LOAD BALANCE TRAFFIC

Aggregate Load Balance with BGP and MPLS

MUM ID 2018 | 19 – 20 Oktober 2018

Yogyakarta, Indonesia

SPEAKER PROFILE

- Firdhyan Adhie Lesmana
  - Adhielesmana.com
  - LapakWifi.com
  - DNS Premium
    - (www.facebook.com/dnspremium)
  - Forum MikroTik Indonesia
- ISP Operations Manager
  - PowerNet Liberia, West Africa.
- MikroTik Certified Trainer & Consultant
  - PowerNet Training Center, Liberia
- Facebook:
  - www.facebook.com/adhielesmana
- Whatsapp :
  - +6289660206541 (ID) / +231777306097 (LR)

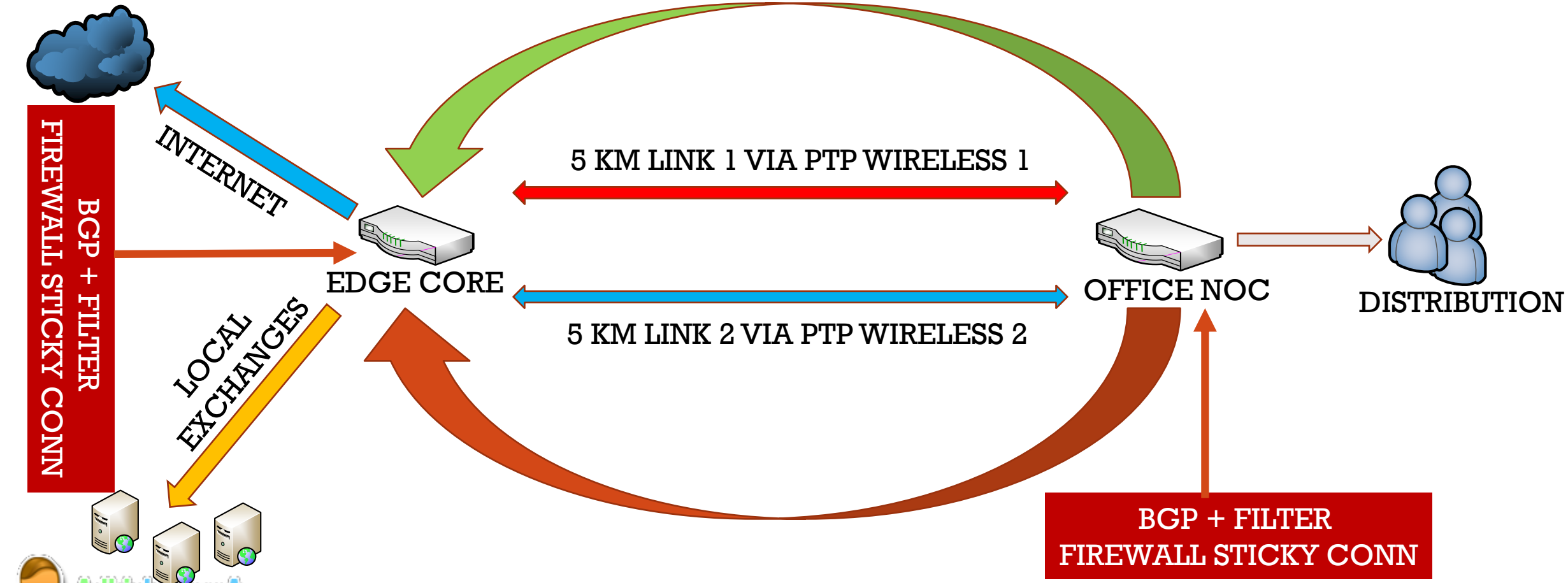
AdhielesmanA
Your Best Networking Partner

