# **BAB IV**

# RANCANGAN JARINGAN USULAN

### 4.1. Jaringan Usulan

Pada tahapan ini penulis memberikan usulan atau solusi untuk ditambahkannya *router mikrotik* dengan diterapkannya Manajemen *Bandwith Queue Tree* agar jaringan di PT. Bahtera Wiraniga Internusa Bekasi selalu berjalan dengan baik.

### 4.1.1. *Topologi* Jaringan

Pada tahap ini, penulis melakukan perubahan pada topologi jaringan dan mengimplementasikan suatu konfigurasi tambahan pada jaringan yang telah berjalan dan mendefinisikan parameter-parameter konfigurasi yang dibutuhkan agar bisa berjalan dengan baik dan sesuai dengan apa yang dibutuhkan oleh PT. Bahtera Wiraniga Internusa Bekasi.



Gambar IV.1 Topologi Jaringan PT Bahtera Wiraniga Internusa Bekasi.

#### 4.1.2. Skema Jaringan



Gambar IV.2 Skema Jaringan PT. Bahtera Wiraniga Internusa Bekasi.

Pada skema jaringan usulan dapat dilihat bahwa ada penambahan pada skema jaringan yaitu ditambahkannya router mikrotik yang nantinya akan digunakan untuk pembagian penggunaan *bandwith*.

#### 4.1.3. Keamanan Jaringan

Pada jaringan PT. Bahtera Wiraniga Internusa Bekasi sudah menggunakan teknik yang cukup baik untuk mengamankan jaringan komputer agar terhindar dari perlakuan oknum yang tidak bertanggung jawab yang berniat untuk merusak jaringan komputer tersebut, teknik yang dilakukan untuk mengamankan yaitu secara sistem atau melalui perangkat lunak dan secara fisik. Untuk masing-masing komputer *client* sudah diamankan dengan antivirus yang baik dimana antivirus tersebut untuk mencegah adanya *malware* atau virus yang akan merusak

*file* pada sistem komputer *client* dan dilakukan pengecekan berkala disetiap komputer *client* agar terhindar dari virus jahat dan tentunya menjadi lebih baik kinerja komputer *client* tersebut. Dan untuk komputer *server*, dalam pengamanannya dilakukan beberapa langkah pengamanan dari dalam sistem perangkat lunak berkala yaitu seperti meng-*update packet windows update*, meng-*install radmin/vnc* sebagai alternatif *remote server*, mengaktifkan *audit policy* dan *account lockout policy* untuk melihat *log* yang mencurigakan, serta melakukan *backup file* yang berada di *server*, pengamanan secara fisik sering dilakukan yaitu seperti kondisi *server* dan mengamankan peralatan *server* dengan meletakkan diruang tersendiri yang terkunci aman, hal tersebut tentunya dilakukan secara berkala agar menjamin kinerja yang baik setiap harinya.

#### 4.1.4. Rancangan Aplikasi

Pada tahap ini penulis melakukan dengan cara mengimplementasikan terlebih dahulu *konfigurasi* Manajemen *Bandwith Queues Tree* menggunakan *Router Mikrotik* yang sudah dibuat menggunakan mesin *virtual*. Simulasi ini bertujuan untuk meminimalisasi kesalahan yang ada sebelum penulis melakukan implementasi langsung ke dalam jaringan sistem nyata.

Penulis menggunakan *software virtual box* untuk memvirtualisasikan Manajemen *Bandwith QueueTree* Menggunakan *Router Mikrotik* pada jaringan PT. Bahtera Wiraniga Internusa Bekasi.

Sebelum konfigurasi dilakukan, dilakukan beberapa konfigurasi dan instalasi *software* pendukung terlebih dahulu.

