

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.

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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

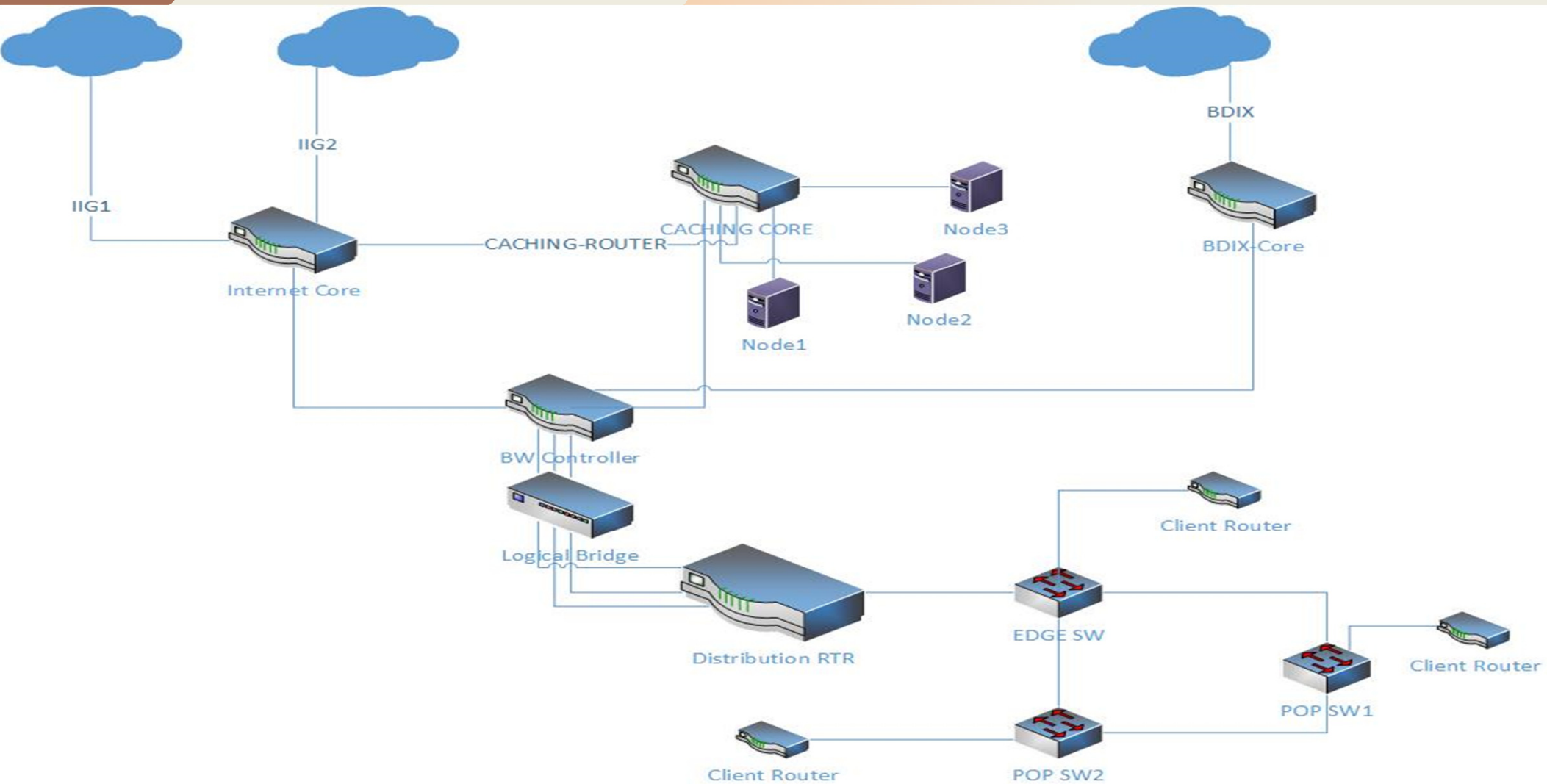
MikroTik Advantage

- 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:

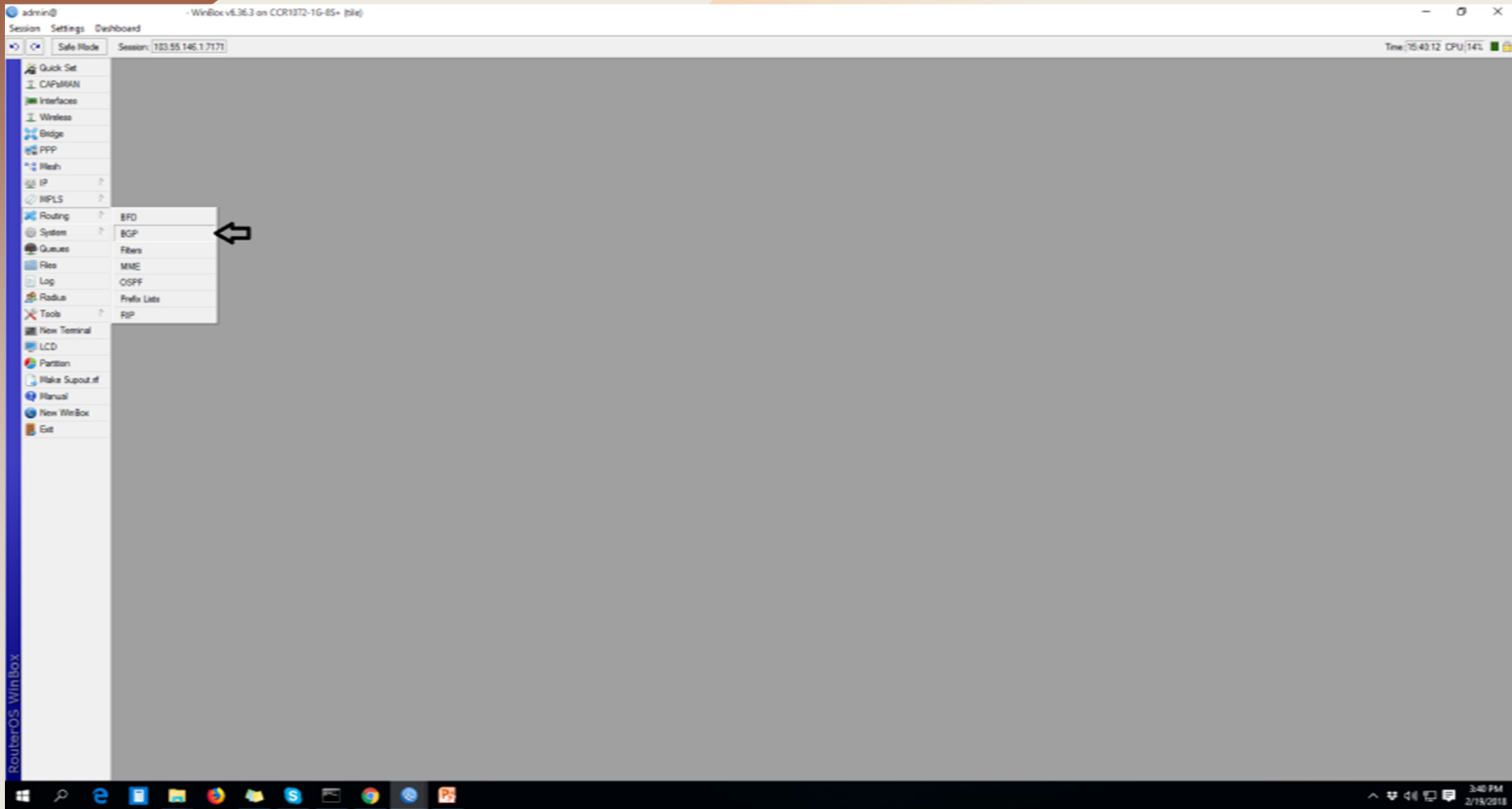
Public AS Numbers (1-64,495)

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+ (8le)

