Mikrotik and MDU Bandwidth Control

Scenerios

- Apartments
- Executive Suites
- Multitenant Offices

Traditional Method

- Get an Internet connection
- Put in a simple router with a switch
- Plug everyone in!

- They think that being an ISP is easy

Bad Examples

Bad Examples

Traditional Problems

- No security
  - Viruses and worms run rampant
  - One apartment owner was sued by a student's parents because of this
- No bandwidth control
  - One or two users consume all the bandwidth
  - Inconsistent performance for users
- Lots of support calls
  - Owners of properties quickly learn the costs of being their own ISP

Managed Internet Access

- Support is handled by us, not the property owner/mgmt
- Unit/Tenant Isolation
  - Added security
- Strict bandwidth control
- Ability to shutdown individual units/tenants for non-payment
- No hardware to take care
- Sell by $/unit or $/tenant (this maintains the oversubscription)

Issues we deal with

- Delivering bandwidth to end users
  - Wired
  - Wireless
  - BPL
- Delivery of protected or public IP’s
- Control of bandwidth hogs
- Detecting SPAM bots

Wired Ethernet

- Use of managed switches
  - We standardize on Dell series
- Break units or tenants into separate VLAN’s
- We sell “cable-tester” RB112 with it
  - Use it to allow on-site personnel to test cabling – half-split problems between you and customer’s wiring

Wireless (WiFi)

- Being asked for specifically
- Many of the hotel chains are requiring it
- Can be cheaper to install
- Buyer doesn’t like to pay for proper RF engineering study

Wireless (WiFi) Cont.

- Not our favorite
  - Increased support costs
  - Apartments have proven very noisy
  - Can’t offer VoIP over it
    - At least not with a clear conscience
  - Conditions change – it worked yesterday
  - Did I mention it increases our support costs
  - Extenders/repeaters are expensive
    - Ruckus works well – highly recommended

Wireless Mesh

- Dual radio (SR2 & SR5) on RB532 boards
- Heavy duty outdoor enclosures
- We really like the Comet 2.4G Omni Antennas
- 5GHz mesh backhaul with 2.4GHz client access
- WDS meshing with RSTP bridges throughout
- Setting up Virtual-AP’s can be a challenge due to problem with VLAN’s on mesh bridge

Wireless Mesh Cont.

- We will be trying out the extension of the mesh using 2.4 only
- Build these with RB112 and R52 radios
- Trying to get the mesh unit costs down

BPL Distribution

- Powerline Distribution for use in a single complex
- Useful when:
  - Units not wired for Cat-5 yet
  - Not all units will be active at the same time
  - Need quick installation times
  - Temporary installations

