

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°

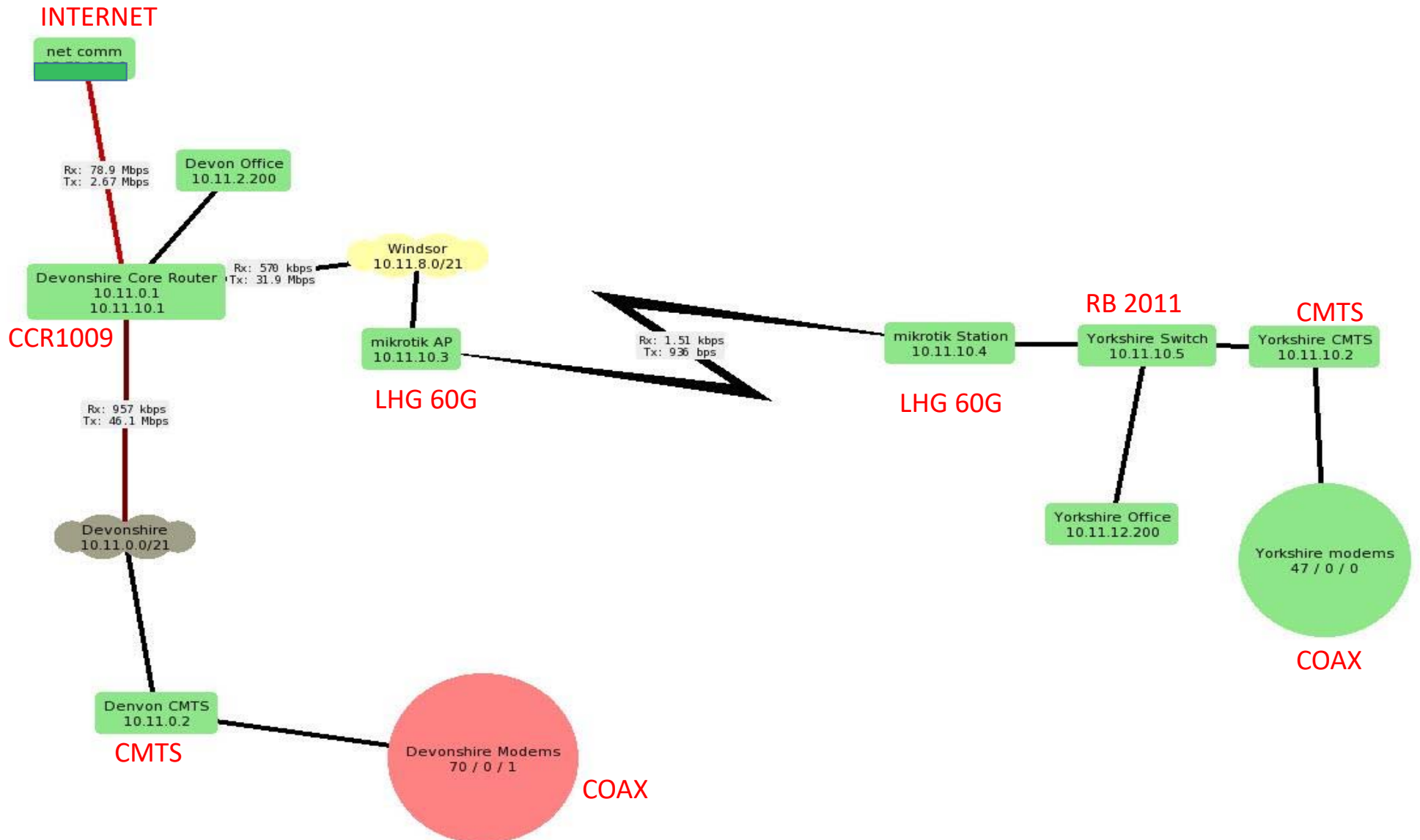
N32.5332°

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

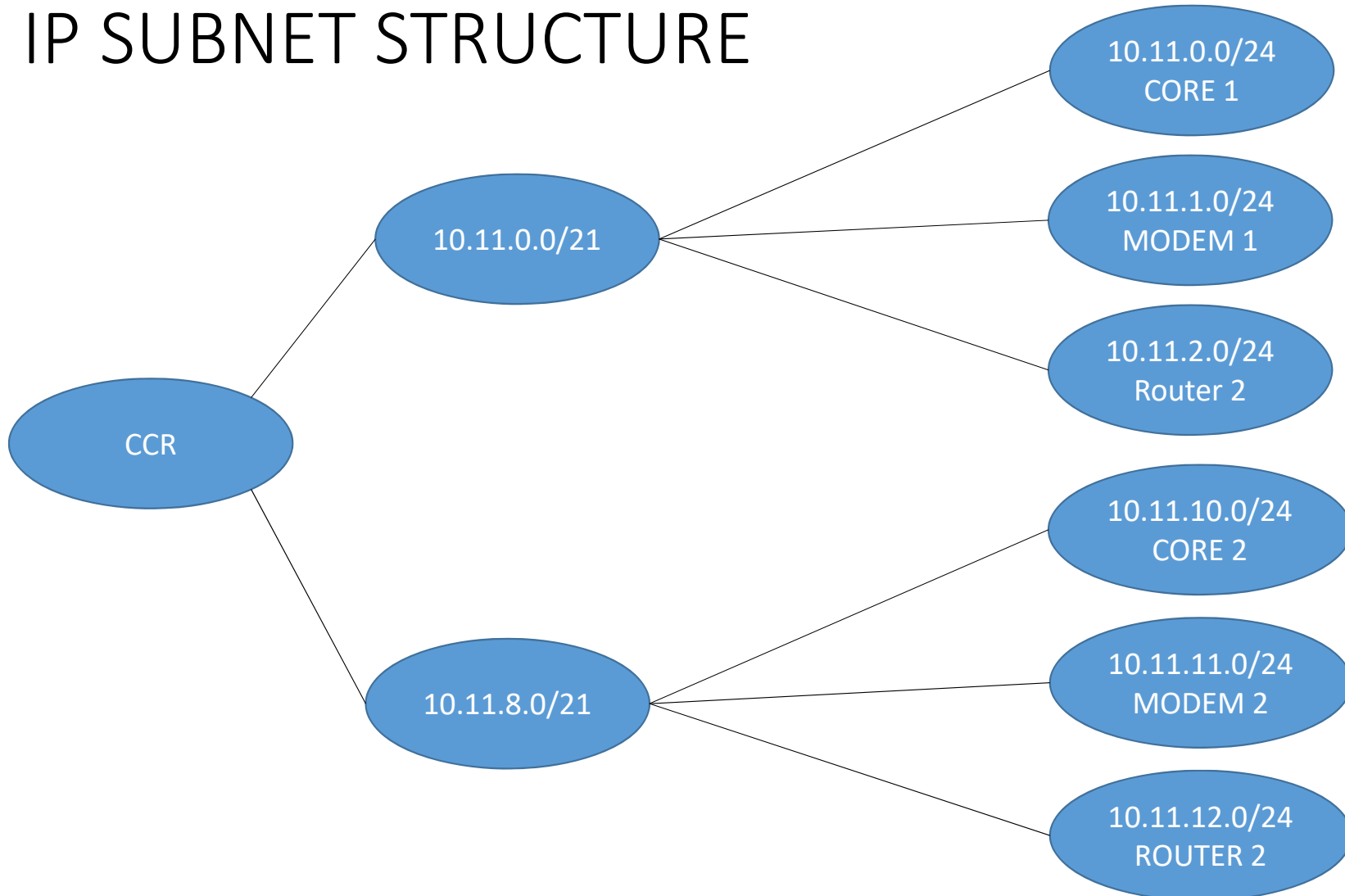
Client Router Operation

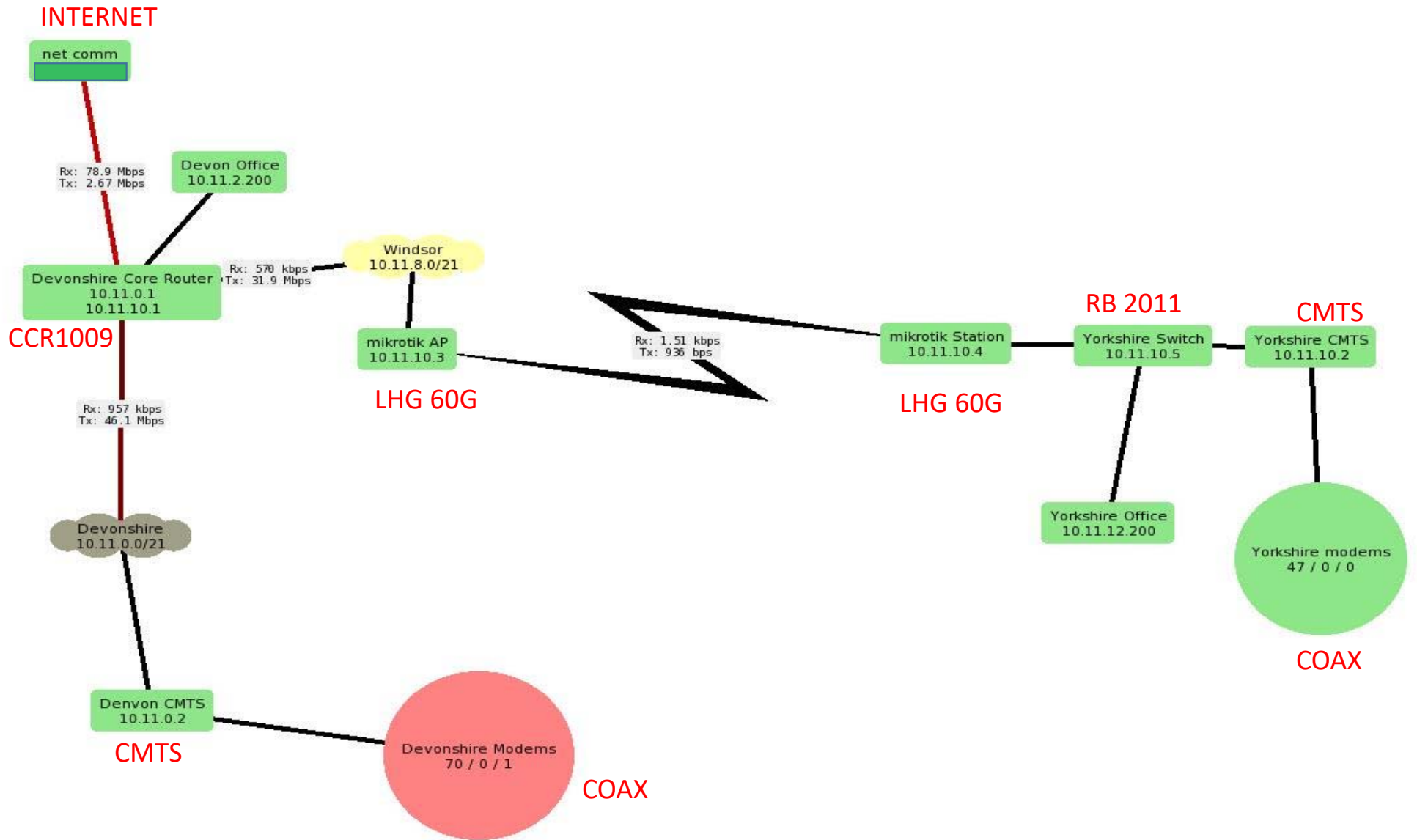
