

A nighttime photograph of the Piazza del Duomo in Milan, Italy. The Galleria Vittorio Emanuele II is on the left, and the Duomo di Milano is on the right. The scene is illuminated by streetlights and building lights, with people walking in the square. The text "MUM EUROPE 2017" is overlaid in white, bold, sans-serif font.

MUM
EUROPE
2017


MIKROTIK TRAFFIC GENERATOR STUDY CASE


17 years experience at IT industry, Mikrotik Certified Consultant and Trainer. MTCNA, MTCRE, MTCTCE, MTCUME, MTCWE, MTCIPv6E, MTCINE, CISA, CISSP, Master ITIL.

- (2016 – Now) CEO @ FiberCLI
- (2015 – Now) CTO WISP
- (2008 – Now) Security Consultant and Analyst
- (2000 – 2007) Networking, Security and ITIL Teacher



JOSE MANUEL ROMAN

 jose.roman@fibercli.com

 +34 652 241 431


 MADRID / PRAGUE


My previous presentations at MUM

- (2016 @ MUM Middle East) - [System integration and analysis](#)
- (2016 @ MUM Spain) - [Integración de MikroTik con cabeceras de fibra óptica](#)
- (2016 @ MUM Europe) - [Securing and testing with MikroTik](#)
- (2015 @ MUM Spain) - [Pruebas de seguridad y configuración con Mikrotik](#)



JOSE MANUEL ROMAN

 JOSE.roman@fibercli.com

 +34 652 241 431

 MADRID / PRAGUE



COMPANY PROFILE



FiberCLI > _

WE ARE PURE FIBER

PROJECT BASED

- Fiber optic installation outdoor and indoor (Hotel and Office Building)
- Wireless installation Rural area and City



business inquiries : hello@fibercli.com



FiberCLI >
WE ARE PURE FIBER

CONSULTANT

- Mikrotik Products
- Licensed Antennas
- Ipv4 Brocker
- Advanced monitoring integrations



business inquiries : hello@fibercli.com

TRAINING

- Official Mikrotik Training Partner with three different languages and modules (English, Indonesia and Spanish)
- Courses on premises of companies in Europe and middle east
- Specialized in IPv6

FiberCLI >
WE ARE PURE FIBER



business inquiries : hello@fibercli.com

AGENDA

- Traffic Generator Introduction
- Special Use Case
- Example

Objective

The goal of this presentation is to explain the operation of the traffic generator

Problem

What to do when I need to test or audit whether a router or a system is working correctly?

Symptoms

We have a complex configuration and we have no idea how to test it.



Solution

Traffic generator



TRAFFIC GENERATOR INTRODUCTION



WHAT IS
TRAFFIC
GENERATOR?





“

Traffic Generator is a tool that allows to evaluate performance of DUT (Device Under Test) or SUT (System Under Test).

”

https://wiki.mikrotik.com/wiki/Manual:Tools/Traffic_Generator

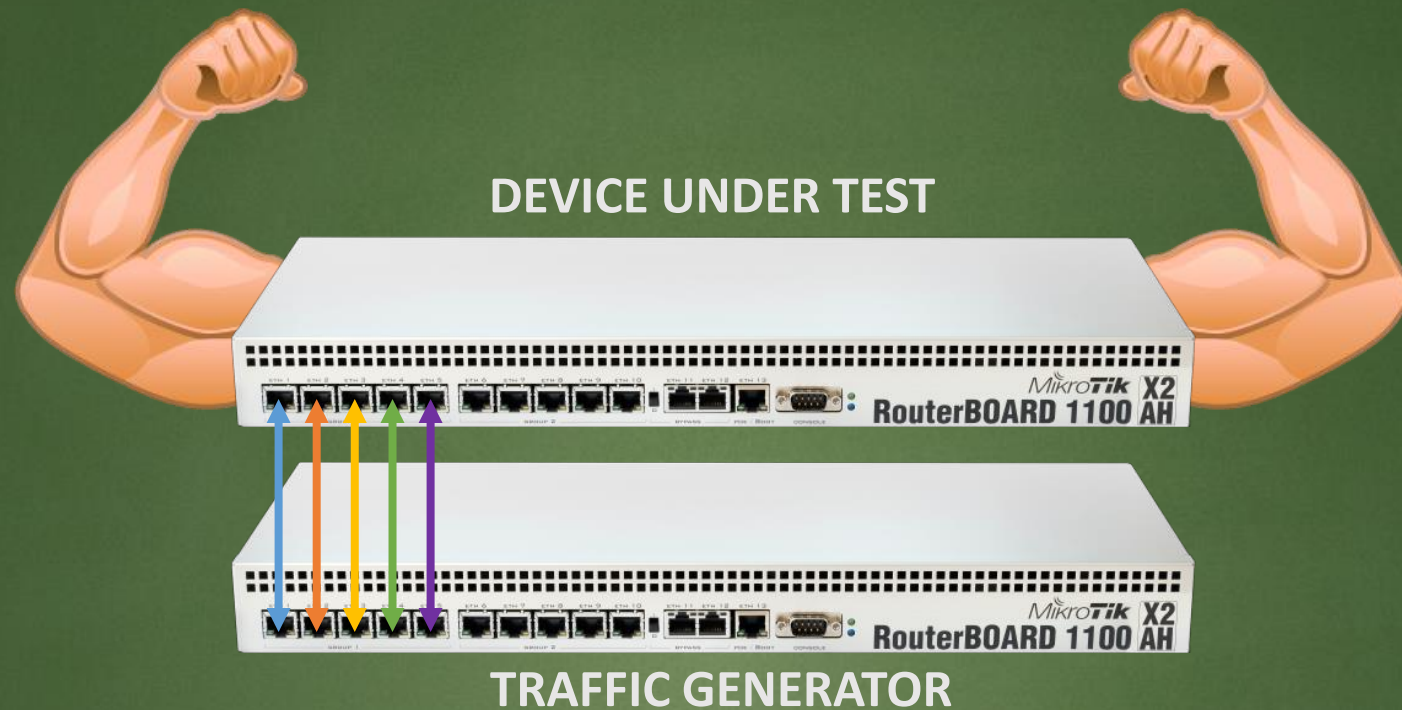


WHAT'S TRAFFIC
GENERATOR CAN
DO?



“Traffic Generator tool can generate and send RAW packets over specific ports. It also collects latency and jitter values, tx/rx rates, counts lost packets and detects Out-of-Order (OOO) packets.

Traffic Generator can be used similar to bandwidth test tool as well as generate packets that will be routed back to packet generator for advanced status collection. ”

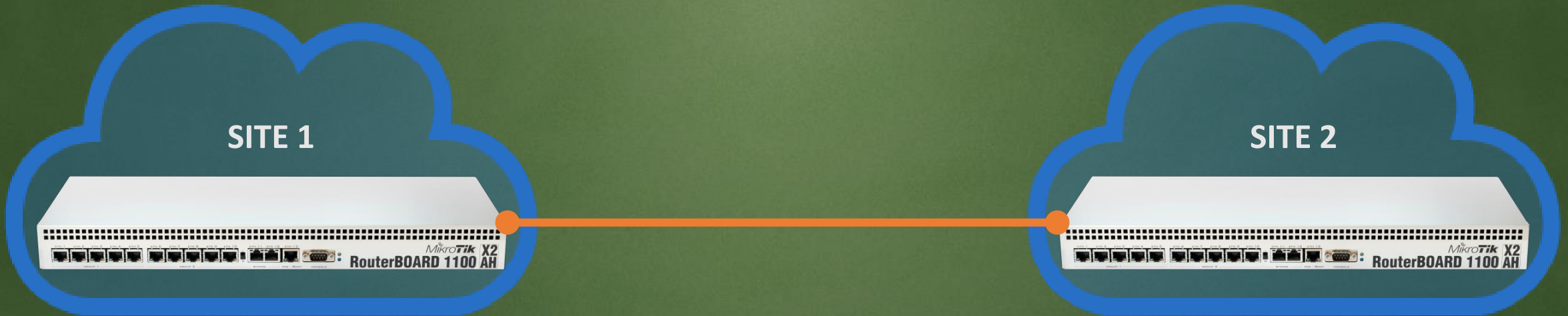


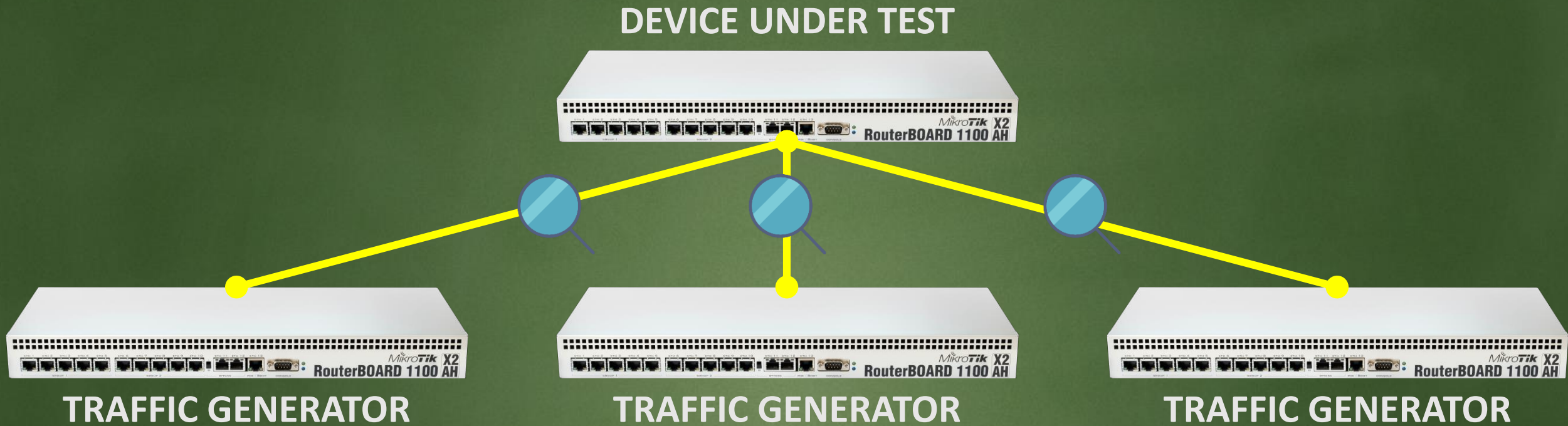
Test performance of device or system before migrate to production infrastructure such as :

- PPS (Packet Per Second)
- CPU
- Throughput / Bandwidth
- Hardware Encryption

Test performance of link (wired or wireless) between sites :

- Latency
- Packet loss
- Jitter
- Bandwidth





Policies (firewall or qos) test performance of device :

- Creating "*fabricated*" packets

EXAMPLE



CASE 1

Simple Traffic Generator



TRAFFIC GENERATOR



DEVICE UNDER TEST



10.1.0.0/24

admin@00:50:00:02:01:09 (TRAFFIC_GENERATOR) - WinBox v6.38.1 on x86 (x86)

Session Settings Dashboard

Safe Mode Session: 00:50:00:02:01:09

**/ip address
add address=10.1.0.1/24 interface=ether1 network=10.1.0.0**

Address List

Address	Network	Interface
10.1.0.1/24	10.1.0.0	ether1

1 item

outerOS WinBox

- Quick Set
- Interfaces
- Bridge
- PPP
- Mesh
- IP
- Routing
- System
- Queues
- Files
- Log
- Radius
- Tools
- New Terminal
- Make Supout.rif
- Manual
- New WinBox

admin@00:50:00:02:02:09 (DUT) - WinBox v6.38.1 on x86 (x86)

Session Settings Dashboard

Safe Mode Session: 00:50:00:02:02:09

**/ip address
add address=10.1.0.2/24 interface=ether1 network=10.1.0.0**

Address List

Address	Network	Interface
10.1.0.2/24	10.1.0.0	ether1

1 item

outerOS WinBox

- Quick Set
- Interfaces
- Bridge
- PPP
- Mesh
- IP
- Routing
- System
- Queues
- Files
- Log
- Radius
- Tools
- New Terminal
- Make Supout.rif
- Manual
- New WinBox

