

MIKROTIK TRAFFIC GENERATOR STUDY CASE

17 years experience at IT industry, Mikrotik Certified Consultant and Trainer. MTCNA, MTCRE, MTCTCE, MTCUME, 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

ADRID / PRAGUE

+34 652 241 431

My previous presentations at MUM

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



JOSE MANUEL ROMAN

JOSE.roman@fibercli.com

MADRID / PRAGUE



COMPANY PROFILE









PROJECT BASED

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



business inquirieS : <u>hello@fibercli.com</u>

CONSULTANT

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



Fiber

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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

AGENDA

Traffic Generator Introduction
 Special Use Case
 Example



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?

- - munit . Classe - The . . . -----. . . 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

ber<mark>CTT</mark>>

Hardware Encryption

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

• Latency

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Packet loss

- Jitter
- Bandwidth



DEVICE UNDER TEST



TRAFFIC GENERATOR



TRAFFIC GENERATOR



TRAFFIC GENERATOR

Polices (firewall or qos) test performance of device :

• Creating "fabricated" packets



EXAMPLE

CASE 1

Simple Traffic Generator

TRAFFIC GENERATOR

Mikro77# X2 RouterBOARD 1100 AH

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10.1.0.0/24

DEVICE UNDER TEST







Seadmin@00:50:00:02:01:09 (TRAFFIC_GENERATOR) - WinBox v6.38.1 on x86 (x86)										
Session Settings Dashb	oard									
Safe Mode	Session: 00:50:00:02:01:09			🔳 🔂						
🔏 Quick Set	Traffic Generator Settings									
Interfaces	Test ID: 0			Traffic Generator Ports						
Bridge	Latency Distribution Max.: 100 us	ОК		4 - 🗸 🛛 5	T	Find				
PPP	Stats Samples To Keep: 100	Cancel		Name 🛆 Inter	face	First Header				
IP	Latency Distribution Samples: 64	Apply		1		Traffic Generator Port <port1></port1>				
😹 Routing 🛛 🗅	Latency Distribution Measure Interval: 0-131us	Quick Start				Name: port1	ОК			
tigi System ♪		Start	ſ			Interface: ether1	Cancel			
	l traffic-generator port	Stop				First Header: mac	Apply			
× Elog add	interface=ether1 name=port1	Inject Pcar					Disable			
🔏 Radius		Stats					Сору			
🗧 💥 Tools 🛛 🖻		Ports					Remove			
New Terminal	-	Packet Templates	Γ			enabled				
Make Supout.rif		Raw Packet Templates		0 items						
Manual		Streams								
Exit	Running: no									

	S a	admin@00:50:00:02:0	01:09 (TRAFFIC_GENERATOR) - WinBox v6.38.1 on >	(86 (x86)	
5	Sess	sion Settings Dashb	oard		
	6	Carl Safe Mode	Session: 00:50:00:02:01:09		
		凝 Quick Set	Traffic Generator Settings		
		Interfaces	Test ID: 0		
		Bridge	Latency Distribution Max.: 100 us	ОК	
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		🔀 Routing 🗅	Latency Distribution Measure Interval: 0-131us	Quick Start	Name 🔺 Header Stack Data Data Byte Port Interface 💌
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-	<u>d</u>	💜 Manual		Streams	URCHIS
	ŏ	Sew WinBox	Destaura		
(r	🛃 Exit	Running: no		



General MAC IP		
Name:	template-1	
Header Stack:	mac Ŧ ♦	Apply
	ip 두	Comment
	udp 두	
Data:	uninitialized ∓	Remove
Data Byte:	0	Packet Template demolate-1>
Port:	port1	General MAC IP UDP
Interface:	·····	Src.:
Assumed Dest.		Dst.:
Assumed Interface:		Protocol:
hasainea interrace.	<u></u>	Assumed Src : 00:50:00:02:01:00
		Assumed Dst.: 00:50:00:02:02:00
		Assumed Protocol: 800 (ip)
		/tool traffic-generato
		add name=template-
		add name-template

		Packet Template <templ< th=""><th>ate-1></th><th></th><th></th></templ<>	ate-1>		
		General MAC IP (JDP		ОК
		Src.:	10.1.0.1	\$	Cancel
		Dst.:	10.1.0.2	\$	Apply
		Protocol:		¢	Comment
		Gateway:		•	Сору
		DSCP:		\$	Remove
		IP ID:		÷	New Packet Template
	ОК	Frag. Offset:		÷	General MAC IP UDP
	Cancel	TTL:		÷	Src. Port:
	Apply	Assumed Src.:	10.1.0.1		Dst. Port:
	Comment	Assumed Dst.:			Assumed Src. Port:
1	Сору	Assumed Protocol:	17 (udp)		Assumed Dst. Port:
	Remove	Assumed DSCP:	0		
		Assumed IP ID:	0		
		Assumed Frag. Offset:	0		
		Assumed TTL:	64		
r	packet-tem	plate			
1	port=port1	ip-dst=10.1	.0.2 ip-src=10.1.	0.1	

	ОК
\$	Cancel
-	Apply
	Comment
	Сору
	Remove

📎 admin@00:5	50:00:02:0	01:09 (TRAFFIC_GENERATOR) - WinBo>	c v6.38.1 on x	c86 (x86)					
Session Setting	gs Dashbo	pard							
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🔏 Quick Se	et	Traffic Generator Settings add	l name=	stream-1 packet-	-size=1500 tx-templa	ate=template-1			
Interface	es	Test ID: 🛽							
😹 Bridge		Latency Distribution Max.: 10	0 us	ОК	Traffic Generator Streams				
📑 PPP		Stats Samples To Keep: 10	0	Cancel		New Packet Stream			Find
°t¦8 Mesh					Name △ Defaul	t Port		S PPS	Tx Template 🔻
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🞲 System	4			Start		Port:	 Apply 		
Queues				Stop		ID: 0	Disable		
Files				laiset Dees		Packet Size: 1500	Conv		
Kog 🔄 Log						MBPS:			
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E 🔀 Tools				Ports		Tu Tamalata Lamalata 1	-		
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🗠 📃 Exit		Running: no							

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2				÷.		Port:							\$	Close	1
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		Test ID:			Packet	Size:							\$	L	1
		Latency Distribution Max.: 100 us	ОК			pps. [·		
	°t¦s Mesh	Stats Samples To Keep: 100	Cancel			nne. E	0						↓		
	≝ IP ▷	Latency Distribution Samples: 64	Apply		M	BPS:							▼		
	😹 Routing 🛛 🗅	Latency Distribution Measure Interval: 0-131us	Quick Start		Tx Temp	late: t	emplate-1					_	₹ \$		
	System ▷		Start		Seq ∧	ID	Tx Packets	1	Tx Rate	Rx Packets	Rx Rate	Lost	t Packets L	ost Rate	•
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	Hies		Inject Pcap		30	0	8	826	10.0 Mbps 10.0 Mbps	(0 01	ops	826	10.0 Mbps	
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ē	😢 Manual		Character rempiates		38	0	8	825	9.9 Mbps	(0 01	ops	825	9.9 Mbps	
DO	🔘 New WinBox		Streams		39 40	0	8	826 826	10.0 Mbps 10.0 Mbps	() OE) OE	ops ops	826 826	10.0 Mbps 10.0 Mbps	
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	🔏 Quick Set	Interfa	ace List							,	[□×
	Interfaces	Inter	face Interface List	Ethernet	EoIP Tunnel	IP Tunnel	GRE Tu	unnel VLAN	VRRP	Bonding	LTE	
	Bridge	+ -	- 🗸 🗙	- 7							Find	
	E PPP		Name	1	Туре	Actual MTU	L Tx		F	Rx		_
	°t¦8 Mesh	R	ether1		Ethernet	150	0	467.	3 kbps		9.9 Mbp	DS
	255 IP 🗅	R	<>ether2		Ethemet	150	0		0 bps		Übp	JS
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	Cueues	R B	<i>€i>etherb</i>		Ethemet	150	0		0 bps		0 bp)S
			<pre>sterner7</pre>		Ethemet	150	0		0 bps		0 br	15
	Hiles	R	ether9		Ethernet	150	0		0 bps		0 br	os l
X	📄 Log	R	+>ether10-Manager	ment	Ethemet	150	0		0 bps		4.5 kbp	os
/in Bo	🧟 Radius 💥 Tools 🔹 ▷											
3	New Terminal											
Ŏ] Make Supout.rif	10 ite	ms (1 selected)									•
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Packet Template <templ< th=""><th>ate-1></th><th></th></templ<>	ate-1>	
General MAC IP (JDP	ОК
Src.:	10.1.0.1	Cancel
Dst.:	10.1.0.2	Apply
Protocol:		Comment
Gateway:	▼	Сору
DSCP:		Remove
IP ID:		
Frag. Offset:	<u> </u>	
TTL:	<u></u>	
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	

