the right, a 'Limitation details' dialog box is open, showing fields for 'Name:', 'Owner:' (admin), 'Download:', 'Upload:', 'Transfer:', 'Uptime:', 'Rate limits' (with Rx and Tx fields for Rate limit, Burst rate, Burst threshold, and Min rate), and 'Priority:' (Not specified). A 'Constraints' section at the bottom has an 'Add' button.

MikroTik
Mikrotik User Manager

Profiles Limitations

Profile: default +

Name: default

Name for users:

Owner: admin

Profile part

▲ Period

Days: ☒ Sunday
☒ Monday
☒ Tuesday
☒ Wednesday
☒ Thursday
☒ Friday
☒ Saturday

Time: 0:00:00 - 23:59:59

▲ Limits

New limit Cancel Add

Limitation details

▲ Main

Name:

Owner: admin

▲ Limits

Download: 0B

Upload: 0B

Transfer: 0B

Uptime:

▲ Rate limits

Rate limit: Rx Tx

Burst rate: Rx Tx

Burst threshold: Rx Tx

Burst time: Rx Tx

Min rate: Rx Tx

Priority: Not specified

▼ Constraints

Add

Hotspot

Although not covered here we
could also use Hotspot

SUMMARY

The only real difference between a Docsis based network and an Ethernet or wireless based network other than the physical layer protocols is the need to deliver config files to the modems.

While there is a need for expensive Docsis provisioning software and servers on large complex networks this case study shows how to build a working solution using only a MikroTik edge router.