- 1. Instal *software* Winbox
- 2. Membuat *address list*

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System         O Lee         192 (163, 1182)           O Lee         192 (163, 1182)           O Lee         192 (163, 1183)           O Lee         192 (163, 1167)           O Lee         192 (163, 1167)           O Lee         192 (163, 1167)           O Lee         192 (163, 1155)           O Lee         192 (163, 1155)	System         • User         192,163,1132           Res         • User         192,163,1134           Outer         • User         192,163,1134           Log         • User         192,163,1134           Res         • User         192,163,1134           Visition         • User         192,163,1147           Res         • User         192,163,1147           New Termand         • User         192,163,1144           Visition         • User         192,163,1147           New Termand         • User         192,163,1195           New Termand         • User         192,163,1195	System         • User         152:163:112           Gouese         • User         152:163:114           Site         • User         152:163:114           Log         • User         152:163:114           Log         • User         152:163:114           Log         • User         152:163:114           Log         • User         152:163:114           Maximum         • User         152:163:114           Maximum         • User         152:163:117           New Termin         • User         152:163:1155	noong .	• User 192.163.1771	
Quoues         © Uer         152:163:1183           Guoues         © Uer         152:163:1163           Outer         152:163:1164         Outer           O Uer         152:163:1164           O Uer         152:163:1155           MathOUTE         Pettor           Markanut         O Uer         152:163:1155	Boules         0 User         192, 163, 1183           Ine         0 User         192, 163, 1184           Log         0 User         192, 163, 1184           Vitre         0 User         192, 163, 1134           Vitre         0 User         192, 163, 1135           Patton         0 User         192, 163, 1135	Cacues         • User         152:163:183           • User         152:163:184           • User         152:163:164           • User         152:163:164           • User         152:163:164           • User         152:163:164           • User         152:163:167           • User         152:163:155	System	● User 192.168.1.182	
File         0 Uer         102 (103 / 104 (104 / 104 /	Res         O Los         192 (193 ) 194           Log         O Los         192 (183 ) 197           Redux         O Los         192 (183 ) 197           Robus         O Los         192 (183 ) 197           Robus         O Los         192 (183 ) 197           New Terminal         O Los         192 (183 ) 197           New Terminal         O Los         192 (183 ) 195           PattaOUTER         O Los         192 (183 ) 195           PattaOuter         New Terminal         New Terminal           PattaOuter         New Terminal         New Terminal           PattaOuter         New Terminal         New Terminal         New Terminal           PattaOuter         New Terminal         New Terminal         New Terminal           FattaOuter         New Terminal         New Terminal         New Terminal           FattaOuter         New Terminal         New Terminal         New Terminal         New Terminal           FattaOuter         New Terminal         New Terminal         New Terminal         New Terminal         New Terminal           FattaOuter         New Terminal         New Terminal         New Terminal         New Terminal         New Terminal           FattaOuter         New Terminal	File         • Uer         152 183 1.164           Log         • Uer1         152 183 1.167           Ratu         • Uer1         152 183 1.167           Ratu         • Uer1         152 183 1.167           Tobi         • Uer1         152 183 1.165           MeaROUTER         • Uer1         152 183 1.155           Fetton         MeaSopout f         152 183 1.155	Queues	• User 192.168.1.183	
• Uer1         192,163,1158           Log         • Uer1         192,163,1157           Radua         • Uer1         192,163,1124           Tools         • Uer1         192,163,1124           New Termal         • Uer1         192,163,1155           Neter Termal         • Uer1         192,163,1155           Neter Termal         • Uer1         192,163,1155	0         0         192,158,1158           Log         0         0         192,158,1157           Radua         0         0         192,158,1152           Volumi         192,158,1155         0           New Termal         0         0           MetaROUTER         Petton           Feature         192,168,1155	• User         152:163:158           Radun         • User         122:163:162           Od         • User         122:163:162           Main         • User         12:163:155	Files	• User 192.168.1.184	
L0g         •         User1         152,163,1167           Rodus         •         User1         152,163,1127           •         User1         152,163,1174           •         User1         152,163,1174           •         User1         152,163,1155           •         User1         152,163,1155           Mais Spacuff         •         User1         152,163,1155	Log              • User1             152,183,1187             • User1             152,181,1167             • User1             152,181,1167             • User1             152,181,1167             • User1             122,183,1196             • User1             • User1             122,183,1196             • User1             122,183,1196             • User1             • User1             122,183,1196             • User1             122,183,1196             • User1             122,183,1196             • User1             • User1             122,183,1196             • User1             • User1             122,183,1196             • User1	L03              • Use1         12: 183.187              IS: 187.187              IS: IS: 183.187              IS: IS: IS: IS: IS: IS: IS:		User1 192.168.1.158	
Raduar         • Upril         102:103:11/3           Otab         • Upril         102:103:11/3           New Termal         • Upril         102:103:11/3           Mata/DUTER         Patton         -           Marual         -         -           Ext         -         -	Redux         • User 1         132.153.174           Tools         • Ober 1         132.153.174           Wer-Terman         • Ober 1         132.153.155           Mets-Supcrift         132.153.155           Mets-Supcrift         132.155.155	Radun • 0 Uari 112:03:1174 Tola • 0 Uari 112:03:1174 New Terminal • Uberi 1132:163:1155 Main Support of Main Support of	Log	© User1 132.168.1.167	
Toola              • User1             132:163:136             • User1             132:163:135             • User1             132:163:135             • User1             132:163:135             • User1             132:163:155             • User1             · User1	Toola         0 Llast 1         132.163.1195           New Terminal         0 Llast 1         132.163.1195           Make Support ff Kenda         0 Llast 1         132.163.1195	Tools              • 0 Liver1             132 163 1.195            New Terminal             • 0 Liver1             132 163 1.155            Massaudfination            Sate	Radius	0 Uter 1 102.106.1.102	
New Terminal              • User 1             132-168.1.155            MetaFOUTER              Patton            Marual              Exe	New Terminal              • Uker 1             192,163,1155            Meta Subouting               Partition            Meta-subouting               Partition            Meta-subouting              Exet	New Terminal	Tools 1	e liker 1 192 183 195	
Marko Unitadi Marko Spot uff Manual Est	NateSUTER ReaROITER NateSupport	MetaPOUTER Patton MetaSopouta Set Set	New Terminal	User1 192.168.1.155	
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Ext	y mane advocation Marcual Ese	Have d where 0	Make Support of		
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EXT			Fialida		
			EXE		
		Marc Richard			
		Million (Local and Local and L			