DESKRIPSI

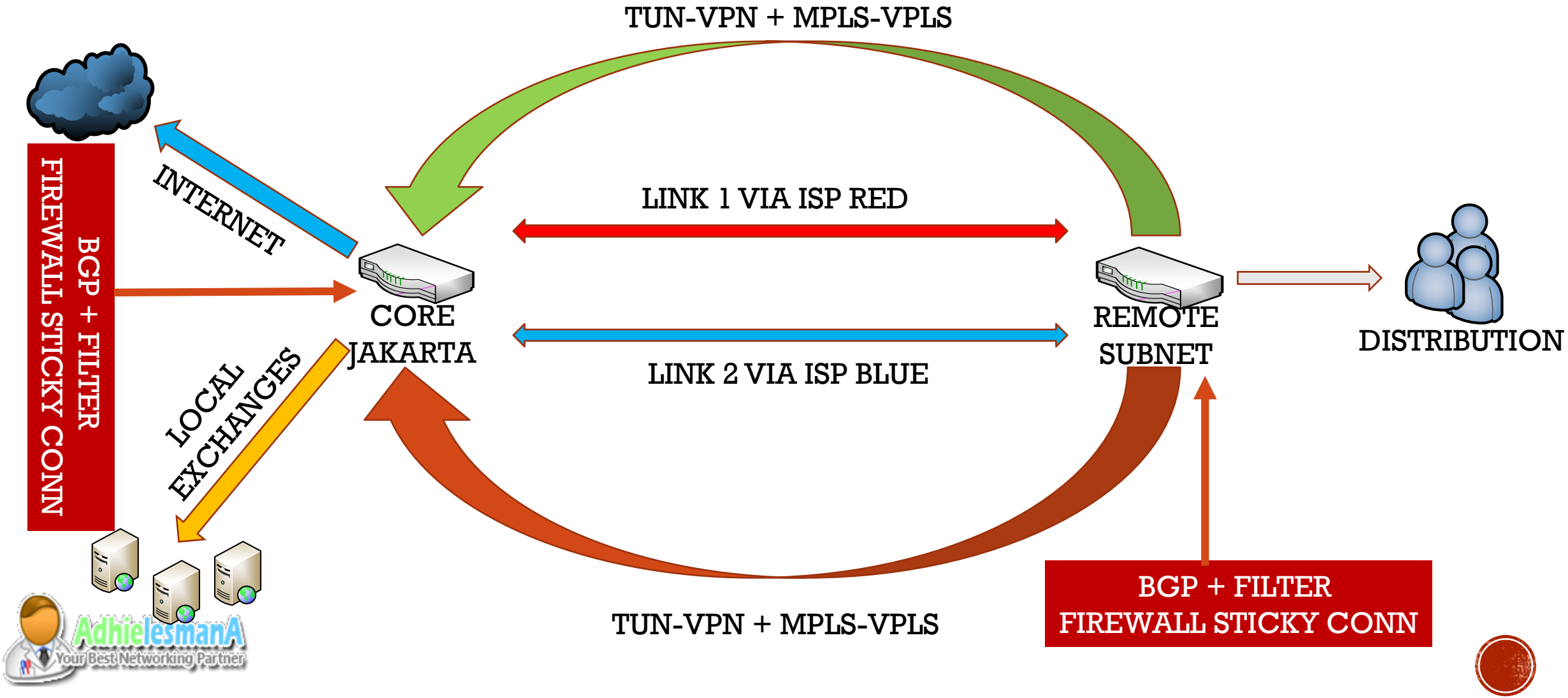
- Aggregating traffic for two or more backbone link.
  - Increase Total Backbone capacity.
  - Traffic Aggregate Solution
  - Not “Internet” Load Balance