Most “modems” are actually a combination of cable modem and client wifi router

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





- 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	

MikroTik DHCP Server Config

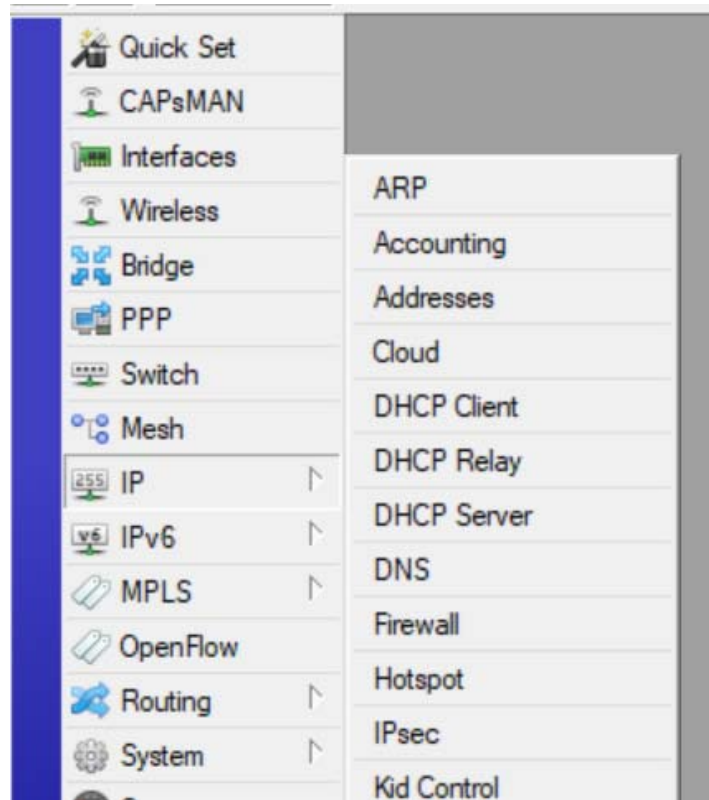
We need to have the MikroTik router provide several parameters to the modem

