

# Setup a Professional ISP Using MikroTik and Bandwidth Control in Bridge mode

MikroTik Routers to deliver Giga-bits of Traffic, Also we use it as a Bandwidth controller and firewall.

**By: Md. Abdur Rob Miah**

# Presentation Objectives

## MikroTik as Core & Bandwidth Controller and Distribution Router for ISP

- Limitations of MikroTik
- Advantages of MikroTik
- Using Mikrotik as a Bandwidth Controller and Firewall.
- Sizing and choosing Suitable Hardware
- Splitting Load to Multiple Routers

# Target Audience

- ISP more than 500 mbps Bandwidth.
- Fast growing Broadband ISP who will reach their achievement as a market leader.
- 500 mbps bandwidth at NOC
- ISP looking for cost effective Bandwidth Controller.
- ISP interested in Distribute their service.

# Current Trends

## Options available for ISPs

### Core Router:

- CISCO
- JUNIPER

# Limitations of MikroTik

## Router Hardware

- Tested & Certified Hardware with Benchmark
- Best performing Network Adapters System CPU Uses 32 bit
- Difficulty in Expansion & Scaling
- Slow Packet Forwarding & packet Drops at High Load

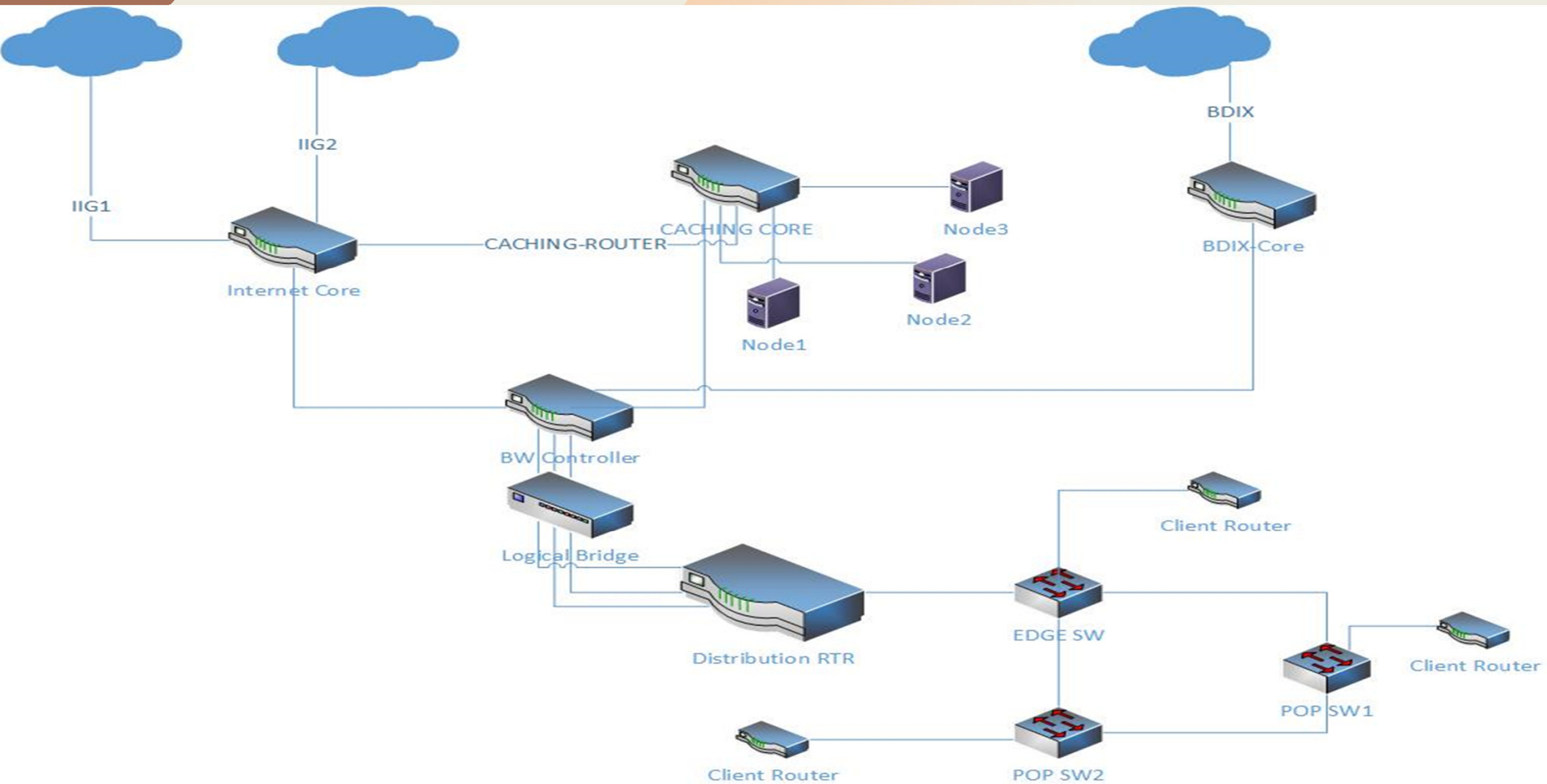
# MikroTik Advantage

- Runs on Standard Hardware
- Quick, simple and Low Cost Licensing
- Use Existing Knowledge and experience on MikroTik
- GUI to monitor
- Cost Effective Redundancy Planned Scale-ability

# Common Do's and Don't

- Separate Core And Access Routers Avoid NAT
- Avoid Connection Tracking
- Allocate One Interrupt per LAN Card Allocate One CPU Core per LAN
- Local Traffic not through Core Router
- Fast CPU & RAM