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



Packet Template <templ< th=""><th>ate-1></th><th></th><th></th></templ<>	ate-1>		
General MAC IP (JDP		ОК
Src.:		¢	Cancel
Dst.:	10.1.0.1	+	Apply
Protocol:		\$	Comment
Gateway:	10.1.0.2	•	Сору
DSCP:		÷	Remove
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		

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: 🚺 Start Stream: \$ Stop Port: ŧ Close Interface: ŧ New Window Packet Size: ŧ PPS: \$ MBPS: 10 ۵ ₹ \$ 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	٠
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	908	10.0 Mbpe	928	10.0 Mbpe	0	0 boe	207ue	1.09me	10.5me	10 3me	

20 items

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0	admin@00:50:00:02:02:09 (DUT) - WinBox v6.38.1 on x86 (x86)													
Sea	ssion Settings Dashb	oard												
Ŷ	Cafe Mode	Session:	00:50:00:02:02:0)9					Ме	mory:9	90.4 MiB C	PU: <mark>2%</mark>		<u>.</u>
	🔏 Quick Set	Interface L	ist											×
	🛲 Interfaces	Interface	Interface List	Ethernet	EoIP Tunnel	IP Tunnel	GR	E Tunnel	VLAN	VRRP	Bonding	LTE		
	Bridge	+ -	✓ ×	- 7								Fin	d	٦
	📑 PPP	Nam	e	1	Туре	Actual MTU	L	. Tx			Rx			-
	°t¦8 Mesh	R 🕪	ther1		Ethernet	150	0		9.9	Mbps		9.9 N	lbps	
	255 IP	R 🗫	ther2		Ethernet	150	0			0 bps		0	bps	
		R 🍀	ther3		Ethernet	150	0			0 bps		0	bps	_
	Kouting I	R «j>e	ther4		Ethemet	150	0			0 bps		0	bps	_
	🎲 System 🛛 🗅	R *i>e	ther5		Ethemet	150	0			0 bps		0	bps	_
			thero		Ethemet	150	0			Obps		0	bps	_
	2 400000		ther ⁸		Ethemet	150	0			Obpe		0	bps	\neg
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	0 Radius						-		-					
	💥 Tools 🔹 🗅													
×	💽 New Terminal													_
8	🛄 Make Supout.rif	10 items (1	selected)											-
		Toncenta (Sciecter				-							

Interface <ether1></ether1>			
General Ethernet Loo	p Protect Status	Traffic	ОК
Tx/Rx Rate:	9.9 Mbps	/ 9.9 Mbps	Cancel
Tx/Rx Packet Rate:	819 p/s	/ 819 p/s	Apply
FP Tx/Rx Rate:	0 bps	/ 0 bps	Disable
FP Tx/Rx Packet Rate:	0 p/s	/ 0 p/s	Comment
Tx/Rx Bytes:	92.8 MiB	/ 225.7 MiB	Torch
Tx/Rx Packets:	73 521	/ 158 344	Cable Test
Tx/Rx Drops:	0	/0	Blink
Tx/Rx Errors:	0	/ 0	Reset MAC Address
Tx: 9.9 Mbps Rx: 9.9 Mbps			
Tx Packet: 819 p/s Rx Packet: 819 p/s			
enabled r	unning	slave	link ok



CASE 2

Multi-Port Traffic Generator

TRAFFIC GENERATOR

DEVICE UNDER TEST





🔘 admin@00:50:00:02:0	01:09 (TRAFFIC_GENERATOR) - WinBox v6.38.1 on x86 (x86)	
Session Settings Dashb	poard /ip address	
Safe Mode	Session: 00:50:00:02:01:09 add address=10.1.0.1/24 interface=ether1 network=10.1.0.0	
🚔 Quick Set	add address=10.2.0.1/24 interface=ether2 network=10.2.0.0	
Interfaces	Address List add address=10.3.0.1/24 interface=ether3 network=10.3.0.0	
Se Bridge	🕈 🖃 🗸 🖾 🍸 🛛 Find	
PPP	Address 🔺 Network Interface 🔻	
°t¦s Mesh	中10.1.0.1/24 10.1.0.0 ether1 /IPV6 address	
ESS IP D	국 10.2.0.1/24 10.3.0.0 ether3 add address=2001:10:1:0::1 interface=ether1	
👳 IPv6 🗈	IPv6 Address List	
🧱 Routing 🗈 🗈	add address=2001:10:3:0::1 interface=ether3	
🚱 System 🗅		
Queues	3 ite Global 🐺 is 🐺 yes 🐺 + - Filter admin@00:50:00:02:02:09 (DUT) - WinBox v6.38.1 on x86 (x86)	×1
Files	Address \triangle Fro Interface Advertise Session Settings Dashboard	
🔀 📄 Log	G ⊕ 2001:10:2::1/64 ether2 yes Safe Mode Session: 00:50:00:02:02:09 Memory: 988.8 MiB CPU: 0% ■ 6	à
🔏 🧟 Radius	G + 2001:10:3::1/64 ether3 yes	
🗧 🎇 Tools 🛛 🗅	Address List	
📄 🔤 New Terminal	3 items out of 13 Bridge Bridge Find	
👸 🗋 Make Supout.rif	Address 🛆 Network Interface 🔻	
	약 [®] Mesh 약 [®] 10.1.0.2/24 10.1.0.0 ether1	
	/in 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 \blacktriangleright	
	add address=10.3.0.2/24 interface=ether3 network=10.3.0.0	
	/inv/6 address Address Address Address Advertise ▼	
	add address=2001:10:1:0::2 interface=ether1	
	add address=2001:10:2:0:2 interface=ether2	
	add address=2001:10:2:0::2 interface=ether2	
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TRAFFIC GENERATOR





🕲 admin@00:50:00:02:01:09 (TRAFFIC_GENERATOR) - WinBox v6.38.1 on x86 (x86)												
Session Settings Dashb	oard											
Safe Mode	Session: 00:50:00:02:01:09											
🔏 Quick Set	Traffic Generator Settings											
Interfaces	Test ID:											
Bridge	Latency Distribution Max.: 100 us	ОК										
PPP	Stats Samples To Keep: 100	Cancel	Traffic Generator Packet Templates									
IP Nesh	Latency Distribution Samples: 64	Apply	+ C Raw Packet Templates Find									
😹 Routing	Latency Distribution Measure Interval: 0-131us	Quick Start	Name 🛆 Header Stack Data Data Byte Port Interface 🔻									
⊕ System D		Start										
Queues		Stop										
Files		Inject Pcap										
		Stats										
Tools		Port										
New Terminal		Packet Templates										
👸 🗋 Make Supout.rif		Raw Packet Templates	Hereit and the second s									
👩 😧 Manual		Oreans	0 items									
🗧 🔘 New WinBox		Streams										
🕰 🖳 Exit	Running: no											

/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,udp ip-dst=10.3.0.1 ip-gateway=10.3.0.2 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,tcp 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-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-port1

Traffic Generator Packet	Templates						×
+ - 🕾 🍸	Raw Packet Templa	ates				Find	
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)							



		QUICK Start										
		Test ID	D: 🚺								Start	
		Stream	n:							\$	Stop	
admin@00:50:00:02:01:09 (TRAFFIC_GENERATOR) - Wir	nBox V6.38.1 on X86 (X86)	Por	t:							÷ 🗌	Close	ī
Session Settings Dashboard		Interface	a.								w Window	5
Safe Mode Session: 00:50:00:02:01:09											W WINDOW	
Quick Set Traffic Generator Settings		Packet Size	e:							▼		
Test ID:		MDDG	2							*		
Sig Bridge			. 20							Ť		
Latency Distribution Max.:		Tx Template	port1-to-port2						₹	÷		
Stats Samples To Keep:	100 Cancel		port1-to-port3						₹	\$		
255 IP Latency Distribution Samples:	64 Apply		port2-to-port1						₹	÷		
Partice N			port2-to-port3						₹	\$		
Latency Distribution Measure Interval:	0-131us Quick Start		port3-to-port1						₹	÷		
System P	Start		port3-to-port2						₹	÷		
	Stop	Seg. (ID	Ty Packete	Ty Rate	Ry Packete	Ry Rate	Lost Packets	Lost Bate I	at Min Lat ∆	Lat M	litter	
Files			1 64	3 19.9 Mbps	s 1 643	19.9 Mbps		0 bps 2	253us 1.65ms	18.5ms	18.3ms	•
🗙 📄 Log	Inject Pcap	1 2	1 64	3 19.9 Mbps	s 1643	19.9 Mbps	0	0 bps 2	246us 1.65ms	18.6ms	18.3ms	
Radius	Stats	1 3	164	3 19.9 Mbps	s 1 643	19.9 Mbps	0	0 bps 2	214us 1.85ms	27.4ms	27.2ms	
		1 4	164	3 19.9 Mbps 3 19.9 Mbps	s 1643 1643	19.9 Mbps 19.9 Mbps	0	U bps 3	3080s 1.91ms 281us 1.91ms	28.2ms	27.9ms 19.7ms	
Tools D	Ports	1 TC	DT 985	B 119.4 Mbps	s 9858	119.4 Mbps	0	0 bps 2	214us 1.76ms	28.2ms	28ms	
📄 🔤 New Terminal	Packet Templates	2 0	1 65	2 20.0 Mbps	s 1652	20.0 Mbps	0	0 bps 3	306us 1.1ms	4.38ms	4.07ms	
	Facket Templates	2 1	1 65	2 20.0 Mbps	s 1652	20.0 Mbps	0	0 bps 2	258us 1.14ms	4.18ms	3.92ms	
	Raw Packet Templates	2 2	1 65	2 20.0 Mbps	s 1652	20.0 Mbps	0	0 bps 2	262us 1.14ms	4.24ms	3.98ms	
🔱 😢 Manual		2 3	1 65	2 20.0 Mbps 2 20.0 Mbps	s 1652 1652	20.0 Mbps 20.0 Mbps	0	U bps 2	213US 1.22ms 283us 1.26ms	4.95ms	4./4ms	
New WinBox	Streams	2 5	1 65	2 20.0 Mbps	s 1652	20.0 Mbps	0	0 bps 3	337us 1.28ms	4.53ms	4.19ms	
		2 TC	DT 9 91	2 120.0 Mbps	s 9 912	120.0 Mbps	0	0 bps 2	213us 1.19ms	4.95ms	4.74ms	
Exit Funning: no		TOT 0	3 29	5 19.9 Mbps	s 3 295	19.9 Mbps	0	0 bps 3	306us 1.34ms	18.2ms	17.9ms	+
		20 items	2.20	10.0 Mb		10.0 Mbaa	0	06 2	050	10 5	10 0	Ē