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

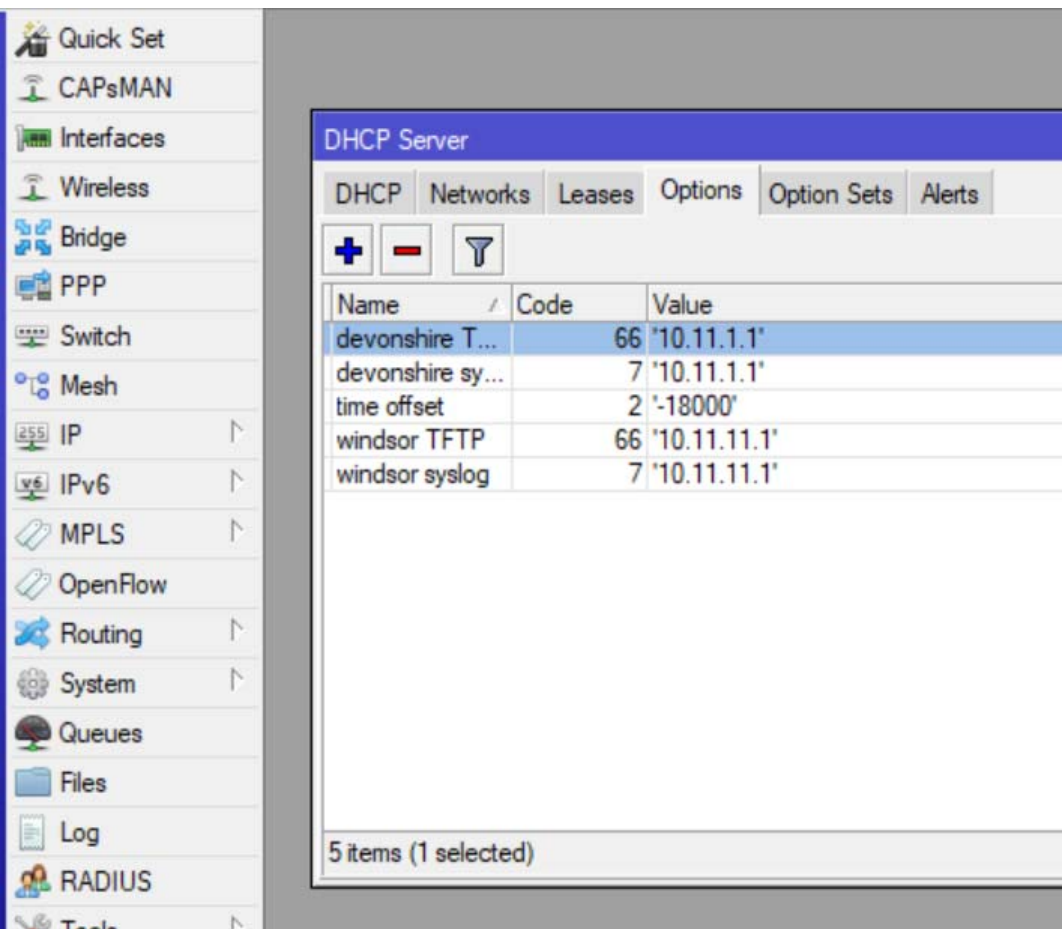
We also need to have the MikroTik provide parameters to the router

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

IP DHCP SERVER



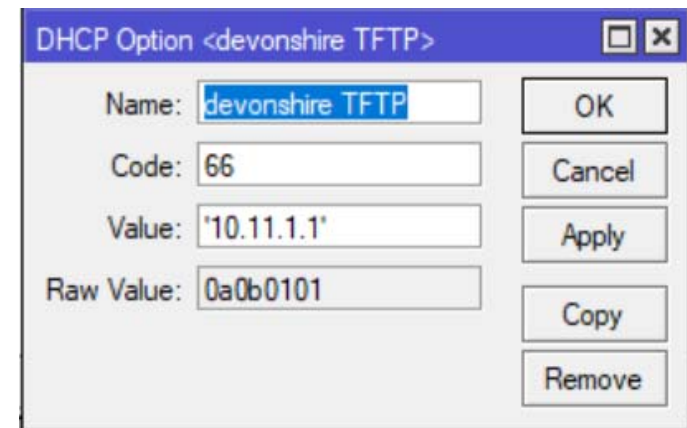
Set DHCP Options



The screenshot shows the Mikrotik WinBox interface for configuring a DHCP server. The left sidebar contains various configuration categories, and the main window displays the DHCP Server configuration page. The 'Options' tab is selected, showing a table of 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	'10.11.1.1'
windsor syslog	7	'10.11.1.1'

5 items (1 selected)



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

Name:	devonshire TFTP	OK
Code:	66	Cancel
Value:	'10.11.1.1'	Apply
Raw Value:	0a0b0101	Copy
		Remove

Set DHCP Option Set

The screenshot shows the Mikrotik WinBox DHCP Server configuration interface. On the left is a sidebar menu with categories like CAPsMAN, Interfaces, Wireless, Bridge, PPP, Switch, Mesh, IP, IPv6, MPLS, OpenFlow, Routing, System, Queues, Files, Log, RADIUS, Tools, and New Terminal. The main window is titled 'DHCP Server' and has tabs for DHCP, Networks, Leases, Options, Option Sets, and Alerts. The 'Option Sets' tab is active, showing a list of option sets: 'Devonshire V...', 'devonshire', and 'windsor'. A dialog box titled 'DHCP Option Set <Devonshire Voip>' is open, allowing configuration of the selected option set. The dialog contains a 'Name' field with 'Devonshire Voip', an 'Options' list with 'devonshire TFTP', 'devonshire syslog', and 'time offset', and buttons for 'OK', 'Cancel', 'Apply', 'Copy', and 'Remove'. At the bottom of the dialog area, it says '3 items (1 selected)'.

/IP DHCP SERVER/ NETWORK for routers

The screenshot displays the Mikrotik WinBox DHCP Server configuration interface. The left sidebar shows the navigation menu with categories like 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, and Exit.

The main window shows the DHCP Server configuration with tabs for DHCP, Networks, Leases, Options, Option Sets, and Alerts. The DHCP Networks tab is active, displaying a table of configured networks:

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	
10.11.3.0/24	10.11.3.1	10.11.3.1	

The selected network 10.11.2.0/24 is shown in a configuration dialog box titled "DHCP Network <10.11.2.0/24>". The fields in the dialog are:

- Address: 10.11.2.0/24
- Gateway: 10.11.2.1
- Netmask: (empty)
- No DNS
- DNS Servers: 8.8.8.8, 4.2.2.2
- Domain: (empty)
- WINS Servers: (empty)
- NTP Servers: 198.55.111.50
- CAPS Managers: (empty)
- Next Server: (empty)
- Boot File Name: (empty)
- DHCP Options: (empty)
- DHCP Option Set: (empty)