AdhielesmanA
Your Best Networking Partner

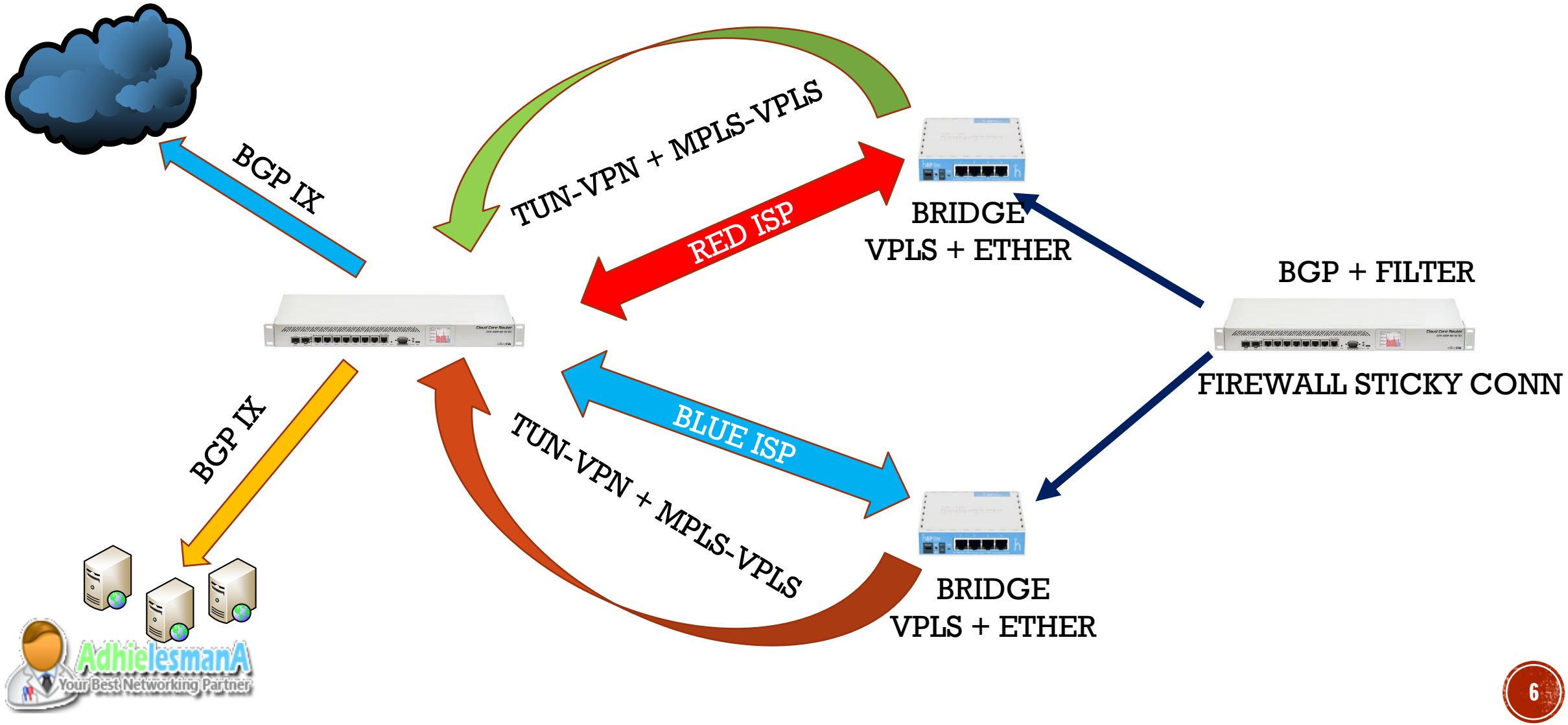
CONTOH TOPOLOGI 1



CONTOH TOPOLOGI 2



CONTOH TOPOLOGI 3



BENEFIT

- Cost Efficient
- Support Redundancy / Failover
- Load Sharing / Aggregate Traffic
- Easy Maintenance & Troubleshoot
- MPLS is faster than EoIP, Less CPU and Less protocol overhead

AdhielesmanA
Your Best Networking Partner

REQUIREMENT

- MikroTik Router (Both Locations)
  - Support MPLS, VPN, BGP, OSPF etc.
- Backbone Link
  - Wireless Backbone
  - Fiber Broadband (Tunnel)

AdhielesmanA
Your Best Networking Partner

STEP BY STEP

- **1. Prepare Link**
  - Make sure link established and traffic can passed.
  - We can use Wireless Backbone or Tunnel via Fiber Broadband
- **2. Create VPLS**
  - MPLS - VPLS on each router
  - Bridge with Ethernet *
- **3. Setup BGP**
  - Setup IP for VPLS interface
  - Create BGP peering in VPLS
  - Additional Route Filter Rules.
- **4. Firewall & Mark Routing**
  - Rule for Sticky Connections.

