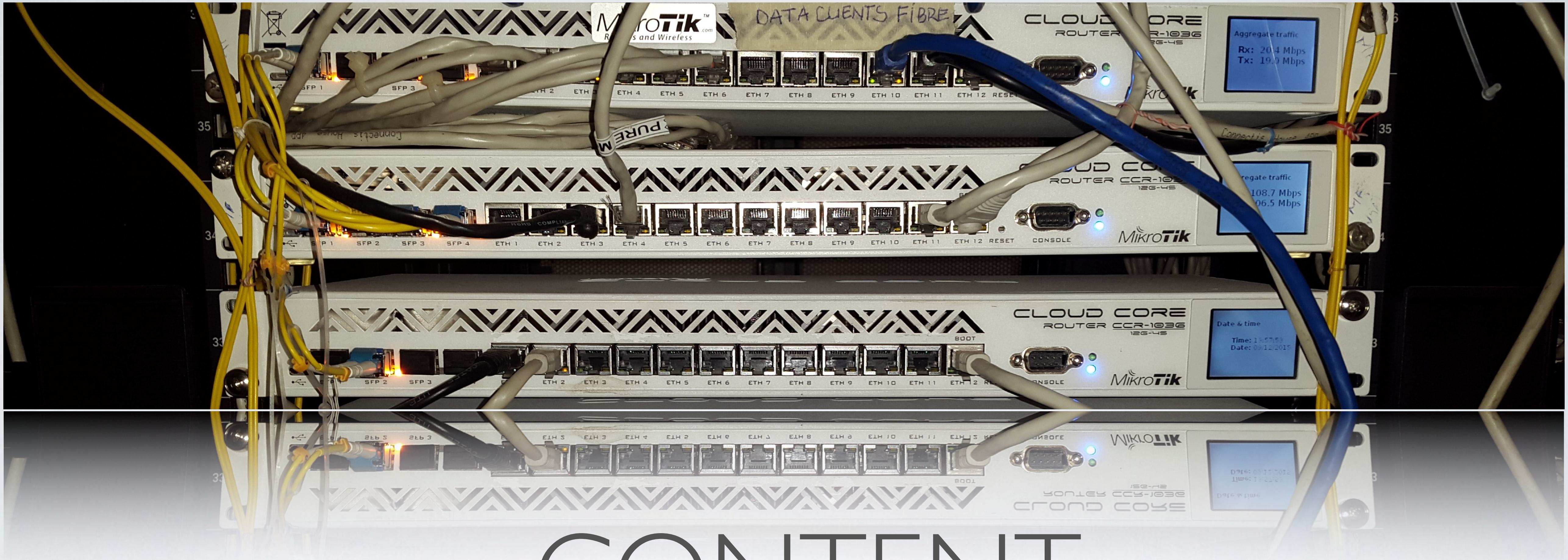
NETWORK DESIGN & SECURITY

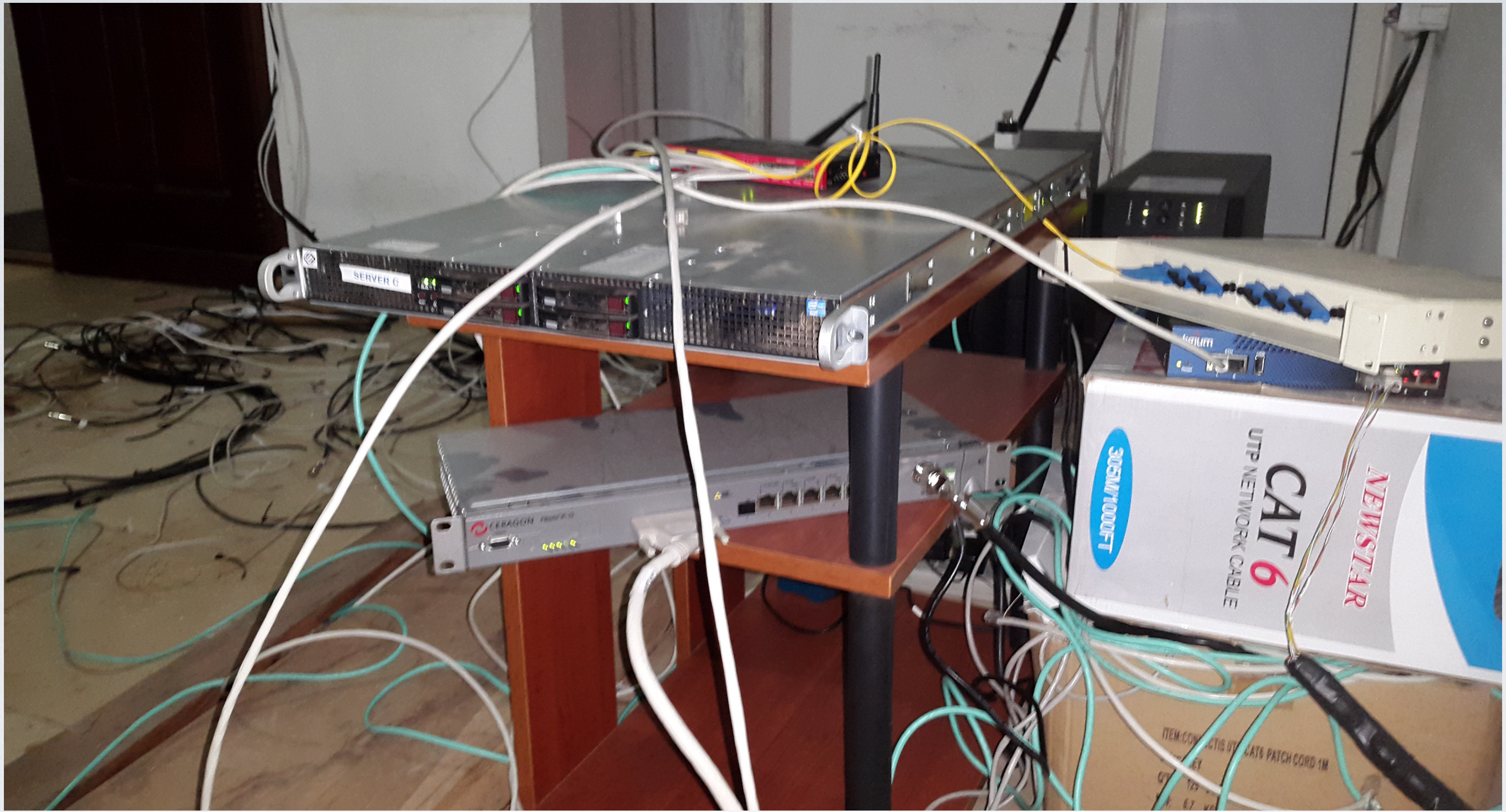
using EoIP Encryption

Narcisse Opu, ICT Consultant



CONTENT

- A three 3 layered network (extended star)
- Network masts of 252
- EoIP encrypted (IPSec) tunnels over IP links - RouterOS 6.35 min
- Redundant connectivity & VPN for remote access



START-UP POINT

- No server room, racks, earth
- Flat network design
- Cabling was a huge web