/IP DHCP SERVER/ NETWORK for modems

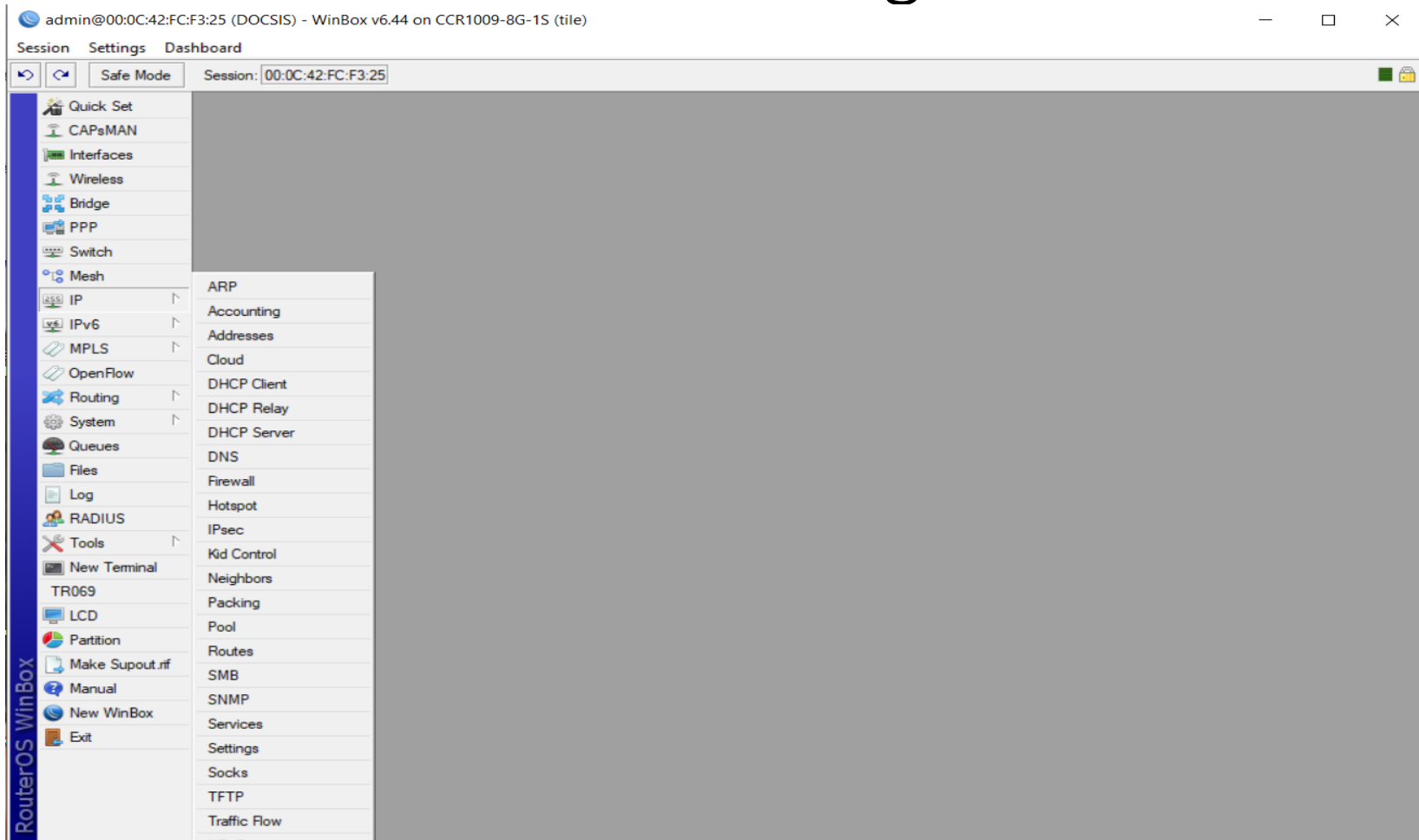
The screenshot displays the Mikrotik WinBox DHCP Server configuration interface. On the left is a sidebar menu with various network services. The main window shows the DHCP Server configuration, with a table of DHCP Networks. A dialog box for editing the network 10.11.1.0/24 is open, showing fields for Address, Gateway, Netmask, DNS Servers, Domain, WINS Servers, NTP Servers, CAPS Managers, Next Server, Boot File Name, DHCP Options, and DHCP Option Set.

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	
10.11.3.0/24	10.11.3.1	10.11.3.1	

DHCP Network <10.11.1.0/24>

Address: 10.11.1.0/24
Gateway: 10.11.1.1
Netmask:
 No DNS
DNS Servers: 8.8.8.8
4.2.2.2
Domain:
WINS Servers:
NTP Servers: 10.11.1.1
CAPS Managers:
Next Server:
Boot File Name: devon55x30snmp.cfg
DHCP Options:
DHCP Option Set: devonshire

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

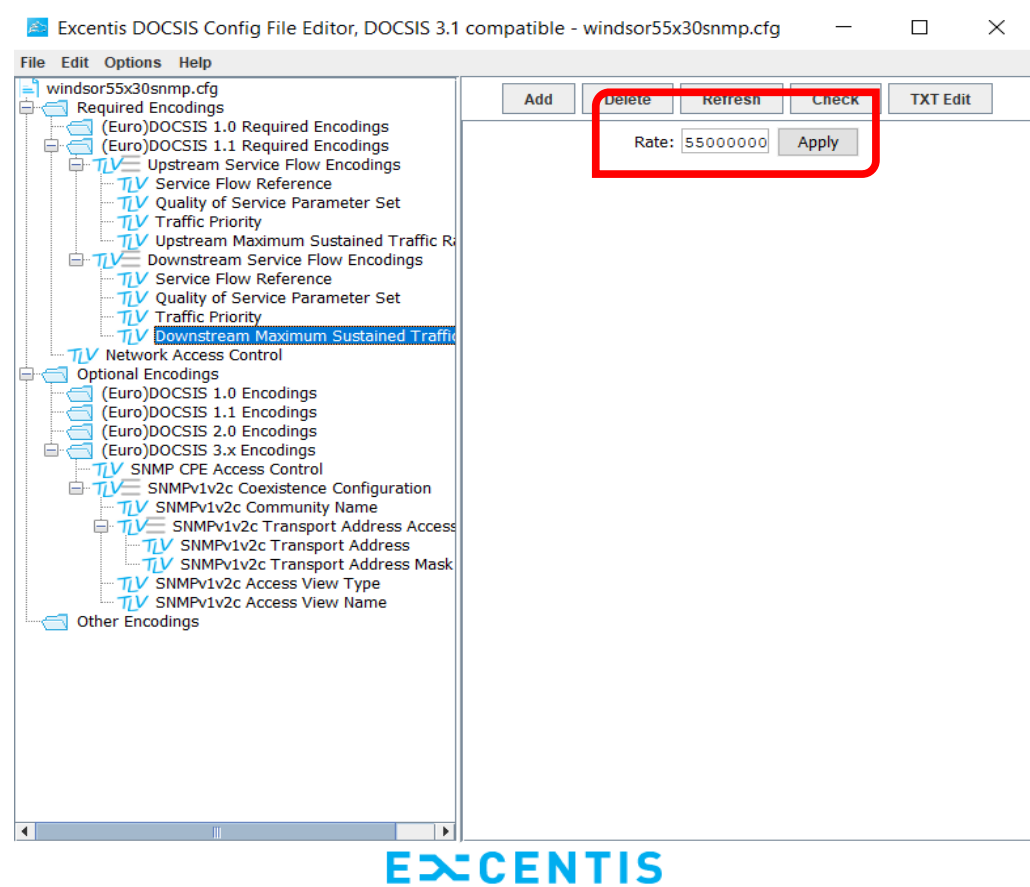
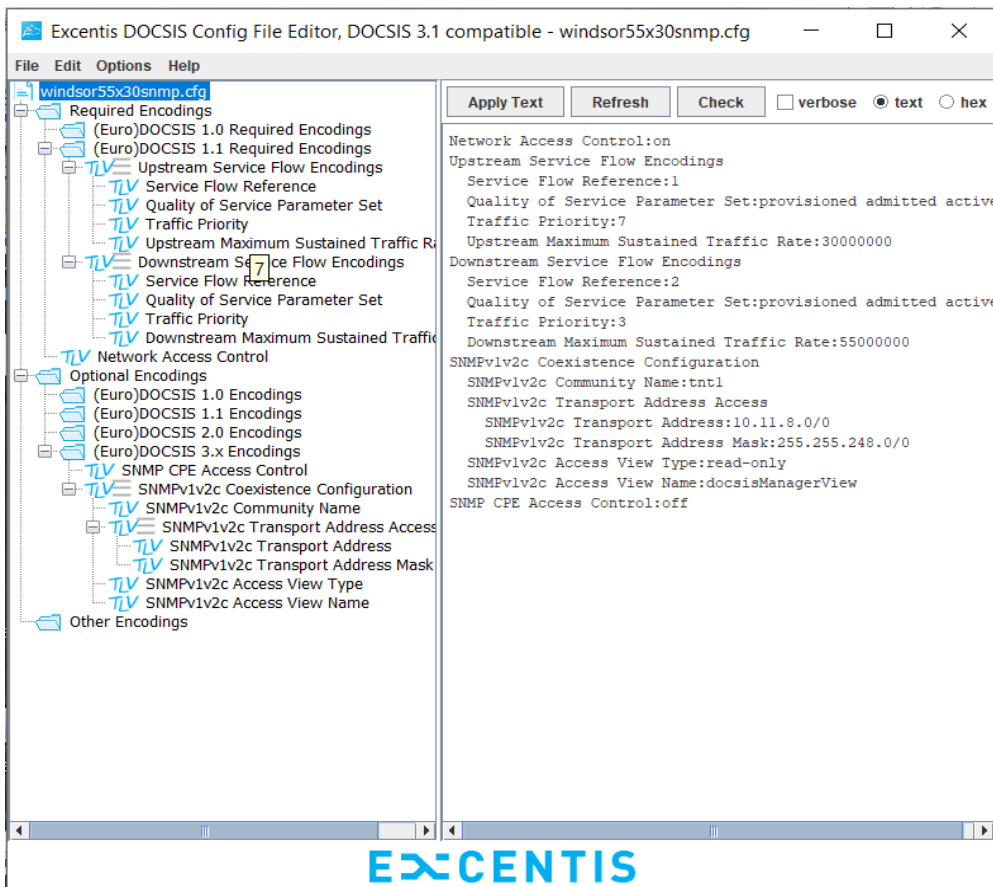
- downstream max traffic flow