	♦ admin@192.168.111.12 (DUT) - WinBox v6.38.1 on x86 (x86)												
S	Session Settings Dashb	ooard											
	Safe Mode	Session: 192.168.111.12]				Memory: 9	88.5 MiB CP	U: 74% 📕 🗎				
Г	🔏 Quick Set	Interface List											
	🛲 Interfaces	Interface Interface List	Ethemet EoIP	Tunnel IP Tunn	nel GRE	Tunnel VLA	N VRRP	Bonding	LTE				
	Bridge	+• - * X	T						Find				
	🚅 PPP	Name /	Type	Actual MTU	2 MTU	Тх		Rx					
	°੮¦ Mesh	R <>ether1	Ethemet	1500		4	0.0 Mbps		40.0 Mbps				
	255 ID N	R <>ether2	Ethernet	1500		4	0.0 Mbps		40.0 Mbps				
		R <>ether3	Ethernet	1500		4	0.0 Mbps		40.0 Mbps				
	👳 IPv6 🔹 🗈	R <>ether4	Ethernet	1500			0 bps		0 bps				
	😹 Routing 🛛 🗅	R <>ether5	Ethernet 1500				0 bps		0 bps				
	Sa Cuntom	R 4:>ether6	Ethernet	1500			0 bps		0 bps				
11	Sig System	R Sether/	Ethemet	1500			0 bps		0 bps				
	👳 Queues	R stether9	Ethemet	1500			0 bps		Obps				
	Files	R 4 *ether10-Mana	Ethemet	1500			74.3 kbps		3.2 kbps				
Ι.	📄 Log												
- 6	🧕 🧟 Radius												
	🗄 🄀 Tools 🔹 🕨												
	New Terminal	•							•				
9	2 🗋 Make Supout.rif	To items (5 selected)											
	Manual												
s	🖁 🍥 New WinBox												
	🤗 📙 Exit												
L				DAUS IN SHUS									

sion Settings Dashboard												
Safe Mode	Session: 192.168.111.1	2								Memory: 988.5 MiB CPU		
🔏 Quick Set	Interface <ether1></ether1>			Interface <ether2></ether2>			Interface <ether3></ether3>					
🛲 Interfaces	General Ethemet Lo	op Protect Status	Traffic	General Ethemet Loo	op Protect Status	Traffic	General Ethemet Loo	p Protect Status	Traffic	ОК		
Bridge	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	Cancel		
PPP	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	Apply		
To Mesh	ED To /Do Doto	0.5		ED To (Do Doto)	Ohee		ED To (Do Deter	0.5	(D han			
	FP IX/KX Rate:	U Dps		FP IX/RX Rate:	U Dps		FP IX/FX Rate:	U Dps		Disable		
Routing	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	/ <u>0 p/s</u>	Comment		
System	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	Torch		
Queues	Tx/Rx Packets:	822 504	/ 736 190	Tx/Rx Packets:	803 832	/ 949 451	Tx/Rx Packets:	876 519	/ 945 310	Cable Test		
Files	Tx/Rx Drops:	0	/ 420	Tx/Rx Drops:	0	/ 460	Tx/Rx Drops:	0	/ 453	Blink		
📄 Log	Tx/Rx Errors:	0	/0	Tx/Rx Errors:	0	/0	Tx/Rx Errors:	0	/0	Reset MAC Address		
🥵 Radius												
🄀 Tools 🗈												
New Terminal	Tx: 40.2 Mbps			Tx: 40.2 Mbps			Tx: 40.2 Mbps					
Make Supout.rif	Rx: 40.2 Mbps			Rx: 40.2 Mbps			Rx: 40.2 Mbps					
Manual												
EXI.	Ty Packet: 3 322	~~		Ty Packet: 3 322 r			Ty Packet: 2 222 p	/_				
	Rx Packet: 3 322	p/s		Rx Packet: 3 322 p	o/s		Rx Packet: 3 322 p	/s				
										link els		
	enabled	running	siave	enabled	running	siave		unning	siave	ііпк ок		

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

Torch (Running))											×
- Basic					- Filters						Start	
Interface:	ether2			₹	Src. Addres	s: 0.0.0.0	0/0				Stop	٦I
Entry Timeout:	00:00:0)3		s	Dst. Addres	s: 0.0.0.0	0/0				Class	╣
- Collect					Src. Address	6: ::/0					Close	
Src. Addres	SS	Src. Add	dress6		Det Address	£/0					ew Window	
Dst. Addres	SS	🗹 Dst. Add	dress6		Dat. / Madress							
MAC Proto	col	Port			MAC Protoco	all						
Protocol		VLAN Id	ł		Protoco	ol: any				₹		
DSCP					Po	t: any				₹		
					VLAN I	d: any				Ŧ		
					DSC	p. any						
					200	. any						
Eth. Proto Pr	otocol	Src.	[Dst.	Δ	VLAN Id	DSCP	Tx Rate ⊽	Rx Rate	Tx Pack	Rx Pack	•
800 (ip)	4/	10.2.0.1	1	10.1.0.1				19.9 Mbps	19.9 Mbps	1644	1644	
8600 (ipv6)	4/	2001:10:2::1	1 8	2001:10:3::	I		40	19.9 Mbps	19.9 Mbps	1644	1644	-
	30	1660250.11.1602.11	1	1021			40	U Dps	0 bps		, .	,
3 items	Total	Tx: 39.8 Mbps	Total R	x: 39.8 Mbp	s Total T	x Packet:	3 288		Total Rx Pac	ket: 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 secenario we will generates three diferent 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

Sadmin@00:50:00:02:05:09 (IP-PHONE_SIMULATOR) - WinBox v6.38.1 on x86 (x86)												
Session Settings Dashbo	pard											
Safe Mode	Session: 00:50:00:02:05:09	🔳 🛅										
Cuick Set Image Ima	Address List Find Address Network Interface Interface 10.1.0.100/24 Interface 1 tem Interface /ip address address=10.1.0.100/24 interface=ether1 network=10.1.0.0											

FiberCLI>_

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

) ac	dmin@00:5	0:00:02:	05:09 (IP-PHONE_SIMULATOR) - W	inBox v6.3	8.1 on	x86 (x86)			×					
S	Sessi	on Settings	a Dashb	oard											
	5	C# Safe	Mode	Session: 00:50:00:02:05:09											
	1	🔓 Quick Set	t	Traffic Generator Settings											
	P	Interfaces	3	Test ID:	0										
	2	🖁 Bridge		Latency Distribution Max.:	100	us	ОК	Traffic Ge	enerator Pack	et Templates					
	Ę	📫 PPP		Stats Samples To Keep:	100		Cancel	+ -	27	Raw Packet Te	mplates			[Find
	°	😮 Mesh					Arabi	Name		△ Header Stack	Data	Data Byte	Port	Interface	
	2	墅 IP	▶	Latency Distribution Samples:	64		Арріу								
	2	\land Routing	Þ	Latency Distribution Measure Interval:	0-131us		Quick Start								
	6	🔅 System	▶				Start								
	4	Dueues 💭					Stop								
		Files					Inject Perm								
	×٦	Log													
6	ž 4	🥵 Radius					Stats								
		Tools	Þ				Ports								
į	٦	New Tem	ninal				Packet Templates	0 items							
- 0	į l] Make Sup	pout.rif				Raw Packet Templates			10000		Alia Statio		distant of	
	ē	😧 Manual					Ctroomo								
	00	婱 New Win	Box				Streams								
4	Ύ	📙 Exit		Running: no											