PORT



TEMPLATE



STREAM



admin@00:50:00:02:01:09 (TRAFFIC_GENERATOR) - WinBox v6.38.1 on x86 (x86)

Session Settings Dashboard

Safe Mode Session: 00:50:00:02:01:09

RouterOS WinBox

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

Traffic Generator Settings

Test ID: 0

Latency Distribution Max.: 100 us

Stats Samples To Keep: 100

Latency Distribution Samples: 64

Latency Distribution Measure Interval: 0-131us

OK

Cancel

Apply

Quick Start

Start

Stop

Inject Packets

Stats

Ports

Packet Templates

Raw Packet Templates

Streams

Running: no

**/tool traffic-generator port
add interface=ether1 name=port1**

Traffic Generator Ports

+ - ✓ ✕ 🔍 Find

Name	Interface	First Header
0 items		

Traffic Generator Port <port 1>

Name: port1

Interface: ether1

First Header: mac

OK

Cancel

Apply

Disable

Copy

Remove

enabled

admin@00:50:00:02:01:09 (TRAFFIC_GENERATOR) - WinBox v6.38.1 on x86 (x86)

Session Settings Dashboard

Safe Mode Session: 00:50:00:02:01:09

RouterOS WinBox

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

Traffic Generator Settings

Test ID:

Latency Distribution Max.: us

Stats Samples To Keep:

Latency Distribution Samples:

Latency Distribution Measure Interval:

Running: no

Buttons: OK, Cancel, Apply, Quick Start, Start, Stop, Inject Pcap, Stats, Ports, Packet Templates, Raw Packet Templates, Streams

Traffic Generator Packet Templates

Raw Packet Templates

Find

Name	Header Stack	Data	Data Byte	Port	Interface
0 items					

New Packet Template

General MAC IP

Name:

Header Stack:

Data:

Data Byte:

Port:

Interface:

Assumed Port:

Assumed Interface:

OK
Cancel
Apply
Comment
Copy
Remove

Packet Template <template-1>

General MAC IP UDP

Src.:

Dst.:

Protocol:

Assumed Src.:

Assumed Dst.:

Assumed Protocol:

OK
Cancel
Apply
Comment
Copy
Remove

Packet Template <template-1>

General MAC IP UDP

Src.:

Dst.:

Protocol:

Gateway:

DSCP:

IP ID:

Frag. Offset:

TTL:

Assumed Src.:

Assumed Dst.:

Assumed Protocol:

Assumed DSCP:

Assumed IP ID:

Assumed Frag. Offset:

Assumed TTL:

OK
Cancel
Apply
Comment
Copy
Remove

New Packet Template

General MAC IP UDP

Src. Port:

Dst. Port:

Assumed Src. Port:

Assumed Dst. Port:

OK
Cancel
Apply
Comment
Copy
Remove

```
/tool traffic-generator packet-template  
add name=template-1 port=port1 ip-dst=10.1.0.2 ip-src=10.1.0.1
```


`/tool traffic-generator stream`
`add name=stream-1 packet-size=1500 tx-template=template-1`

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

Traffic Generator Settings

Test ID:

Latency Distribution Max.: us

Stats Samples To Keep:

Latency Distribution Samples:

Latency Distribution Measure Interval:

OK

Cancel

Apply

Quick Start

Start

Stop

Inject Pcap

Stats

Ports

Packet Templates

Raw Packet Templates

Streams

Traffic Generator Streams

+ - ✓ ✕ ⏏

Name	Default Port
0 items	

New Packet Stream

Name:

Default Port:

Port:

ID:

Packet Size:

MBPS:

PPS:

Tx Template:

OK

Cancel

Apply

Disable

Copy

Remove

enabled

admin@00:50:00:02:01:09 (TRAFFIC_GENERATOR) - WinBox v6.38.1 on x86 (x86)

Session Settings Dashboard

Safe Mode Session: 00:50:00:02:01:09

Traffic Generator Settings

Test ID: 0

Latency Distribution Max.: 100 us

Stats Samples To Keep: 100

Latency Distribution Samples: 64

Latency Distribution Measure Interval: 0-131us

Buttons: OK, Cancel, Apply, **Quick Start**, Start, Stop, Inject Pcap, Stats, Ports, Packet Templates, Raw Packet Templates, Streams

Running: no

Quick Start

Test ID: 0

Stream: [dropdown]

Port: [dropdown]

Interface: [dropdown]

Packet Size: [dropdown]

PPS: [dropdown]

MBPS: 10

Tx Template: template-1

Buttons: Start, Stop, Close, New Window

Seq	ID	Tx Packets	Tx Rate	Rx Packets	Rx Rate	Lost Packets	Lost Rate
28	0	826	10.0 Mbps	0	0 bps	826	10.0 Mbps
29	0	825	9.9 Mbps	0	0 bps	825	9.9 Mbps
30	0	826	10.0 Mbps	0	0 bps	826	10.0 Mbps
31	0	826	10.0 Mbps	0	0 bps	826	10.0 Mbps
32	0	825	9.9 Mbps	0	0 bps	825	9.9 Mbps
33	0	826	10.0 Mbps	0	0 bps	826	10.0 Mbps
34	0	824	9.9 Mbps	0	0 bps	824	9.9 Mbps
35	0	826	10.0 Mbps	0	0 bps	826	10.0 Mbps
36	0	825	9.9 Mbps	0	0 bps	825	9.9 Mbps
37	0	826	10.0 Mbps	0	0 bps	826	10.0 Mbps
38	0	825	9.9 Mbps	0	0 bps	825	9.9 Mbps
39	0	826	10.0 Mbps	0	0 bps	826	10.0 Mbps
40	0	826	10.0 Mbps	0	0 bps	826	10.0 Mbps
41	0	825	9.9 Mbps	0	0 bps	825	9.9 Mbps

20 items

admin@00:50:00:02:02:09 (DUT) - WinBox v6.38.1 on x86 (x86)

Session Settings Dashboard

Safe Mode Session: 00:50:00:02:02:09 Memory: 990.4 MiB CPU: 0%

Interface List

Interface	Name	Type	Actual MTU	L	Tx	Rx
R	ether1	Ethernet	1500		467.3 kbps	9.9 Mbps
R	ether2	Ethernet	1500		0 bps	0 bps
R	ether3	Ethernet	1500		0 bps	0 bps
R	ether4	Ethernet	1500		0 bps	0 bps
R	ether5	Ethernet	1500		0 bps	0 bps
R	ether6	Ethernet	1500		0 bps	0 bps
R	ether7	Ethernet	1500		0 bps	0 bps
R	ether8	Ethernet	1500		0 bps	0 bps
R	ether9	Ethernet	1500		0 bps	0 bps
R	ether10-Management	Ethernet	1500		0 bps	4.5 kbps

10 items (1 selected)

WHY TX/RX TRAFFIC'S NOT EQUAL?

Packet Template <template-1>

General MAC IP UDP

Src.: 10.1.0.1

Dst.: 10.1.0.2

Protocol:

Gateway:

DSCP:

IP ID:

Frag. Offset:

TTL:

Assumed Src.: 10.1.0.1

Assumed Dst.:

Assumed Protocol: 17 (udp)

Assumed DSCP: 0

Assumed IP ID: 0

Assumed Frag. Offset: 0

Assumed TTL: 64

OK

Cancel

Apply

Comment

Copy

Remove

Because we only send (tx) traffic to the destination address as above, DUT/SUT only receive traffic without sending the packet back

Packet Template <template-1>

General MAC IP UDP

Src.:

Dst.: 10.1.0.1

Protocol:

Gateway: 10.1.0.2

DSCP:

IP ID:

Frag. Offset:

TTL:

Assumed Src.: 10.1.0.1

Assumed Dst.:

Assumed Protocol: 17 (udp)

Assumed DSCP: 0

Assumed IP ID: 0

Assumed Frag. Offset: 0

Assumed TTL: 64

OK
Cancel
Apply
Comment
Copy
Remove

Ip address ether1 on Traffic-Generator device

Ip address ether1 on DUT/SUT device

We change the template in the "IP" section like this.

Quick Start

Test ID: 0

Start

Stream:

Stop

Port:

Close

Interface:

New Window

Packet Size:

PPS:

MBPS: 10

Tx Template: template-1

Seq	ID	Tx Packets	Tx Rate	Rx Packets	Rx Rate	Lost Packets	Lost Rate	Lat. Min.	Lat. Avg.	Lat. Max.	Jitter
5	0	827	10.0 Mbps	827	10.0 Mbps	0	0 bps	217us	805us	5.44ms	5.23ms
6	0	825	9.9 Mbps	825	9.9 Mbps	0	0 bps	263us	725us	5.16ms	4.9ms
7	0	825	9.9 Mbps	825	9.9 Mbps	0	0 bps	270us	751us	6.07ms	5.8ms
8	0	827	10.0 Mbps	827	10.0 Mbps	0	0 bps	301us	837us	6.29ms	5.99ms
9	0	825	9.9 Mbps	825	9.9 Mbps	0	0 bps	304us	827us	5.3ms	5ms
10	0	826	10.0 Mbps	826	10.0 Mbps	0	0 bps	227us	817us	5.03ms	4.8ms
11	0	825	9.9 Mbps	825	9.9 Mbps	0	0 bps	219us	1.17ms	11.3ms	11ms
12	0	826	10.0 Mbps	826	10.0 Mbps	0	0 bps	235us	912us	8.89ms	8.66ms
13	0	826	10.0 Mbps	826	10.0 Mbps	0	0 bps	243us	1.04ms	13.2ms	13ms
14	0	826	10.0 Mbps	826	10.0 Mbps	0	0 bps	188us	862us	5.6ms	5.41ms
15	0	825	9.9 Mbps	825	9.9 Mbps	0	0 bps	213us	860us	16.7ms	16.5ms
16	0	825	9.9 Mbps	825	9.9 Mbps	0	0 bps	246us	582us	3.78ms	3.53ms
17	0	826	10.0 Mbps	826	10.0 Mbps	0	0 bps	248us	890us	5.8ms	5.55ms
18	0	826	10.0 Mbps	826	10.0 Mbps	0	0 bps	192us	737us	6.03ms	5.84ms
19	0	826	10.0 Mbps	826	10.0 Mbps	0	0 bps	207us	1.09ms	10.5ms	10.3ms

20 items

admin@00:50:00:02:02:09 (DUT) - WinBox v6.38.1 on x86 (x86)

Session Settings Dashboard

Safe Mode Session: 00:50:00:02:02:09 Memory: 990.4 MiB CPU: 2%

Interface List

Interface	Name	Type	Actual MTU	L. Tx	Rx
R	ether1	Ethernet	1500	9.9 Mbps	9.9 Mbps
R	ether2	Ethernet	1500	0 bps	0 bps
R	ether3	Ethernet	1500	0 bps	0 bps
R	ether4	Ethernet	1500	0 bps	0 bps
R	ether5	Ethernet	1500	0 bps	0 bps
R	ether6	Ethernet	1500	0 bps	0 bps
R	ether7	Ethernet	1500	0 bps	0 bps
R	ether8	Ethernet	1500	0 bps	0 bps
R	ether9	Ethernet	1500	0 bps	0 bps
R	ether10-Management	Ethernet	1500	61.6 kbps	7.2 kbps

10 items (1 selected)