- No IT security measure
- Diguim, IP PBX, RB2011, Ceragon, Fiber

PROPOSED DESIGN

- 3 layered design
- Extended Start Topology
- Physical & EoIP link with masts of 252
- Redundant 3G/VSAT & VPN for remote
- All traffic via EoIPs
- Ext Firewall in Edge

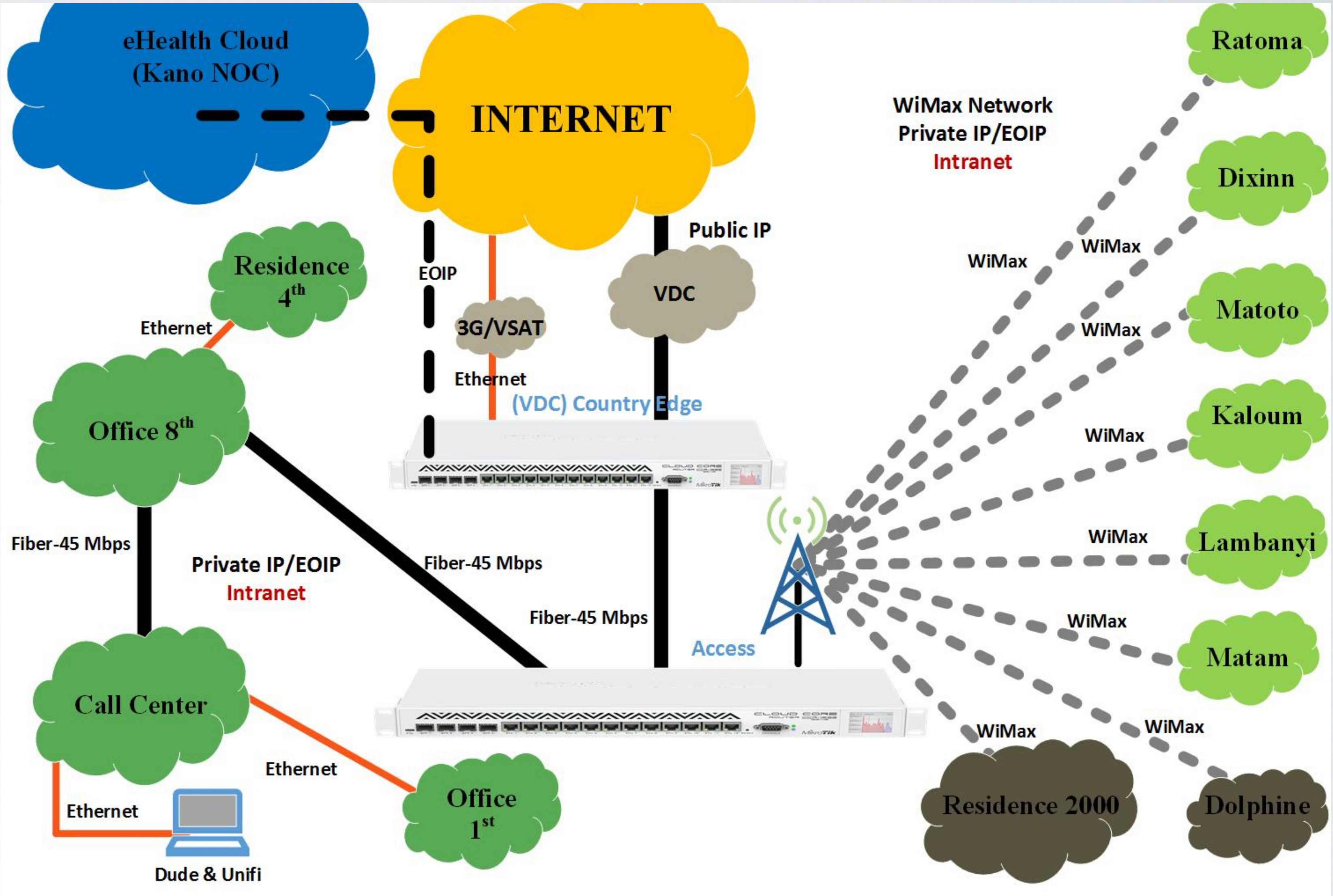


Image credit: Mani

L1 COUNTRY EDGE

- EoIP enabled links between countries
- External firewall and mangle rules are managed
- Remote access VPN
- Global monitoring