Packet Template <v< th=""><th>OIP_RTP></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></v<>	OIP_RTP>										
General MAC IP	UDP	ОК									
Name:	VOIP_RTP	Packet Template <voif< th=""><th>_RTP></th><th></th><th></th><th>Packet Template <voif< th=""><th>P_SIP></th><th></th><th></th><th></th><th></th></voif<></th></voif<>	_RTP>			Packet Template <voif< th=""><th>P_SIP></th><th></th><th></th><th></th><th></th></voif<>	P_SIP>				
Header Stack:	mac T 📤	General MAC IP I	UDP C	К		General MAC IP	UDP	ОК			
		Src.:	Car	ncel		Name: 🚺	/OIP_SIP	Cancel			
		Dst.:	10.100.0.100	ply		Header Stack: m	nac 🔻 🖨	Packet Template <voif< td=""><td>°_SIP></td><td></td><td></td></voif<>	°_SIP>		
	udp 🔹 🗢	Protocol:	17 (udp) 3			ic	, ∓ ♦	General MAC IP	UDP	ОК	
Data:	uninitialized Ŧ		Com	ment			ida 🛛 🖬 📥	Src.:		Cancel	
Data Byte:	0	Gateway:		ру				Dst.:	10.100.0.100	Apply	
		DSCP:	184 🗢 Ren	nove		Data: u	uninitialized 🗧	Protocol	17 (udp) ∓ 🚖		
Port:	▼	IP ID:	Packet Template (VOIP, PTP)			Data Byte: 0)	Geterrer		Comment	
Interface:		Frag. Offset:				D . [Galeway.		Сору	
Assumed Port:	dunamic0	тті.				Ροπ:	•	DSCP:	104 🗢	Remove	
Assumed later from:	ather1		Src. Port:	÷	Cancel	Interface:	`	IP ID:	<u></u>		
Assumed Interrace:	etheri	Assumed Src.:	1 Dst. Port: 16384-32	767 🔷	Apply	Assumed Port: d	tynamic0	Frag. Offset:	Packet Template <voip_< td=""><td>SIP></td><td></td></voip_<>	SIP>	
		Assumed Dst.:	Assumed Src. Port: 100		Comment	Assumed Interface:	ther1	TTI	General MAC IP UI	DP	ОК
		Assumed Protocol:	Assumed Det Port:		Copy				Src. Port:	\$	Cancel
					Pomoyo			Assumed Src.:	Dst. Port: 506	60 🗢	Apply
		Assumed DSCP:			Nemove			Assumed Dst.:	506	±1 ♦	
		Assumed IP ID:	0					Assumed Protocol:		•	Comment
		Assumed Frag. Offset:	0						Assumed Src. Port: 100)	Сору
		Assumed TTL:	64					Assumed DSCP:	Assumed Dst. Port:		Remove
								Assumed IP ID:			
								Assumed Frag. Offset:	0		
								Assumed TTL:	64		

/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

0	© admin@00:50:00:02:01:09 (INTRUDER) - WinBox v6.38.1 on x86 (x86)												
Ses	ssion Settings Da	ashbo	oard										
ю	Ca Safe Mod	le	Session: 00:50:00:02:01:09										
	🄏 Quick Set		Address List										
	Interfaces		+ - ★ E T Find										
	🕌 🙀 Bridge		Address 🛆 Network Interface 💌										
	📑 PPP												
	°t\$ Mesh												
	255 IP	$ \rangle$											
	9월 IPv6	\triangleright											
	😹 Routing	\triangleright											
	லි System	\triangleright	1 item										
	룢 Queues												
	Files	/ip	address										
×	📄 Log	adc	1 address=200.0.0.10/24 interface=ether1 network=200.0.0.0										
B	🧟 Radius 📃												
Vin	💥 Tools	$ \rangle$											
\geq	🔚 New Terminal												
Ö	[Make Supout.r	rif											
te	😋 Manual												
nc	New WinBox												



CREATE FABRICATED RANDOM TRAFIC

• Create random RAW packet in Traffic-Generator

🕓 a	admin@00:50:00:02:0	01:09 (INTRUDER) - WinBox v6.38.1 on x86 (x86)										
Ses	sion Settings Dashbo	oard										
ю	Carl Safe Mode	Session: 00:50:00:02:01:09				a						
	🎢 Quick Set	Traffic Generator Settings			Traffic	Generator Packet 1	Templates					
	Interfaces	Test ID: 🚺			÷	- 6 7	Raw Packet Tem	nplates		Find		
	Bridge	Latency Distribution Max.: 100 us	ОК	1	Name		Header Stack	Data Data	Byte Port Int	erface		
	📑 PPP	Stats Samples To Keep: 100	Cancel			Packet Template <spo< th=""><th>pof></th><th></th><th></th><th></th><th></th><th></th></spo<>	pof>					
	°t¦\$ Mesh		Apply			General MAC IP	Raw		Packet Template <spo< th=""><th>of></th><th></th><th></th></spo<>	of>		
	9 IP	Latency Distribution Samples: 64				Name:	spoof		Ca General MAC IP	Raw		ОК
	👳 IPv6 🛛 🗅	Latency Distribution Measure Interval: 0-131us	Quick Start	<u>/</u>		Header Stack:	mac	₹ \$	A Src.		+	Cancel
	😹 Routing 🛛 🗅		Start				ip	₹	Cor Dst.	10.100.0.100	€ L	Apply
	63 System ▷		Stop			·	raw	+ ₹	C Protocol	4	<u></u>	Comment
	🙊 Queues		laiset Dees			Data:	uninitialized	.	Re Gateway	200.0.0.1		Сору
	Files					Data Byte:	0		DSCP		• L	Remove
X	E Log		Stats		0 item	Port:		▼	IP ID	+	÷	
ĕ	🥵 Radius		Pc/ts		-	Interface:		▼	Frag. Offset			
Nir	🄀 Tools 🔹 🗅		Packet Templates			Assumed Port:	dynamic0					
ς Ω	New Terminal		Raw Packet Templates			Assumed Interface:	ether1		Assumed Src.	200.0.0.10	4	
õ	🛃 Make Supout.rif		Straame						Assumed Protocol	47 (ore)	417	
Ē	🤁 Manual										50	
Ы	S New WinBox	Running: no							Assumed DSCP			
									Assumed Frag. Offset		41.7	
											51.7	

/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

0	admin@00:50:00:02:	02:09 (DUT) - WinBox	v6.38.1 on x86	i (x86)				_	
Se	ssion Settings Dashb	oard							
ю	Safe Mode	Session: 00:50:00:02:0		I	Memory	986.1 MiB	CPU: 0%		
	🔏 Quick Set	Address List		[
	Interfaces	+ - * ×	- 7	Find					
	👷 Bridge	Address	Network	Interface	Comment	•			
	📑 PPP	⊕ 10.0.0.1/24	10.0.0.0	ether1	INTERNET				
	°t% Mesh	守 10.1.0.1/24 白 10 100 0 1/24	10.1.0.0	ether3					
	🐺 IP 🗅		10.100.0.0	etrierz	VOIF SERVER				
	👳 IPv6 🔹 🗈								
	😹 Routing 💦 🗅								
	🍪 System 🗈								
	🙊 Queues	3 items (1 selected)							
	Files								
×	E Log								

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

👌 🕥 New WinBox



CREATE MANGLE AND QUEUE TREE

- Create two mangle for VOIP and one mangle for rest of packets destinated 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 P	orts Conne	ctions A	ddress Lists	Layer7 Pro	otocols				
+ -	>	3	7	oo Rese	t Counters	oo Rese	et All Counter	5			Find	all	₹
# A	ction	Chain	Src	. Address	Dst. Address	Proto	Src. Port	Dst. Port	In. Inter	Out. Int	Bytes	Packets	•
::: VOIP	RULES					-							-
0 4	mar	prerouting			10.100.0.10	0					0 B		0
	mar	prerouting			10.100.0.10	0					0 B		0
2 KEST	RULES	promuting.			10 100 0 10	0					0.0		0
		prorodurig			10.100.0.10								
3 items													

/ip firewall mangle

Fiber<mark>CLI</mark>>

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 Typ	es					
+ - 🖉	× 🖻 🍸	00 Reset C	ounters	o Reset All (Counters			Fil	nd
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	backets queu	ed			
stration to the pitt									