- whether or not customer can access modem

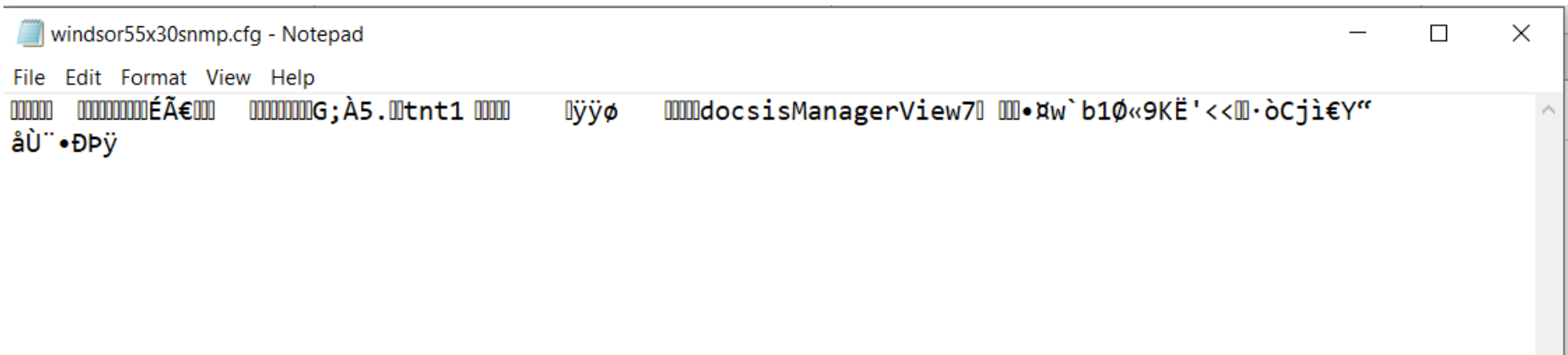
- SNMP community names

- address of SNMP server

Config file editor



File to upload



windsor55x30snmp.cfg - Notepad

File Edit Format View Help

ÉÃ€ G;À5.tnt1 öÿø docsisManagerView70 •xw`b1Ø«9KË'<<•òCjì€Y“
åÙ”•ÐPÿ

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.

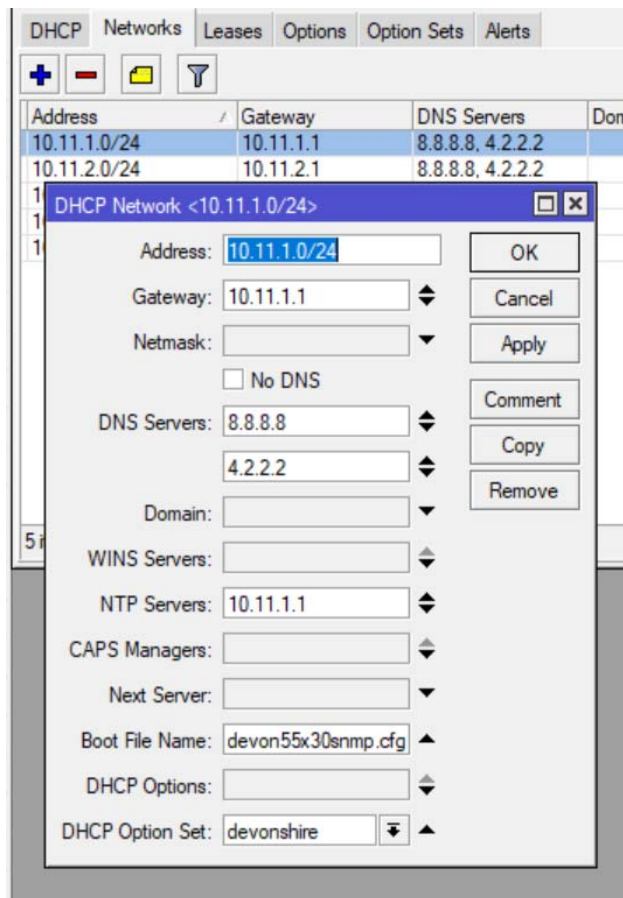
In this case study all modems are placed in subnet 1, and all routers into subnet 2.

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.