OPTION #1 WIRELESS BACKBONE

- Mode AP
  - AP Bridge or Bridge
    - ap + wds if station using wds
  - Bridged with Ethernet

- Mode Station
  - Station Bridge or Station WDS
  - Bridged with Ethernet

AdhielesmanA
Your Best Networking Partner

OPTION #2 TUNNEL BACKBONE

- Server PPTP / L2TP
  - Setup PPP Profile and Secret for Client PPP User Password
  - Use PTP Addressing /32 instead of IP Pool.

- Client PPTP / L2TP
  - Dial VPN Tunnel
  - Check IP
  - Test Connection, Ping to neighbor PTP IP address

MPLS - VPLS

- Create VPLS links between point to point router.
- Follow this information about VPLS
  - https://wiki.mikrotik.com/wiki/Manual:MPLSVPLS
  - Require OSPF
  - Require Loopback IP and Interfaces
- Join to MTCINE Training to learn BGP and MPLS Topic

AdhielesmanA
Your Best Networking Partner

BRIDGE VPLS AND ETHERNET

- Create Interface Bridge (For Topology 3)
  - add VPLS and Ethernet on Bridge.
  - For topology 1 and 2 we don't need bridge

AdhielesmanA
Your Best Networking Partner

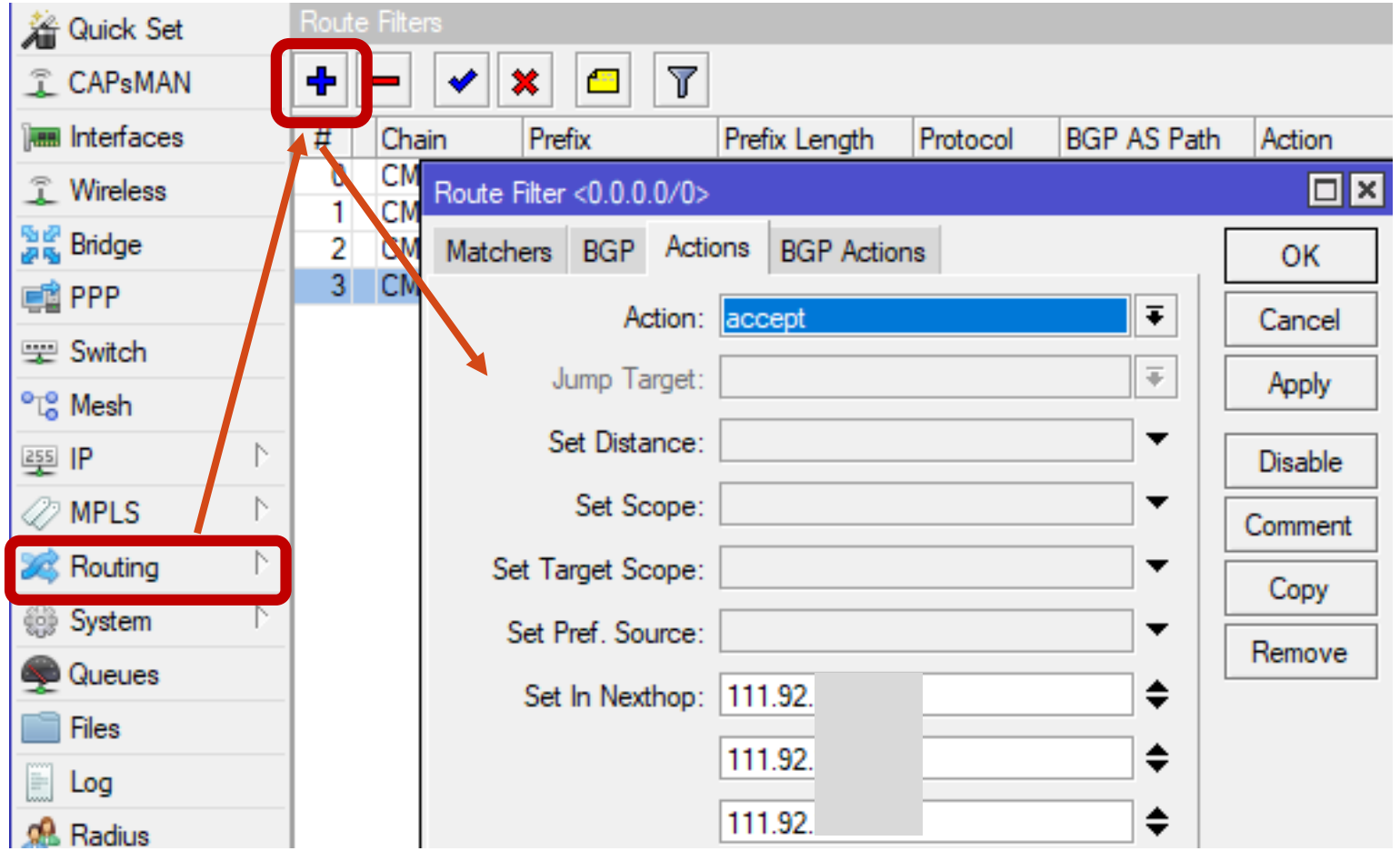
SETUP BGP PEERING

- Once the link is established and both router is reacheable.
- Create BGP peering between both locations and each link.
- Create new Routing Filter with custom action parameter.
- Assign the routing filter on BGP Instance

AdhielesmanA
Your Best Networking Partner

ROUTING FILTER EXAMPLE

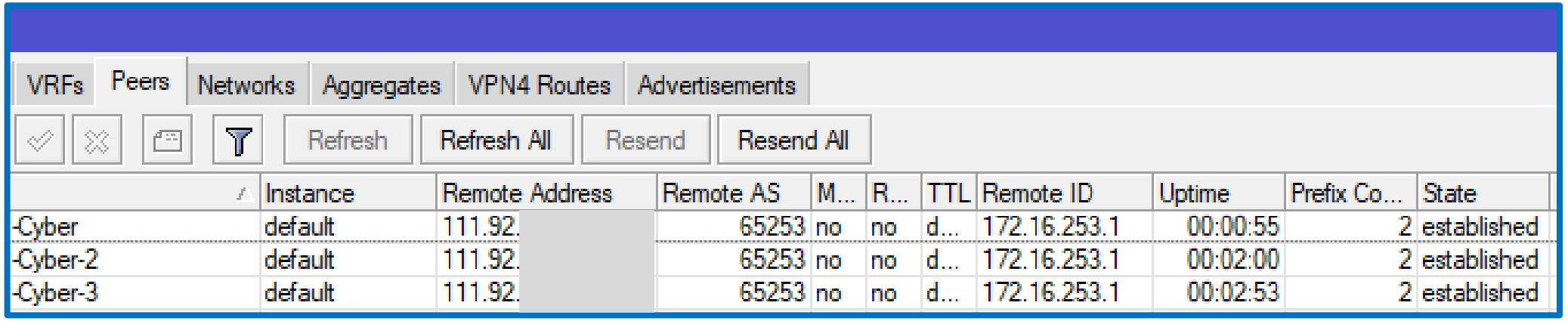
- Make Incoming BGP Route Filter.
- Make ICMP to Each Opposite routers IP
- Apply Route filter on Core and Remote Router