/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

Session Settings Dashboard

6

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

Aurock Set			Quick Start (Ruppi	20)						x
Interfaces	Traffic Generator Settings		Galek Statt (Hahhh	'9/						
Bridge	Test ID: 0		Test ID: 0						Start	
📑 PPP	Latency Distribution Max : 100 us	ОК	Stream:					÷	Stop	
°t¦8 Mesh	State Samples To Keen: 100	Canad	Port:					÷	Close	
59 IP 🖻		Cancer	Interface:					\$	New Window	i -
👳 IPv6 🔹 🗅	Latency Distribution Samples: 64	Apply	Packet Size:					\$		
😹 Routing 🛛 🗅	Latency Distribution Measure Interval: 0-131us	Quick Start						•		
System ▷		Start	FF3:					▼	1	
👰 Queues			MBPS: 20					•		
Files		Stop	Tx Template: spo	oof				₹ \$		
E Log		Inject Pcap	Seg. (ID	Ty Packets	Tv Rate	Ry Packets	Ry Bate	Lost Packets	Lost Rate	
🧟 Radius		Stats	52 0	1 651	19.9 Mbps	0	0 bps	1 651	19.9 Mbps	•
🄀 Tools 🛛 🗅		Ports	53 0	1 636	19.8 Mbps	0	0 bps	1 636	19.8 Mbps	
New Terminal		Packet Templates	55 0	1 645	20.1 Mbps 19.9 Mbps	0	0 bps 0 bps	1 645	19.9 Mbps	
Ante Supout.rif		Tacket Templates	56 0	1 658	20.0 Mbps	0	0 bps	1 658	20.0 Mbps	
Manual N	1	Raw Packet Templates	57 0	1 651	19.9 Mbps	0	0 bps	1 651	19.9 Mbps	
uianuai		Changen	58 0	1 651	19.9 Mbps	0	0 bps	1 651	19.9 Mbps	
🕒 New WinBox		Streams	59 0	1 652	20.0 Mbps	0	0 bps	1 652	20.0 Mbps	•
Exit	Running: yes		•	1.651	19 9 Mbos	0	Ubos	1.651	I Y Y Mbbs	
			20 items							

INTRUDER

SIMULATOR) - WinBox v6.38.1 on x86 (x86)

Session Settings Dashboard

RouterOS WinB

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

🚰 Quick Set									
Interfaces			Quick Start (Ru	unning)					×
Bridge	Traffic Generator Settings		Test ID:	0				Start	
📑 PPP	Test ID: 0		Stream:				÷	Stop	
°t <mark>8</mark> Mesh	Latency Distribution Max.: 100 us	ок	Port:				4	Close	
환 IP 🕨 🕨	State Samples To Keep: 100	Creat	Interfaces						
Routing	Stats Samples To Neep. 100	Cancel	interrace:				`	New Window	
💮 System 🗅	Latency Distribution Samples: 64	Apply	Packet Size:				<u> </u>		
Queues	Latency Distribution Measure Interval: 0-131us	Quick Start	PPS:				\$		
		Start	MBPS:				†		
Log		Stop	Tx Template:	VOIP_RTP			₹ \$		
🥵 Radius				VOIP SIP					
🖌 Tools 🛛 🕅		Inject Pcap		Voli _51					
New Terminal		Stats	Seq ∧ ID	Tx Packets T	x Rate Rx Pa	ckets Rx Rate	Lost Packets	Lost Rate	
Make Supout rif		Ports	9 1 9 TOT	10	121.1 kbps 242.2 kbps	0 0 bp	s 10 s 20	121.1 kbps 242.2 kbps	•
Manual Manual			10 0	10	121.1 kbps	0 0 bp	s 10	121.1 kbps	
er Manual		Packet Templates	10 1	10	121.1 kbps	0 0 bp	s 10	121.1 kbps	
🔘 New WinBox		Raw Packet Templates	10 TOT	20	242.2 kbps	0 0 bp	s 20	242.2 kbps	
📃 Exit			11 0	10	121.1 kbps	0 0 bp	s 10	121.1 kbps	
		Streams	11 1	10	121.1 kbps	0 0 bp	s 10	121.1 kbps	
	Running: ves		12 0	20	121.1 kbps	0 0 bp	s 20 s 10	242.2 KDps	ر الار الع
	i kanning. yoo		12 1	10	121.1 kbps	0 0 bp	s 10	121.1 kbps	T.
	IP-PH	DN E	20 tems		1U	LA7	ΓΟ	R	

Steam States United Dataset	🔇 admin@00:50:00:02:02:09	9 (DUT) - WinBox v6.38.1 on x	86 (x86)													_ 8 ×	
Image: All and Section (1990)	Session Settings Dashboard	ngs Dashboard															
Quark SH Interface Interface <thinterface< th=""> <thinterface< th=""> <thinterface< th=""></thinterface<></thinterface<></thinterface<>	Safe Mode Ses	ssion: 00:50:00:02:02:09												Memory: 98	6.0 MiB CPU	: 15% 📕 🛅	
Workson Briefson	🔏 Quick Set 🛛 Interf	face List						Queue List									
Bisder Image: Type:	🛲 Interfaces Inte	erface Interface List Ethernet	EoIP Tunnel	IP Tunnel GR	E Tunnel VLAN VRF	RP Bonding	LTE	Simple Queues Interface Queues Queue Tree Queue Types									
Berler Non- Tope Actual W10 Image: Statistic with the statis with statistic with the statist with the statist wi	😹 Bridge 🚽						Find	+	× 🗂	T 00 Rese	t Counters	00 Reset A	VI Counters	1		Find	
Werk R Percent 150 0.0 bes 193 Mes 102 Mes <th>📑 PPP</th> <th>Name /</th> <th>Type</th> <th>Actual MTU</th> <th>Tx</th> <th>By</th> <th></th> <th>Name A</th> <th>Parent</th> <th>Packet Marks</th> <th>Limit At (b</th> <th>Max Limit</th> <th>Ava Bate</th> <th>Queued Bytes</th> <th>Bytes</th> <th>Packets V</th>	📑 PPP	Name /	Type	Actual MTU	Tx	By		Name A	Parent	Packet Marks	Limit At (b	Max Limit	Ava Bate	Queued Bytes	Bytes	Packets V	
IP IP<	°t% Mesh R	<i>ether1</i>	Ethernet	1500	0 bp)S	19.9 Mbps	BPBX_Traffic	global	T dorter Marra	Linie / e (D	Max Emit	10.2 Mbp	os 0 B	577.0 MiB	403 324	
10-6 Note winds Dement 1000 Desk Desk Init Init Desk Desk <th>😇 IP 🕨 🕨</th> <th><pre></pre></th> <th>Ethernet</th> <th>1500</th> <th>10.3 Mbp</th> <th>)S</th> <th>102.8 kbps</th> <th>REST</th> <th>PBX_Traffic</th> <th>rest-packets</th> <th>5M</th> <th>10M</th> <th>10.0 Mbp</th> <th>os 13.2 KiB</th> <th>537.9 MiB</th> <th>376 021</th>	😇 IP 🕨 🕨	<pre></pre>	Ethernet	1500	10.3 Mbp)S	102.8 kbps	REST	PBX_Traffic	rest-packets	5M	10M	10.0 Mbp	os 13.2 KiB	537.9 MiB	376 021	
Roding R 4-bries5 Bhemet 1500 Obes	👳 IPv6 D R	<pre>*/*ether3 </pre>	Ethemet	1500	102.8 KDp 0 bp	95 A	0 bps		FBX_Traffic	voip-packets	IMI	INI	240.0 KDp	DS UB	33.1 MIB	27 302	
9 system R ***threfs Bhomet 1000 Ubos Ubos <th>😹 Routing 🗈 R</th> <th>ether5</th> <th>Ethernet</th> <th>1500</th> <th>0 bp</th> <th>)S</th> <th>0 bps</th> <th>Queue <rest></rest></th> <th></th> <th></th> <th></th> <th>Queue <v< th=""><th>OIP></th><th></th><th></th><th></th></v<></th>	😹 Routing 🗈 R	ether5	Ethernet	1500	0 bp)S	0 bps	Queue <rest></rest>				Queue <v< th=""><th>OIP></th><th></th><th></th><th></th></v<>	OIP>				
Queue R +-defe Bhome 1000 0.0	System D R	<pre> <!-- style="text-align: center;"--> <!-- style="text-align: center;" </ style="text-align: center;"--> <!-- style="text-align: center;" </ style="text-align: center;" </</th--><th>Ethernet</th><th>1500</th><th>0 bp</th><th>)S</th><th>0 bps</th><th>General Statistic</th><th>cs</th><th></th><th></th><th>General</th><th>Statistics</th><th></th><th></th><th>0</th></pre>	Ethernet	1500	0 bp)S	0 bps	General Statistic	cs			General	Statistics			0	
R + 4ehee 5 Ehemit 1500 Obea Obea Ng Nake	Cueues R	<pre> ether8</pre>	Ethernet	1500	0 bp)S	0 bps	Ave Date	10.0 Mba	-			va Datas [240.0 khaa		L	
Image: Second December 10-Management Linemet 1000 69 / Apps IA 1 kops Mage: Redue Mage: Redue 837 Image: Redue Mage: Redue BB Dase Mage: Redue Image: Redue <th></th> <th></th> <th>Ethernet</th> <th>1500</th> <th>0 bp</th> <th>)S</th> <th>0 bps</th> <th>Avg. Nate</th> <th></th> <th>5</th> <th></th> <th></th> <th>wy. nate.</th> <th>240.0 KDps</th> <th></th> <th></th>			Ethernet	1500	0 bp)S	0 bps	Avg. Nate		5			wy. nate.	240.0 KDps			
Wide Occurd Bytes: 132 KB Occurd Bytes: 10 Accurd Bytes: 0		ether 10-Management	Ethemet	1500	69.7 Kbp)S	14.1 kbps	Avg. Packet Rate	e: 837			Avg. Pac	ket Rate:	20		Арр	
Image: Contract of the contract	Cog C Destina							Queued Bytes	s: 13.2 KiB			Queu	ed Bytes:	0 B		Disa	
New Yimbal Interns (3 selected) Interns (Ourse of De shot	. 0		= =		De elveter [0					
10 tems (3 selected) 10 tems (3 selected) Bytes: 527.9 MB Bytes: 527.9 MB Bytes: 331.MB Col Image: State of the Packet State o			•	Queued Packets	s: 19			Queued	Packets:	U		Com					
Wake Support if Image: Support if Imaf	New Terminal 10 it	tems (3 selected)						Bytes	s: 537.9 MiB	}			Bytes:	39.1 MiB		Coj	
Wanual	Make Supout.rif	wall						Packets	s [.] 376 021				Packets:	27 302		Rem	
New WinBox Intel Todes Intel Todes United Usis Contess Usis Con	😧 Manual Ditta	or Pulso NAT Mangle Pour	Sonrice Ports	Connections	Addresse Liste Lawer7 F	Protocolo		- Tacket	5. 570 021			le	Tackets.	27 302		Reset Co	
Exit Image: Contract on Reset All Counters End all # Action Chain Src. Address Dat. Address P. (2 n. interOut. Int. Wolf PULES 0 mark packet perouting 10.100.0.100 1 mark packet perouting 10.100.0.100 20.5 MB 14.333 1 mark packet perouting 10.100.0.100 20.5 MB 14.333 1 mark packet perouting 10.100.0.100 1258.8 MB 880 019	New WinBox		Jervice I Uits	Connections	Address Lisis Layer / I	TOLOCOIS		Dropped	d: 366 994				Dropped:	0		React All (
# # Action Chain Sic. Address Det. Address P. SD[In. Inter Out. Int. Bytes Packets T VOIP RULES 0 mark packet prerouting 10.100.0.100 20.5 MB 14.333 20.5 MB 14.333 1 Packet prerouting 10.100.0.100 20.5 MB 14.333 20.5 MB 14.333 2 mark packet prerouting 10.100.0.100 1258.8 MB 880 019 enabled enabled 2 mark packet prerouting 10.100.0.100 1258.8 MB 880 019 enabled enabled Junct Jatema	📕 Exit 📃 🛨		00 Reset Cou	unters 00 Re	set All Counters	Find a	↓	PCQ Queues	s:			S PCQ	Queues:			Reset Air	
0 mark packet prerouting 10.100.0.100 20.5 MB 14.333 1 mark packet prerouting 10.100.0.100 20.5 MB 14.333 1: REST RULES 10.100.0.100 1258.8 MB 880 019 2 mark packet prerouting 10.100.0.100 1258.8 MB 880 019 enabled enabled enabled enabled 10.100.0.100 10.100.0.100 3 tems 3 tems 10.100.0.100 10.100.0.100 10.100.0.100 10.100.0.100	#	Action Chain :	Src. Address	Dst. Address P	S D In. Inter Out. Int.	Bytes F	Packets 🔻										
1 mark packet prerouting 10.100.0.100 20.5 MB 14.333 ::: REST RULES 10.100.0.100 1258.8 MB 880 019 enabled enabled enabled) semicroscopy and the second		10.100.0.100		20.5 MiB	14 333										
Image: Rest Rules 2 mark packet prerouting 10.100.0.100 1258.8 MiB enabled enabled anabled	1	Mark packet prerouting		10.100.0.100		20.5 MiB	14 333										
anabled enabled enabled	2	;; REST RULES		10 100 0 100		1258 8 MiB	880.019										
In the second se		- B mane protocaling		10.100.0.100		1200.01110	000 010		_	_			_	_	_		
BUUT 3 items	X							enabled				enabled					
BUU 3 items	B																
3 items	Vir																
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3 items	Ö																
3 items	e l																
	370	ems															
	ž																