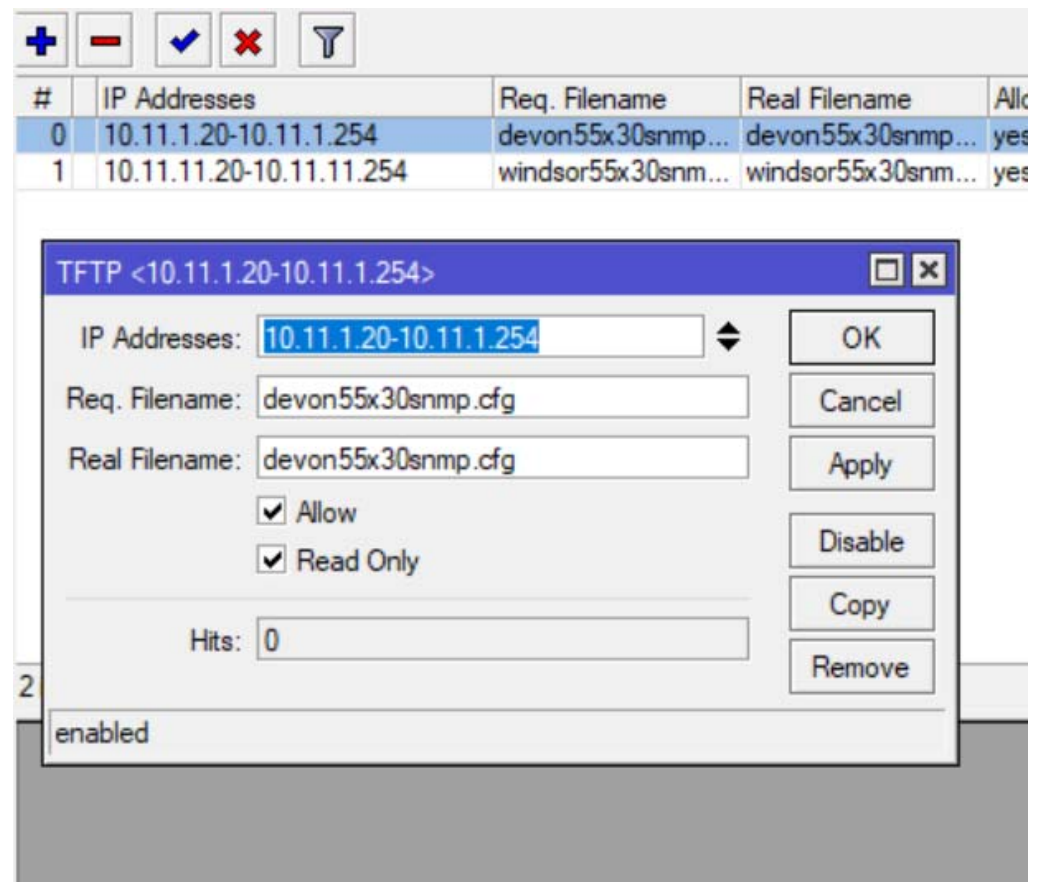
DHCP network and TFTP server



The screenshot shows the DHCP configuration interface with a dialog box for editing a network. The dialog box is titled "DHCP Network <10.11.1.0/24>". It contains the following fields and controls:

- Address: 10.11.1.0/24
- Gateway: 10.11.1.1
- Netmask: (empty)
- No DNS
- DNS Servers: 8.8.8.8, 4.2.2.2
- Domain: (empty)
- WINS Servers: (empty)
- NTP Servers: 10.11.1.1
- CAPS Managers: (empty)
- Next Server: (empty)
- Boot File Name: devon55x30snmp.cfg
- DHCP Options: (empty)
- DHCP Option Set: devonshire

Buttons on the right side of the dialog include: OK, Cancel, Apply, Comment, Copy, and Remove.



The screenshot shows the TFTP configuration interface with a dialog box for editing a server. The dialog box is titled "TFTP <10.11.1.20-10.11.1.254>". It contains the following fields and controls:

- IP Addresses: 10.11.1.20-10.11.1.254
- Req. Filename: devon55x30snmp.cfg
- Real Filename: devon55x30snmp.cfg
- Allow
- Read Only
- Hits: 0

Buttons on the right side of the dialog include: OK, Cancel, Apply, Disable, Copy, and Remove.

Below the dialog box, the text "enabled" is visible.

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] [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

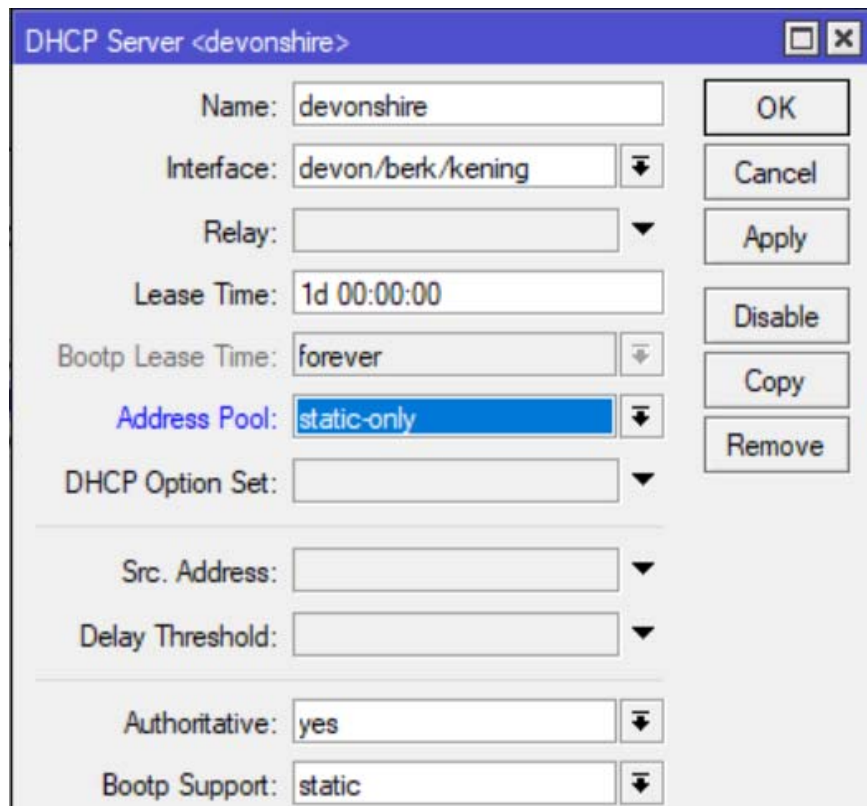
1 item (1 selected)