## Gambar IV.3 Address list Mikrotik

- 3. Membuat *mangle* atau *rule* untuk user atau *client* dengan cara :
  - a. Pada tab *general*

\

- 1) *Chain* = *forward*
- 2) *Out interface = Local*
- b. Pada tab *advanced* 
  - 1) Dst address list = User ( di sesuaikan dengan yang dibuat

pada menu address list )

- c. Pada tab Action
  - 1) Action = Mark connection
  - 2) *New packet mark = Download*

	Mikrotik) - WinBox v6.36.4	on RB951G-2HnD (mipsbe)				
C* Safe Mode						✓ Hide Passwords
Guick Set	Frewall	New Mangle Rule				
CAPSMAN	Filter Rules NAT Man	General Advanced Extra Ac	tion Statistics		ОК	
Interfaces	+ - / × (	Chain: forward		Ŧ	Cancel	Find
, Wireless	# Action Chain	Sro. Addrese:			Annh	
🕻 Bridge	0 / mar forwar	Sic. Addiess.			Арру	
PPP 2	I 2 Mar IOrwar	Ust. Address:			Disable	
Switch		Protocol:		•	Comment	
Mesh		See Post		*	Сору	
IP 1		D D			Pomouro	
MPLS 1		Dst. Port;			Tremove	
Routing 1		Any. Port:		*	Reset Counters	
System 1		P2P:		•	Reset All Counters	
Queues		In. Interface:		-		
Files		Out. Interface: 🗌 oca		<b>Ŧ</b>		
Log						
Radius		In. Interface List:		•		
Tools 1	-	Out. Interface List:		•		
New Terminal						
MetaROUTER		Packet Mark:				
Partition		Connection Mark:		•		
Make Supout.rif	_	Routing Mark:		•		
Manual		Routing Table:		•		
Exit		-				
		Connection Type:		•		
		Connection State:		•		
		Connection NAT State:		-		
	2 items					

Gambar IV.4 General Mangle Mikrotik

C* Safe Mode					✓ Hide Pass	swords 📕 🗎
at Quick Set	Frewal	New Mangle Rule				6×
L CAPSMAN	Filter Rules NAT Man	General Advanced Extra Action Statistics		ОК		
m Interfaces	+ - 0 8 6	Sre Addrages List		Canad	Find	i Ŧ
📜 Wreless	# Action Chain			Cancer		
Bindge	0 / mar forwar	Dst. Address List: [] [ <u>MERCIPE</u> ]	• •	Apply		
PPP	1 / mar forwar	Laver7 Protocol:	•	Disable		
T Switch				Comment		
° 💲 Mesh		Content:	•	Conv		
I A A		Connection Bytes:	Ψ	Сору		
🖉 MPLS 🗈 🗅		Connection Rate:	v	Remove		
Routing		Per Connection Classifier		Reset Counters		
🎲 System 🗈				Reset All Counters		
Queues		Src. MAC Address:				
Files		Out. Bridge Port:	•			
🖹 Log		In Bridge Post				
A. Radius						
🔨 Tools 📉		In. Bridge Port List:	•			
New Terminal		Out. Bridge Port List:	•			
MetaROUTER						
🥵 Partition		IPsec Policy:	•			
💄 Make Supout rf		Ingreen Priority				
😝 Manual						
📕 Ext		Priority:				
		DSCP (TOS):	•			
		TCP MSS:	v			
		Packet Size:	¥			
		Random:	•			
		·▼ TCP Bags				
		- ICMP Options				
		IPv4 Options:	-			
		TTI ·				