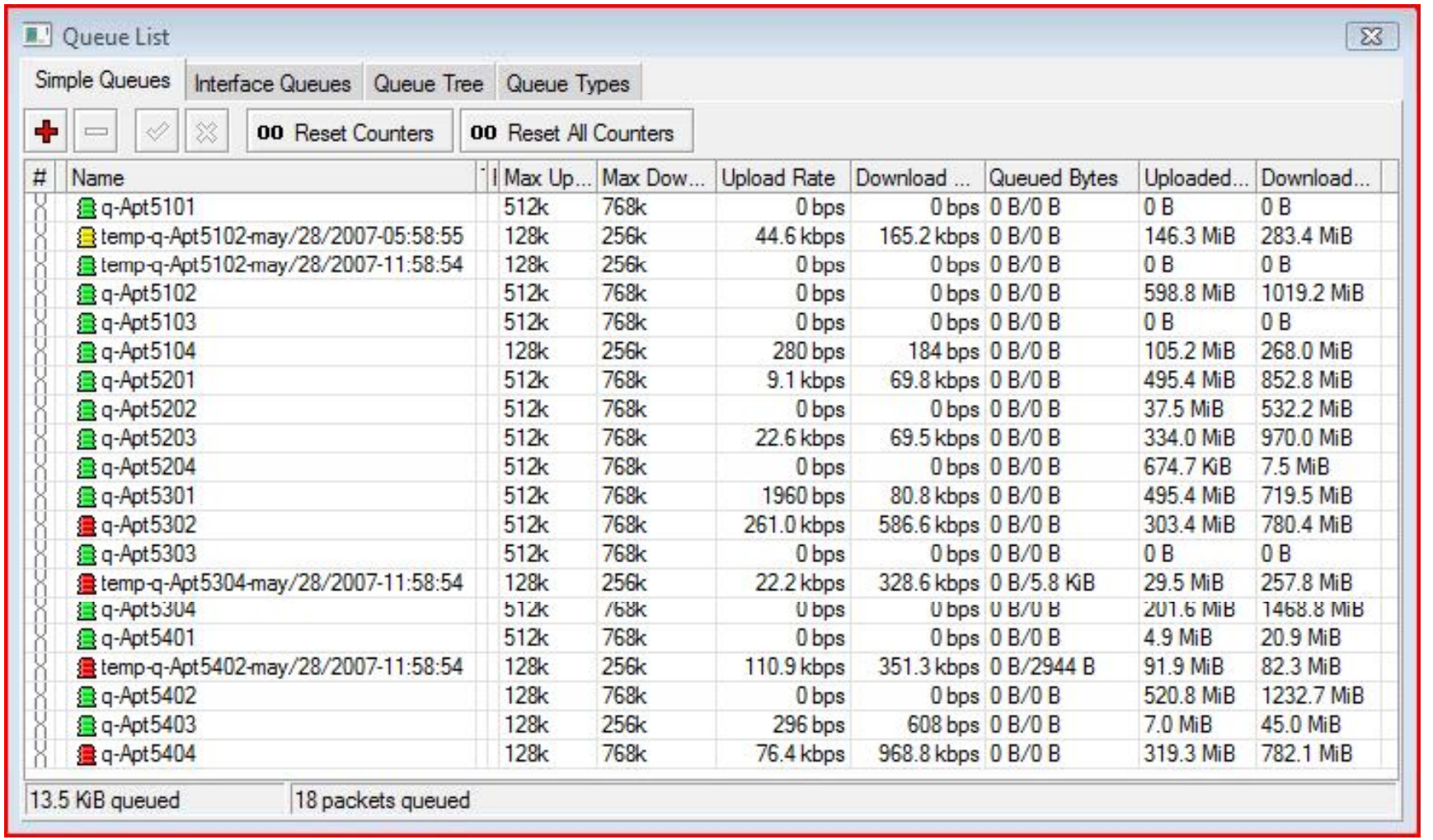
Router Hardware

- RB532
  - Up to 20 units and 10Mbps
- 1U Intel Server
  - Up to 200 units and 100Mbps
  - Not too much needed in hardware:
    - 2.8GHz P4 or better
    - Dual 10/100 Ethernet ports
    - 256MB RAM
    - 256MB IDE Flash Drive
    - Optional redundant power supply