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

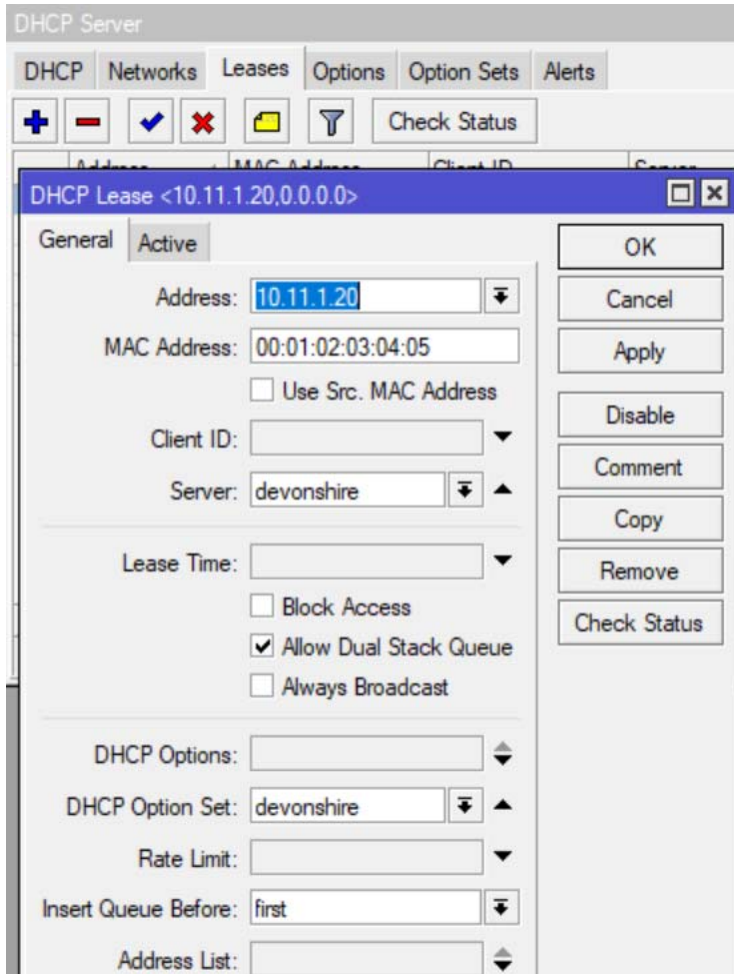


The image shows a screenshot of a DHCP Server configuration window titled "DHCP Server <devonshire>". The window contains several configuration fields and a set of control buttons on the right side.

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

Control buttons on the right side of the window include: OK, Cancel, Apply, Disable, Copy, and Remove.

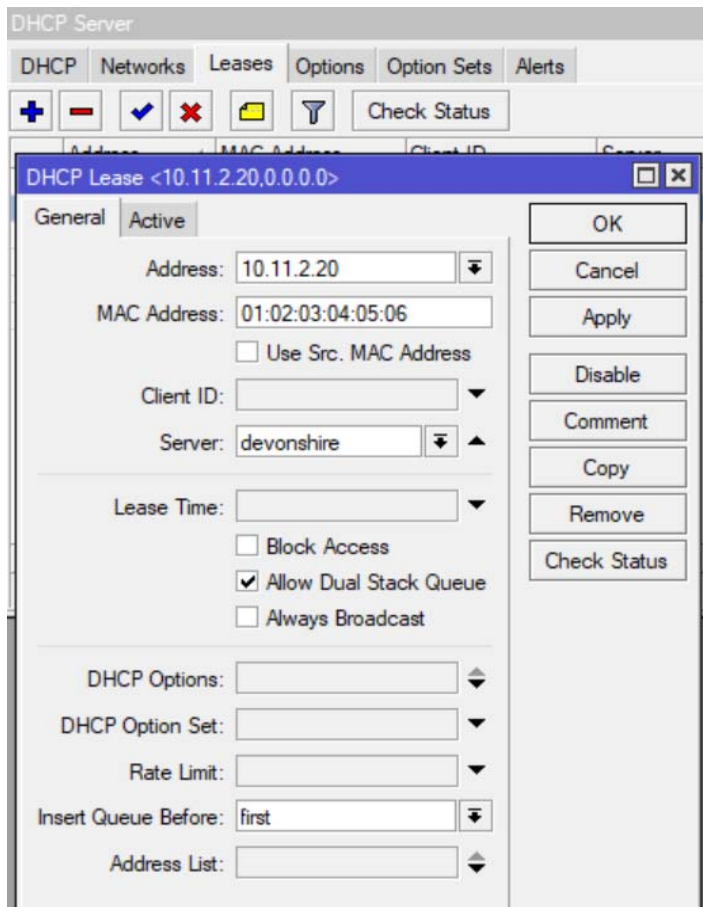
Add Modem



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

All Modem IP address will be issued from one subnet

Add Router



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

The screenshot shows the RouterOS WinBox interface. The main window displays the 'IP Service List' configuration page. The left sidebar contains a navigation menu with categories like 'Quick Set', 'Interfaces', 'Wireless', 'Bridge', 'PPP', 'Switch', 'Mesh', 'IP', 'IPv6', 'MPLS', 'OpenFlow', 'Routing', 'System', 'Queues', 'Files', 'Log', 'RADIUS', 'Tools', 'New Terminal', 'TR069', 'LCD', 'Partition', 'Make Supout.rtf', 'Manual', 'New WinBox', and 'Exit'. The 'IP' category is expanded, showing sub-items like 'Accounting', 'Addresses', 'Cloud', 'DHCP Client', 'DHCP Relay', 'DHCP Server', 'DNS', 'Firewall', 'Hotspot', 'IPsec', 'Kid Control', 'Neighbors', 'Packing', 'Pool', 'Routes', 'SMB', 'SNMP', 'Services', and 'Settings'. The 'IP Service List' window is open, displaying a table with the following data:

Name	Port	Available From	Certificate
api	8728		
api-ssl	8729		none
ftp	21		
ssh	22		
telnet	23		
winbox	8291		
www	80		
www-ssl	443		none

The 'www' service is selected. The status bar at the bottom of the window indicates '8 items (1 selected)'.