Gambar IV.5 Advanced Mangle Mikrotik

O. B	likrotik) - WinBox v6.36.4 on RB951G-2HnD (mipsbe)			
Safe Mode				🗹 Hide Passwords 🔳 🛅
a Quick Set	Frewal	New Mangle Fule		
L CAPSMAN	Fiter Rules NAT Mangle Raw Service Ports Conn	General Advanced Extra Action Statistics	ОК	
Interfaces	+	Artion: mark narket	Capcel	Find al F
📜 Wreless	# Action Chain Src. Address Dst. Addres		Carice	
💢 Bridge	0 / mar forward		Apply	
📲 PPP	I I mar tonward	Log Prefix:	Disable	
🙄 Switch		New Packet Mark: Download	Comment	
° & Mesh		Passthrough	Сору	
· 메 만			Remove	
MPLS				
Routing			Reset Counters	
System P			Reset All Counters	
Gueues				
Files				
d Paden				
Y Tools				
New Terminal				
MetaROUTER				
Partition				
Make Supout of				
@ Manual				
📕 Ext				
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<u> </u>				
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SO				
10				
but				
x	2 tems (1 selected)			

# Gambar IV.6 Action Mangle Mikrotik

	/likrotik)	- WinB	ox vo.30.4	on KB9	616-2HnD	(mipsbe)									1	0 0	
C Safe Mode	_														✓ Hide F	Passwords	
Quick Set	Frewal				1												E
CAPSMAN	Fiter F	lules N	AT Mang	le Rav	W Service	Ports Conn	ections )	Address Lists	Layer7 Pro	otocols							
m Interfaces	+ -		8	7	I Res	et Counters	oo Res	et All Counter	5						Find	al	
🗼 Wreless	#	Action	Chain	0	Src. Address	Dst. Addres	s Proto.	Src. Port	Dst. Port	In. Inter.	Out. Int.	Bytes	Packets				
🖁 Bridge	0	/ ma	r forward	d I							local	8.6 GIB	8 044 210	 			
PPP	2	/ ma	forward	1							local	0 B	9238 920				
2 Switch																	
8 Mesh																	
EIP N																	
MPLS 1																	
Routing 🗈																	
System																	
Queues																	
Files																	
Log																	
Radius																	
Tools 🗅																	
New Terminal																	
MetaROUTER																	
Partition																	
Make Supout of																	
Manual																	
Exit																	
	-																

# Gambar IV.7 Hasil Mangle Mikrotik

- 4. Membuat *Queue Tree* untuk *User* atau *Client* dengan cara
  - a. Pada tab *general* 
    - 1) Name = User-Download
    - 2) Parent = Local
    - Packet Mark = Download ( Disesuaikan yang dibuat pada Magle Mikrotik )
    - 4) Max Limit = 1M ( Disesuaikan dengan bandwith yang di butuhkan )