Bandwidth Hogs

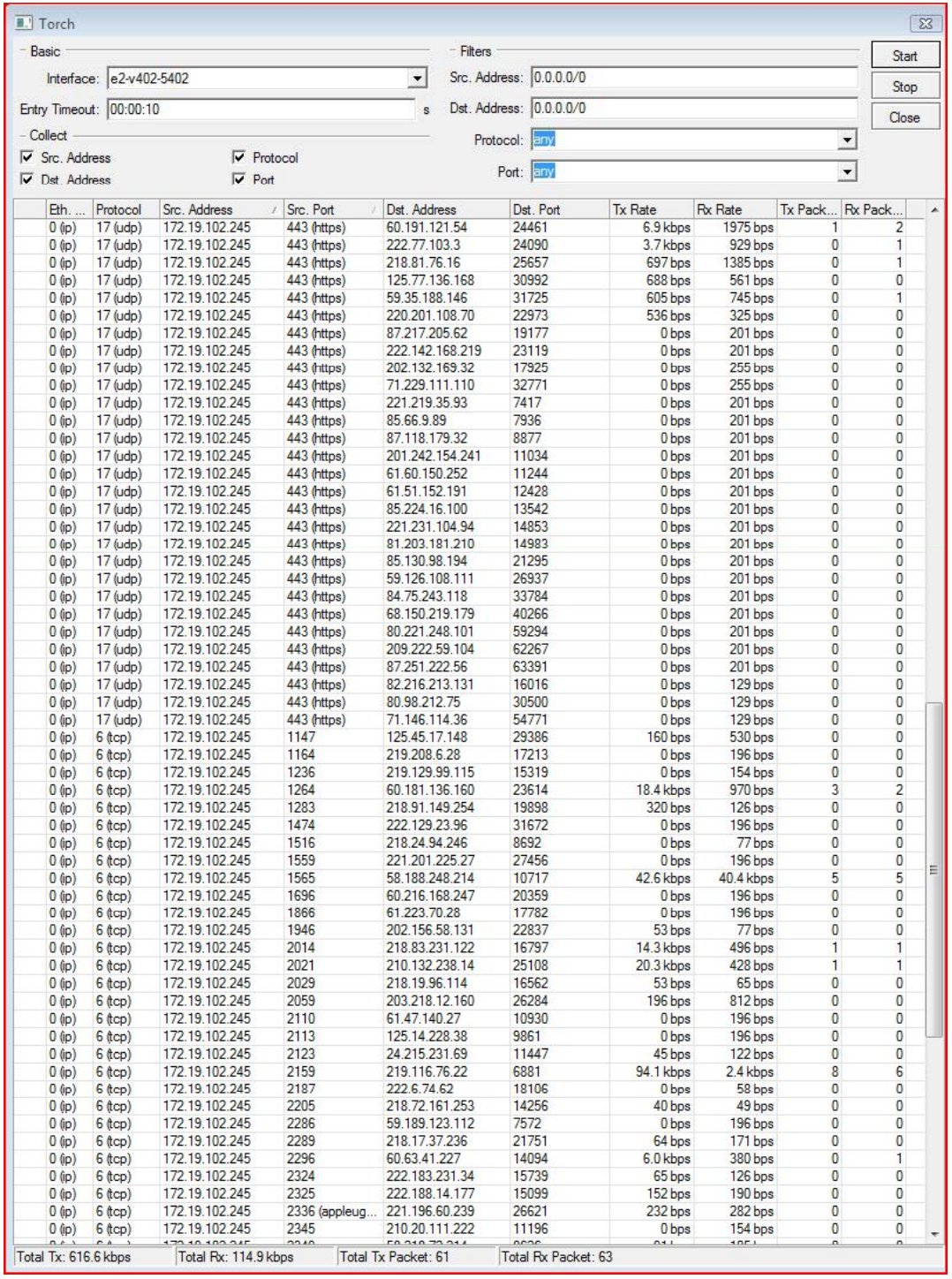
- Use of simple queues
- Review of bytes transferred every X hours with automatic penalty
  - This is done with a script that scans the queue stats and inserts temporary queues to put offenders into “bandwidth jail”
- For the worst, we institute hotspots to force a human presence