# Proposed Network Diagram



# Core Router

In Core Router CCR 1072-1G-8S+ Connect More than 5Gbps Internet Bandwidth, License Level 6 which is direct connected to the BW controller and GGC Router, All the NAT and Upstream and Downstream BGP announce from this router.

# CACHING Router

In Caching Router CCR 1072-1G-8S+ Server More than 8 Gbps Caching Bandwidth, License Level 6 which is direct connected to the BW controller and Core Router. All the Caching Server is connected to this router and Caching Server BGP Network is announced from here.

# Bandwidth Controller

In Bandwidth Controller Router Dell Server R430 with 4 1G Lan Card and 4 10G Lan Card, which is using as a firewall and Bandwidth Controller. All the Firewall and queuing policy is implementing here. Logically it using as a Bridge Mode, While Distribution router directly Connected to the core and Caching server through this router.

# Distribution Router

In Distribution Router CCR 1072-1G-8S+ Distribute all the bandwidth, all kinds of distribution and routing policy is implementing here. Example- BGP, OSPF, Static routing.

# Working Policy

**To done this Task We Need to know about some knowledge of BGP and Configure it as per the proposed diagram.**

## **What Is BGP ?**

The Border Gateway Protocol (BGP) is the protocol used throughout the Internet to exchange routing information between networks. It is the language spoken by routers on the Internet to determine how packets can be sent from one router to another to reach their final destination.

## **What Is ASN Number ?**

An AS is a group of IP networks operated by one or more network operator(s) that has a single and clearly defined external routing policy.

There are two types of AS Numbers:

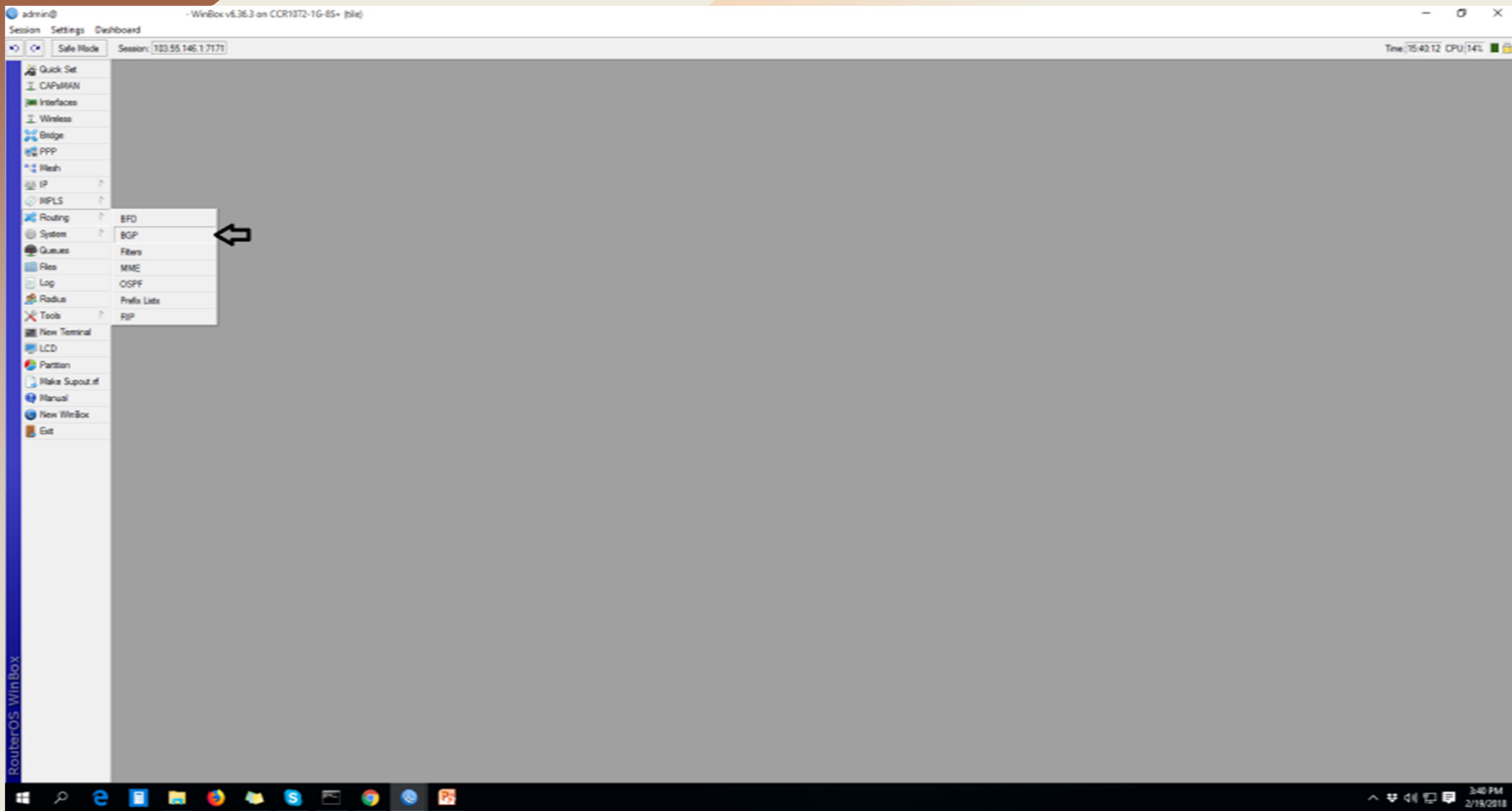
Public AS Numbers (1-64,495)

Private AS Numbers (64,512 – 65,534)

Reserved to use documentation (64,511-64,496)

0 and 65,535 – Reserved.

# MikroTik BGP



# BGP PROPERTIES

admin@ - WinBox v5.36.3 on COR1872-1G-8S+ (31k)

Session Settings Dashboard

Safe Mode Session: 103.55.146.1:7171 Time: 17:34:42 CPU: 11%

Quick Set CAPWAP Interfaces Wireless Bridge PPP Mesh IP MPLS Routing System Queues Files Log Radius Tools New Terminal LCD Partition Make Supt.out Manual New WinBox Exit

BGP

Instances VRFs Peers Networks Aggregates VPN4 Routes Advertisements

Refresh Refresh All Resend Resend All

Name	Instance	Remote Address	Remote AS	Int.	R.	TTL	Remote ID	Uptime	Prefix Co.	State	Comment
	default	45.64.133.53	24323	no	no	d...	202.74.247.254	9d 23:08...		1 established	
	default	45.64.133.233	24323	no	no	d...	202.74.247.254	13d 21:0...		1 established	
	default	103.55.146.2	134146	no	no	d...				idle	
	default	103.55.144.18	134146	no	no	d...	103.55.144.18	13d 21:0...		1 established	
	OWIN-BGP	103.55.146.254	64512	no	no	d...	103.55.146.254	13d 21:0...	3139	established	
	default	103.55.144.6	132735	no	no	d...	103.55.144.6	13d 21:0...		2 established	
	default	103.55.144.2	134146	no	no	d...	103.73.227.177	13d 21:0...		6 established	

