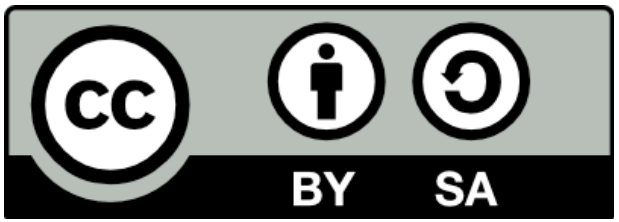
MikroTik™

FASTPATH PERFORMANCE



Perkenalan

- **Pujo Déwobroto**
- Citraweb Nusa Infomedia
  - Mikrotik distributor, training partner (mikrotik.co.id)
  - ISP (citra.net.id)
  - Web developer (citra.web.id)
- MTCNA, MTCTCE, MTCWE, MTCUME, MTCRE, MTCINE, TR0132

Fastpath**

Merupakan fitur pada mikrotik v6 untuk meneruskan paket tanpa banyak pengolahan di sisi linux kernel / software

- CPU load reduce
- Faster speed

*** Syarat dan ketentuan berlaku**

Interface

Routerboard	Interfaces
RB6xx Series	Ether1, Ether2
RB7xx Series	All Ethernet
RB800	ether1, Ether2
RB9xx	All Ethernet
RB1000	All Ethernet
RB1100 Series	Ether1 – Ether10, Ether11
RB2011 Series	All Ethernet, SFP
CCR Series	All Ethernet, SFP
All Devies	Wireless Interface (wireless-fp / wireless-cm) Bridge Interface Bonding Interface (RX ONLY)

Fastpath bisa berjalan minimal interface source sudah mensupport

Handlers

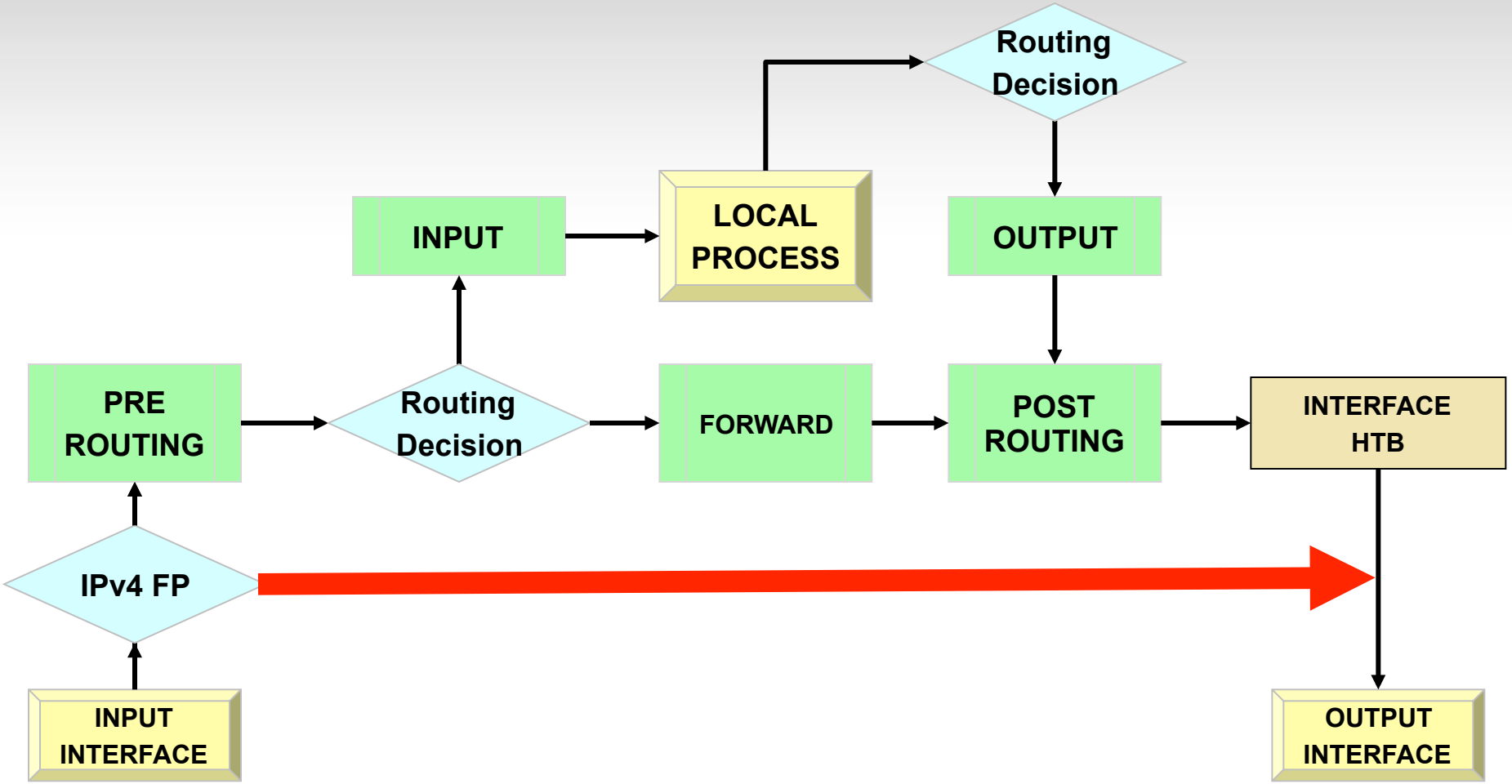
- IPv4
- IPv4 Fasttrack
- Traffic Generator
- MPLS
- Bridge