Temporary Queues

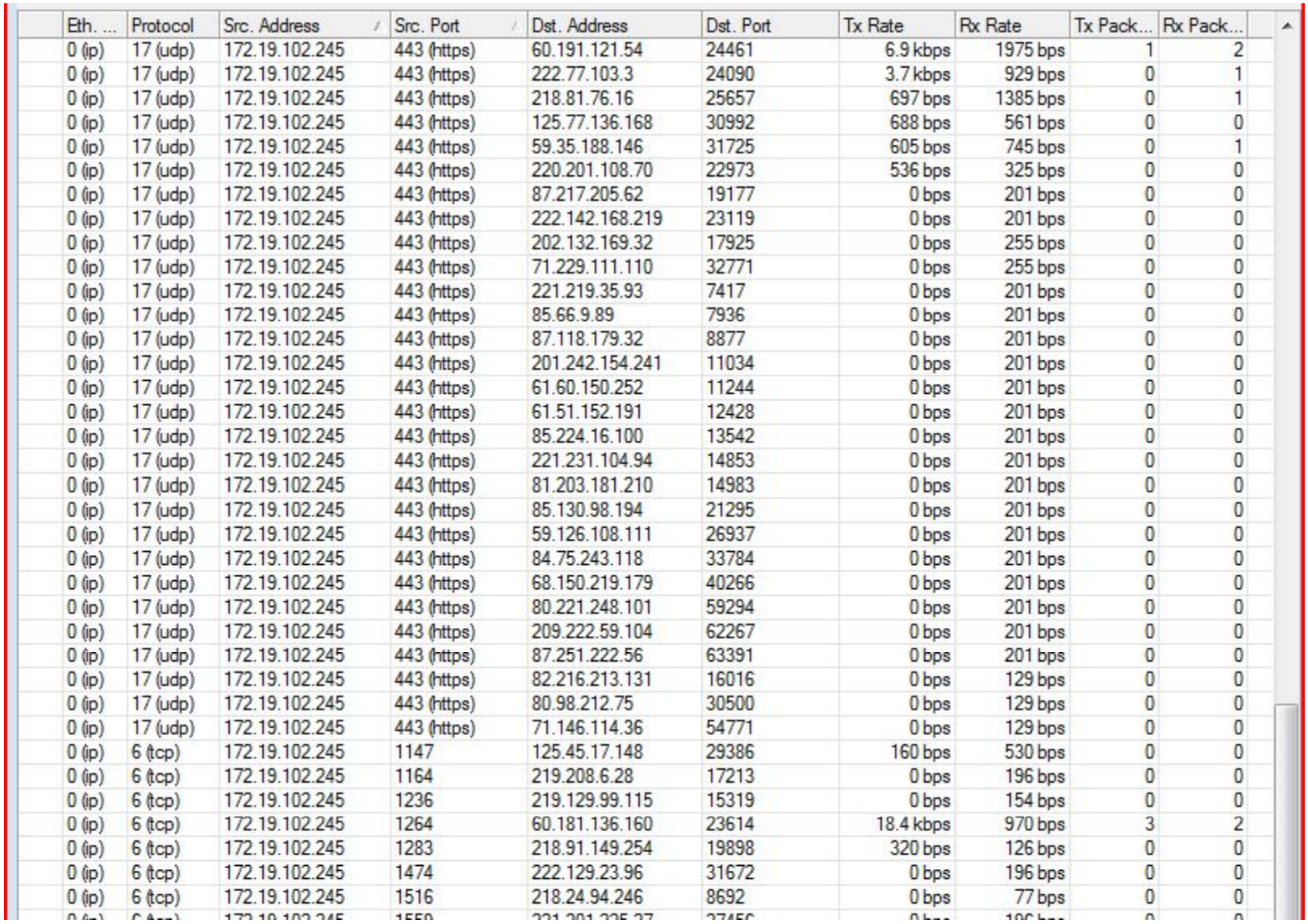


#	Name	Max Up...	Max Dow...	Upload Rate	Download ...	Queued Bytes	Uploaded...	Download...
	q-Apt5101	512k	768k	0 bps	0 bps	0 B/0 B	0 B	0 B
	temp-q-Apt5102-may/28/2007-05:58:55	128k	256k	44.6 kbps	165.2 kbps	0 B/0 B	146.3 MiB	283.4 MiB
	temp-q-Apt5102-may/28/2007-11:58:54	128k	256k	0 bps	0 bps	0 B/0 B	0 B	0 B
	q-Apt5102	512k	768k	0 bps	0 bps	0 B/0 B	598.8 MiB	1019.2 MiB
	q-Apt5103	512k	768k	0 bps	0 bps	0 B/0 B	0 B	0 B
	q-Apt5104	128k	256k	280 bps	184 bps	0 B/0 B	105.2 MiB	268.0 MiB
	q-Apt5201	512k	768k	9.1 kbps	69.8 kbps	0 B/0 B	495.4 MiB	852.8 MiB
	q-Apt5202	512k	768k	0 bps	0 bps	0 B/0 B	37.5 MiB	532.2 MiB
	q-Apt5203	512k	768k	22.6 kbps	69.5 kbps	0 B/0 B	334.0 MiB	970.0 MiB
	q-Apt5204	512k	768k	0 bps	0 bps	0 B/0 B	674.7 KiB	7.5 MiB
	q-Apt5301	512k	768k	1960 bps	80.8 kbps	0 B/0 B	495.4 MiB	719.5 MiB
	q-Apt5302	512k	768k	261.0 kbps	586.6 kbps	0 B/0 B	303.4 MiB	780.4 MiB
	q-Apt5303	512k	768k	0 bps	0 bps	0 B/0 B	0 B	0 B
	temp-q-Apt5304-may/28/2007-11:58:54	128k	256k	22.2 kbps	328.6 kbps	0 B/5.8 KiB	29.5 MiB	257.8 MiB
	q-Apt5304	512k	768k	0 bps	0 bps	0 B/0 B	201.6 MiB	1468.8 MiB
	q-Apt5401	512k	768k	0 bps	0 bps	0 B/0 B	4.9 MiB	20.9 MiB
	temp-q-Apt5402-may/28/2007-11:58:54	128k	256k	110.9 kbps	351.3 kbps	0 B/2944 B	91.9 MiB	82.3 MiB
	q-Apt5402	128k	768k	0 bps	0 bps	0 B/0 B	520.8 MiB	1232.7 MiB
	q-Apt5403	128k	256k	296 bps	608 bps	0 B/0 B	7.0 MiB	45.0 MiB
	q-Apt5404	128k	768k	76.4 kbps	968.8 kbps	0 B/0 B	319.3 MiB	782.1 MiB