Interface <ether1>

General Ethernet Loop Protect Status Traffic

Tx/Rx Rate: 9.9 Mbps / 9.9 Mbps

Tx/Rx Packet Rate: 819 p/s / 819 p/s

FP Tx/Rx Rate: 0 bps / 0 bps

FP Tx/Rx Packet Rate: 0 p/s / 0 p/s

Tx/Rx Bytes: 92.8 MiB / 225.7 MiB

Tx/Rx Packets: 73 521 / 158 344

Tx/Rx Drops: 0 / 0

Tx/Rx Errors: 0 / 0

Tx: 9.9 Mbps

Rx: 9.9 Mbps

Tx Packet: 819 p/s

Rx Packet: 819 p/s

enabled running slave link ok

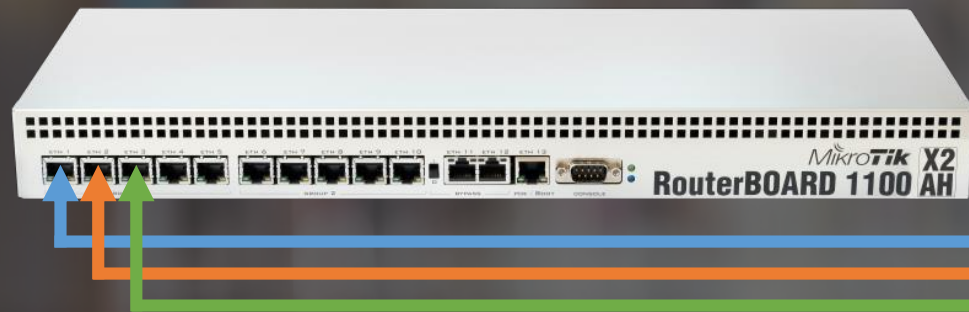
OK Cancel Apply Disable Comment Torch Cable Test Blink Reset MAC Address

CASE 2

Multi-Port Traffic Generator



TRAFFIC GENERATOR



DEVICE UNDER TEST



admin@00:50:00:02:01:09 (TRAFFIC_GENERATOR) - WinBox v6.38.1 on x86 (x86)

Session Settings Dashboard

Safe Mode Session: 00:50:00:02:01:09

Quick Set
Interfaces
Bridge
PPP
Mesh
IP
IPv6
Routing
System
Queues
Files
Log
Radius
Tools
New Terminal
Make Supout.rif

Address List

Address	Network	Interface
10.1.0.1/24	10.1.0.0	ether1
10.2.0.1/24	10.2.0.0	ether2
10.3.0.1/24	10.3.0.0	ether3

IPv6 Address List

Global is yes

Address	From Pool	Interface	Advertise
2001:10:1::1/64		ether1	yes
2001:10:2::1/64		ether2	yes
2001:10:3::1/64		ether3	yes

3 items out of 13

/ip address
 add address=10.1.0.1/24 interface=ether1 network=10.1.0.0
 add address=10.2.0.1/24 interface=ether2 network=10.2.0.0
 add address=10.3.0.1/24 interface=ether3 network=10.3.0.0

/ipv6 address
 add address=2001:10:1:0::1 interface=ether1
 add address=2001:10:2:0::1 interface=ether2
 add address=2001:10:3:0::1 interface=ether3

admin@00:50:00:02:02:09 (DUT) - WinBox v6.38.1 on x86 (x86)

Session Settings Dashboard

Safe Mode Session: 00:50:00:02:02:09 Memory: 988.8 MiB CPU: 0%

Quick Set
Interfaces
Bridge
PPP
Mesh

Address List

Address	Network	Interface
10.1.0.2/24	10.1.0.0	ether1
10.2.0.2/24	10.2.0.0	ether2
10.3.0.2/24	10.3.0.0	ether3

IPv6 Address List

Global is yes

Address	From Pool	Interface	Advertise
2001:10:1::2/64		ether1	yes
2001:10:2::2/64		ether2	yes
2001:10:3::2/64		ether3	yes

3 items out of 13

/ip address
 add address=10.1.0.2/24 interface=ether1 network=10.1.0.0
 add address=10.2.0.2/24 interface=ether2 network=10.2.0.0
 add address=10.3.0.2/24 interface=ether3 network=10.3.0.0

/ipv6 address
 add address=2001:10:1:0::2 interface=ether1
 add address=2001:10:2:0::2 interface=ether2
 add address=2001:10:3:0::2 interface=ether3

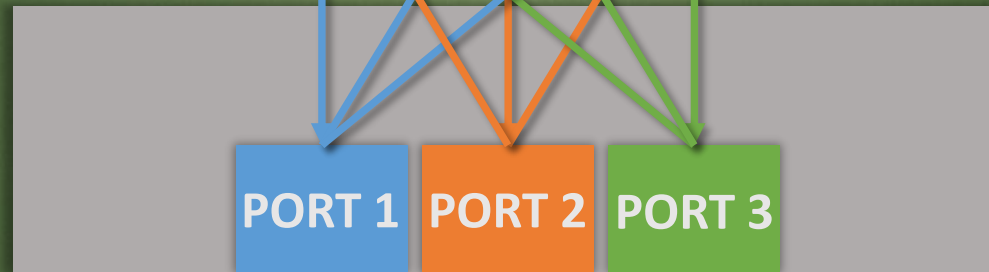
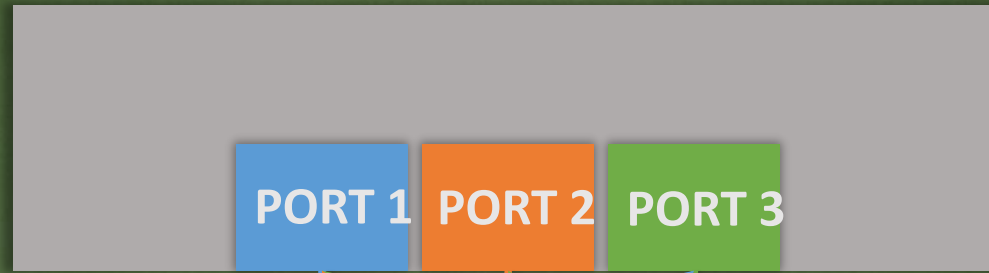
TEMPLATES



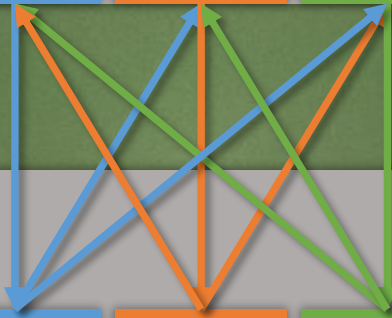
START

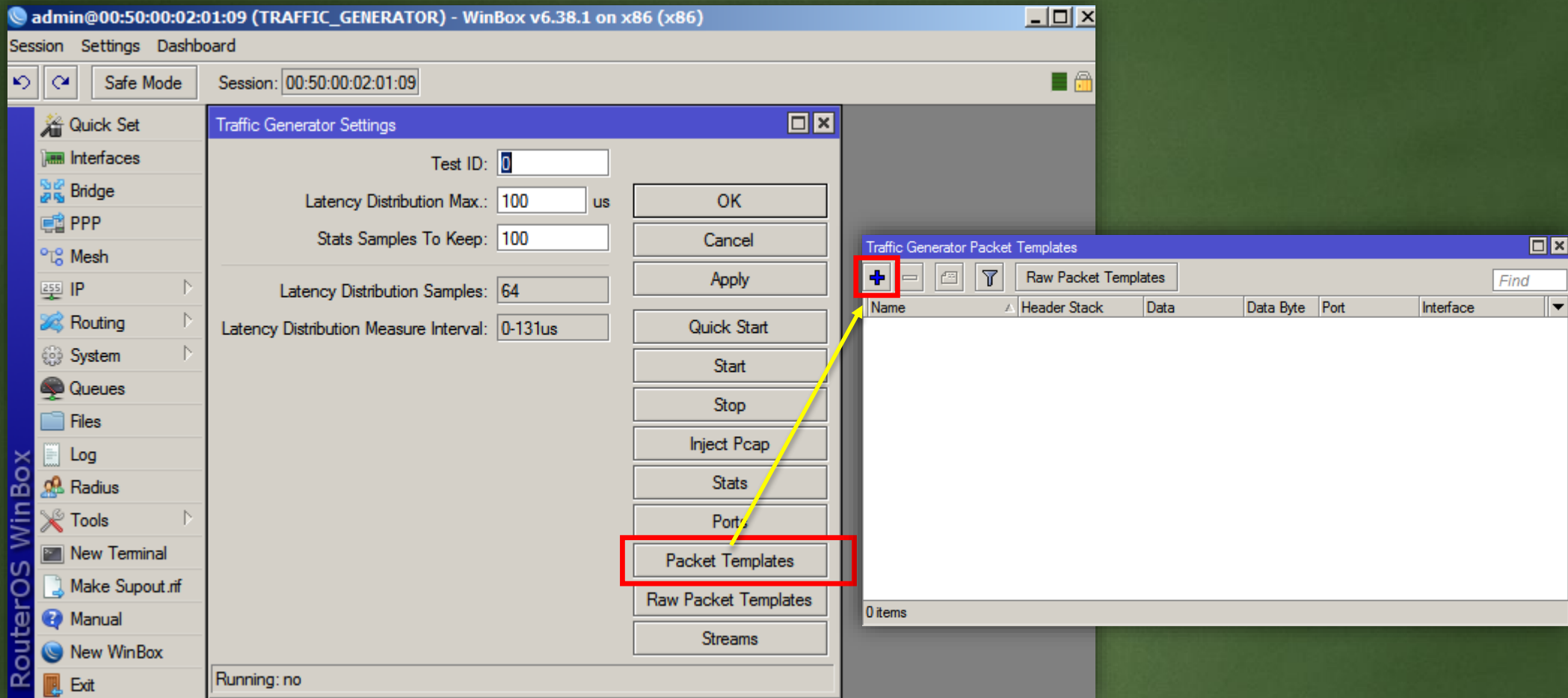


TRAFFIC GENERATOR



DEVICE UNDER TEST





```
/tool traffic-generator packet-template
```

```
add header-stack=mac,ip,ipv6,udp ip-dst=10.2.0.1 ip-gateway=10.1.0.2 ipv6-dst=2001:10:2::1/128 ipv6-gateway=2001:10:1::2 name=port1-to-port2  
add header-stack=mac,ip,ipv6,tcp ip-dst=10.3.0.1 ip-gateway=10.1.0.2 ipv6-dst=2001:10:3::1/128 ipv6-gateway=2001:10:1::2 name=port1-to-port3  
add header-stack=mac,ip,ipv6,raw ip-dst=10.1.0.1 ip-gateway=10.2.0.2 ipv6-dst=2001:10:1::1/128 ipv6-gateway=2001:10:2::2 name=port2-to-port1  
add header-stack=mac,ipv6,ip,udp ip-dst=10.3.0.1 ip-gateway=10.2.0.2 ipv6-dst=2001:10:3::1/128 ipv6-gateway=2001:10:2::2 name=port2-to-port3  
add header-stack=mac,ipv6,ip,tcp ip-dst=10.1.0.1 ip-gateway=10.3.0.2 ipv6-dst=2001:10:1::1/128 ipv6-gateway=2001:10:3::2 name=port3-to-port1  
add header-stack=mac,ipv6,ip,raw ip-dst=10.2.0.1 ip-gateway=10.3.0.2 ipv6-dst=2001:10:2::1/128 ipv6-gateway=2001:10:3::2 name=port3-to-port2
```

Traffic Generator Packet Templates

Raw Packet Templates

Name	Header Stack	Data	Data Byte	Port	Interface
port1-to-port2	mac, ip, ipv6, udp	uninitialized			
port1-to-port3	mac, ip, ipv6, tcp	uninitialized			
port2-to-port1	mac, ip, ipv6, raw	uninitialized			
port2-to-port3	mac, ipv6, ip, udp	uninitialized			
port3-to-port1	mac, ipv6, ip, tcp	uninitialized			
port3-to-port2	mac, ipv6, ip, raw	uninitialized			

6 items (6 selected)

admin@00:50:00:02:01:09 (TRAFFIC_GENERATOR) - WinBox v6.38.1 on x86 (x86)

Session Settings Dashboard

Safe Mode Session: 00:50:00:02:01:09

Traffic Generator Settings

Test ID: 0

Latency Distribution Max.: 100 us

Stats Samples To Keep: 100

Latency Distribution Samples: 64

Latency Distribution Measure Interval: 0-131us

Buttons: OK, Cancel, Apply, **Quick Start**, Start, Stop, Inject Pcap, Stats, Ports, Packet Templates, Raw Packet Templates, Streams