(Mi)	rotik) - WinBox v6.36.4 on RB951G-2H	nD (mipsbe)							
C <sup>4</sup> Safe Mode									🗹 Hide Passwords 📕 🛅
Quick Set	Frewal								E ×
1 CAPSMAN	Filter Rules NAT Mangle Raw S	ervice Ports Connection	ns Address Lists Layer7	Protocols					
Interfaces			-						Find J.
2 Weday		1-	1						Citity di
1 Wreiess	Name / Address	Timeout							•
💢 Bridge	Manager 192.168.1.1/6     Manager 192.168.1.1/6								
📲 PPP	<ul> <li>Manager 192.168.1.178</li> </ul>								
I Switch	Manager 192.168.1.179								
0.9 Mach	Manager 192.168.1.180			Queue «User-Do	(nload)				
O PROFIL	@ User 192.168.1.153		Queue List	Court	United of G		- Cherry and a second s		
ም <b>ም</b> ቦ	© User 192.168.1.151		Simple Queues Interface	General Statist	3		ОК		
🖉 MPLS 🗈 🏌	User 192 168 1 159			Name:	Manager		Cancel		
Routing	O User 192.168.1.163		+ - <b>/</b> X (			1.		Find	
A Sustam	@ User 192.168.1.171		Name /	rarent:	local	•	Apply	Packets 🔻	
	@ User 192.168.1.182		User-Download	Packet Marks:	Download	₹ \$	Drashla	.6 GiB 7 887 2	
ueues	User 192.168.1.183     User 192.168.1.183		User1-Download				Lisable	.3 GIB 9 033 2	
🛄 Files	Oller 192.168.1.164			Queue Type:	pcq-download-defaul	t Ŧ	Comment		
■ Log	Q User1 192,168,1,158	-		Drivebu	0		Camu		
d Dadus	@ User1 192.168.1.167			Phoney.	0		Сору		
No nous	@ User1 192.168.1.162			Bucket Size:	0.100		Remove		
X Tools	User1 192.168.1.174				1				
New Terminal	User1 192.168.1.195     O User1 192.168.1.195			Limit At:		▼ bits/s	Reset Counters		
MetaROUTER	User 1 132, 100, 1, 133	_		May Limit	al.	▲ hite/e	Reset All Counters		
Patition				max come.		- 010/0			
- HL O - Id				Burst Limit:		▼ bits/s			
Make Supout nt				Burst Threshold:		▼ bits/s			
😫 Manual					-	1			
Ext				Burst Time:	1	<b>▼</b> 8		- /	
-			2 items (1 selected)						
		Ļ							
				enabled					
									2
									2
						_			
	21 items (1 selected)								

Gambar IV.8 General Queue Tree Mikrotik



Gambar IV.9 Hasil *Queue Tree Mikrotik* 

## 4.1.5. Manajemen Jaringan

Pada tahap ini, penulis melakukan implementasi Manajemen Bandwith Menggunakan Router Mikrotik. Sesuai dengan batasan masalah yang penulis lakukan.

## 4.2 Pengujian Jaringan

Dalam membangun sebuah jaringan komputer tentunya perlu dilakukan pengujian terhadap jaringan tersebut untuk memastikan semua sistem berjalan sesuai apa yang diharapkan.

#### 4.2.1. Penggujian Jaringan Awal

Pada pengujian jaringan awal sebelum dilakukan perubahan, penulis akan menjelaskan hal-hal yang sering dilakukan sebelum Manajemen *Bandwith Queue Tree* di terapkan.

Biasanya Administrator melakukan test bandwith menggunakan Speedtest dengan cara membuka link <u>www.speedtest.net</u> dengan aplikasi browser seperti

Chrome



Gambar IV.10 Hasil *Speedtest* Awal

Berdasarkan gambar IV.10 di atas sebelum diterapkannya Manajemen *Bandwith* menunjukan hasil *speedtest* besarnya *Bandwith* yang dimiliki PT. Bahtera Wiraniga Internusa Bekasi. Jumlah *Bandwidth* yang di dapat untuk downlaod sebesar 10 Mbps dan *Upload* sebesar 2.25 Mbps.

### 4.2.2. Pengujian Jaringan Akhir

Setelah penulis melakukan semua tahapan konfigurasi, pada tahap ini penulis akan melakukan tahapan final dalam menerapkan Manajemen Bandwidth Queue Tree Menggunakan Router Mikrotik yaitu dengan cara test bandwidth menggunakan Speedtest dengan membuka link <u>www.speedtest.net</u> pada aplikasi browser seperti Chrome



Gambar IV.11 Hasil *Speedtest* Akhir

Berdasarkan gambar IV.11 diatas menujukan hasil *speedtest* setelah diterapkannya Manajemen *Bandwidth*. Jumlah *bandwidth* yang di dapat untuk kecepatan *download* sebesar 0.97 Mbps dan *Upload* sebesar 2.25 Mbps berbeda dengan gambar IV.10 kenapa Administrator memberikan *Bandwidth* untuk kecepatan *donwload* sebesar 1 Mbps dan *Upload* sebesar 2.25 Mbps. karena *bandwidth* yang di dapat telah dibagi sesuai dengan kebutuhan dan hasil pembagian bisa kita lihat dari gambar IV.9.