CASE 4

Testing wireless

S admin@192.168.88.254 (MikroTik) - WinBox v6.37.5 on RB951G-2HnD (mipsbe)											
ession Settings Dashboard											
Safe Mode	Session: R1MumMilan										
🔏 Quick Set	Interface <wlan1></wlan1>	Wireless Tables									
I CAPsMAN	General Wireless HT HT MCS WDS Nstreme NV2 Advanced Status	Interfaces Nstreme Dual Access List Registration Connect List Security Profiles Channels									
Interfaces	Mode: station bridge										
🚊 Wireless	Band: 2GHz-B/G/N ₹	Radio Name / MAC Address Interface Uptime AP W Last Activit Tx/Rx Signal Tx Rate Rx Rate									
Bridge	Channel Width: 20/40MHz Ce										
PPP	Frequency: 2422										
Switch	SCID: MusMine										
	Scan List: default										
Routing	Wireless Protocol: any										
∰ System ♪	Security Profile: class										
Queues	 Default Authenticate 										
Files		DHCP Client									
📄 Log	Address List	DHCP Client DHCP Client Options									
🧟 Radius		nd 🖌 🗁 🖉 🖉 Release Renew Find									
🔀 Tools 🗈 🗎	Address / Network Interface	▼ Interface ∧ Use P Add D IP Address Expires After St ▼									
New Terminal	D 🖶 192.168.88.254/24 192.168.88.0 wlan1	wian 1 yes yes 192.168.88.254/24 00:06:39 bound									
MetaROUTER											
Partition											
Make Supout.rif											
Manual											
	Ст										
3		allon									
ő											
	1 item	1 item									
ŏ											
Y		1 item									

admin@192.168.88.1	(MikroTik) - WinBox v	6.36.3 on cAP Lite (mips	pe)		and the second second second	and the second second							
ession Settings Das	hboard												
Safe Mode	Session: R1MumMilan	1											
🔏 Quick Set	Interface <wlan1></wlan1>					Bridge							
CAPsMAN	General Wireless		treme Statue Traffic		_	Bridge Ports F	Filters NAT Hosts						
🛲 Interfaces	Mo	e: ap bridge		Ŧ	ОК	+	× 🖸 🝸						
🚊 Wireless	Ba	H: 2GHz-B/G/N			Cancel			Priority (h	n Path Cos	st Horizor	Role	Root Pat	
📲 🤹 Bridge					Apply	;;; defconf							
📑 PPP	Channel Wid	n: ZU/40MHz Ce			Diaphle	::: defconf	bridae		80	10	disabled port		
🛫 Switch	Frequen	y: auto		▼ MHz	Disable	⊈ twlan1	bridge		80	10	designated port		
°t <mark>8</mark> Mesh	SS	D: MumMilan		•	Comment								
19 E	Scan L	t: default		∓ ≑	Advanced Mode								
Ø MPLS	Wireless Protoc	ol: 802.11		₹	Torch								
🌌 Routing 🗈	Security Prof	e: profile1		₹	WPS Accept								
i System ▷	WPS Mo	e: disabled		Ŧ	Care								
🙊 Queues	Bridge Mou	a: enabled			Scan								
Files				•	Freq. Usage								
Log	VLAN Mo	e: no tag		₹	Align	2 items (1 selected	i)						
🥵 Radius	VLAN	D: 1			Address List								
🔀 Tools 🗈				1	+- •	× 🗅 🍸						Find	
New Terminal	Default AP Tx Ra	e:		▼ bps	Re Para		△ Network	Interface				•	
MetaROUTER	Default Client Tx Rate	e:		▼ bps	- 192.168.88	3.1/24	192.168.88.0	bridge					
🧶 Partition		Default Authenticate											
🛄 Make Supout.rif		 Default Forward 											
😢 Manual		Hide SSID											
New WinBox													
Exit													
2						Ρ							
8													
2	enabled	running	ave	ng ap	1 item (1 selected)								
				-									