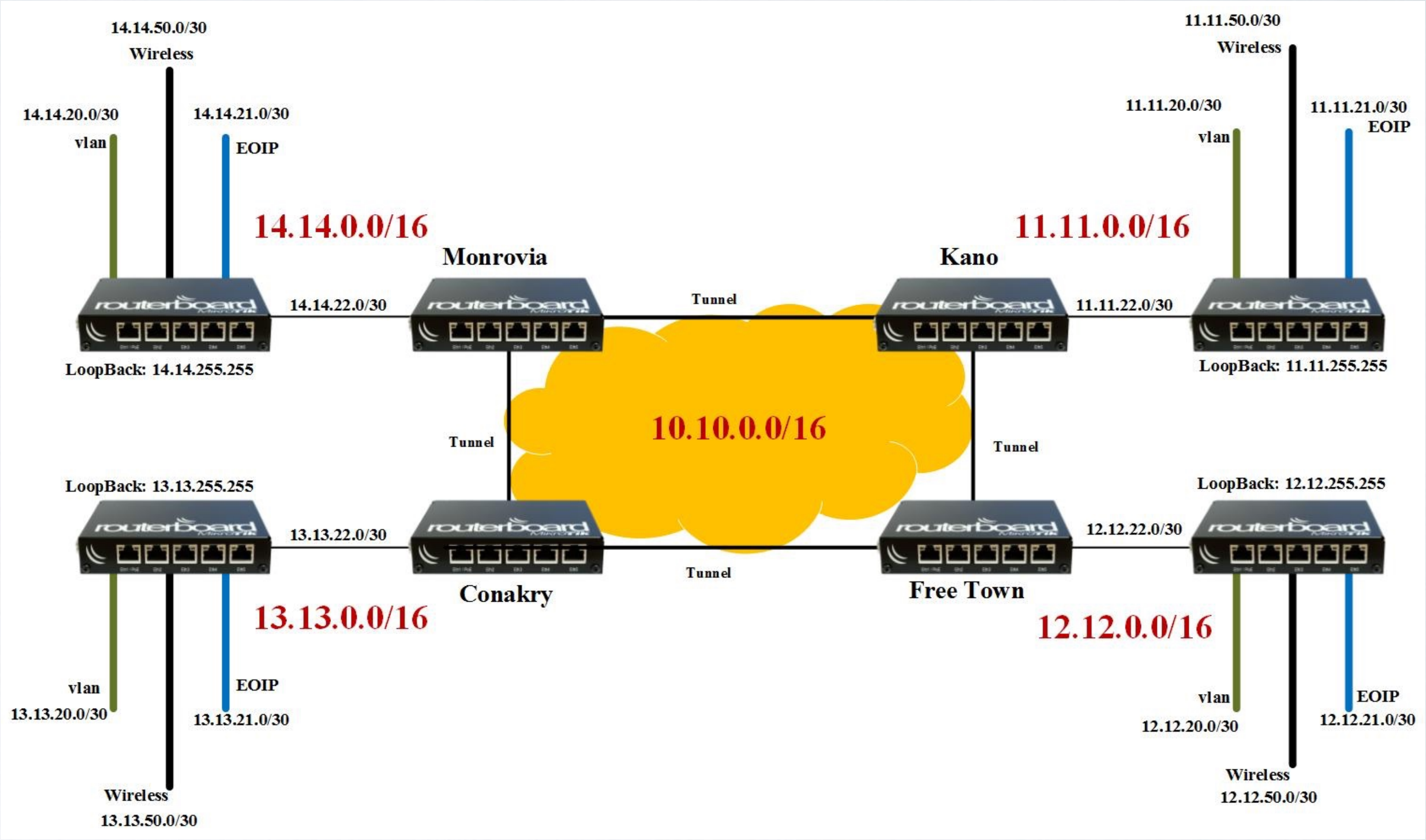
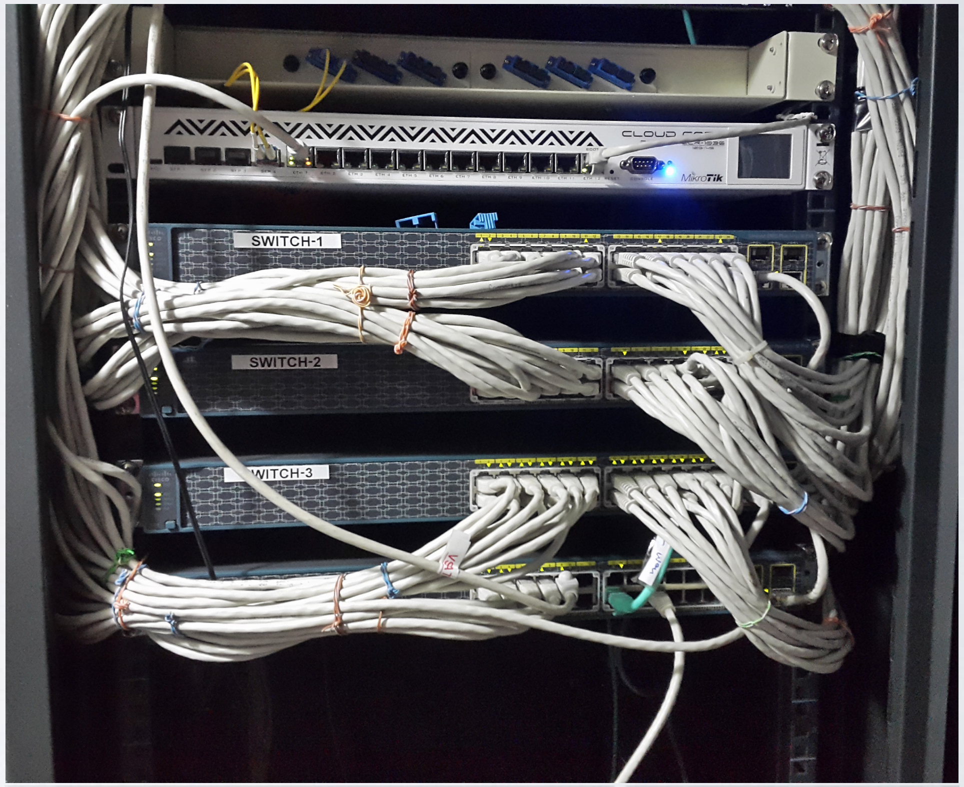