7 items

RouterOS WinBox

5:34 PM 2/18/2018

# CORE ROUTER BGP INSTACNE AND CONFIGURATION

rob@ - WinBox v6.38.5 on CCR1072-1G-8S+ (tile)

Session Settings Dashboard

Safe Mode Session: 103.55.146.46:7242 CPU: 2% Uptime: 42d 07:07:46

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

BGP

Instances VRFs Peers Networks Aggregates VPN4 Routes Advertisements

+ Refresh Refresh All Resend Resend All Find

Name	Instance	Remote Address	Remote AS	M...	R...	TTL	Remote ID	Uptime	Prefix Co...	State
DIST-1-INTERNET	Test-Internet	103.221.52.6	65539	no	no	d...	172.15.1.10	42d 07:07:11	3	established

14 items

RouterOS WinBox

5:54 PM 2/19/2018

# DISTRIBUTION ROUTER BGP NETWORK CONFIGURATION

WinBox v6.40.3 on CCR1036-8G-25+ (tile)

Session Settings Dashboard

Safe Mode Session: 103.221.52.6.7242 CPU: 6%

RouterOS WinBox

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

BGP

Instances VRFs Peers Networks Aggregates VPN4 Routes Advertisements

Network

Network	Synchron...
10.1.128.0/17	no
10.2.252.0/24	no
10.2.253.0/24	no

3 items

6:01 PM 2/19/2018

# DISTRIBUTION ROUTER BGP PEER CONFIGURATION

rob@ - WinBox v6.40.3 on CCR1036-8G-2S+ (tile)

Session Settings Dashboard

Safe Mode Session: 103.221.52.6.7242 CPU:4%

RouterOS WinBox

BGP

Instances VRFs Peers Networks Aggregates VPN4 Routes Advertisements

Refresh Refresh All Resend Resend All

Name Instance Remote Address Remote AS M... R... TTL Remote ID Uptime Prefix Co... State

BGP Peer <INTERNET-PEER>

General Advanced Status

Name: INTERNET-PEER

Instance: default

Remote Address: 103.221.52.5

Remote Port:

Remote AS: 65536

TCP MD5 Key:

Nexthop Choice: default

☐ Multihop

☐ Route Reflect

Hold Time: 180 s

Keepalive Time:

TTL: default

Max Prefix Limit:

Max Prefix Restart Time:

In Filter: IIG-IN

Out Filter:

AllowAS In:

☐ Remove Private AS

☐ AS Override

Default Originate: never

☐ Passive

☐ Use BFD

OK

Cancel

Apply

Disable

Comment

Copy

Remove

Refresh

Refresh All

Resend

Resend All

enabled established

6:01 PM 2/19/2018

RouterOS WinBox

Quick Set

CAPsMAN

Interfaces

Wireless

Bridge

PPP

Mesh

IP

MPLS

Routing

System

Queues

Files

Log

Radius

Tools

New Terminal

LCD

Partition

Make Supout.tif

Manual

New WinBox

Ext

Queue List

Simple QueuesInterface QueuesQueue TreeQueue Types

Reset Counters

Reset All Counters

Find

#	Name	Target	Upload Max Limit	Download Max Limit	Packet Marks	Download	Total Max Limit (bps)	Comment
63	Youtube - 800 Taka - DIST - 1,2,3,4	10.1.139.0/24, 10.1.140.0/24, 10.1.3.0/24, 10.1.14.0/24, 10.3.3.0/24, 10.3.14.0/24, 10.4.3.0/24, 10.1.154.0/24, 10.1.24.0/24, 10.3.24.0/24, 10.4.24.0/24	500M	500M	AMRA-TUBE	28.7 Mbps		
64	Youtube - 900 Taka - DIST - 1,2,3,4	10.1.154.0/24, 10.1.24.0/24, 10.3.24.0/24, 10.4.24.0/24	500M	500M	AMRA-TUBE	0 bps		
65	Youtube - 1000 Taka - DIST - 1,2,3,4	10.1.141.0/24, 10.1.4.0/24, 10.3.4.0/24, 10.4.4.0/24	500M	500M	AMRA-TUBE	6.9 Mbps		
66	Youtube - 1100 Taka - DIST - 1,2,3,4	10.1.155.0/24, 10.1.11.0/24, 10.3.11.0/24, 10.4.11.0/24	500M	500M	AMRA-TUBE	0 bps		
67	Youtube - 1200 Taka - DIST - 1,2,3,4	10.1.142.0/24, 10.1.5.0/24, 10.3.5.0/24, 10.4.5.0/24	500M	500M	AMRA-TUBE	0 bps		
68	Youtube - 1300 Taka - DIST - 1,2,3,4	10.1.156.0/24, 10.1.25.0/24, 10.3.25.0/24, 10.4.25.0/24	500M	500M	AMRA-TUBE	0 bps		
69	Youtube - 1400 Taka - DIST - 1,2,3,4	10.1.157.0/24, 10.1.29.0/24, 10.3.29.0/24, 10.4.29.0/24	500M	500M	AMRA-TUBE	0 bps		
70	Youtube - 1500 Taka - DIST - 1,2,3,4	10.1.143.0/24, 10.1.6.0/24, 10.3.6.0/24, 10.4.6.0/24	500M	500M	AMRA-TUBE	8.1 Mbps		
71	Youtube - 1600 Taka - DIST - 1,2,3,4	10.1.158.0/24, 10.1.30.0/24, 10.3.30.0/24, 10.4.30.0/24	500M	500M	AMRA-TUBE	0 bps		
72	Youtube - 1700 Taka - DIST - 1,2,3,4	10.1.159.0/24, 10.1.31.0/24, 10.3.31.0/24, 10.4.31.0/24	500M	500M	AMRA-TUBE	0 bps		
73	Youtube - 1800 Taka - DIST - 1,2,3,4	10.1.144.0/24, 10.1.17.0/24, 10.3.17.0/24, 10.4.17.0/24	500M	500M	AMRA-TUBE	0 bps		
74	Youtube - 1900 Taka - DIST - 1,2,3,4	10.1.160.0/24, 10.1.32.0/24, 10.3.32.0/24, 10.4.32.0/24	500M	500M	AMRA-TUBE	0 bps		
75	Youtube - 2000 Taka - DIST - 1,2,3,4	10.1.145.0/24, 10.1.7.0/24, 10.3.7.0/24, 10.4.7.0/24	500M	500M	AMRA-TUBE	30.1 kbps		
76	Youtube - 2200 Taka - DIST - 1,2,3,4	10.1.161.0/24, 10.1.33.0/24, 10.3.33.0/24, 10.4.33.0/24	500M	500M	AMRA-TUBE	0 bps		
77	Youtube - 2300 Taka - DIST - 1,2,3,4	10.1.146.0/24, 10.1.18.0/24, 10.3.18.0/24, 10.4.18.0/24	500M	500M	AMRA-TUBE	0 bps		
78	Youtube - 2400 Taka - DIST - 1,2,3,4	10.1.163.0/24, 10.1.35.0/24, 10.3.35.0/24, 10.4.35.0/24	500M	500M	AMRA-TUBE	0 bps		
79	Youtube - 2500 Taka - DIST - 1,2,3,4	10.1.147.0/24, 10.1.8.0/24, 10.3.8.0/24, 10.4.8.0/24	500M	500M	AMRA-TUBE	0 bps		