Running: no

Quick Start

Test ID: 0

Stream: [dropdown]

Port: [dropdown]

Interface: [dropdown]

Packet Size: [dropdown]

PPS: [dropdown]

MBPS: 20

Tx Template: port1-to-port2, port1-to-port3, port2-to-port1, port2-to-port3, port3-to-port1, port3-to-port2

Buttons: Start, Stop, Close, New Window

Seq	ID	Tx Packets	Tx Rate	Rx Packets	Rx Rate	Lost Packets	Lost Rate	Lat. Min.	Lat. A...	Lat. M...	Jitter
1	1	1 643	19.9 Mbps	1 643	19.9 Mbps	0	0 bps	253us	1.65ms	18.5ms	18.3ms
1	2	1 643	19.9 Mbps	1 643	19.9 Mbps	0	0 bps	246us	1.65ms	18.6ms	18.3ms
1	3	1 643	19.9 Mbps	1 643	19.9 Mbps	0	0 bps	214us	1.85ms	27.4ms	27.2ms
1	4	1 643	19.9 Mbps	1 643	19.9 Mbps	0	0 bps	308us	1.91ms	28.2ms	27.9ms
1	5	1 643	19.9 Mbps	1 643	19.9 Mbps	0	0 bps	281us	1.91ms	20ms	19.7ms
1	TOT	9 858	119.4 Mbps	9 858	119.4 Mbps	0	0 bps	214us	1.76ms	28.2ms	28ms
2	0	1 652	20.0 Mbps	1 652	20.0 Mbps	0	0 bps	306us	1.1ms	4.38ms	4.07ms
2	1	1 652	20.0 Mbps	1 652	20.0 Mbps	0	0 bps	258us	1.14ms	4.18ms	3.92ms
2	2	1 652	20.0 Mbps	1 652	20.0 Mbps	0	0 bps	262us	1.14ms	4.24ms	3.98ms
2	3	1 652	20.0 Mbps	1 652	20.0 Mbps	0	0 bps	213us	1.22ms	4.95ms	4.74ms
2	4	1 652	20.0 Mbps	1 652	20.0 Mbps	0	0 bps	283us	1.26ms	4.67ms	4.39ms
2	5	1 652	20.0 Mbps	1 652	20.0 Mbps	0	0 bps	337us	1.28ms	4.53ms	4.19ms
2	TOT	9 912	120.0 Mbps	9 912	120.0 Mbps	0	0 bps	213us	1.19ms	4.95ms	4.74ms
TOT	0	3 295	19.9 Mbps	3 295	19.9 Mbps	0	0 bps	306us	1.34ms	18.2ms	17.9ms
TOT	1	3 295	19.9 Mbps	3 295	19.9 Mbps	0	0 bps	253us	1.4ms	18.5ms	18.2ms

20 items

admin@192.168.111.12 (DUT) - WinBox v6.38.1 on x86 (x86)

Session Settings Dashboard

Safe Mode Session: 192.168.111.12 Memory: 988.5 MiB CPU: 74%

RouterOS WinBox

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

Interface List

Interface Interface List Ethernet EoIP Tunnel IP Tunnel GRE Tunnel VLAN VRRP Bonding LTE

+ - ✓ ✗ [Icons] Find

	Name	Type	Actual MTU	L2 MTU	Tx	Rx
R	ether1	Ethernet	1500		40.0 Mbps	40.0 Mbps
R	ether2	Ethernet	1500		40.0 Mbps	40.0 Mbps
R	ether3	Ethernet	1500		40.0 Mbps	40.0 Mbps
R	ether4	Ethernet	1500		0 bps	0 bps
R	ether5	Ethernet	1500		0 bps	0 bps
R	ether6	Ethernet	1500		0 bps	0 bps
R	ether7	Ethernet	1500		0 bps	0 bps
R	ether8	Ethernet	1500		0 bps	0 bps
R	ether9	Ethernet	1500		0 bps	0 bps
R	ether10-Mana...	Ethernet	1500		74.3 kbps	3.2 kbps

10 items (3 selected)

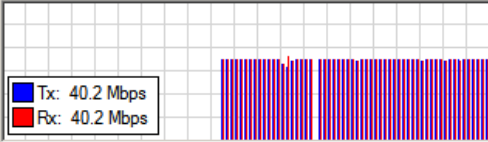
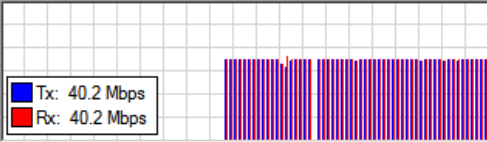
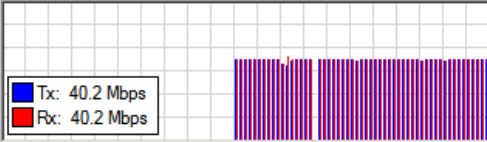
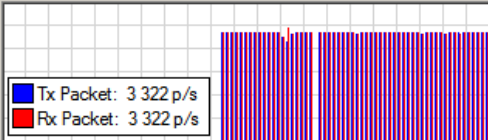
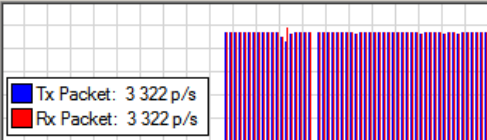
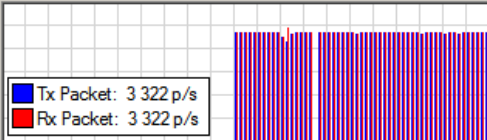
admin@192.168.111.12 (DUT) - WinBox v6.38.1 on x86 (x86)

Session Settings Dashboard

Safe Mode Session: 192.168.111.12 Memory: 988.5 MiB CPU: 60%

Quick Set

- Interfaces
- Bridge
- PPP
- Mesh
- IP
- IPv6
- Routing
- System
- Queues
- Files
- Log
- Radius
- Tools
- New Terminal
- Make Supout.tif
- Manual
- New WinBox
- Exit

Interface <ether1>		Interface <ether2>		Interface <ether3>	
General	Ethernet	Loop Protect	Status	Traffic	
Tx/Rx Rate: 40.2 Mbps / 40.2 Mbps		Tx/Rx Rate: 40.2 Mbps / 40.2 Mbps		Tx/Rx Rate: 40.2 Mbps / 40.2 Mbps	
Tx/Rx Packet Rate: 3 322 p/s / 3 322 p/s		Tx/Rx Packet Rate: 3 322 p/s / 3 322 p/s		Tx/Rx Packet Rate: 3 322 p/s / 3 322 p/s	
FP Tx/Rx Rate: 0 bps / 0 bps		FP Tx/Rx Rate: 0 bps / 0 bps		FP Tx/Rx Rate: 0 bps / 0 bps	
FP Tx/Rx Packet Rate: 0 p/s / 0 p/s		FP Tx/Rx Packet Rate: 0 p/s / 0 p/s		FP Tx/Rx Packet Rate: 0 p/s / 0 p/s	
Tx/Rx Bytes: 1187.1 MiB / 1062.5 MiB		Tx/Rx Bytes: 1160.1 MiB / 1370.4 MiB		Tx/Rx Bytes: 1265.1 MiB / 1364.4 MiB	
Tx/Rx Packets: 822 504 / 736 190		Tx/Rx Packets: 803 832 / 949 451		Tx/Rx Packets: 876 519 / 945 310	
Tx/Rx Drops: 0 / 420		Tx/Rx Drops: 0 / 460		Tx/Rx Drops: 0 / 453	
Tx/Rx Errors: 0 / 0		Tx/Rx Errors: 0 / 0		Tx/Rx Errors: 0 / 0	
					
					
enabled	running	slave		enabled	running
enabled	running	slave		enabled	running
enabled	running	slave		enabled	running

OK

Cancel

Apply

Disable

Comment

Torch

Cable Test

Blink

Reset MAC Address

Torch (Running)

Interface: ether2

Entry Timeout: 00:00:03 s

Filters

Src. Address: 0.0.0.0/0

Dst. Address: 0.0.0.0/0

Src. Address6: ::/0

Dst. Address6: ::/0

MAC Protocol: all

Protocol: any

Port: any

VLAN Id: any

DSCP: any

Start

Stop

Close

New Window

Collect

Src. Address Src. Address6

Dst. Address Dst. Address6

MAC Protocol Port

Protocol VLAN Id

DSCP

Eth. Proto...	Protocol	Src.	Dst.	VLAN Id	DSCP	Tx Rate	Rx Rate	Tx Pack...	Rx Pack...
800 (ip)	47	10.2.0.1	10.1.0.1			19.9 Mbps	19.9 Mbps	1644	1644
86dd (pv6)	47	2001:10:2::1	2001:10:3::1			19.9 Mbps	19.9 Mbps	1644	1644
86dd (pv6)	58	fe80::250ff:fe02:101	ff02::1		48	0 bps	0 bps	0	0

3 items Total Tx: 39.8 Mbps Total Rx: 39.8 Mbps Total Tx Packet: 3 288 Total Rx Packet: 3 288

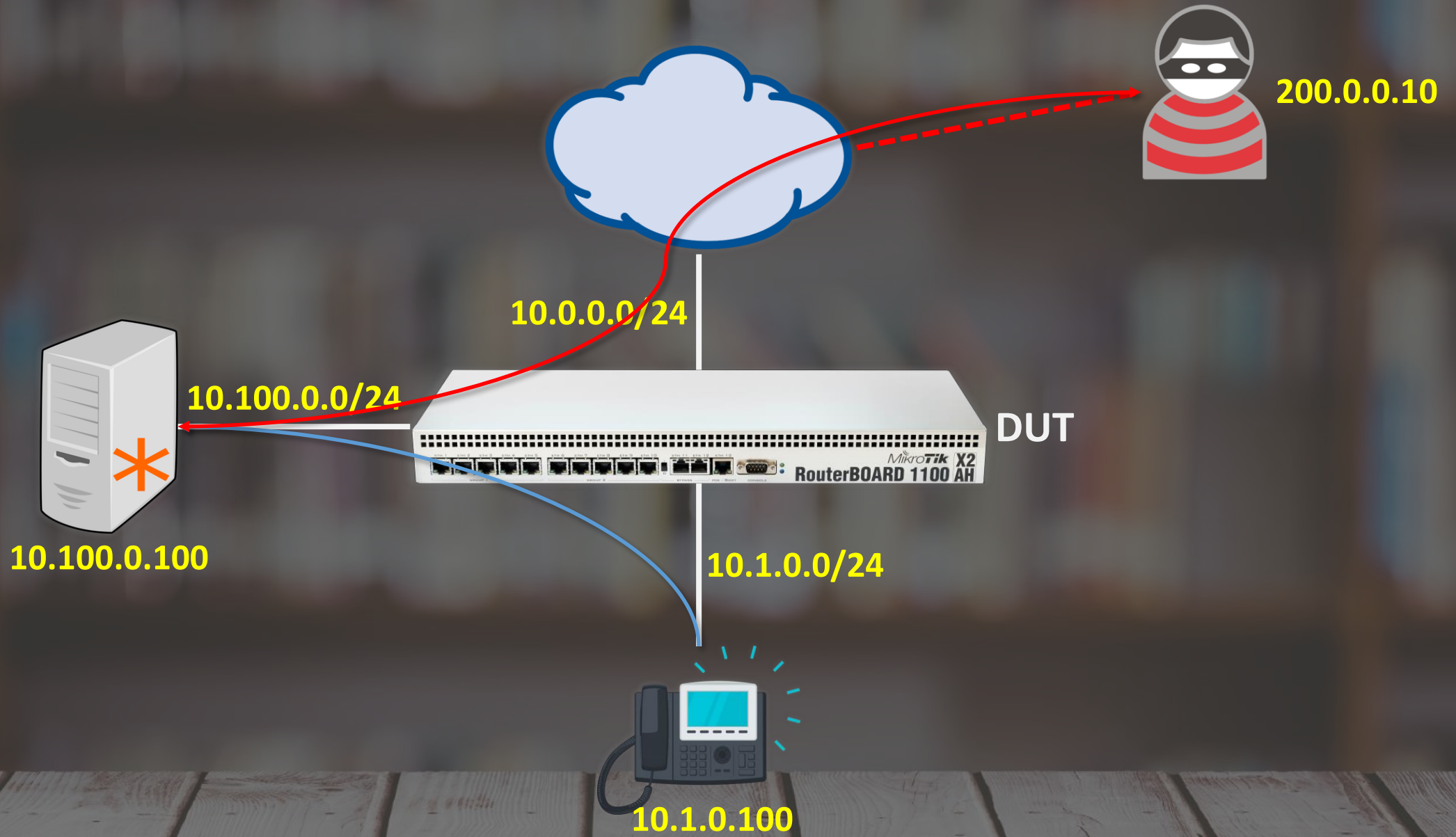
CASE 3

Fabricated Packets test



In this case we will try a queue tree configuration that prioritizes voice traffic. QoS router has mangle rules and queue tree limitations.