admin@192.168.88.2	254 (MikroTik) - WinBox v6.37.5 on RB951G-2HnD (mipsbe)														
Session Settings Da	shboard														
Safe Mode	Session: R1MumMilan	I													
Image: CAPsMAN Image:	Test ID 0 Latency Distribution Mass: 100000 Latency Distribution Samples: 64 Apply 0K Latency Distribution Measure Interval: 0:14m Cenneel 0K Latency Distribution Measure Interval: 0:14m Cenneel 0K Latency Distribution Measure Interval: 0:14m Cenneel 0K Cancel 0K Default Post: 0:2000 Cancel 0K Cancel 0K Default Post: 0:2000 Cancel 0K Default Post: 0:2000 Cancel 0:2000 Default Post: 0:2000 Cancel 0:2000 Default Post: 0:2000 <td< th=""><th></th></td<>														
	Assumed Protocol: [17 (udp) T D SCP: 0 Assume Frag Fiset: affic Assumed TTL: 64 Assumed TTL: 64														
admin@192.168.88.	254 (Mikroli	ik) - WinBox v	/6.37.5 on R	(8951G-2HnD (m	ipsbe)										
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Session Settings Da	shboard														
Safe Mode	Session:	R1MumMilan													a
🔏 Quick Set	Traffic Ger	nerator Settings	;				×								
CAPsMAN			Test ID	0	1								Latency Distribution	(Kunning)	
Interfaces		Latana Diat	de dien Marc	100000		OK	1						Stream ID: 0		
Wireless		Latency Distr	ndution Max.	: 100000 us		UK	-						Port: port1		
Bridge	_	Stats Samp	oles To Keep	: 100	(Cancel									
	1	atency Distribut	tion Samples	64		Apply							Sequence: 1		
	-					tala Orașt									
OTO Mach	Latency L	Jistribution Mea	isure interval	U-1./9s	Qu	lick Start							tt Interes	(Count) Chara (%)	
	Fraffic Gene	erator Stats										[64 0-1.79s	1702 100.000	
	Streams F	Ports Raw											27 755ms-783ms	475 27.908	
W MPLS		Dial diam											26 727ms-755ms	351 20.622	
Kouting N	1 Late	ency Distribution	n		1				I			Find	11 308ms-336ms	159 9.341	
💮 System	C / II	T. D	10 414	Dete Du D	a line ts	Rx Rate	Lost Packets	Lost Rate	Lat. Min.	Lat. Avg.	Lat. Max.	Jitter	24 671ms-699ms	138 8.108	
🙊 Queues			19 4 14	3.3 Mops	3 697	871.4 KDps 1892.8 kbps	15 833	9.0 Mbps 8.1 Mbps	6.44ms 112ms	325ms	772ms 576ms	766ms 463ms	5 140ms-168ms	118 6.933	
📄 Files	3 0		19 531	9.9 Mbps	1 019	521.7 kbps	18 512	9.4 Mbps	138ms	566ms	968ms	831ms	12 336ms-364ms	87 5.111	
📄 Log	4 0		19 532	10.0 Mbps	653	334.3 kbps	18 879	9.6 Mbps	994ms	1.29s	1.73s	737ms	0 0-28ms	63 3.701	
🧟 Radius	5 U 6 0		19 531	9.9 Mbps	1 052	794.6 KDps 551.4 kbps	17 979	9.2 Mbps 9.4 Mbps	738ms 836ms	1.03s	1.41s 1.38s	543ms	2 55.9ms-83.9m 1 28ms-55.9ms	s 26 1.527	
💥 Tools 🗈 🗅	7 0		19 532	10.0 Mbps	918	470.0 kbps	18 614	9.5 Mbps	1.24s	1.53s	1.79s	557ms	36 1.01s-1.03s	0 0.000	
New Terminal	8 0		19 531	9.9 Mbps	1 270	650.2 kbps	18 261	9.3 Mbps	549ms	910ms	1.89s	1.34s	37 1.03s-1.06s	0 0.000	
Mata POLITER	10 0		19 532	9.9 Mbps	2 205	6.0 Mbps	7 686	8.8 Mbps 3.9 Mbps	44.5ms 8.22ms	665ms 70.7ms	1.51s 223ms	1.46s 215ms	38 1.06s-1.09s	0 0.000	
	11 0		19 531	9.9 Mbps	16 647	8.5 Mbps	2 884	1476.6 kbps	7.6ms	39.7ms	161ms	153ms	40 1.12s-1.15s	0 0.000	
V Partition	12 0		19 531	9.9 Mbps	14 706	7.5 Mbps	4 825	2.4 Mbps	7.95ms	44.5ms	147ms	139ms	41 1.15s-1.17s	0 0.000	
J Make Supout.rif	13 0		19 531	10.0 Mbps	16 328	8.3 Mbps	3 203	1639.9 Kbps 1692.6 kbps	6.5/ms 5.92ms	36.2ms 37.9ms	16/ms 190ms	184ms	42 1.17s-1.2s	0 0.000	
😋 Manual	15 0		19 531	9.9 Mbps	19 087	9.7 Mbps	444	227.3 kbps	6.59ms	23.9ms	76.3ms	69.7ms	44 1.235-1.20s	0 0.000	
New WinBox	16 0		19 532	10.0 Mbps	11 108	5.6 Mbps	8 424	4.3 Mbps	6.96ms	91.3ms	314ms	307ms	46 1.29s-1.31s	0 0.000	
🖣 📴 Exit	17 0		19 531	9.9 Mbps	17 606	9.0 Mbps 9.8 Mbps	328	985.6 KDps 167.9 kbps	6.13ms 8.07ms	32.9ms 30.6ms	138ms 92.9ms	132ms 84.8ms	43 1.2s-1.23s	0 0.000	
	10 0		10 501	Q Q Mbpa	1/ 101	7.2 Mbpp	250	2.7 Mbpa	0.21mg	51.0mg	19500	10000	48 1.34s-1.37s	0 0.000	
	37 items							$+ \frown$					49 1.37s-1.4s	0 0.000	
Ď													51 1.43s-1.45s	0 0.000	
o													52 1.458-1.468 53 1.488-1.51e	0 0.000	
													50 1.48-1.43s	0 0.000	
9													54 1.51s-1.54s	0 0.000	
													55 1 548-1 578	0 0.000	

admin@192.168.88.2	54 (MikroTik) - WinBox v6.37.5 on	RB951G-2HnD (mipsbe)	alan kanadara													٢
Session Settings Das	hboard															
Safe Mode	Session: R1MumMilan															
🔏 Quick Set	Traffic Generator Settinos			Packet Stre	am <str1></str1>					Laten	ev Distribution (Bu	unning)				X
I CAPsMAN	Test I	D: 0		Nam	ie: str1		ОК			Laten	cy Distribution (ne	anning)				
Interfaces	Latency Distribution Ma	x · 1000000 us	ок	Default Po	nt: dvnamic0		Cancel			Strea	am ID: 🧕			^	Start	
Wireless	State Camples To Kee		<u> </u>				Cancer				Port: port1			₹ ▲	Stop	
Sidge Bridge	Stats Samples To Ree		Cancel	Po	rt: port I	•	Apply			Sequ	ience: 1				Close	
📑 PPP	Latency Distribution Sample	es: 64	Apply		D: 0		Disable								New Wiedow	
🛫 Switch	Latency Distribution Measure Interv	al: 0-1.79s	Quick Start	Packet Siz	e: 1500		Сору								TYEW WINDOW	4
°t¦8 Mesh			Charle	MBP	S: 1	_ ▲				#	Latency	△ Count	√ Share (%)			
255 IP 🗅			Juli	PP	S:	-	Remove			64	0-1.79s 0-28ms		8 100.000			
Ø MPLS			Stop	T. Terrelat						1	28ms-55.9ms		3 37.500			
🕺 Routing	Inaffic Generator State		· · · • 1	TX rempia	.e. juup	•				2	55.9ms-83.9ms		2 25.000			
∰ System ►	Streame Date Daw									27	1.020 1.060		0 0.000			
Queues	Streams Ports Raw									38	1.06s-1.09s		0 0.000			
Files	Latency Distribution								Find	40	1.12s-1.12s		0 0.000			
	Seq A ID IX Packets	x Rate Rx Packets	Rx Rate Los	t Packets Lo	ost Rate	Lat. Min.	Lat. Avg.	Lat. Max.	Jitter	41	1.15s-1.17s		0 0.000			
A Radius	0 83	996.0 kbps 996.0 kbps	8 96.0 KDps 6 72.0 kbps	/5 77	900.0 kbps 924.0 kbps	716us 1.46s	39.3ms 1.72s	78ms 1.81s	77.3ms 344ms	42	1.17s-1.2s		0 0.000			
	3 0 83	996.0 kbps	0 0 bps	83	996.0 kbps					45	1.26s-1.20s		0 0.000			-
	4 0 84	1008.0 kbps 2	2 264.0 kbps	62	744.0 kbps	2.52s	2.66s	2.78s	251ms	46	1.29s-1.31s		0 0.000			_
	6 0 84	1008.0 kbps 2	8 336.0 kbps	45	672.0 kbps	3.69s	3.85s	4.02s	325ms	43	1.2s-1.23s 1.31s-1.34s		0 0.000			
MetaROUTER	7 0 83	996.0 kbps 3	4 408.0 kbps	49	588.0 kbps	11.1ms	205ms	392ms	381ms	48	1.34s-1.37s		0 0.000			
Partition	8 0 83	996.0 kbps 9	6 1152.0 kbps 0 0 bps	-13 84	156.0 kbps 1008.0 kbps	137ms	659ms	1.14s	1s	49	1.37s-1.4s		0 0.000			
📑 Make Supout.rif	10 0 83	996.0 kbps 3	4 408.0 kbps	49	588.0 kbps	1.44s	1.68s	2.03s	584ms	52	1.43s-1.43s		0 0.000			-
😧 Manual	11 0 83	996.0 kbps	0 0 bps	83	996.0 kbps		0.07	0.07		53	1.48s-1.51s		0 0.000			
New WinBox	12 0 83	13 1008.0 kbps 13	5 1632.0 kbps 3 2.5 Mbps	-53	636.0 kbps 1548.0 kbps	2.72s	3.95s	2.6/s	3.35s	50	1.4s-1.43s		0 0.000			
Exit	14 0 83	996.0 kbps 19	7 2.3 Mbps	-114	1368.0 kbps	4.35ms	1.13s	2.87s	2.87s	55	1.54s-1.57s		0 0.000			
	15 0 83	996.0 kbps 7	1 852.0 kbps	12	144.0 kbps	39.4ms	422ms	712ms	673ms	56	1.57s-1.59s		0 0.000			
	17 0 83	996.0 kbps 6	0 720.0 kbps	-4	276.0 kbn	20.1 15	T3b7ms	788ms	767ms	57	1.59s-1.62s		0 0.000			
Ő	10 0 02	000 0 1-1 11	1050 01-1		200	100 -	71	000	027	59	1.65s-1.68s		0 0.000			
J	26 items									60	1.68s-1.71s		0 0.000			
										61	1.71s-1.73s		0 0.000			
Ŷ										63	1 76s-1 79s		0 0.000			+
										CE ito						