Image credit: Mani

L2 ACCESS

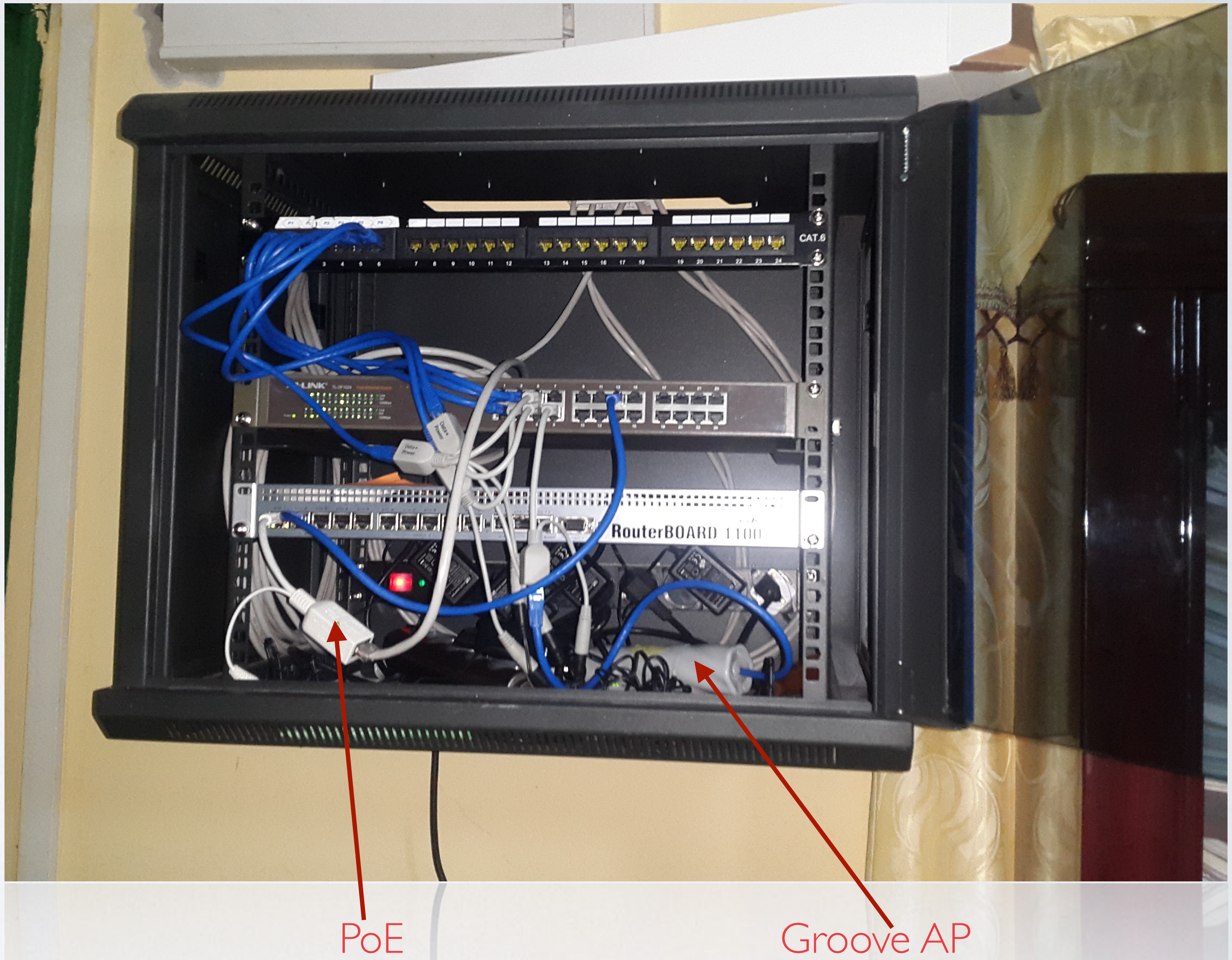
- Define Interfaces with IP & 252 masts
- Define logical interface EoIP with name, IP & 252 masts, remote IP, physical interface assigned to, MTU and ID. Repeat (MTU & ID).
- Tunnel is encrypted and 2 IPs allowed
- Routing is conducted here.
- Internal firewall rules.
- All traffic via the EoIPs.