SCENARIO

In this scenario we will generate three different packets

- Two packets generated by (IP-PHONE_SIMULATOR) specified like RTP and SIP packets.
- One packet generated by (INTRUDER) random packet like spoofing

IP-PHONE_SIMULATOR

The screenshot shows the WinBox v6.38.1 interface for an IP-Phone Simulator. The main window title is "admin@00:50:00:02:05:09 (IP-PHONE_SIMULATOR) - WinBox v6.38.1 on x86 (x86)". The interface includes a menu bar with "Session", "Settings", and "Dashboard". Below the menu bar, there are navigation buttons and a "Safe Mode" button. The session ID is "00:50:00:02:05:09".

The left sidebar contains a menu with the following items: Quick Set, Interfaces, Bridge, PPP, Mesh, IP, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, Make Supout.rif, Manual, and New WinBox.

The main content area displays the "Address List" configuration window. This window has a toolbar with icons for adding (+), deleting (-), checking (✓), unchecking (✗), saving (floppy), and filtering (funnel). A "Find" search box is also present. The table below shows the current configuration:

Address	Network	Interface
10.1.0.100/24	10.1.0.0	ether1

At the bottom of the window, it indicates "1 item".

```
/ip address  
add address=10.1.0.100/24 interface=ether1 network=10.1.0.0
```


CREATE FABRICATED VOIP TRAFIC

- RTP CALL voice audio data will be marked by DSCP value of 46 DSCP value of 46 results in a ToS byte value of 184 EF=0xB8
- SIP CALL signaling messages will be marked by DSCP value of 26A DSCP value of 26 results in a ToS byte value of 104 AF31=0x68 (=104)75

admin@00:50:00:02:05:09 (IP-PHONE_SIMULATOR) - WinBox v6.38.1 on x86 (x86)

Session Settings Dashboard

Safe Mode Session: 00:50:00:02:05:09

RouterOS WinBox

- Quick Set
- Interfaces
- Bridge
- PPP
- Mesh
- IP
- Routing
- System
- Queues
- Files
- Log
- Radius
- Tools
- New Terminal
- Make Supout.nif
- Manual
- New WinBox
- Exit

Traffic Generator Settings

Test ID:

Latency Distribution Max.: us

Stats Samples To Keep:

Latency Distribution Samples:

Latency Distribution Measure Interval:

OK

Cancel

Apply

Quick Start

Start

Stop

Inject Pcap

Stats

Ports

Packet Templates

Raw Packet Templates

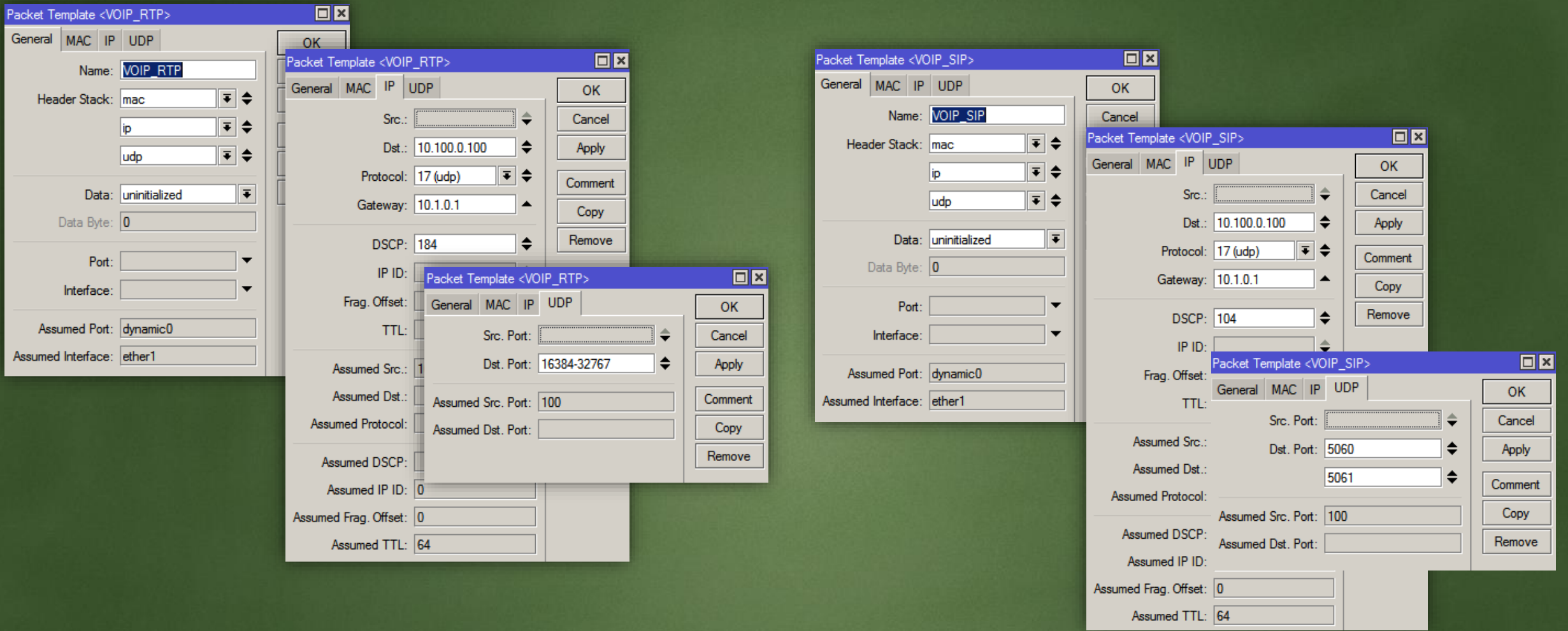
Streams

Running: no

Traffic Generator Packet Templates

Raw Packet Templates

Name	Header Stack	Data	Data Byte	Port	Interface
0 items					



```

/tool traffic-generator packet-template
add ip-dscp=184 ip-dst=10.100.0.100 ip-gateway=10.1.0.1 ip-protocol=udp name=VOIP_RTP udp-dst-port=16384-32767
add ip-dscp=104 ip-dst=10.100.0.100 ip-gateway=10.1.0.1 ip-protocol=udp name=VOIP_SIP udp-dst-port=5060,5061

```


INTRUDER

The screenshot shows the WinBox v6.38.1 interface. The main window title is "admin@00:50:00:02:01:09 (INTRUDER) - WinBox v6.38.1 on x86 (x86)". The interface includes a menu bar with "Session", "Settings", and "Dashboard". Below the menu bar, there are navigation buttons and a "Safe Mode" indicator. The left sidebar contains a tree view of configuration categories: Quick Set, Interfaces, Bridge, PPP, Mesh, IP, IPv6, Routing, System, Queues, Files, Log, Radius, Tools, New Terminal, Make Supout.tif, Manual, and New WinBox. The main area displays the "Address List" configuration window, which has a table with the following data:

Address	Network	Interface
200.0.0.10/24	200.0.0.0	ether1

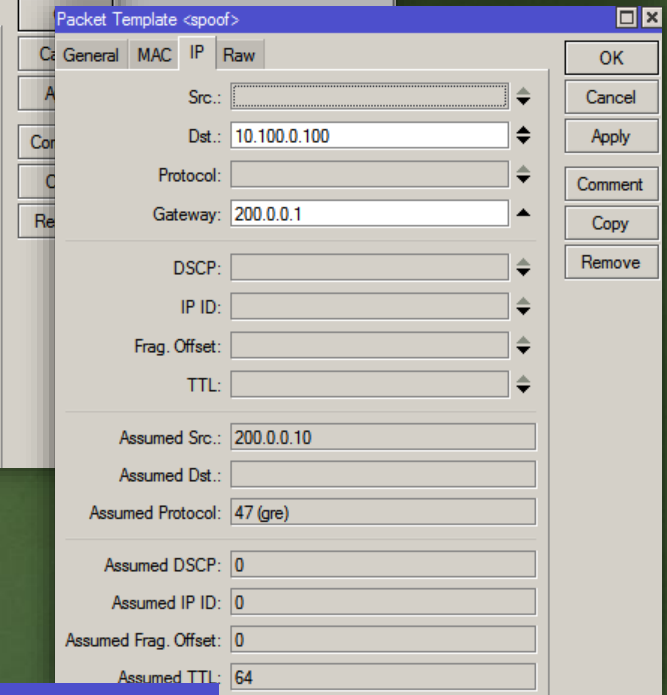
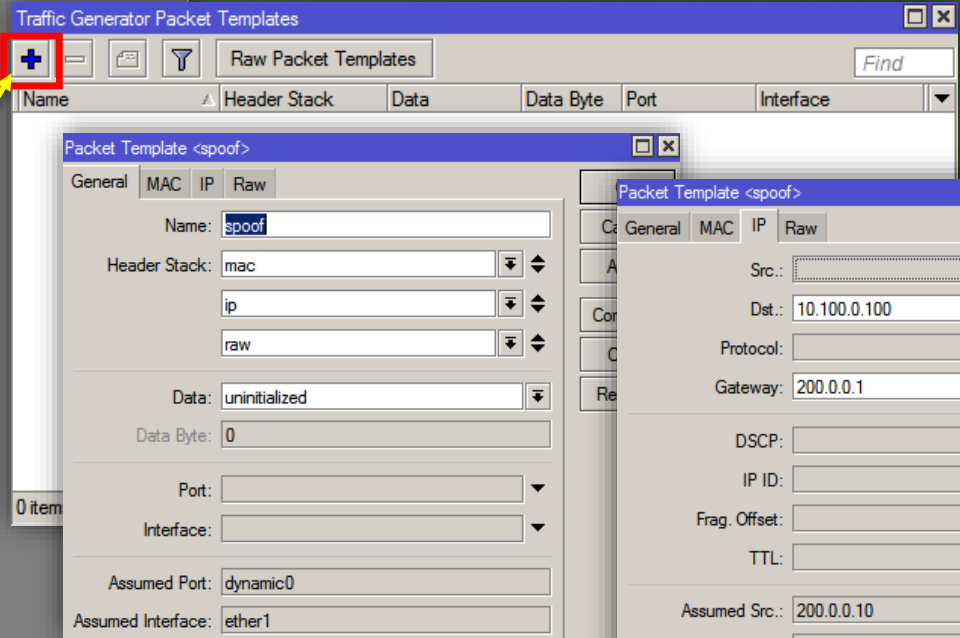
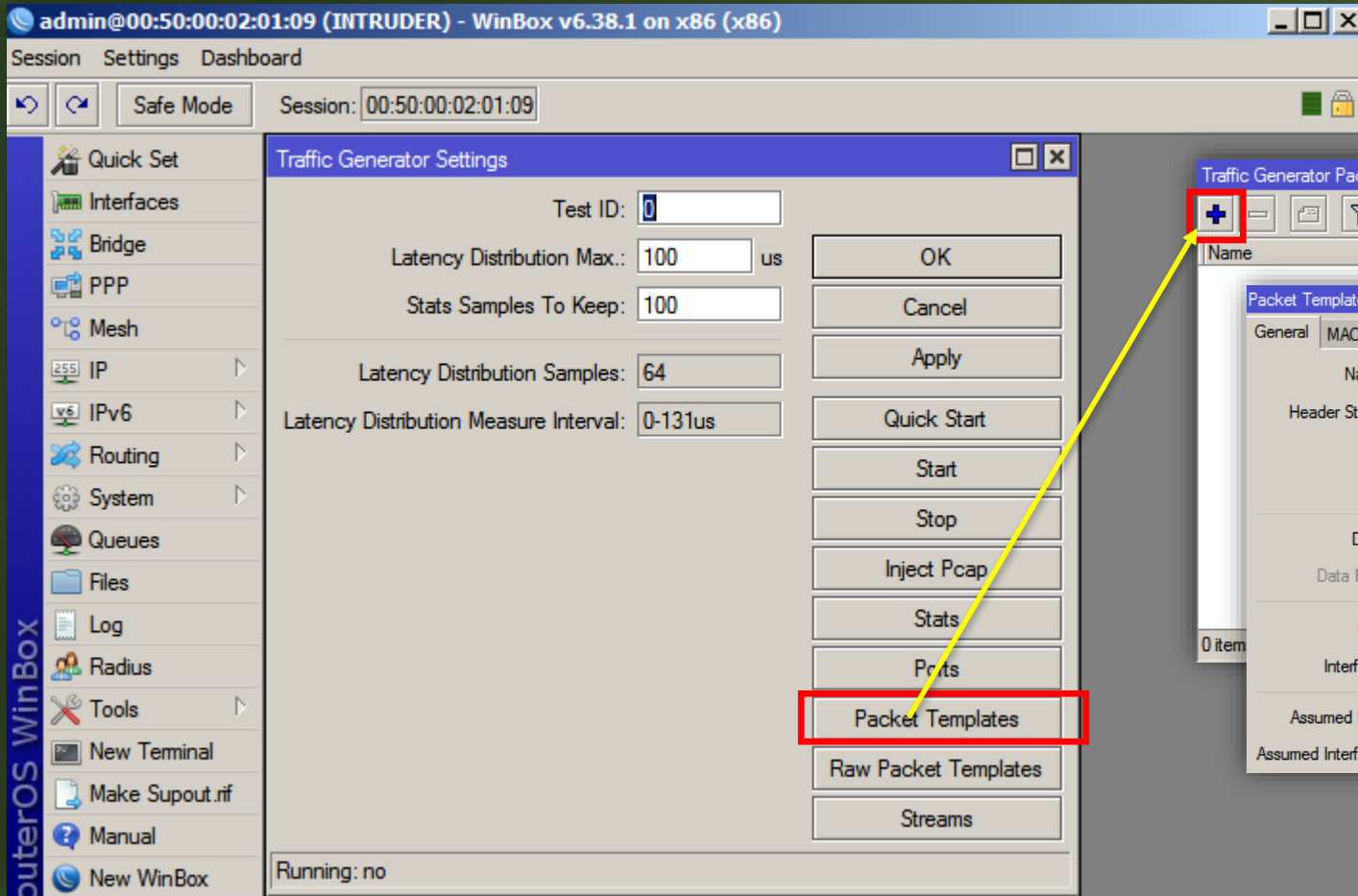
Below the table, it indicates "1 item". A blue callout box at the bottom of the screenshot contains the following text:

```
/ip address  
add address=200.0.0.10/24 interface=ether1 network=200.0.0.0
```