AdhielesmanA Your Best Networking Partner

ESTABLISHING THE BGP PEERS

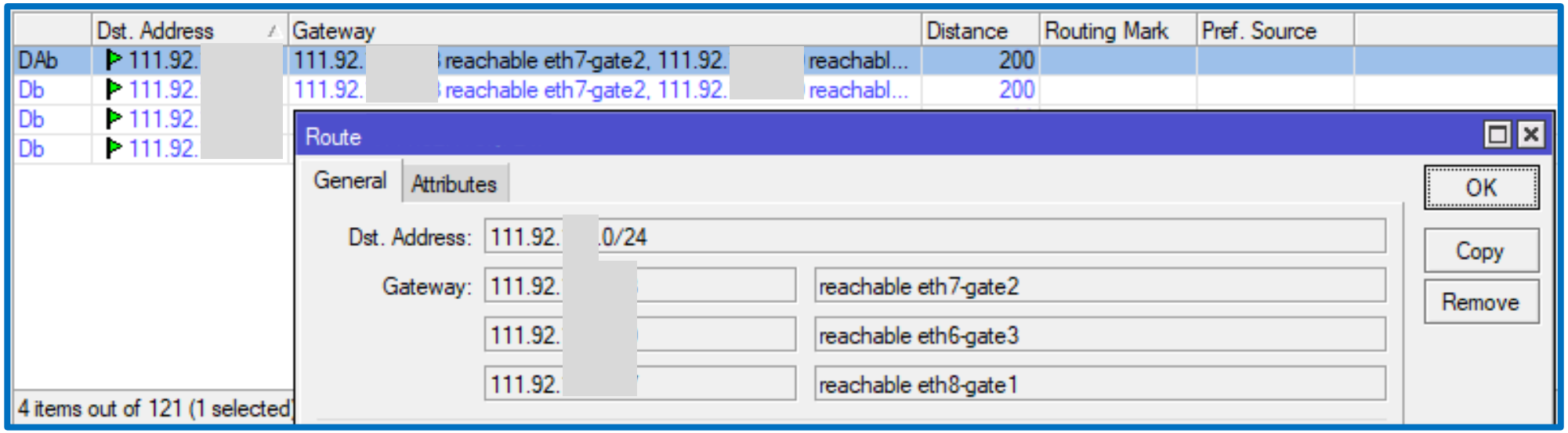
- Assign the Route filter to BGP Peers configuration
- Establishing the BGP Peers



	Instance	Remote Address	Remote AS	M...	R...	TTL	Remote ID	Uptime	Prefix Co...	State
-Cyber	default	111.92.	65253	no	no	d...	172.16.253.1	00:00:55	2	established
-Cyber-2	default	111.92.	65253	no	no	d...	172.16.253.1	00:02:00	2	established
-Cyber-3	default	111.92.	65253	no	no	d...	172.16.253.1	00:02:53	2	established

ROUTING BY BGP - FILTER

- Routing Result from BGP + Routing Filter
- Result on Remote Router



ROUTING BY BGP - FILTER

- Result on Core Router

	Dst. Address	Gateway		Distance
DAb	111.92. .0/30	111.92.	reachable VPLS-MD-1, 111.92. rea...	200
DAb	111.92. /30	111.92.	reachable VPLS-MD-1, 111.92. rea...	200
DAb	111.92. /30	111.92.	reachable VPLS-MD-1, 111.92. rea...	200
DAb	111.92. /30	111.92.	reachable VPLS-MD-1, 111.92. rea...	200

FIREWALL AND ROUTING MARK

- Add new firewall mangle and mark route all incoming traffic from each WAN interfaces.
- Create new routing mark for each Gateway following the routing mark from ip firewall mangle.
- Do this on both end.