IPv4 Handler

Tidak boleh mengaktifkan :

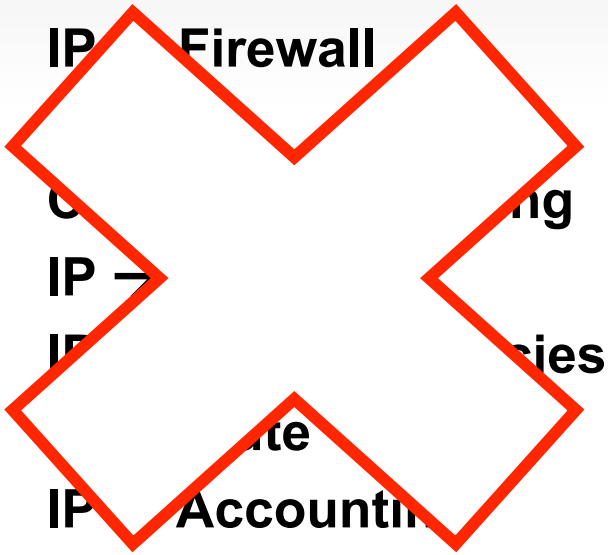
- **IP → Firewall**
- **Queue**
- **Connection Tracking**
- **IP → Hotspot**
- **IP → IPSec → Policies**
- **IP → route → VRF**
- **IP → Accounting**
- **Mesh, Metarouter Interfaces**
- **Tool → MAC-SCAN**
- **Tool → IPSCAN**
- **Tool → Sniffer**
- **Tool → Torch**
- **Tool → Traffic Generator**

IPv4 Fastpath Flow



IPv4 Fasttrack Handler

Tidak boleh mengaktifkan :