CREATE FABRICATED RANDOM TRAFFIC

- Create random RAW packet in Traffic-Generator





```
/tool traffic-generator packet-template  
add header-stack=mac,ip,raw ip-dst=10.100.0.100 ip-gateway=200.0.0.1 name=spoof  
/tool traffic-generator stream add name=stream-1 packet-size=1500 tx-template=spoof
```


DUT/SUT

admin@00:50:00:02:02:09 (DUT) - WinBox v6.38.1 on x86 (x86)

Session Settings Dashboard

Safe Mode Session: 00:50:00:02:02:09 Memory: 986.1 MiB CPU: 0%

Address List

Address	Network	Interface	Comment
10.0.0.1/24	10.0.0.0	ether1	INTERNET
10.1.0.1/24	10.1.0.0	ether3	CLIENT
10.100.0.1/24	10.100.0.0	ether2	VOIP SERVER

3 items (1 selected)

```
ip address
add address=10.100.0.1/24 comment="VOIP SERVER" interface=ether2 network=10.100.0.0
add address=10.0.0.1/24 comment=INTERNET interface=ether1 network=10.0.0.0
add address=10.1.0.1/24 comment=CLIENT interface=ether3 network=10.1.0.0
```

CREATE MANGLE AND QUEUE TREE

- Create two mangle for VOIP and one mangle for rest of packets destined to VOIP Server
- Create three queue-tree
 - One parent queue (PBX_Traffic)
 - One queue for rest packets (REST)
 - One queue for VOIP packets (VOIP)

Firewall

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

+ - ✓ ✕ [Filter 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...	Bytes	Packets
::: VOIP RULES											
0	mar...	prerouting		10.100.0.100						0 B	0
1	mar...	prerouting		10.100.0.100						0 B	0
::: REST RULES											
2	mar...	prerouting		10.100.0.100						0 B	0

3 items

/ip firewall mangle

add action=mark-packet chain=prerouting comment="VOIP RULES" dscp=46 dst-address=10.100.0.100 new-packet-mark=voip-packets passthrough=no

add action=mark-packet chain=prerouting dscp=26 dst-address=10.100.0.100 new-packet-mark=voip-packets passthrough=no

add action=mark-packet chain=prerouting comment="REST RULES" dst-address=10.100.0.100 new-packet-mark=rest-packets passthrough=no

Queue List

Simple Queues Interface Queues Queue Tree Queue Types

+ - ✓ ✕ ☰ ☹ ☹ Reset Counters ☹ Reset All Counters Find

Name	Parent	Packet Marks	Limit At (b...	Max Limit ...	Avg. Rate	Queued Bytes	Bytes	Packets
PBX_Traffic	global				0 bps	0 B	0 B	0
REST	PBX_Traffic	rest-packets	5M	10M	0 bps	0 B	0 B	0
VOIP	PBX_Traffic	voip-packets	1M	1M	0 bps	0 B	0 B	0

3 items 0 B queued 0 packets queued

```

/queue tree
add name=PBX_Traffic parent=global
add limit-at=5M max-limit=10M name=REST packet-mark=rest-packets parent=PBX_Traffic
add limit-at=1M max-limit=1M name=VOIP packet-mark=voip-packets parent=PBX_Traffic priority=1

```

LAUNCH SIMULATION



- Launch traffic-generator from “INTRUDER” with packets 20 mbps
- Launch traffic-generator from “IP-PHONE_SIMULATOR” with 120 kbps traffic

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

Traffic Generator Settings

Test ID:

Latency Distribution Max.: us

Stats Samples To Keep:

Latency Distribution Samples:

Latency Distribution Measure Interval:

Quick Start

Start

Stop

Inject Pcap

Stats

Ports

Packet Templates

Raw Packet Templates

Streams

Running: yes

Quick Start (Running)

Test ID:

Stream:

Port:

Interface:

Packet Size:

PPS:

MBPS:

Tx Template:

Seq	ID	Tx Packets	Tx Rate	Rx Packets	Rx Rate	Lost Packets	Lost Rate
52	0	1 651	19.9 Mbps	0	0 bps	1 651	19.9 Mbps
53	0	1 636	19.8 Mbps	0	0 bps	1 636	19.8 Mbps
54	0	1 667	20.1 Mbps	0	0 bps	1 667	20.1 Mbps
55	0	1 645	19.9 Mbps	0	0 bps	1 645	19.9 Mbps
56	0	1 658	20.0 Mbps	0	0 bps	1 658	20.0 Mbps
57	0	1 651	19.9 Mbps	0	0 bps	1 651	19.9 Mbps
58	0	1 651	19.9 Mbps	0	0 bps	1 651	19.9 Mbps
59	0	1 652	20.0 Mbps	0	0 bps	1 652	20.0 Mbps
60	0	1 651	19.9 Mbps	0	0 bps	1 651	19.9 Mbps

20 items

INTRUDER

- Quick Set
- Interfaces
- Bridge
- PPP
- Mesh
- IP
- Routing
- System
- Queues
- Files
- Log
- Radius
- Tools
- New Terminal
- Make Supout.rtf
- Manual
- New WinBox
- Exit

Traffic Generator Settings

Test ID: 0

Latency Distribution Max.: 100 us

Stats Samples To Keep: 100

Latency Distribution Samples: 64

Latency Distribution Measure Interval: 0-131us

OK

Cancel

Apply

Quick Start

Start

Stop

Inject Pcap

Stats

Ports

Packet Templates

Raw Packet Templates

Streams

Quick Start (Running)

Test ID: 0

Stream:

Port:

Interface:

Packet Size:

PPS:

MBPS:

Tx Template: VOIP_RTP

VOIP_SIP

Start

Stop

Close

New Window

Seq	ID	Tx Packets	Tx Rate	Rx Packets	Rx Rate	Lost Packets	Lost Rate
9	1	10	121.1 kbps	0	0 bps	10	121.1 kbps
9	TOT	20	242.2 kbps	0	0 bps	20	242.2 kbps
10	0	10	121.1 kbps	0	0 bps	10	121.1 kbps
10	1	10	121.1 kbps	0	0 bps	10	121.1 kbps
10	TOT	20	242.2 kbps	0	0 bps	20	242.2 kbps
11	0	10	121.1 kbps	0	0 bps	10	121.1 kbps
11	1	10	121.1 kbps	0	0 bps	10	121.1 kbps
11	TOT	20	242.2 kbps	0	0 bps	20	242.2 kbps
12	0	10	121.1 kbps	0	0 bps	10	121.1 kbps
12	1	10	121.1 kbps	0	0 bps	10	121.1 kbps

IP-PHONE SIMULATOR

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

Interface List

Interface	Name	Type	Actual MTU	L Tx	Rx
R	ether1	Ethernet	1500	0 bps	19.9 Mbps
R	ether2	Ethernet	1500	10.3 Mbps	102.8 kbps
R	ether3	Ethernet	1500	102.8 kbps	263.8 kbps
R	ether4	Ethernet	1500	0 bps	0 bps
R	ether5	Ethernet	1500	0 bps	0 bps
R	ether6	Ethernet	1500	0 bps	0 bps
R	ether7	Ethernet	1500	0 bps	0 bps
R	ether8	Ethernet	1500	0 bps	0 bps
R	ether9	Ethernet	1500	0 bps	0 bps
R	ether10-Management	Ethernet	1500	69.7 kbps	14.1 kbps

10 items (3 selected)

Firewall

#	Action	Chain	Src. Address	Dst. Address	P...	In. Inter...	Out. Int.	Bytes	Packets
::: VOIP RULES									
0	mark packet	prerouting		10.100.0.100				20.5 MiB	14 333
1	mark packet	prerouting		10.100.0.100				20.5 MiB	14 333
::: REST RULES									
2	mark packet	prerouting		10.100.0.100				1258.8 MiB	880 019

3 items

Queue List

Name	Parent	Packet Marks	Limit At (b...	Max Limit ...	Avg. Rate	Queued Bytes	Bytes	Packets
PBX_Traffic	global				10.2 Mbps	0 B	577.0 MiB	403 324
REST	PBX_Traffic	rest-packets	5M	10M	10.0 Mbps	13.2 KiB	537.9 MiB	376 021
VOIP	PBX_Traffic	voip-packets	1M	1M	240.0 kbps	0 B	39.1 MiB	27 302

Queue <REST>

General Statistics

Avg. Rate: 10.0 Mbps

Avg. Packet Rate: 837

Queued Bytes: 13.2 KiB

Queued Packets: 9

Bytes: 537.9 MiB

Packets: 376 021

Dropped: 366 994

PCQ Queues:

enabled

Queue <VOIP>

General Statistics

Avg. Rate: 240.0 kbps

Avg. Packet Rate: 20

Queued Bytes: 0 B

Queued Packets: 0

Bytes: 39.1 MiB

Packets: 27 302

Dropped: 0

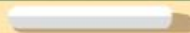
PCQ Queues:

enabled

DUT

CASE 4

Testing wireless



- Quick Set
- CAPsMAN
- Interfaces
- Wireless
- Bridge
- PPP
- Switch
- Mesh
- IP
- MPLS
- Routing
- System
- Queues
- Files
- Log
- Radius
- Tools
- New Terminal
- MetaROUTER
- Partition
- Make Supout.tif
- Manual
- New WinBox
- Exit

Interface <wlan1>

General Wireless HT HT MCS WDS Nstreme NV2 Advanced Status ...