AdhielesmanA
Your Best Networking Partner

FIREWALL AND ROUTING MARK

Firewall

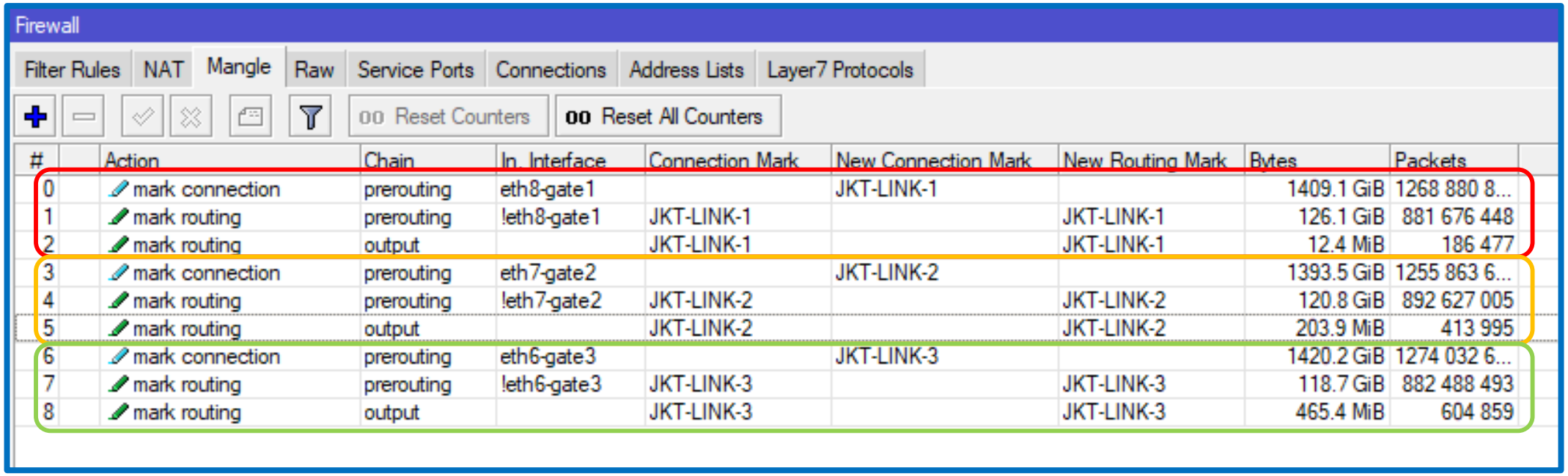
Filter Rules | NAT | Mangle | Raw | Service Ports | Connections | Address Lists | Layer7 Protocols

oo Reset Counters | oo Reset All Counters

#	Action	Chain	In. Interface	Connection Mark	New Connection Mark	New Routing Mark	Bytes	Packets
0	mark connection	prerouting	eth8-gate1		JKT-LINK-1		1409.1 GiB	1268 880 8...
1	mark routing	prerouting	!eth8-gate1	JKT-LINK-1		JKT-LINK-1	126.1 GiB	881 676 448
2	mark routing	output		JKT-LINK-1		JKT-LINK-1	12.4 MiB	186 477
3	mark connection	prerouting	eth7-gate2		JKT-LINK-2		1393.5 GiB	1255 863 6...
4	mark routing	prerouting	!eth7-gate2	JKT-LINK-2		JKT-LINK-2	120.8 GiB	892 627 005
5	mark routing	output		JKT-LINK-2		JKT-LINK-2	203.9 MiB	413 995
6	mark connection	prerouting	eth6-gate3		JKT-LINK-3		1420.2 GiB	1274 032 6...
7	mark routing	prerouting	!eth6-gate3	JKT-LINK-3		JKT-LINK-3	118.7 GiB	882 488 493
8	mark routing	output		JKT-LINK-3		JKT-LINK-3	465.4 MiB	604 859