CASE 5

Injecting pcap

What is pcap?

B

How can I generate pcap captures?



D

_ 🗆 🛛 🗡 admin@10.0.1.1 (trainerMum) - WinBox v6.27 on RB951G-2HnD (mipsbe) юI C⁴ Safe Mode 🗹 Hide Passwords 🔳 🛅 🚰 Quick Set CAPsMAN Interfaces Wireless 📲 📲 📲 Traffic Generator Settings 💼 PPP Test ID: 🛫 Switch Latency Distribution Max .: 100 OK us °ta Mesh Stats Samples To Keep: 100 Cancel 255 IP Apply v∉ IPv6 Latency Distribution Samples: 64 Find MPLS Quick Start Latency Distribution Measure Interval: 0-109us File -OpenFlow Start 970 00:23:59 🔺 😹 Routing 20 00:23:59 0 00:23:59 System 0 00:23:59 Inject Pcap Queues 0 00:23:59 Ξm Files JUDIO 02 07:23:00 Ξp 002 05:39:10 E Log Ports Ξp 002 05:38:54 🧟 Radius Ξp 002 05:48:26 Packet Templates Ξp 002 07:22:07 💥 Tools Шр 970 00:48:43 Raw Packet Templates New Terminal 🔲 sł 970 00:00:36 £ 🖹 sy Streams c 002 04:06:30 MetaROUTER Οu 970 00:00:20 Running: no 🕭 Partition E v 002 07:51:56 web-proxy1 web-proxy store Jan/02/1970 00:24:01 📜 Make Supout.rif 43 items 18.7 MiB of 128.0 MiB used 85% free New WinBox \overline{c} Manual 📃 Exit

Inject pcap

🛇 admin@192.168.4.1 (R2) - WinBox v6.23 on RBmAP2n (mipsbe) _ 0 × Session Settings Dashboard CPU:3% Safe Mode Session: 192.168.4.1 he wick Set 🗆 🗙 🛛 File List CAPsMAN General Streaming Filter TB 😢 Backup Restore Upload... OK Interfaces File Name Туре Size Creation Memory Limit: 100 kb 744 B Jan/0 Wireless Cancel capture Only Headers Bridge Apply E flash/RouterAcceso-19700102-... backup 20.5 KiB Jan/02/ X 📑 PPP flash/skins flash/RouterAcceso-19700102-0326.backup Jan/01/ ile Name: capture . Start General Advanced Start 🙄 Switch File Limit: 1000 kb Stop °t[®] Mesh Ping To: 10.0.0.1 Stop ISS IP Packets Interface: -Close 2 MPLS ARP Ping Connections New Window 😹 Routing Packet Count: Hosts System Timeout: 1000 ms Protocols Queues Files 10.8 MiB of 16.0 MiB used 32% free 4 items Log 📌 Radius 7 Seq # / Host Time Reply Size TTL Status 36 10.0.0.1 1ms 50 50 Det. Port IP Pr... Sze 204... 1 (c... 204.... 1 (c... 204... 1 (c... 204.... 1 (c... 🔀 Tools 64 Src. Port Dst. Address Time.. / Interface Direction Src. Address 37 10.0.0.1 64 0ms 10.0.0.2 10.0.0.1 64 0.054 ether1 New Terminal 38 10.0.0.1 1ms 50 64 64 64 64 10.0.0.1 1.053 ether1 10002 39 10.0.0.1 Oms Oms Oms 50 64 E MetaROUTER 10.0.0.1 2.053 ether1 10.0.0.2 40 10.0.0.1 50 64 🕗 Partition 3.047 ether1 10.0.0.2 10.0.0.1 50 41 10.0.0.1 64 4.047 ether1 10.0.0.2 10.0.0.1 64 64 42 10.0.0.1 Oms 50 64 📜 Make Supout.rt 5.052 ether1 10.0.0.2 10.0.0.1 43 10.0.0.1 Oms 50 64 6.054 ether1 10.0.0.1 64 64 🕜 Manual 10.0.0.2 44 10.0.0.1 Oms Oms 50 64 7.050 ether1 10.0.0.2 10.0.0.1 New WinBox 50 64 45 10.0.0.1 8.049 ether1 10.0.0.2 10.0.0.1 64 50 46 10.0.0.1 1ms 64 📕 Exit 47 10.0.0.1 Oms 50 64 48 10.0.0.1 Oms 50 64 49 items 31 of 49 packets re... 36% packet loss Min: 0 ms Avg: 0 ms Max: 7 ms 9 items

Inject pcap

D.

🚫 admin@192.168.4.1 (F	R2) - WinBox v6.23 on RBmAP2n (mipsbe)														— D — X
Session Settings Das	hboard														
Safe Mode	Session: 192.168.4.1				_										CPU: 3% 📕 🛅
Quick Set					Park	at Soffer S	attings			Ele	list				
CAPsMAN					Gen		i Ph					Dealers	Destars Uni		
Interfaces					Gei	strea	ming Filter	_	ОК			IE Backup	nestore upi	080	
🗊 Wireless					Mer	mory Limit:	100	kb	Cancel	FP 1	capture		∠ Iype file	Size	744 B Jan/02/
Bridge							Only Headers		Apply	Ĩ			1.1		
PPP	Ping				١×	ile Name:	capture				Inject Pcap				
T Switch	General Advanced		. [Start		Cl. L.	1000		Start		Interfa	sce: ether1		₹	Start
°18 Mesh	Ping To: 10.0.0.1			Stop	F.	Fie Limit:	1000	KD	Stop		Pcap	File: capture		Ŧ	Stop
ES IP 1	Interface:		_	Class	H				Packets		Speed Multip	lier: 1.000		Ŧ	Close
MPLS N	ARP Pipe		l	Close					Connections			✓ Loop			Cidas
Routing 1	Padrat Count:		l	New Wind	w						terat	ion: 4			
itilia System ♪									HOSES	5	Ty Pack	ate: 25			
Queues	Timeout: 1000		ms						Protocols		TX FOUN	.613. 33			
Fles						ed					Tx By	tes: 2240			
Fles					L	ed	Packet Sniffer Pac	ckets		4 it	Tx By ems	tes: 2240	MiB of 16.0 MiB used		32% free
Files		a Danky Siza T	TI Status			ed	Packet Sniffer Pac	ckets		4 it	Tx By ems	tes: 2240	MiB of 16.0 MiB used		32% free
Files Files Cog Radius Ye Tools	Seg # / Host Tin 36 10.0.0.1 Tim	e Reply Size T 50	TL Status 64		•	ed	Packet Sniffer Pac	ckets	Dimetion Sec. A	4 m	Tx By ems	tes: 2240	MiB of 16.0 MiB used	Dent ID De	32% free
Files Log Radius Tools New Terminal	Seq # / Host Tim 36 10.0.0.1 1m 37 10.0.0.1 0m	e Reply Size T 5 50 5 50	TL Status 64 64		•	ed	Packet Sniffer Pac	ckets Ce	Direction Src. Ac	4 it/	Tx By ems Src.	Port Dst. Address	MiB of 16.0 MiB used	Prot IP Pr	32% free
Files Log Radius Tools New Terminal MetaBOUTER	Seq # Host Tin 36 10.0.0.1 1m 37 10.0.0.1 0m 38 10.0.0.1 1m 39 10.0.0.1 0m	e Reply Size T 50 50 50 50 50 50	TL Status 64 64 64 64		•	ed	Packet Sriffer Pac	okets De	Direction Src. Ac	4 it	Tx By ems Src.	Port Dst. Address	MiB of 16.0 MiB used	Prot IP Pr	32% free
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Inject pcap

Conclusion



Grazie mille!

Jose.roman@fibercli.com