Mode: station bridge

Band: 2GHz-B/G/N

Channel Width: 20/40MHz Ce

Frequency: 2422 MHz

SSID: MumMilan

Scan List: default

Wireless Protocol: any

Security Profile: class

Default Authenticate

Wireless Tables

Interfaces Nstreme Dual Access List Registration Connect List Security Profiles Channels

00 Reset

Radio Name	MAC Address	Interface	Uptime	AP	W...	Last Activit...	Tx/Rx Signal ...	Tx Rate	Rx Rate
6C3B6BE...	6C:3B:6B:EE:43:21	wlan1	00:03:28	yes	no	0.000	-19/-21	120Mbps-...	54Mbps-4...

Address List

Address	Network	Interface
192.168.88.254/24	192.168.88.0	wlan1

1 item

DHCP Client

DHCP Client Options

Interface	Use P...	Add D...	IP Address	Expires After	St...
wlan1	yes	yes	192.168.88.254/24	00:06:39	bounc

1 item

Station

- Quick Set
- CAPsMAN
- Interfaces
- Wireless
- Bridge
- PPP
- Switch
- Mesh
- IP
- MPLS
- Routing
- System
- Queues
- Files
- Log
- Radius
- Tools
- New Terminal
- MetaROUTER
- Partition
- Make Supout.tif
- Manual
- New WinBox
- Exit

Interface <wlan1>

General Wireless HT HT MCS WDS Netrema Status Traffic

Mode: ap bridge

Band: 2GHz-B/G/N

Channel Width: 20/40MHz Ce

Frequency: auto MHz

SSID: MumMilan

Scan List: default

Wireless Protocol: 802.11

Security Profile: profile1

WPS Mode: disabled

Bridge Mode: enabled

VLAN Mode: no tag

VLAN ID: 1

Default AP Tx Rate: bps

Default Client Tx Rate: bps

Default Authenticate

Default Forward

Hide SSID

OK

Cancel

Apply

Disable

Comment

Advanced Mode

Torch

WPS Accept

Scan...

Freq. Usage...

Align...

Bridge

Bridge Ports Filters NAT Hosts

Interface	Bridge	Priority (h...	Path Cost	Horizon	Role	Root Pat...
::: defconf						
ether1	bridge	80	10		disabled port	
::: defconf						
wlan1	bridge	80	10		designated port	

2 items (1 selected)

Address List

Address	Network	Interface
192.168.88.1/24	192.168.88.0	bridge

1 item (1 selected)

AP

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

Traffic Generator Settings

Test ID: 0

Latency Distribution Max.: 1000000 us

Stats Samples To Keep: 100

Latency Distribution Samples: 64

Latency Distribution Measure Interval: 0-14ms

OK

Cancel

Apply

Quick Start

Packet Template <udp>

General MAC IP UDP

Src.: []

Dst.: 192.168.88.254

Protocol: []

Gateway: 192.168.88.1

DSCP: []

IP ID: []

Frag. Offset: []

TTL: []

Assumed Src.: 192.168.88.254

Assumed Dst.: []

Assumed Protocol: 17 (udp)

Assumed DSCP: 0

Assumed IP ID: 0

Assumed Frag. Offset: 0

Assumed TTL: 64

OK

Cancel

Apply

Comment

Copy

Remove

Packet Stream <str1>

Name: str1

Default Port: dynamic0

Port: port1

ID: 0

Packet Size: 64

MBPS: 10

PPS: []

Tx Template: udp

enabled

OK

Cancel

Apply

Disable

Copy

Remove

Start

Test ID: 0

Stream: str1

Port: port1

Interface: []

Packet Size: []

PPS: []

MBPS: []

Tx Template: []

Start

Cancel

Running: no

1 item (1 selected)

Traffic generator

Traffic Generator Settings

Test ID: 0

Latency Distribution Max.: 1000000 us

Stats Samples To Keep: 100

Latency Distribution Samples: 64

Latency Distribution Measure Interval: 0-1.79s

OK

Cancel

Apply

Quick Start

Traffic Generator Stats

Streams Ports Raw

Latency Distribution

Seq	ID	Tx Packets	Tx Rate	Rx Packets	Rx Rate	Lost Packets	Lost Rate	Lat. Min.	Lat. Avg.	Lat. Max.	Jitter
1	0	19 414	9.9 Mbps	1 702	871.4 kbps	17 712	9.0 Mbps	6.44ms	594ms	772ms	766ms
2	0	19 330	9.9 Mbps	3 697	1892.8 kbps	15 833	8.1 Mbps	112ms	325ms	576ms	463ms
3	0	19 531	9.9 Mbps	1 019	521.7 kbps	18 512	9.4 Mbps	138ms	566ms	968ms	831ms
4	0	19 532	10.0 Mbps	653	334.3 kbps	18 879	9.6 Mbps	994ms	1.29s	1.73s	737ms
5	0	19 531	9.9 Mbps	1 552	794.6 kbps	17 979	9.2 Mbps	738ms	1.03s	1.41s	668ms
6	0	19 531	9.9 Mbps	1 077	551.4 kbps	18 454	9.4 Mbps	836ms	1.04s	1.38s	543ms
7	0	19 532	10.0 Mbps	918	470.0 kbps	18 614	9.5 Mbps	1.24s	1.53s	1.79s	557ms
8	0	19 531	9.9 Mbps	1 270	650.2 kbps	18 261	9.3 Mbps	549ms	910ms	1.89s	1.34s
9	0	19 532	10.0 Mbps	2 205	1128.9 kbps	17 327	8.8 Mbps	44.5ms	665ms	1.51s	1.46s
10	0	19 531	9.9 Mbps	11 845	6.0 Mbps	7 686	3.9 Mbps	8.22ms	70.7ms	223ms	215ms
11	0	19 531	9.9 Mbps	16 647	8.5 Mbps	2 884	1476.6 kbps	7.6ms	39.7ms	161ms	153ms
12	0	19 531	9.9 Mbps	14 706	7.5 Mbps	4 825	2.4 Mbps	7.95ms	44.5ms	147ms	139ms
13	0	19 531	9.9 Mbps	16 328	8.3 Mbps	3 203	1639.9 kbps	6.57ms	36.2ms	167ms	160ms
14	0	19 532	10.0 Mbps	16 226	8.3 Mbps	3 306	1692.6 kbps	5.92ms	37.9ms	190ms	184ms
15	0	19 531	9.9 Mbps	19 087	9.7 Mbps	444	227.3 kbps	6.59ms	23.9ms	76.3ms	69.7ms
16	0	19 532	10.0 Mbps	11 108	5.6 Mbps	8 424	4.3 Mbps	6.96ms	91.3ms	314ms	307ms
17	0	19 531	9.9 Mbps	17 606	9.0 Mbps	1 925	985.6 kbps	6.13ms	32.9ms	138ms	132ms
18	0	19 531	9.9 Mbps	19 203	9.8 Mbps	328	167.9 kbps	8.07ms	30.6ms	92.9ms	84.8ms
19	0	19 531	9.9 Mbps	14 181	7.2 Mbps	5 350	2.7 Mbps	8.23ms	51.9ms	195ms	186ms

37 items

Latency Distribution (Running)

Stream ID: 0

Port: port1

Sequence: 1

#	Latency	Count	Share (%)
64	0-1.79s	1702	100.000
27	755ms-783ms	475	27.908
26	727ms-755ms	351	20.622
25	699ms-727ms	176	10.340
11	308ms-336ms	159	9.341
24	671ms-699ms	138	8.108
5	140ms-168ms	118	6.933
20	559ms-587ms	106	6.227
12	336ms-364ms	87	5.111
0	0-28ms	63	3.701
2	55.9ms-83.9ms	26	1.527
1	28ms-55.9ms	3	0.176
36	1.01s-1.03s	0	0.000
37	1.03s-1.06s	0	0.000
38	1.06s-1.09s	0	0.000
39	1.09s-1.12s	0	0.000
40	1.12s-1.15s	0	0.000
41	1.15s-1.17s	0	0.000
42	1.17s-1.2s	0	0.000
44	1.23s-1.26s	0	0.000
45	1.26s-1.29s	0	0.000
46	1.29s-1.31s	0	0.000
43	1.2s-1.23s	0	0.000
47	1.31s-1.34s	0	0.000
48	1.34s-1.37s	0	0.000
49	1.37s-1.4s	0	0.000
51	1.43s-1.45s	0	0.000
52	1.45s-1.48s	0	0.000
53	1.48s-1.51s	0	0.000
50	1.4s-1.43s	0	0.000
54	1.51s-1.54s	0	0.000
55	1.54s-1.57s	0	0.000

Stats

- Quick Set
- CAPsMAN
- Interfaces
- Wireless
- Bridge
- PPP
- Switch
- Mesh
- IP
- MPLS
- Routing
- System
- Queues
- Files
- Log
- Radius
- Tools
- New Terminal
- MetaROUTER
- Partition
- Make Supout.rtf
- Manual
- New WinBox
- Exit

Traffic Generator Settings

Test ID: 0

Latency Distribution Max.: 1000000 us

Stats Samples To Keep: 100

Latency Distribution Samples: 64

Latency Distribution Measure Interval: 0-1.79s

OK Cancel Apply Quick Start Start Stop

Packet Stream <str1>

Name: str1

Default Port: dynamic0

Port: port1

ID: 0

Packet Size: 1500

MBPS: 1

PPS:

Tx Template: udp

OK Cancel Apply Disable Copy Remove

Latency Distribution (Running)

Stream ID: 0

Port: port1

Sequence: 1

Start Stop Close New Window

#	Latency	Count	Share (%)
64	0-1.79s	8	100.000
0	0-28ms	3	37.500
1	28ms-55.9ms	3	37.500
2	55.9ms-83.9ms	2	25.000
36	1.01s-1.03s	0	0.000
37	1.03s-1.06s	0	0.000
38	1.06s-1.09s	0	0.000
39	1.09s-1.12s	0	0.000
40	1.12s-1.15s	0	0.000
41	1.15s-1.17s	0	0.000
42	1.17s-1.2s	0	0.000
44	1.23s-1.26s	0	0.000
45	1.26s-1.29s	0	0.000
46	1.29s-1.31s	0	0.000
43	1.2s-1.23s	0	0.000
47	1.31s-1.34s	0	0.000
48	1.34s-1.37s	0	0.000
49	1.37s-1.4s	0	0.000
51	1.43s-1.45s	0	0.000
52	1.45s-1.48s	0	0.000
53	1.48s-1.51s	0	0.000
50	1.4s-1.43s	0	0.000
54	1.51s-1.54s	0	0.000
55	1.54s-1.57s	0	0.000
56	1.57s-1.59s	0	0.000
57	1.59s-1.62s	0	0.000
58	1.62s-1.65s	0	0.000
59	1.65s-1.68s	0	0.000
60	1.68s-1.71s	0	0.000
61	1.71s-1.73s	0	0.000
62	1.73s-1.76s	0	0.000
63	1.76s-1.79s	0	0.000