UDP Blast (lots of connections)



UDP Zoomed



Eth. ...	Protocol	Src. Address	Src. Port	Dst. Address	Dst. Port	Tx Rate	Rx Rate	Tx Pack...	Rx Pack...
0 (ip)	17 (udp)	172.19.102.245	443 (https)	60.191.121.54	24461	6.9 kbps	1975 bps	1	2
0 (ip)	17 (udp)	172.19.102.245	443 (https)	222.77.103.3	24090	3.7 kbps	929 bps	0	1
0 (ip)	17 (udp)	172.19.102.245	443 (https)	218.81.76.16	25657	697 bps	1385 bps	0	1
0 (ip)	17 (udp)	172.19.102.245	443 (https)	125.77.136.168	30992	688 bps	561 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	59.35.188.146	31725	605 bps	745 bps	0	1
0 (ip)	17 (udp)	172.19.102.245	443 (https)	220.201.108.70	22973	536 bps	325 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	87.217.205.62	19177	0 bps	201 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	222.142.168.219	23119	0 bps	201 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	202.132.169.32	17925	0 bps	255 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	71.229.111.110	32771	0 bps	255 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	221.219.35.93	7417	0 bps	201 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	85.66.9.89	7936	0 bps	201 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	87.118.179.32	8877	0 bps	201 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	201.242.154.241	11034	0 bps	201 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	61.60.150.252	11244	0 bps	201 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	61.51.152.191	12428	0 bps	201 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	85.224.16.100	13542	0 bps	201 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	221.231.104.94	14853	0 bps	201 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	81.203.181.210	14983	0 bps	201 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	85.130.98.194	21295	0 bps	201 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	59.126.108.111	26937	0 bps	201 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	84.75.243.118	33784	0 bps	201 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	68.150.219.179	40266	0 bps	201 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	80.221.248.101	59294	0 bps	201 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	209.222.59.104	62267	0 bps	201 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	87.251.222.56	63391	0 bps	201 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	82.216.213.131	16016	0 bps	129 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	80.98.212.75	30500	0 bps	129 bps	0	0
0 (ip)	17 (udp)	172.19.102.245	443 (https)	71.146.114.36	54771	0 bps	129 bps	0	0
0 (ip)	6 (tcp)	172.19.102.245	1147	125.45.17.148	29386	160 bps	530 bps	0	0
0 (ip)	6 (tcp)	172.19.102.245	1164	219.208.6.28	17213	0 bps	196 bps	0	0
0 (ip)	6 (tcp)	172.19.102.245	1236	219.129.99.115	15319	0 bps	154 bps	0	0
0 (ip)	6 (tcp)	172.19.102.245	1264	60.181.136.160	23614	18.4 kbps	970 bps	3	2
0 (ip)	6 (tcp)	172.19.102.245	1283	218.91.149.254	19898	320 bps	126 bps	0	0
0 (ip)	6 (tcp)	172.19.102.245	1474	222.129.23.96	31672	0 bps	196 bps	0	0
0 (ip)	6 (tcp)	172.19.102.245	1516	218.24.94.246	8692	0 bps	77 bps	0	0

SMTP Bot Detection

- Firewall rule triggers on too many SMTP connections
- Adds tenant/unit to block list
- E-mail support personnel with alert
- Useful to keep the public IP on the router from getting blacklisted

IP Schemes

- Protected IP
  - Class C for each unit/tenant
  - Utilize single Public IP for protected IP tenants
- Public IP
  - Use OSPF to presence a /30 or bigger to unit/tenant
  - Mostly used for business connections
  - We don’t offer public IP’s on Residential plans

Use of HotSpot

- Redirect tenants to web site for complex
- Use Drupal to allow complex to manage their own content

Connectivity Tester

- Built on RB112
- Easy enough for a building maintenance person or building manager to use
- Useful to half-split problems due to your Internet access or due to building wiring
- We wish Mikrotik would add a real LCD package to make feedback better
  - Add some button input controls as well while you're at it
- Makes bandwidth and ping loss testing easy
  - Tests between the building router Mikrotik and the RB112