AdhielesmanA
Your Best Networking Partner

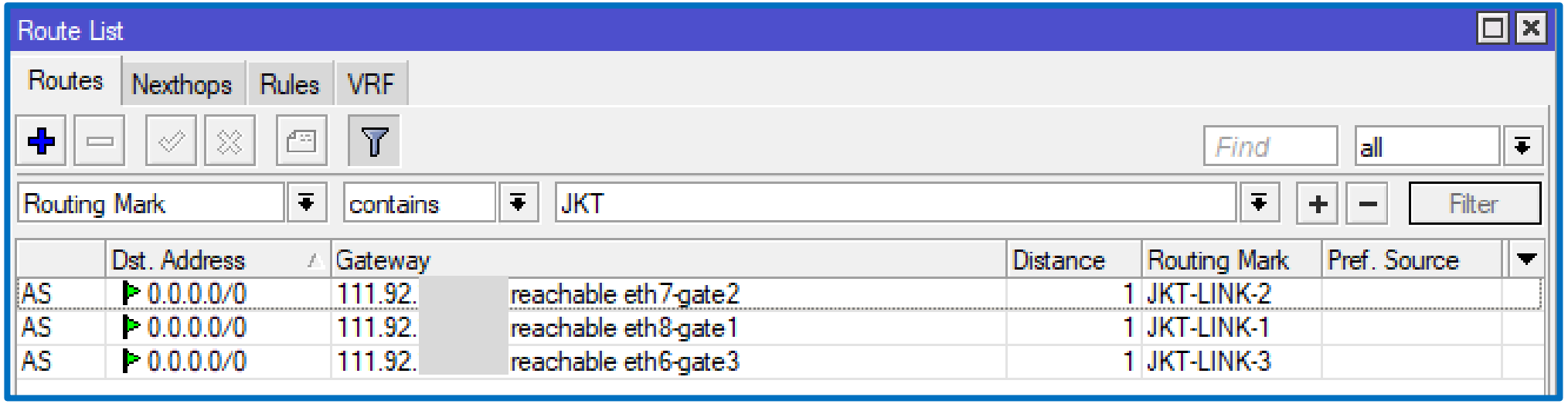
FIREWALL AND ROUTING MARK



#	Action	Chain	In. Interface	Connection Mark	New Connection Mark	New Routing Mark	Bytes	Packets
0	mark connection	prerouting	eth8-gate1		JKT-LINK-1		1409.1 GiB	1268 880 8...
1	mark routing	prerouting	!eth8-gate1	JKT-LINK-1		JKT-LINK-1	126.1 GiB	881 676 448
2	mark routing	output		JKT-LINK-1		JKT-LINK-1	12.4 MiB	186 477
3	mark connection	prerouting	eth7-gate2		JKT-LINK-2		1393.5 GiB	1255 863 6...
4	mark routing	prerouting	!eth7-gate2	JKT-LINK-2		JKT-LINK-2	120.8 GiB	892 627 005
5	mark routing	output		JKT-LINK-2		JKT-LINK-2	203.9 MiB	413 995
6	mark connection	prerouting	eth6-gate3		JKT-LINK-3		1420.2 GiB	1274 032 6...
7	mark routing	prerouting	!eth6-gate3	JKT-LINK-3		JKT-LINK-3	118.7 GiB	882 488 493
8	mark routing	output		JKT-LINK-3		JKT-LINK-3	465.4 MiB	604 859

AdhielesmanA
Your Best Networking Partner

STATIC ROUTE – ROUTING MARK



RESULT

- Result on Remote Router
- Load Balance Aggregated Traffic.
- No NAT
  - Packet go and comes with origin IP addresses
  - No src-address changes even when the routing path changes
    - Normally in load-balance our src-address always changes

eth6-gate3	Ethernet	1500	1580	4.5 Mbps	43.7 Mbps
eth7-gate2	Ethernet	1500	1580	2.7 Mbps	36.9 Mbps
eth8-gate1	Ethernet	1500	1580	5.8 Mbps	44.4 Mbps

AdhielesmanA
Your Best Networking Partner

RESULT

- Result on MAIN CORE Router

MD-NODE-1	L2TP Server Binding	1480		49.2 Mbps	9.6 Mbps
MD-NODE-2	L2TP Server Binding	1480		55.8 Mbps	2.9 Mbps
MD-NODE-3	L2TP Server Binding	1480		45.9 Mbps	5.5 Mbps
VPLS-MD-1	VPLS	1500	1600	48.9 Mbps	9.4 Mbps
VPLS-MD-2	VPLS	1500	1600	55.5 Mbps	2.7 Mbps
VPLS-MD-3	VPLS	1500	1600	45.6 Mbps	5.2 Mbps

AdhielesmanA
Your Best Networking Partner

THANKS

- Q & A
- Thanks To MikroTik
- ClickMediaNet - Blora

AdhielesmanA
Your Best Networking Partner