Session Settings Dashboard

Safe Mode Session: 103.55.146.17171 Time: 17:34:42 CPU: 11%

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

BGP

Instances VRFs Peers Networks Aggregates VRF4 Routes Advertisements

Refresh Refresh All Resend Resend All

| Name | Instance | Remote Address | Remote AS | ML | R. | TTL | Remote ID | Uptime | Prefix Co. | State | Comment |
|------|----------|----------------|-----------|----|----|-----|----------------|----------|------------|------------------|---------|
| | default | 45.64.133.53 | 24323 | no | d. | | 202.74.247.254 | 9d 23:08 | | 1 established | |
| | default | 45.64.133.233 | 24323 | no | d. | | 202.74.247.254 | 13d 21:0 | | 1 established | |
| | default | 103.55.146.2 | 134146 | no | d. | | | | | idle | |
| | default | 103.55.144.18 | 134146 | no | d. | | 103.55.144.18 | 13d 21:0 | | 1 established | |
| | OWIN-BGP | 103.55.146.254 | 64512 | no | d. | | 103.55.146.254 | 13d 21:0 | | 3139 established | |
| | default | 103.55.144.6 | 130735 | no | d. | | 103.55.144.6 | 13d 21:0 | | 2 established | |
| | default | 103.55.144.2 | 134146 | no | d. | | 103.73.227.177 | 13d 21:0 | | 6 established | |

7 items

5:34 PM 2/19/2018

CORE ROUTER BGP INSTANCNE AND CONFIGURATION

The screenshot shows the WinBox v6.38.5 interface for a Core Router. The main window displays the BGP configuration page, specifically the 'Instances' tab. The table below shows the configuration for a single BGP instance.

| 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 |

The interface also shows a sidebar with various configuration options like 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, and Exit. The bottom status bar shows the system time as 5:54 PM on 2/19/2018.

DISTRIBUTION ROUTER BGP NETWORK CONFIGURATION

The screenshot displays the WinBox v6.40.3 interface for a CCR1036-8G-25+ router. The main window is titled "BGP" and shows the "Networks" tab. The left sidebar contains various configuration categories, and the bottom taskbar shows the Windows OS environment.

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

Session Settings Dashboard

Safe Mode Session: 103.221.52.6.7242 CPU: 6%

BGP

Instances VRFs Peers Networks Aggregates VPN4 Routes Advertisements

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

3 items

RouterOS WinBox

6:01 PM 2/19/2018

DISTRIBUTION ROUTER BGP PEER CONFIGURATION

The screenshot displays the WinBox v6.40.3 interface for configuring a BGP peer. The main window is titled "BGP Peer <INTERNET-PEER>" and is divided into several sections:

- General Tab:**
 - Name: INTERNET-PEER
 - Instance: default
 - Remote Address: 103.221.52.5
 - Remote Port: (empty)
 - Remote AS: 65536
 - TCP MD5 Key: (empty)
 - Nexthop Choice: default
 - Multihop
 - Route Reflect
 - Hold Time: 180 s
 - Keepalive Time: (empty)
 - TTL: default
 - Max Prefix Limit: (empty)
 - Max Prefix Restart Time: (empty)
 - In Filter: IIG-IN
 - Out Filter: (empty)
 - AllowAS In: (empty)
 - Remove Private AS
 - AS Override
 - Default Originate: never
 - Passive
 - Use BFD
- Status:** enabled
- Connection State:** established

The interface includes a sidebar with navigation options like "Quick Set", "CAPsMAN", "Interfaces", "Wireless", "Bridge", "PPP", "Mesh", "IP", "MPLS", "Routing", "System", "Queues", "Files", "Log", "Radius", "Tools", "New Terminal", "LCD", "Partition", "Make Spout.rf", "Manual", "New WinBox", and "Exit". The top status bar shows "CPU:4%" and the bottom taskbar displays the date and time as "6:01 PM 2/19/2018".

| # | Name | Target | Upload Max Limit | Download Max Limit | Packet Marks | Download | Total Max Limit (bi... | 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... | 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 | | |



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, semi-transparent circles in shades of light beige and peach. The word "QUESTIONS" is centered in white, uppercase, sans-serif font within the intersection of two overlapping circles.

QUESTIONS

Thanks For Attending MUM

Any Further query

Please contact

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