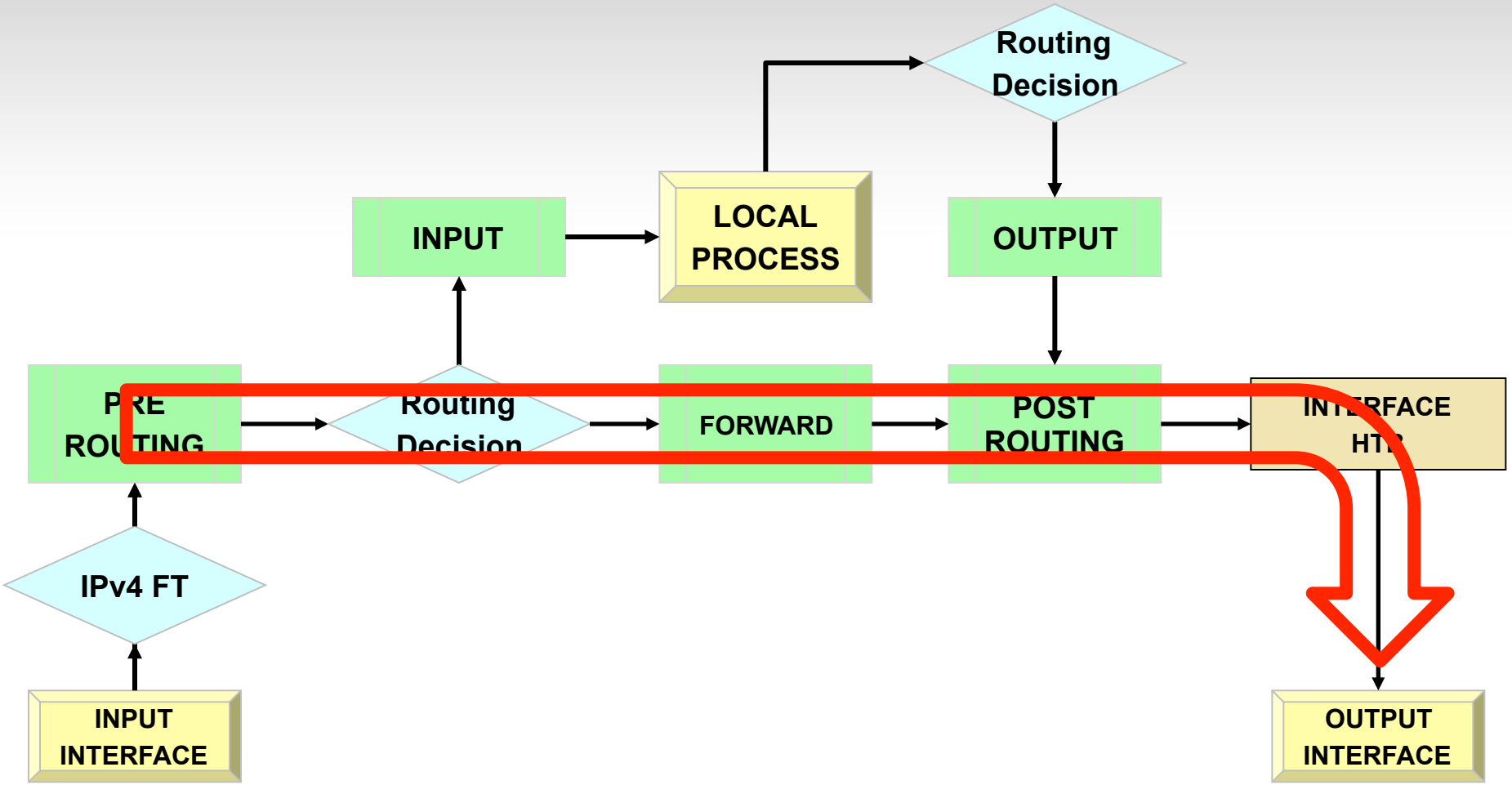


- IP → Firewall
- C… …ng
- IP →
- I… …sies
- …te
- IP → Accountin…

- Mesh, Metarouter Interfaces
- Tool → MAC-SCAN
- Tool → IPSCAN
- Tool → Sniffer
- Tool → Torch

Sampai v6.33rc16, baru TCP & UDP

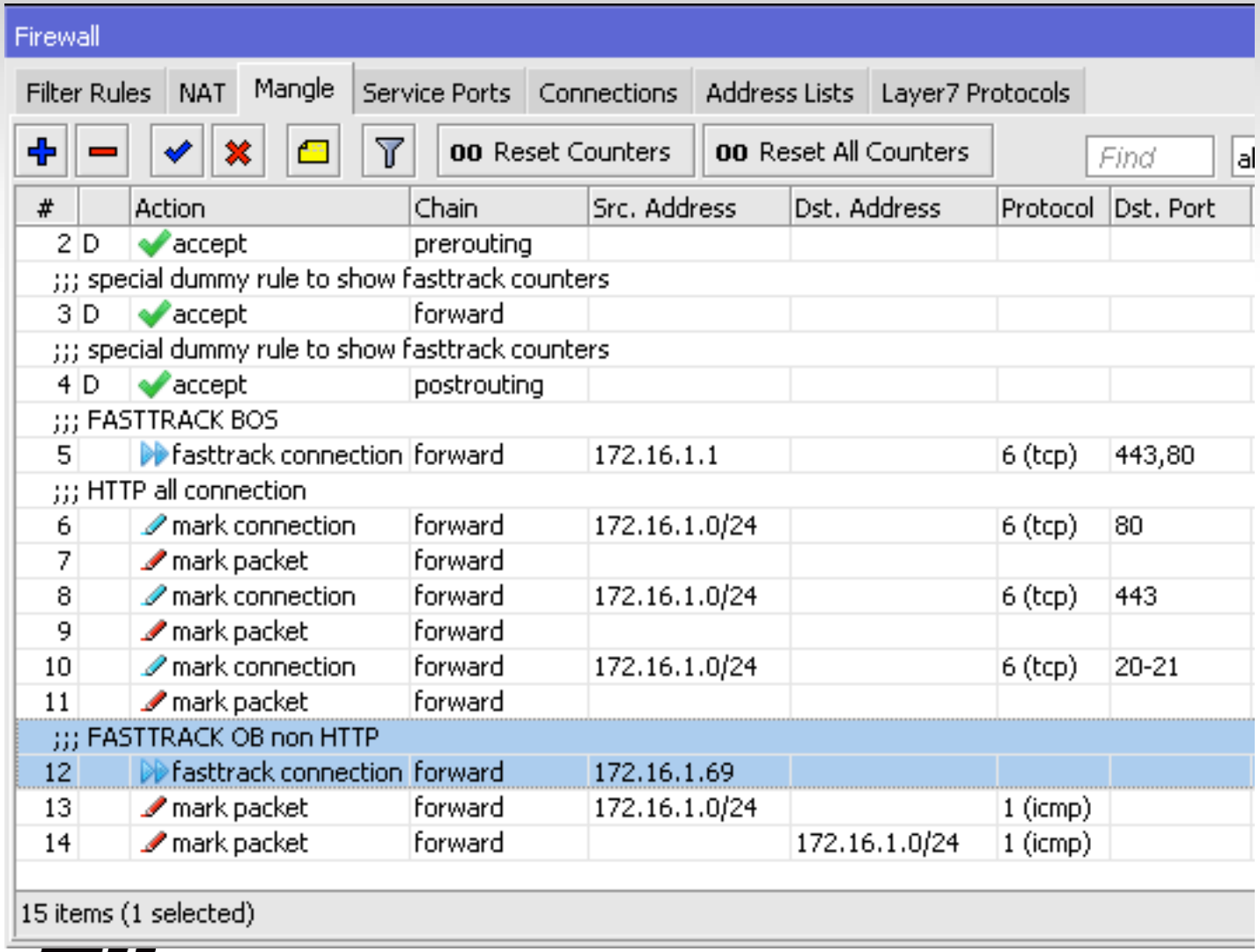
IP Fasttrack Handler Flow



Fasttrack Customise

- Fasttrack tidak hanya sebagai ON-OFF acceleration saja, tetapi tetap bisa kita kustomisasi
- Gunakan firewall matcher untuk mengklasifikasi paket datanya
- Sesuai “pakem”nya, urutan berpengaruh