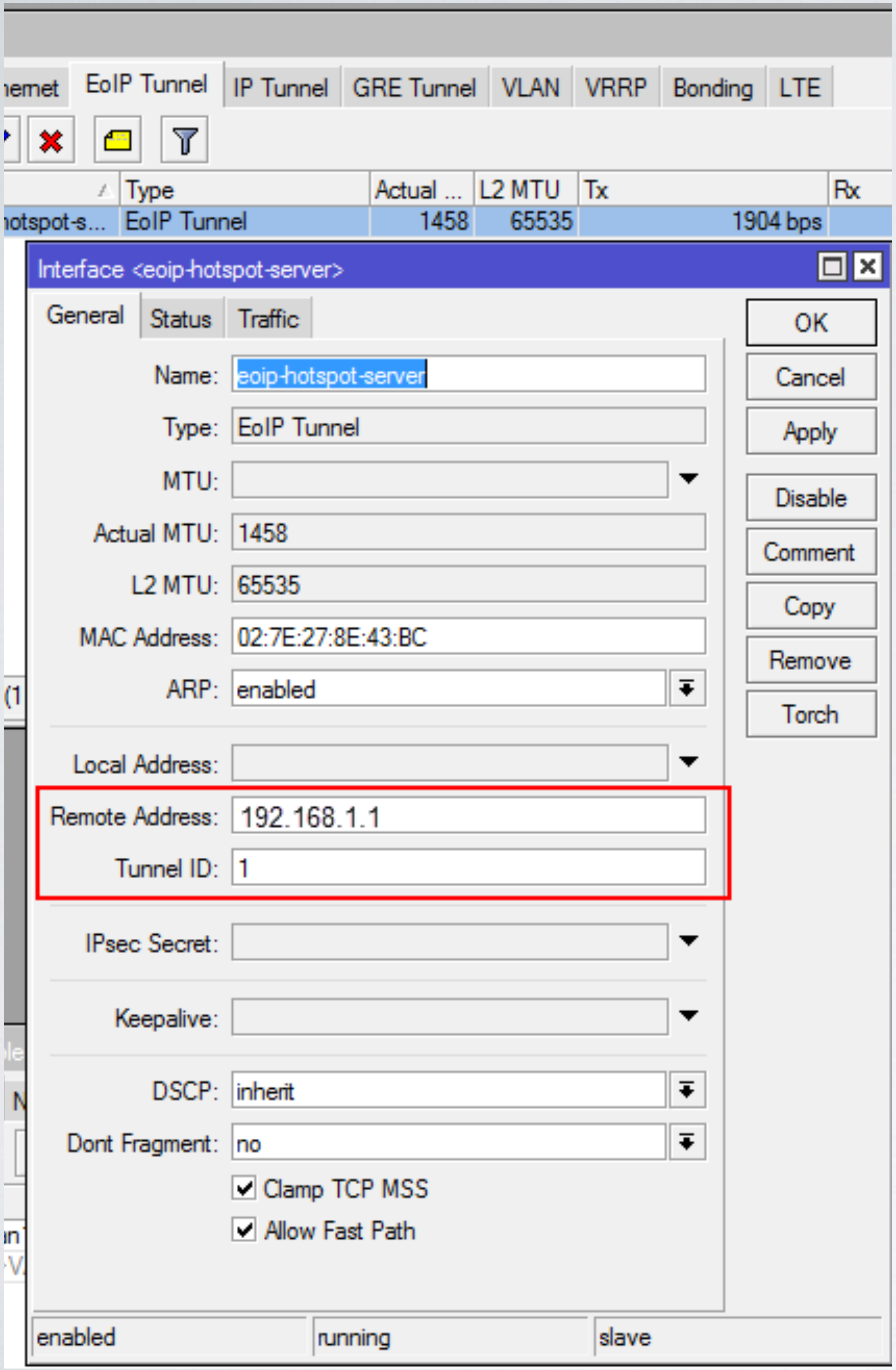


13.13.20.0/30 for IP link &13.13.21.0/30 for EoIP tunnels

L3 DISTRIBUTION

- Router & Groove APs (PoE)
- EoIP tunnel connects to the Access
- Tunnel is encrypted and 2 IPs allowed
- Internal firewall rules
- All traffic via the EoIP





	Type	Actual ...	L2 MTU	Tx	Rx
otspot-s...	EoIP Tunnel	1458	65535	1904 bps	

Interface <eoip-hotspot-server>

Name: eoip-hotspot-server

Type: EoIP Tunnel

MTU:

Actual MTU: 1458

L2 MTU: 65535

MAC Address: 02:7E:27:8E:43:BC

ARP: enabled

Local Address:

Remote Address: 192.168.1.1

Tunnel ID: 1

IPsec Secret:

Keepalive:

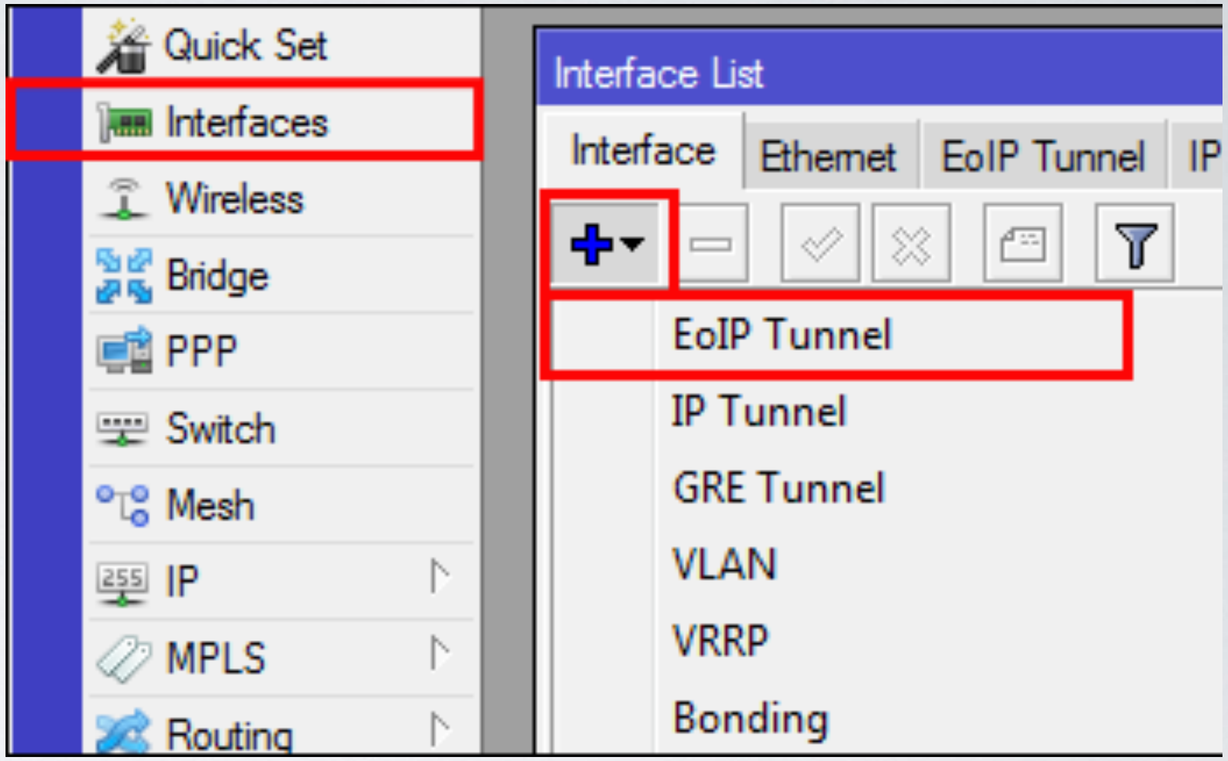
DSCP: inherit

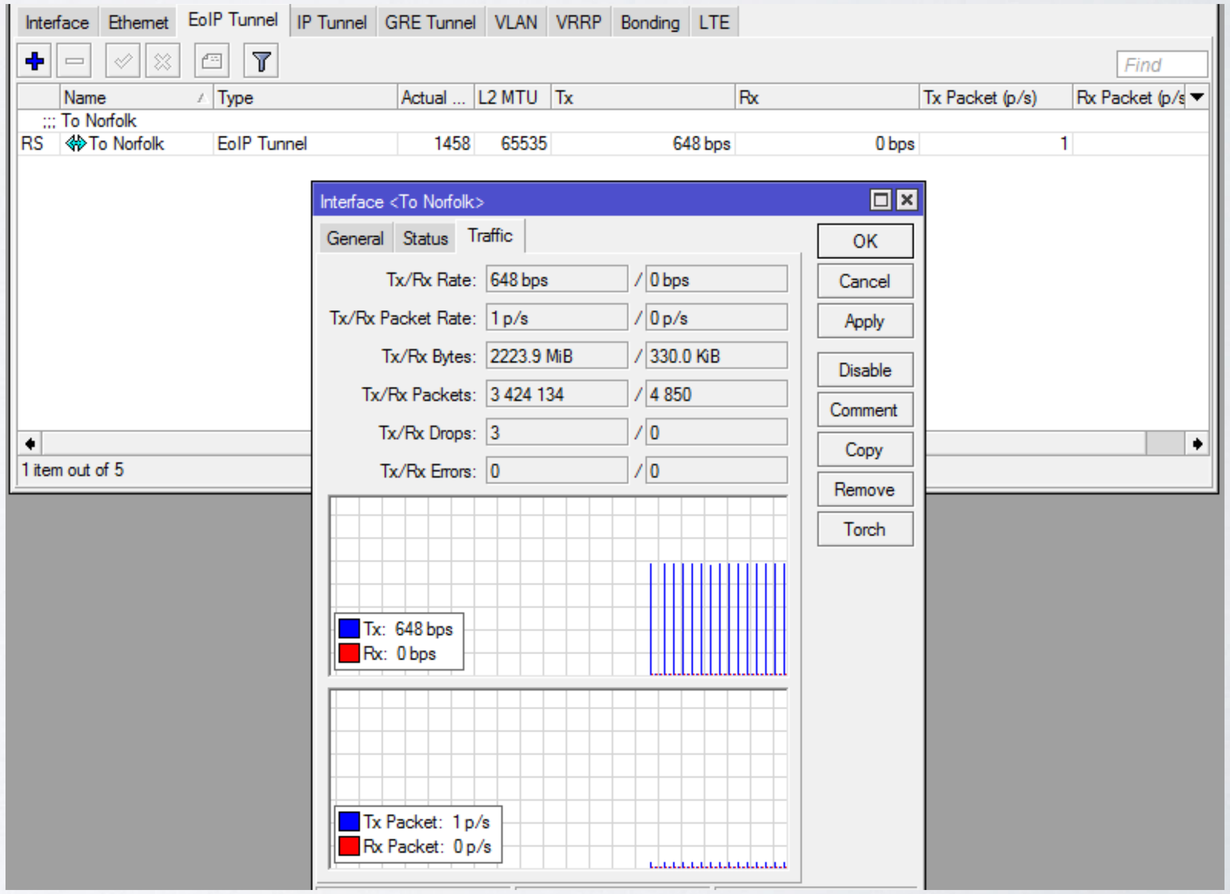
Dont Fragment: no

☑ Clamp TCP MSS

☑ Allow Fast Path

enabled | running | slave





	Name	Type	Actual ...	L2 MTU	Tx	Rx	Tx Packet (p/s)	Rx Packet (p/s
	::: To Norfolk							
RS	To Norfolk	EoIP Tunnel	1458	65535	648 bps	0 bps	1	