Traffic Generator Stats

Streams Ports Raw

Latency Distribution

Seq	ID	Tx Packets	Tx Rate	Rx Packets	Rx Rate	Lost Packets	Lost Rate	Lat. Min.	Lat. Avg.	Lat. Max.	Jitter
1	0	83	996.0 kbps	8	96.0 kbps	75	900.0 kbps	716us	39.3ms	78ms	77.3ms
2	0	83	996.0 kbps	6	72.0 kbps	77	924.0 kbps	1.46s	1.72s	1.81s	344ms
3	0	83	996.0 kbps	0	0 bps	83	996.0 kbps				
4	0	84	1008.0 kbps	22	264.0 kbps	62	744.0 kbps	2.52s	2.66s	2.78s	251ms
5	0	83	996.0 kbps	38	456.0 kbps	45	540.0 kbps	3.37s	3.62s	3.98s	607ms
6	0	84	1008.0 kbps	28	336.0 kbps	56	672.0 kbps	3.69s	3.85s	4.02s	325ms
7	0	83	996.0 kbps	34	408.0 kbps	49	588.0 kbps	11.1ms	205ms	392ms	381ms
8	0	83	996.0 kbps	96	1152.0 kbps	-13	156.0 kbps	137ms	659ms	1.14s	1s
9	0	84	1008.0 kbps	0	0 bps	84	1008.0 kbps				
10	0	83	996.0 kbps	34	408.0 kbps	49	588.0 kbps	1.44s	1.68s	2.03s	584ms
11	0	83	996.0 kbps	0	0 bps	83	996.0 kbps				
12	0	83	996.0 kbps	136	1632.0 kbps	-53	636.0 kbps	1.8s	2.27s	2.67s	868ms
13	0	84	1008.0 kbps	213	2.5 Mbps	-129	1548.0 kbps	2.72s	3.95s	1.78s	3.35s
14	0	83	996.0 kbps	197	2.3 Mbps	-114	1368.0 kbps	4.35ms	1.13s	2.87s	2.87s
15	0	83	996.0 kbps	71	852.0 kbps	12	144.0 kbps	39.4ms	422ms	712ms	673ms
16	0	84	1008.0 kbps	88	1056.0 kbps	-4	48.0 kbps	7.0ms	343ms	809ms	802ms
17	0	83	996.0 kbps	60	720.0 kbps	23	276.0 kbps	20.1ms	367ms	788ms	767ms
18	0	83	996.0 kbps	112	1356.0 kbps	0	0 bps	1.00s	1.00s	0.00s	0.00s

Stats

CASE 5

Injecting pcap

What is pcap?



How can I generate pcap captures?



VirtualBox Host-Only Network

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/> Expression...

No.	Time	Source	Destination	Protocol	Length	Info
130	7...	192.168.56.102	192.168.56.1	TCP	1112	8291 → 49249 [PSH, ACK] Seq=28631 Ack=2202 Win=2113 Len=1058
131	7...	192.168.56.3	192.168.56.1	TCP	400	8291 → 49235 [PSH, ACK] Seq=31066 Ack=2076 Win=501 Len=346
132	7...	192.168.56.3	192.168.56.1	TCP	244	8291 → 49235 [PSH, ACK] Seq=31412 Ack=2143 Win=501 Len=190
133	7...	192.168.56.3	192.168.56.1			
134	7...	192.168.56.3	192.168.56.1			
135	7...	192.168.56.102	192.168.56.1			
136	7...	192.168.56.3	192.168.56.1			

Frame 1: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits) on interface
Ethernet II, Src: PcsCompu_54:a6:cf (08:00:27:54:a6:cf), Dst: 01:00:00:00:00:00
Internet Protocol Version 4, Src: 192.168.56.102, Dst: 192.168.56.1
Transmission Control Protocol, Src Port: 8291, Dst Port: 49249
Data (1460 bytes)

0000 0a 00 27 00 00 13 08 00 27 54 a6 cf 08 00 45
0010 05 dc b4 5e 40 00 40 06 8f 05 c0 a8 38 66 c0
0020 38 01 20 63 c0 61 f0 a0 89 96 a3 a2 a0 8f 50
0030 08 41 a9 66 00 00 ff 01 08 83 4d 32 01 00 ff
0040 02 00 00 00 00 00 08 00 00 00 02 00 ff 88 02

Wireshark: Save file as

Guardar en: Escritorio

Sitios recientes

- Escritorio
- Bibliotecas
- Equipo
- Red

Bibliotecas

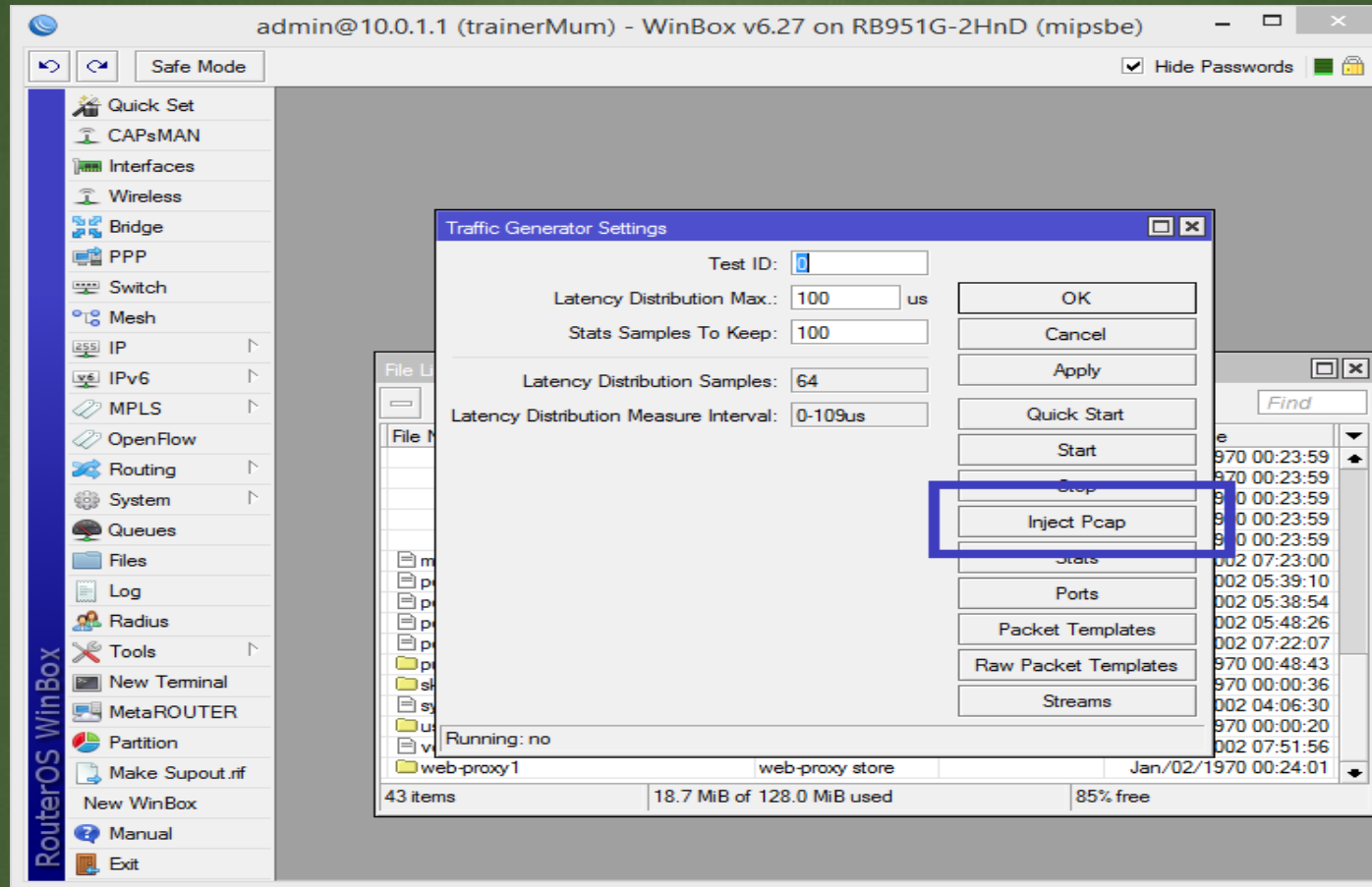
- Bibliotecas Carpeta de sistema
- Jose Manuel Roman Carpeta de sistema
- Red Carpeta de sistema
- Grupo en el hogar Carpeta de sistema
- Equipo Carpeta de sistema
- Downloads Acceso directo 989 bytes

Nombre: capture

Tipo: Wireshark/... - pcapng (*.pcapng;*.pcapng.gz;*.ntar;*.nta)

Compress with gzip

Guardar Cancelar Ayuda



Inject pcap

The screenshot displays the RouterOS WinBox interface. The main window shows the 'Packet Sniffer Settings' dialog box with the 'General' tab selected. The 'Memory Limit' is set to 100 kb and the 'File Limit' is set to 1000 kb. The 'File Name' is 'capture' and the 'File Limit' is 1000 kb. The 'Packet Sniffer Packets' window shows a list of captured packets with columns for Time, Interface, Direction, Src. Address, Src. Port, Dst. Address, Dst. Port, Prot., IP Pr., and Size. The 'File List' window shows a list of files with columns for File Name, Type, Size, and Creation Date.

Seq # / Host	Time	Reply Size	TTL	Status
36 10.0.0.1	1ms	50	64	
37 10.0.0.1	0ms	50	64	
38 10.0.0.1	1ms	50	64	
39 10.0.0.1	0ms	50	64	
40 10.0.0.1	0ms	50	64	
41 10.0.0.1	0ms	50	64	
42 10.0.0.1	0ms	50	64	
43 10.0.0.1	0ms	50	64	
44 10.0.0.1	0ms	50	64	
45 10.0.0.1	0ms	50	64	
46 10.0.0.1	1ms	50	64	
47 10.0.0.1	0ms	50	64	
48 10.0.0.1	0ms	50	64	

Time...	Interface	Direction	Src. Address	Src. Port	Dst. Address	Dst. Port	Prot...	IP Pr...	Size
0.054	ether1	tx	10.0.0.2		10.0.0.1	204...	1 (c...		64
1.053	ether1	tx	10.0.0.2		10.0.0.1	204...	1 (c...		64
2.053	ether1	tx	10.0.0.2		10.0.0.1	204...	1 (c...		64
3.047	ether1	tx	10.0.0.2		10.0.0.1	204...	1 (c...		64
4.047	ether1	tx	10.0.0.2		10.0.0.1	204...	1 (c...		64
5.052	ether1	tx	10.0.0.2		10.0.0.1	204...	1 (c...		64
6.054	ether1	tx	10.0.0.2		10.0.0.1	204...	1 (c...		64
7.050	ether1	tx	10.0.0.2		10.0.0.1	204...	1 (c...		64
8.049	ether1	tx	10.0.0.2		10.0.0.1	204...	1 (c...		64

Inject pcap

The screenshot shows the Mikrotik WinBox interface with several windows open. The main window is the Packet Sniffer Settings dialog, which is divided into General, Streaming, and Filter tabs. The General tab is active, showing a Memory Limit of 100 kb and an option for Only Headers. A File List window is also open, showing a file named 'capture' with a size of 744 B. The Inject Pcap dialog is open, showing the Interface set to 'ether1', Pcap File set to 'capture', Speed Multiplier set to 1.000, and a checked Loop option. The Ping tool is also open, showing a Ping To address of 10.0.0.1 and a Packet Count of 49. The main interface shows a list of network devices and a table of ping results.

Seq #	Host	Time	Reply Size	TTL	Status
36	10.0.0.1	1ms	50	64	
37	10.0.0.1	0ms	50	64	
38	10.0.0.1	1ms	50	64	
39	10.0.0.1	0ms	50	64	
40	10.0.0.1	0ms	50	64	
41	10.0.0.1	0ms	50	64	
42	10.0.0.1	0ms	50	64	
43	10.0.0.1	0ms	50	64	
44	10.0.0.1	0ms	50	64	
45	10.0.0.1	0ms	50	64	
46	10.0.0.1	1ms	50	64	
47	10.0.0.1	0ms	50	64	
48	10.0.0.1	0ms	50	64	

Inject pcap

Conclusion



ANY
QUESTIONS

?

Grazie mille!

Jose.roman@fibercli.com