Fasttrack action

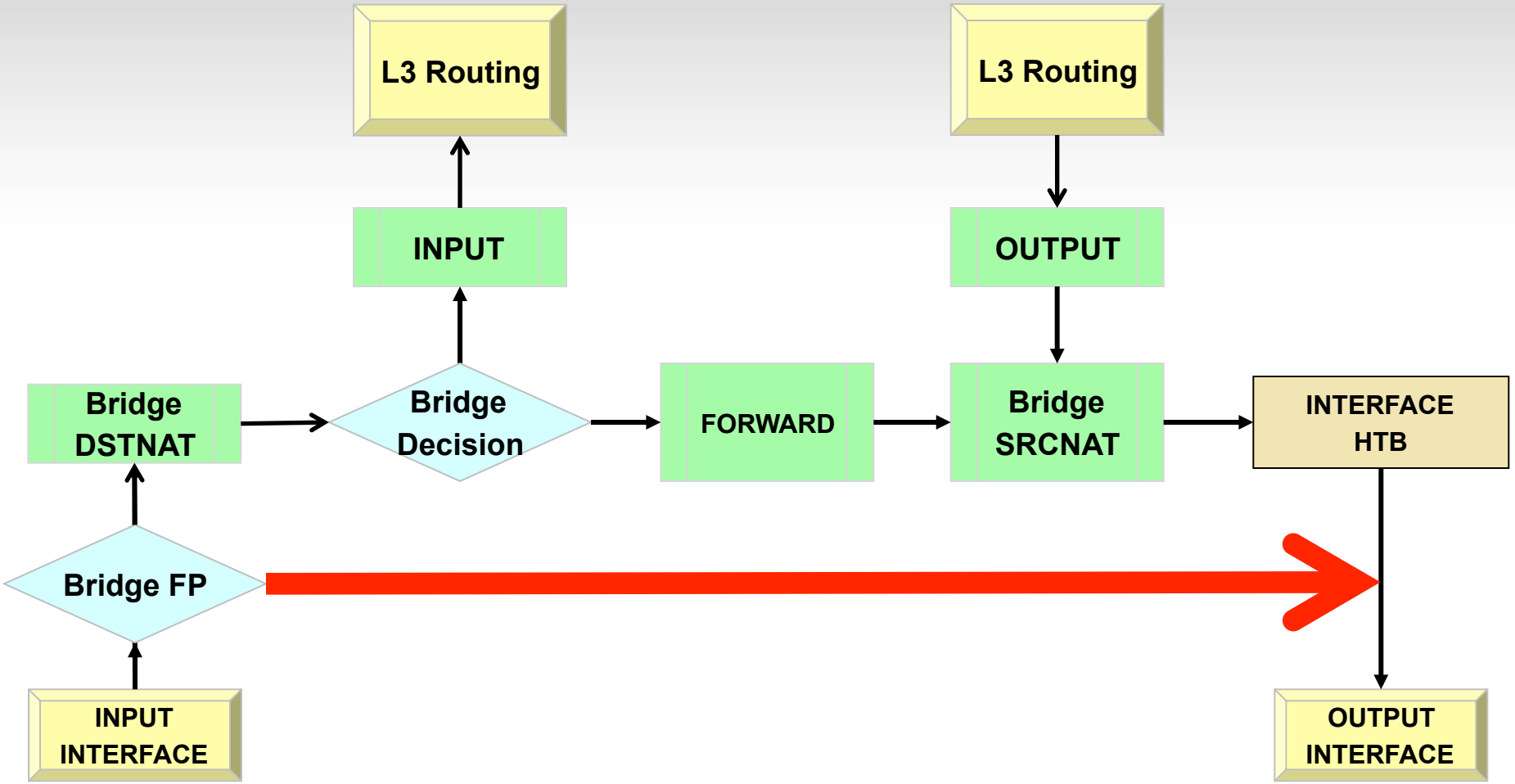


Bridge Handler

Tidak boleh mengaktifkan :

Bridge → Filter
Bridge → NAT
Use IP Firewall
Mesh, Metarouter Interfaces
Tool → Sniffer
Tool → Torch

Bridge Fastpath Flow



Handler Lain

- Traffic Generator & MPLS, Fastpath secara otomatis akan aktif jika interface yang digunakan sudah mendukung
- Khusus MPLS hanya bisa untuk LSR (Paket masuk, ganti label, kirim)