1 item out of 5

Interface <To Norfolk>

Tx/Rx Rate: 648 bps / 0 bps

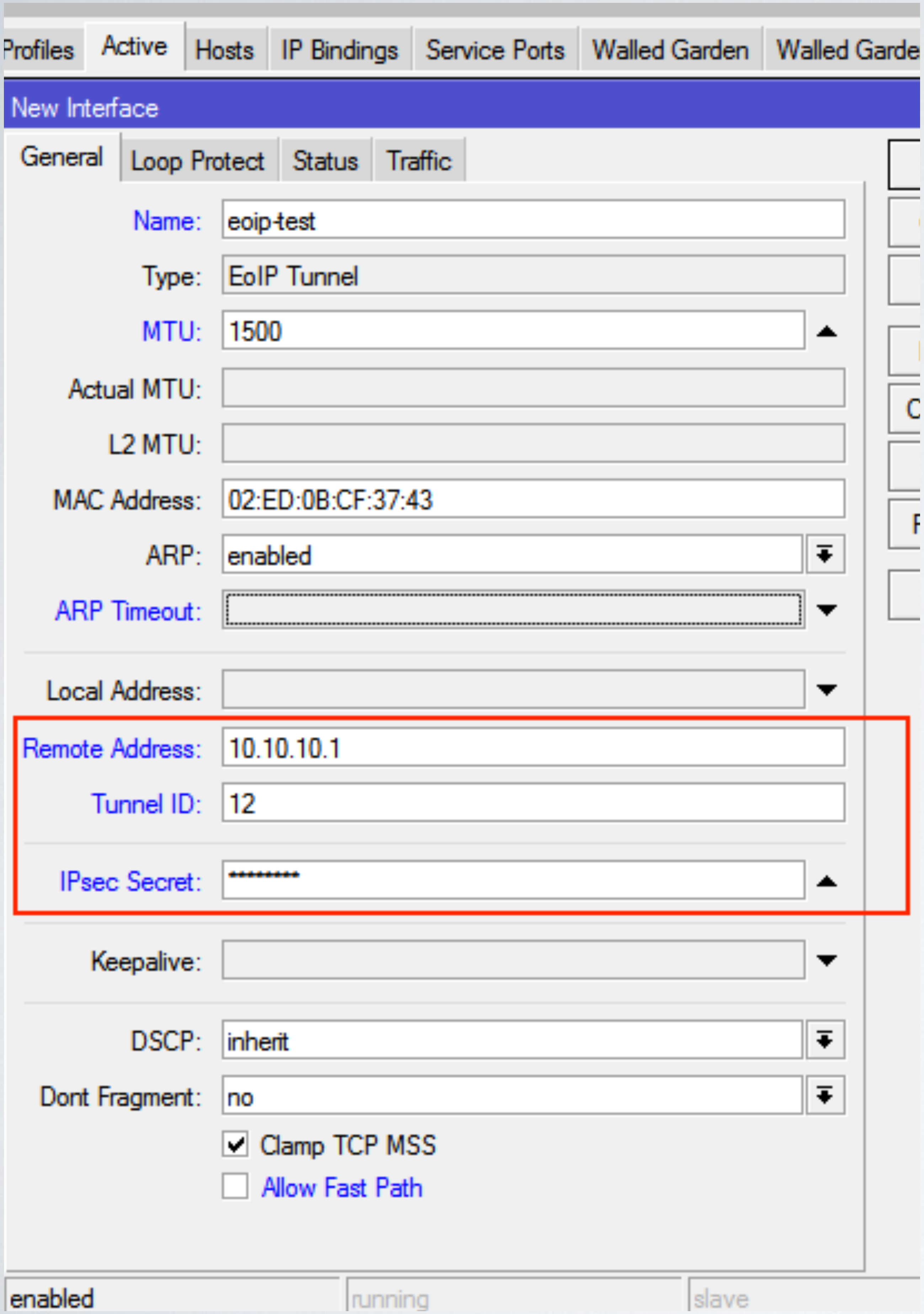
Tx/Rx Packet Rate: 1 p/s / 0 p/s

Tx/Rx Bytes: 2223.9 MiB / 330.0 KiB

Tx/Rx Packets: 3 424 134 / 4 850

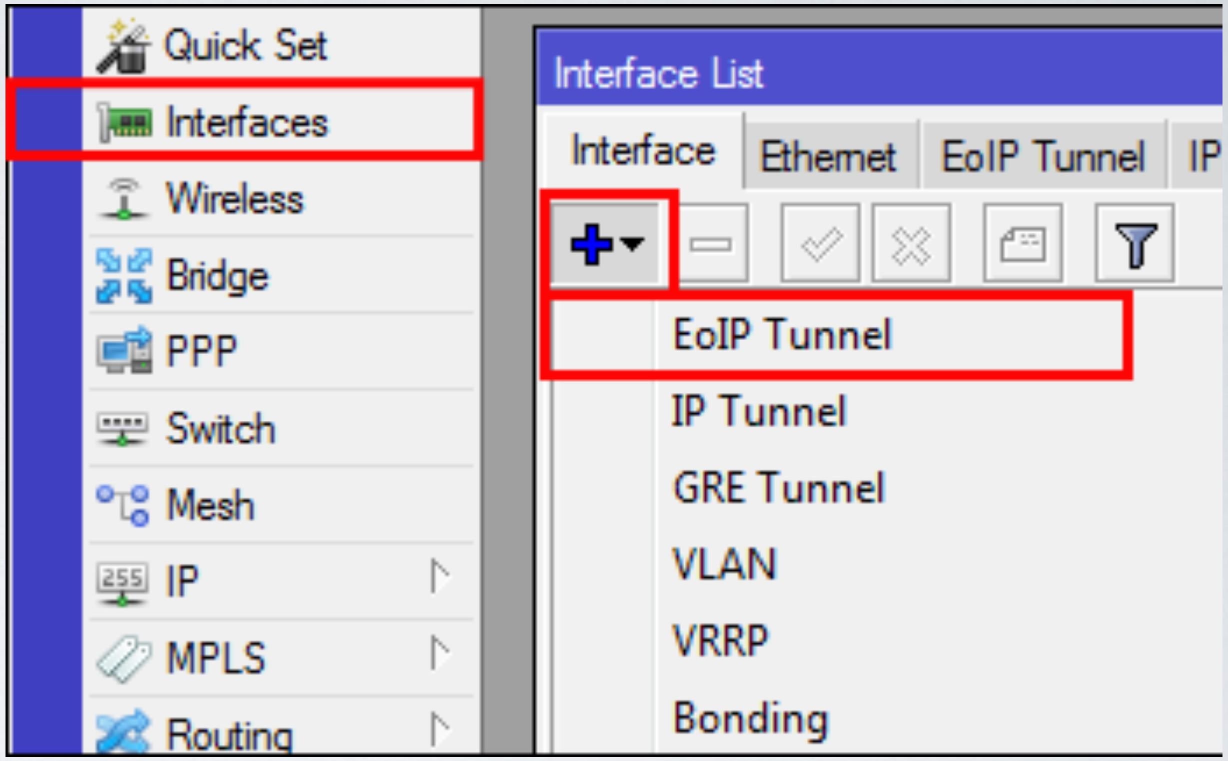
Tx/Rx Drops: 3 / 0

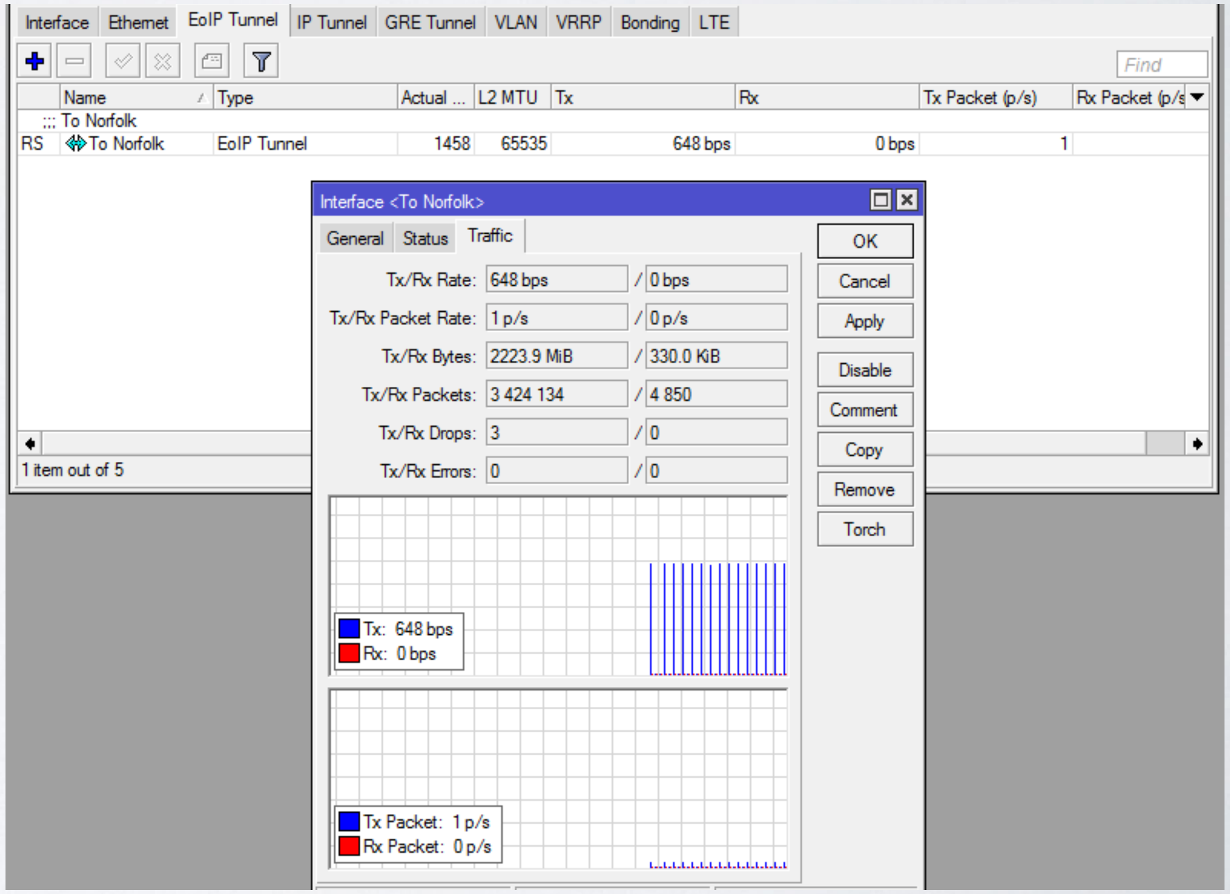
Tx/Rx Errors: 0 / 0



Name: eoip-test
Type: EoIP Tunnel
MTU: 1500
Actual MTU:
L2 MTU:
MAC Address: 02:ED:0B:CF:37:43
ARP: enabled
ARP Timeout:
Local Address:
Remote Address: 10.10.10.1
Tunnel ID: 12
IPsec Secret: *********
Keepalive:
DSCP: inherit
Dont Fragment: no
☑ Clamp TCP MSS
☐ Allow Fast Path

enabled | running | slave





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"Notes to remember"

- A user with viewing rights was created for the NOC.
- Edge Routers cannot be accessed from outside the network, a VPN was used for remote access.
- Only specified Mac addresses were permitted to ping & access routers from within the network. Generally, pings were dropped.
- Thanks to the 3-layered architecture, visibility, scalability and debuggability were improved.
- Thanks to 2 IPs per subnet and EoIP tunnel, and all traffic routed via the EoIP tunnels, network security is improved.

SERVERROOM

- Secured room
- Racks, cooling, earth, & Gen
- Improved cabling
- UPSs in series
- Upgraded servers and network devices
- Video surveillance
- Global monitoring

> “Thanks for the your kind attention, comments and questions are welcomed”

–Narcisse Opu