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

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

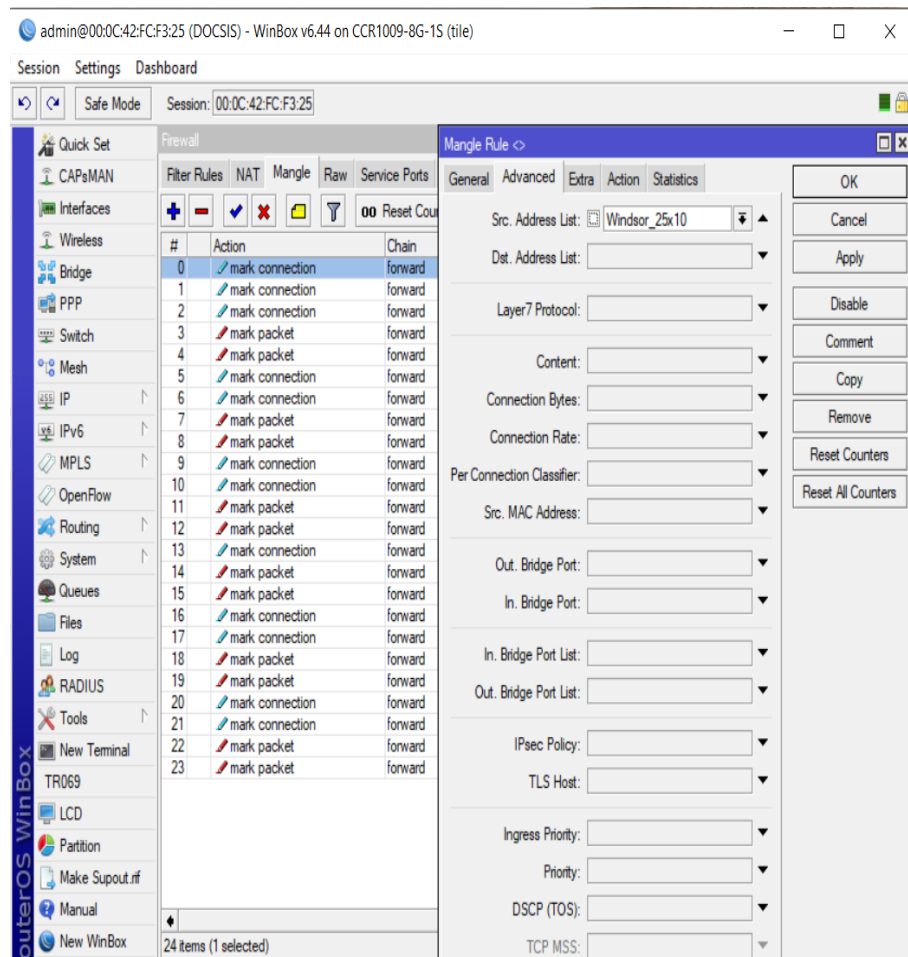
Find all

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

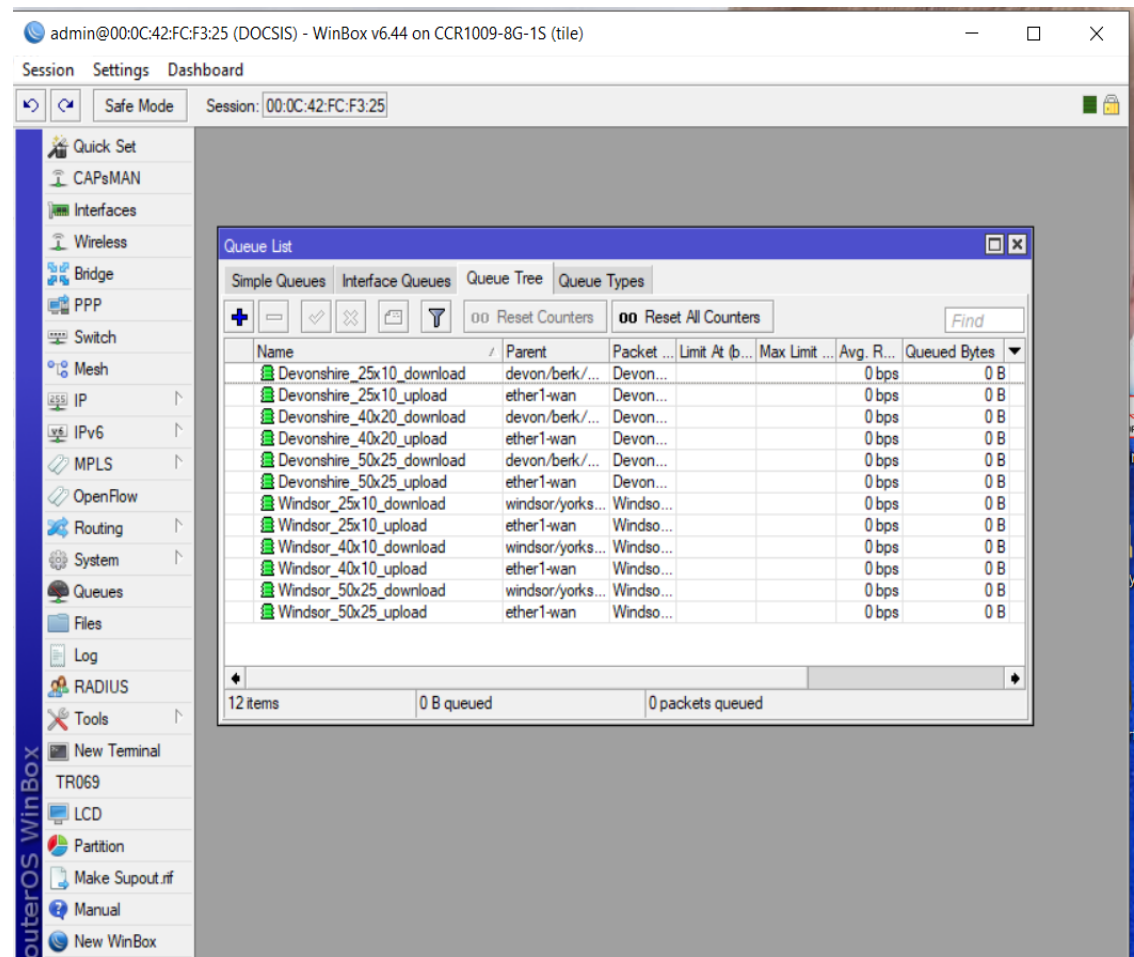
outerOS WinBox

Mangle and Queue Tree Based on address lists



The screenshot shows the WinBox Firewall configuration interface. The 'Mangle Rule' window is open, displaying the 'General' tab. The 'Src. Address List' is set to 'Windsor_25x10'. The 'Action' column in the rule list shows various actions like 'mark connection' and 'mark packet'.

#	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



The screenshot shows the WinBox Queue List configuration interface. The 'Queue List' window is open, displaying the 'Queue Tree' tab. The table lists various queues with their names, parents, and statistics.

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

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 Find all

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

Firewall

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

+ - ✓ ✗ 📄 🔍 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
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

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

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

<input type="checkbox"/>	▼ Last name	
<input type="checkbox"/>		
<input type="checkbox"/>	Vanwagner	19.
<input type="checkbox"/>	Hoffman	20.
<input type="checkbox"/>	Corbin	
<input type="checkbox"/>	Jones	16.
<input type="checkbox"/>	Oakley	36.
<input type="checkbox"/>		
<input type="checkbox"/>		12.
<input type="checkbox"/>		
<input type="checkbox"/>		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 navigation 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 is divided into two tabs: 'Profiles' and 'Limitations'. The 'Profiles' tab is active, showing a form with the following fields: 'Profile:' (dropdown menu set to 'default'), 'Name:' (text input 'default'), 'Name for users:' (text input), and 'Owner:' (text input 'admin'). A 'Profile part' dialog box is open in the foreground, containing a 'Period' section with 'Days:' (checkboxes for Sunday through Saturday, all checked) and 'Time:' (input fields '0:00:00' and '23:59:59'). Below this is a 'Limits' section with 'New limit', 'Cancel', and 'Add' buttons. To the right, a 'Limitation details' dialog box is open, showing configuration options: 'Main' (Name, Owner: admin), 'Limits' (Download: 0B, Upload: 0B, Transfer: 0B, Uptime), 'Rate limits' (Rate limit, Burst rate, Burst threshold, Burst time, Min rate, all with Rx and Tx input fields), and 'Constraints' (Priority: Not specified, Add button).

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.