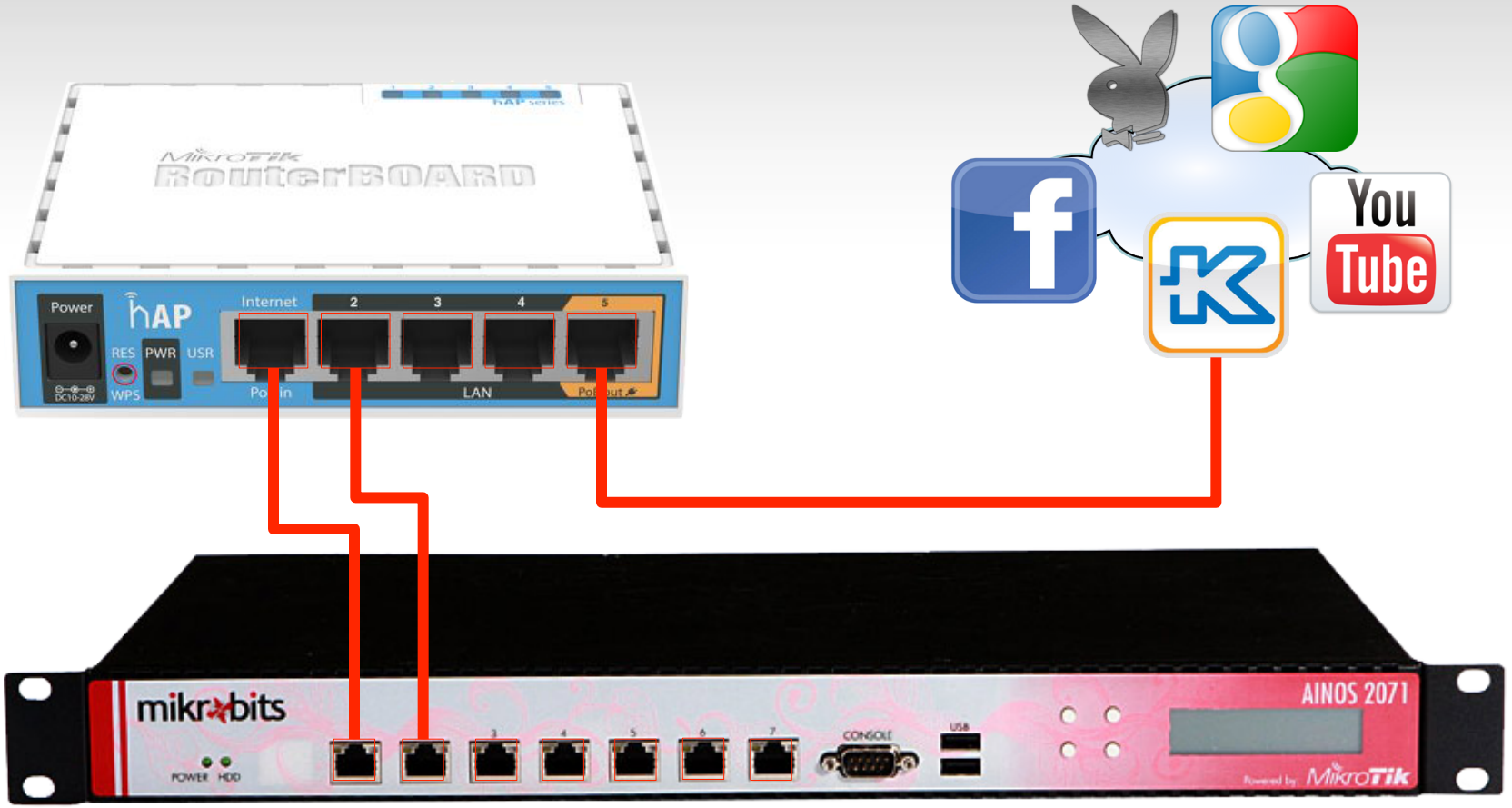
Cepat / Lambat ??

- Latency : lama waktu paket pengiriman
- Jitter : rata-rata perbedaan latency antar paket
- Latency & Jitter merupakan delay dalam sebuah jaringan
- Keduanya bisa disebabkan :
  - Transmisi Delay / Kapasitas Link (ex: fast ethernet, gigabit ethernet, 10g fiber, wlan 802.11 dll)
  - Queueing Delay
  - Processing Delay (firewall, routing process, packet cheksum dll)
  - Hukum Fisika --> signal data tidak bisa melebihi kecepatan cahaya

Latency kecil = Good Jitter kecil = Better !!