80	Youtube - 2600 Taka - DIST - 1,2,3,4	10.1.164.0/24, 10.1.36.0/24, 10.3.36.0/24, 10.4.36.0/24	500M	500M	AMRA-TUBE	0 bps		
81	Youtube - 2700 Taka - DIST - 1,2,3,4	10.1.165.0/24, 10.1.37.0/24, 10.3.37.0/24, 10.4.37.0/24	500M	500M	AMRA-TUBE	0 bps		
82	Youtube - 2800 Taka - DIST - 1,2,3,4	10.1.166.0/24, 10.1.38.0/24, 10.3.38.0/24, 10.4.38.0/24	500M	500M	AMRA-TUBE	0 bps		
83	Youtube - 2900 Taka - DIST - 1,2,3,4	10.1.167.0/24, 10.1.39.0/24, 10.3.39.0/24, 10.4.39.0/24	500M	500M	AMRA-TUBE	0 bps		
84	Youtube - 3000 Taka - DIST - 1,2,3,4	10.1.148.0/24, 10.1.15.0/24, 10.3.15.0/24, 10.4.15.0/24	500M	500M	AMRA-TUBE	0 bps		
85	Internet - Rajuk - 500 Taka - DIST - 4	10.4.23.0/24	500M	500M		930.1 kbps		
86	1MB_200_Taka-DIST-2	10.1.41.0/24	500M	500M		1889.4 kbps		
87	2MB_250_Taka-DIST-2	10.1.42.0/24	500M	500M		297.4 kbps		
88	3MB_300_Taka-DIST-2	10.1.43.0/24	500M	500M		2.2 Mbps		
89	4MB_400_Taka-DIST-2	10.1.44.0/24	500M	500M		0 bps		
90	Internet - 300 Taka - DIST - 1,2,3,4	10.1.128.0/24, 10.1.13.0/24, 10.3.13.0/24, 10.4.13.0/24	500M	500M		298.5 kbps		
91	Internet - 500 Taka - DIST - 1	10.1.130.0/24, 10.1.131.0/24, 10.1.132.0/24, 10.1.133.0/24, 10.1.134.0/24, 10.1.135.0/24, 10.1.13...	500M	500M		42.0 Mbps		
92	Internet - 500 Taka - DIST - 2	10.1.2.0/24, 10.1.9.0/24, 10.1.10.0/24, 10.1.16.0/24, 10.1.21.0/24, 10.1.22.0/24	500M	500M		34.1 Mbps		
93	Internet - 500 Taka - DIST - 3	10.3.2.0/24, 10.3.9.0/24, 10.3.10.0/24, 10.3.16.0/24, 10.3.21.0/24, 10.3.22.0/24	500M	500M		34.9 kbps		
94	Internet - 500 Taka - DIST - 4	10.4.2.0/24, 10.4.9.0/24, 10.4.10.0/24, 10.4.16.0/24, 10.4.21.0/24, 10.4.22.0/24	500M	500M		668.5 kbps		
95	Internet - 600 Taka - DIST - 1,2,3,4	10.1.137.0/24, 10.1.40.0/24, 10.3.40.0/24, 10.4.40.0/24	500M	500M		566 bps		
96	Internet - 700 Taka - DIST - 1,2,3,4	10.1.138.0/24, 10.1.19.0/24, 10.3.19.0/24, 10.4.19.0/24	500M	500M		639.2 kbps		
97	Internet - 800 Taka - DIST - 1,2,3,4	10.1.139.0/24, 10.1.140.0/24, 10.1.3.0/24, 10.1.14.0/24, 10.3.3.0/24, 10.3.14.0/24, 10.4.3.0/24, 10...	500M	500M		25.5 Mbps		
98	Internet - 900 Taka - DIST - 1,2,3,4	10.1.154.0/24, 10.1.24.0/24, 10.3.24.0/24, 10.4.24.0/24	500M	500M		11.2 Mbps		
99	Internet - 1000 Taka - DIST - 1,2,3,4	10.1.141.0/24, 10.1.4.0/24, 10.3.4.0/24, 10.4.4.0/24	500M	500M		3.2 Mbps		
100	Internet - 1100 Taka - DIST - 1,2,3,4	10.1.155.0/24, 10.1.11.0/24, 10.3.11.0/24, 10.4.11.0/24	500M	500M		0 bps		
101	Internet - 1200 Taka - DIST - 1,2,3,4	10.1.142.0/24, 10.1.5.0/24, 10.3.5.0/24, 10.4.5.0/24	500M	500M		878 bps		
102	Internet - 1300 Taka - DIST - 1,2,3,4	10.1.156.0/24, 10.1.25.0/24, 10.3.25.0/24, 10.4.25.0/24	500M	500M		0 bps		
103	Internet - 1400 Taka - DIST - 1,2,3,4	10.1.157.0/24, 10.1.29.0/24, 10.3.29.0/24, 10.4.29.0/24	500M	500M		0 bps		
104	Internet - 1500 Taka - DIST - 1,2,3,4	10.1.143.0/24, 10.1.6.0/24, 10.3.6.0/24, 10.4.6.0/24	500M	500M		86.4 kbps		
