

Mikrotik

Why? (for a Delphi Group)

- Networking is everywhere
- Many Delphi programs will require network connectivity
- Delphi users may find some of the features that Mikrotik routers provide useful
 - And at a reasonable price
- I have recently spent some time attempting to get a Mikrotik to do mostly what I want and thought that while I still am in Mikrotik mode, a bit of a presentation might be good

Overview

Mikrotik, A router/network gear manufacturer

- Latvia
- Started 1996
- Revenue EUR 202M (2015)
- Traditionally made in Latvia, not sure of current state

- Traditionally Wireless ISP products
- Router software to run on x86 computers
- These days also have a range of SOHO through enterprise routers
 - Outdoor wireless links
 - SOHO Wireless and ethernet only routers
 - 4g/LTE connectivity
 - Enterprise routers suitable for ISP's capable of terminating thousands of CPE's
- CHR version software specifically for running on virtualised platforms
- A range of ethernet switches from SOHO to Enterprise
 - 1G + 4 SFP+ unit looks interesting
- Assorted other bits and pieces
 - Ethernet repeaters
 - Antennas
 - Lora communications

https://download2.mikrotik.com/catalog_2020.pdf

- Most of the following discussion will be on the router products.
- And mostly on their SOHO router products

Why Mikrotik

- They are a very flexible routing platform
- They have many of the enterprise routing facilities
 - OSPF, BGP, etc routing protocols
 - SPAN (packet monitoring)
 - NetFlow (Network monitoring) needs an external collector
- They have a lot of tweaky options (which can be both a blessing and a curse)
- Very flexible firewall
- You can get a lot of diagnostic information out of them so you can see what is happening on your network
 - Can create per user statistics (internally)
- VPN capabilities
- SMB

Software Updates

- Pretty regular, Not always perfect, but usually ok in the Long-Term Branch
- Maybe give it a week, before installing new updates
- Usually pretty good at issuing updates when security vulnerabilities are found
- Current versions are v6.x
- Beta (Alpha really) of v7.x is available has some nice features. (But still quite flaky in spots)

Software Features

- The feature set is largely consistent across the range of routers
- The features mostly work the same from the smallest to the largest
- There are license levels, and some features are unavailable or have reduced capacity on lower license levels

<https://wiki.mikrotik.com/wiki/Manual:License>

Hardware features

- Traditionally the SOHO routers and outdoor Wireless devices used a MIPS CPU platform, some of the newer devices are moving to an ARM 32 platform
- Many of the Enterprise devices are based on the Tiler multi-core platform (ranging from 7 to 72 cores), however the most recent is an ARM 64 device
- And the CHR and x86 devices are whatever you make them
- The SOHO Routers usually have a broad power supply range typically 10-30v, with some routers being able to use up to 56v input power

PoE

- Commonly Mikrotiks use passive PoE, nominally of 24V
- Many of their SOHO routers will accept (24V) PoE in on Ether1
- Some of them (Especially the dedicated Access Points, and outdoor wireless) will also accept standard active PoE through to 56V
- Some of routers provide PoE output (Same as input voltage from either PoE or power plug)

Wi-Fi

- Unfortunately, It's not perfect
- It's mostly good, perhaps a bit slow
- Very good for Point to Point links
- Not sure about high density situations

Show and Tell

Map lite

- Single port 2.4GHz Mini Access Point
 - Can use as an AP, or client device, or both (eg Repeater)
- Powered from Passive, or Active PoE (1 Direction only), or USB



Map

- 2 Port 2.4GHz Mini Access Point
- 2nd Port can Supply PoE
- Powered from Passive/Active PoE, USB or Power Socket
- Can use USB port via an OTG adapter



Hap Lite

- 4 port 2.4GHz Home Access Point
- USB power only
- Easy to keep in pack



Hap AC²

- 2.4GHz and 5GHz AC Home Access Point
- Arm CPU
- High speed IPSEC VPN capability
- Powered from Passive PoE, or Power Socket
- USB



Hex S

- Ethernet Router
- SMIPS platform
- Has a 1Gb SFP port
- High Speed IPSEC capability
- Powered from Passive or Active PoE, or power Socket



- PoE out on Port 5
- USB

RB-4011iGS+RM

- Ethernet Router
- Arm 32 Platform
- Like a Hex, but bigger and a lot faster
- No USB (Serial port)
- 10Gb SFP



GPER

- Gigabit Passive Ethernet Repeater
- PoE in and Out
- Can cascade them to make a link up to over 1km
- 250m between GPER's (Cat 6 cable)



WOOBM

- Wireless out of band management
- USB Serial port with Wi-Fi connection
- You rarely need it, but when you do need it, it can save you a lot.



Default Settings

Most of the SOHO routers/Access Points

- Lan side IP Address 192.168.88.1/24
- DHCP client on Wan port (Usually ether1)
- NAT with SPI Firewall
- Login Admin with no password
- Wireless Active but with no password on it 😞
- There is also a quickset facility to rapidly setup common configurations

I usually build my configs based on their default config

The routers can also be reset to no default configuration where they have no IP addresses, no firewall, ethernet ports are enabled but that's about it.

- Access is via Serial or Mac Telnet/Winbox until you have given device an IP address

Router Management

Multiple ways to manage the routers

- Winbox dedicated windows application
- Webfig (Web based configuration)
- Telnet/SSH CLI access
- Mac Telnet, Mac Winbox, usually for when the router does not have an IP Address on its management interface(s)
- TikApp for Android/IOS

I usually use Winbox, this also provides cli access.

Demo

Show Winbox, and perhaps Webfig Usage here

Hap Lite

- Configured to connect to 4g modem via Wi-Fi
- Also running AP
- Connection also via Ethernet (Wan & Lan)
- Show Winbox and Webfig interfaces
- Show traffic in and out of the device
- Couple of simple Queues (Wi-Fi and Lan)
- Backup via Export and Backup button
- Reset to no defaults (need Ethernet after this)
- Login to it using Mac Winbox

Occasionally useful bits

Monitor traffic

- Setup 2 ports on router as a bridge (hardware offload)
- Set the switch to SPAN monitor one of these ports
- Plug computer into SPAN destination port
- Plug in DUT via the Monitored ports
- Watch the traffic flowing (Wireshark)

Monitor traffic 2

- There is a packet sniffing facility which allows the router itself to capture packets.
- Which can be stored on the router and downloaded to the computer remotely.

Use AP as client device, or repeater

- The AP's can be configured to provide one or more SSID's, as well as being a Client Device.
- It can connect to another AP as a client, and then repeat it either via its wireless or wired interface.

Traffic Limiting

- Can specify that a specific IP address gets throttled
- There is also a Kid Control facility
- QOS can be implemented (often by hand)

Graphing

- Can graph Router Resources, Interface Statistics and simple Queue Statistics

Support

- Training is available, they have a certification scheme
- They have Mikrotik User Meetings (MUM) around the world (Not at present)
- Forums
 - <https://forum.mikrotik.com/>
- Documentation (google is your friend here)
 - <https://wiki.mikrotik.com/>
 - <https://help.mikrotik.com/docs/>

Purchasing

- Duxtel are the Australian region distributors, and a training provider, and are usually quite helpful
- There are other suppliers (Kogan, wisp.net.au, ebay, etc)

Issues (mine)

- No DSL Support
 - Requires 3rd party bridged modem (Draytek is common, there are also SFP's that are a DSL modem)
- No Voip
- These 2 make it often a less than ideal replacement for the ISP supplied all in one modem/router.
 - FTTN, and FTTB connections
- Scripting language can be painful, 1 line working at a time usually