CPU load kecil = JOSS

Metode Pengetesan



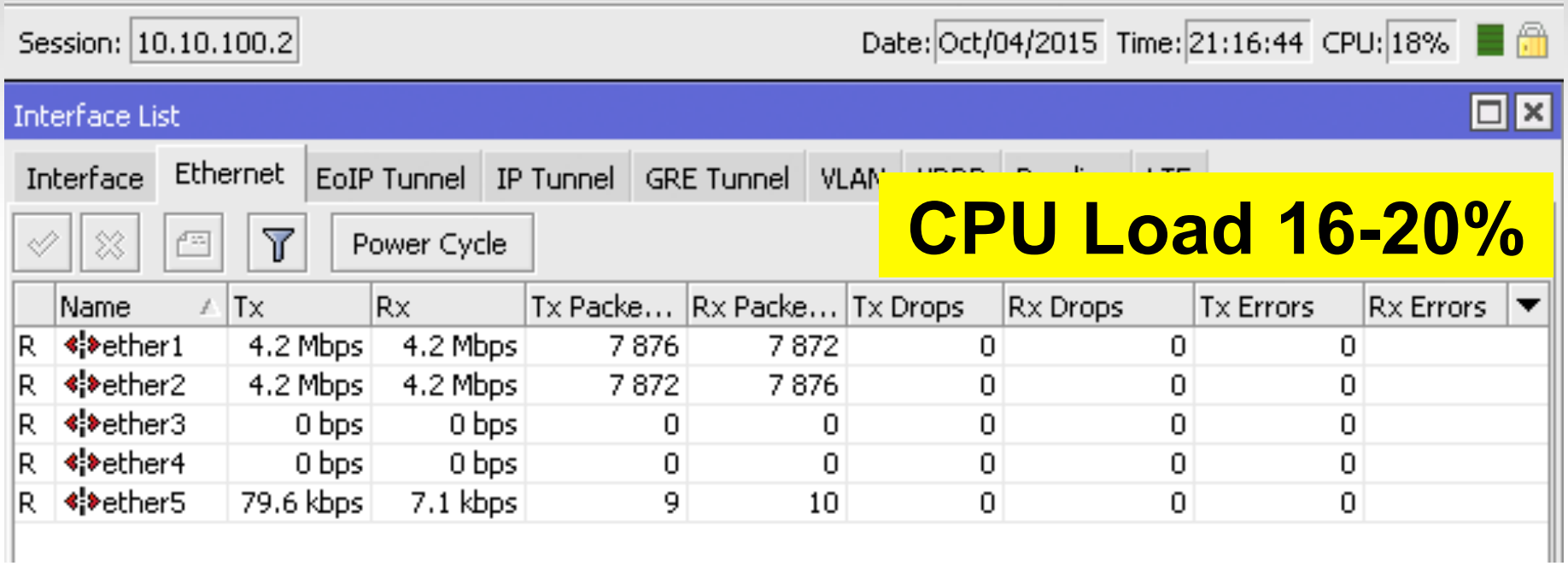
Metode Pengetesan (2)

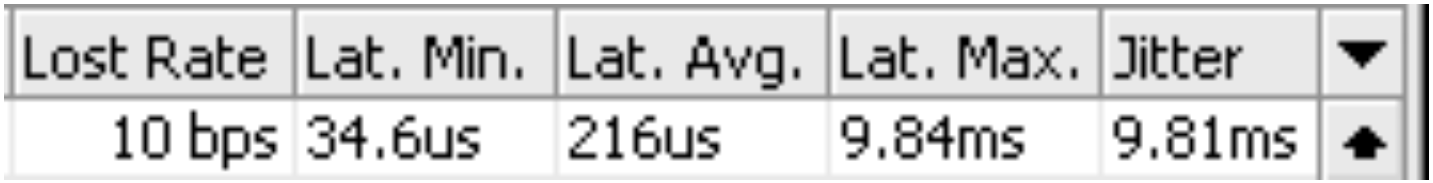
- Router Generator mensimulasikan 4 Client melakukan upload & download simultan
  - besar packet 64byte
  - 1Mbps@stream
  - Protocol UDP
- hAP menggunakan v6.33rc16

Test 1: Basic Routing

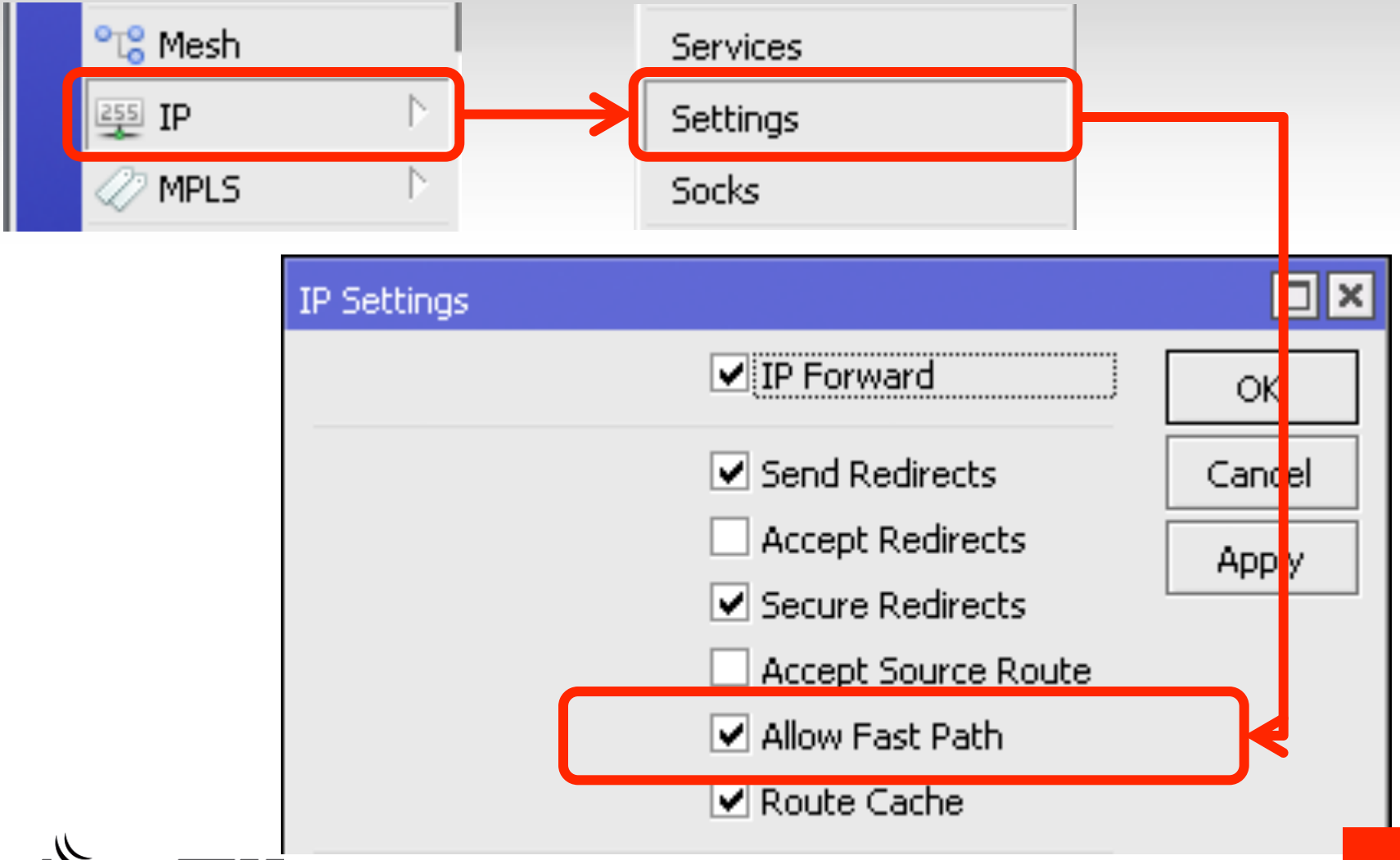
- Fastpath : OFF
- Conntract : OFF
- 4 Stream dari ether1 ⬅➡ ether2