105	Internet - 1600 Taka - DIST - 1,2,3,4	10.1.158.0/24, 10.1.30.0/24, 10.3.30.0/24, 10.4.30.0/24	500M	500M		0 bps		
106	Internet - 1700 Taka - DIST - 1,2,3,4	10.1.159.0/24, 10.1.31.0/24, 10.3.31.0/24, 10.4.31.0/24	500M	500M		0 bps		
107	Internet - 1800 Taka - DIST - 1,2,3,4	10.1.144.0/24, 10.1.17.0/24, 10.3.17.0/24, 10.4.17.0/24	500M	500M		0 bps		
108	Internet - 1900 Taka - DIST - 1,2,3,4	10.1.160.0/24, 10.1.32.0/24, 10.3.32.0/24, 10.4.32.0/24	500M	500M		0 bps		
109	Internet - 2000 Taka - DIST - 1,2,3,4	10.1.145.0/24, 10.1.7.0/24, 10.3.7.0/24, 10.4.7.0/24	500M	500M		6.1 kbps		
110	Internet - 2100 Taka - DIST - 1,2,3,4	10.1.161.0/24, 10.1.33.0/24, 10.3.33.0/24, 10.4.33.0/24	500M	500M		0 bps		
111	Internet - 2200 Taka - DIST - 1,2,3,4	10.1.162.0/24, 10.1.34.0/24, 10.3.34.0/24, 10.4.34.0/24	500M	500M		0 bps		
112	Internet - 2300 Taka - DIST - 1,2,3,4	10.1.146.0/24, 10.1.18.0/24, 10.3.18.0/24, 10.4.18.0/24	500M	500M		0 bps		
113	Internet - 2400 Taka - DIST - 1,2,3,4	10.1.163.0/24, 10.1.35.0/24, 10.3.35.0/24, 10.4.35.0/24	500M	500M		0 bps		
114	Internet - 2500 Taka - DIST - 1,2,3,4	10.1.147.0/24, 10.1.8.0/24, 10.3.8.0/24, 10.4.8.0/24	500M	500M		0 bps		
115	Internet - 2600 Taka - DIST - 1,2,3,4	10.1.164.0/24, 10.1.36.0/24, 10.3.36.0/24, 10.4.36.0/24	500M	500M		0 bps		
116	Internet - 2700 Taka - DIST - 1,2,3,4	10.1.165.0/24, 10.1.37.0/24, 10.3.37.0/24, 10.4.37.0/24	500M	500M		0 bps		
117	Internet - 2800 Taka - DIST - 1,2,3,4	10.1.166.0/24, 10.1.38.0/24, 10.3.38.0/24, 10.4.38.0/24	500M	500M		0 bps		
118	Internet - 2900 Taka - DIST - 1,2,3,4	10.1.167.0/24, 10.1.39.0/24, 10.3.39.0/24, 10.4.39.0/24	500M	500M		0 bps		
119	Internet - 3000 Taka - DIST - 1,2,3,4	10.1.148.0/24, 10.1.15.0/24, 10.3.15.0/24, 10.4.15.0/24	500M	500M		0 bps		
120 items	0 B queued		0 packets queued					

The background features a solid brown horizontal bar at the top. Below it, several large, overlapping circles in shades of light beige and peach are scattered across the frame. The text is centered within the overlapping area of two circles.

Now We Can do It to Our networks

# Scalability

- ⌘ Current Setup is can be scaled to 10 gig
- ⌘ Standby Router is kept for fail over
- ⌘ Total Cost of ownership of this setup is just 5% of other options
- ⌘ Existing Experience and knowledge on MikroTik is used for configuration and management.
- ⌘ No dependancy on any proprietary hardware.

The image features a solid brown horizontal bar at the top. Below it, the background is composed of several overlapping circles in various shades of beige and light brown. The word "QUESTIONS" is centered in white, uppercase letters within the intersection of two of these circles.

QUESTIONS

# Thanks For Attending MUM

Any Further query

Please contact

Md.Abdur Rob Miah

Cell : 01716018888

Email: [robce7@gmail.com](mailto:robce7@gmail.com)

Facebook: [www.facebook.com/robce7](http://www.facebook.com/robce7)