Result 1: Basic Routing





Test 2 : Basic Routing + FP



Result 2 : Basic Routing + FP

Session: 10.10.100.2 Date: Oct/04/2015 Time: 21:23:18 CPU: 13%

Interface List

Interface | Ethernet | EoIP Tunnel | IP Tunnel | GRE Tunnel | VLAN | VRRP | Bonding | LTE

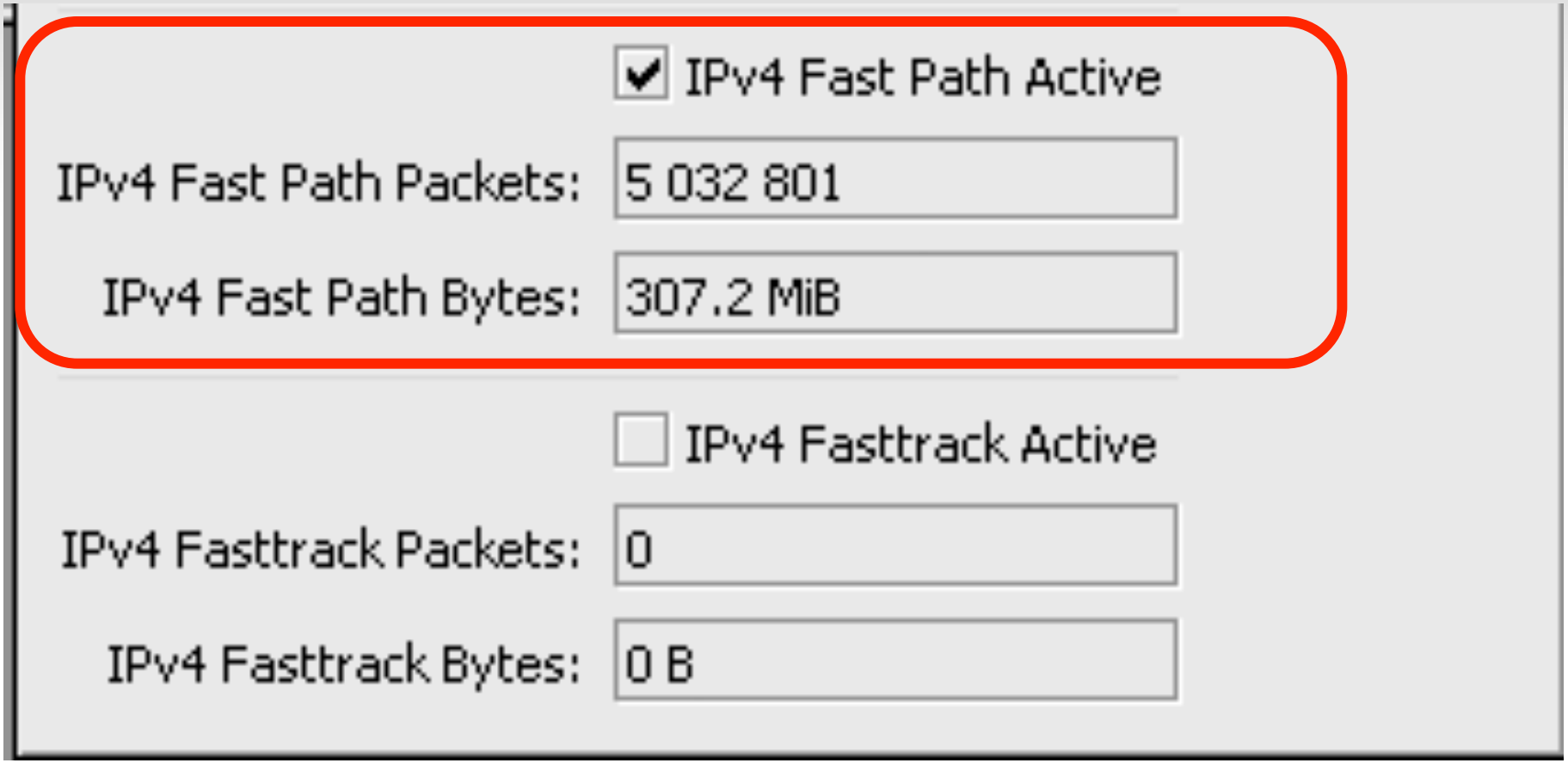
Power Cycle

CPU Load 10-15%

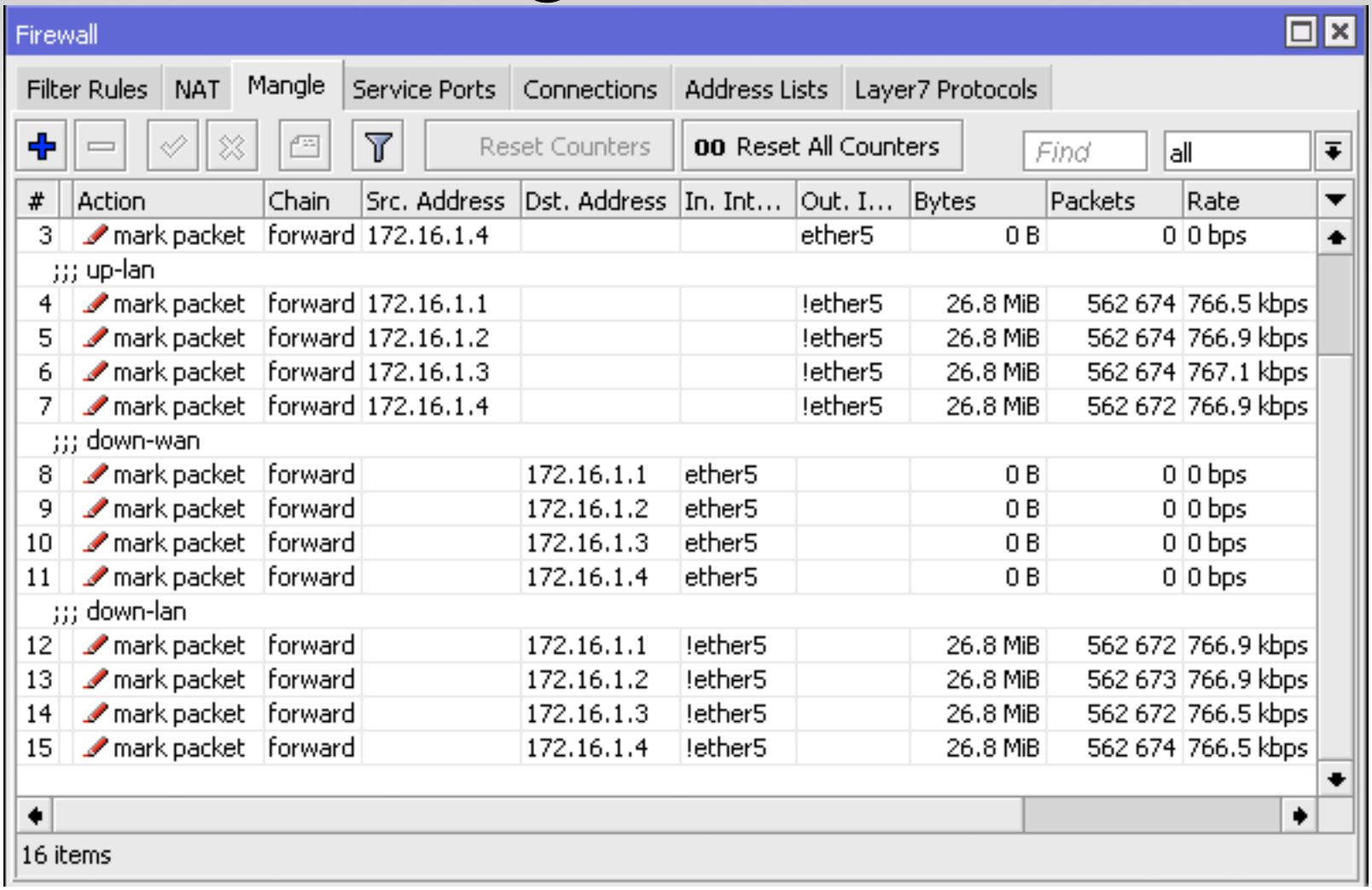
	Name	Tx	Rx	Tx Packe...	Rx Packe...	Tx Drops	Rx Drops	Tx Errors	Rx Errors
R	ether1	4.2 Mbps	4.2 Mbps	7 874	7 873	0	0	0	
R	ether2	4.2 Mbps	4.2 Mbps	7 873	7 874	0	0	0	
R	ether3	0 bps	0 bps	0	0	0	0	0	
R	ether4	0 bps	0 bps	0	0	0	0	0	
R	ether5	67.9 kbps	6.4 kbps	8	9	0	0	0	

Lost Rate	Lat. Min.	Lat. Avg.	Lat. Max.	Jitter
0 bps	36.4us	216us	7.89ms	7.85ms

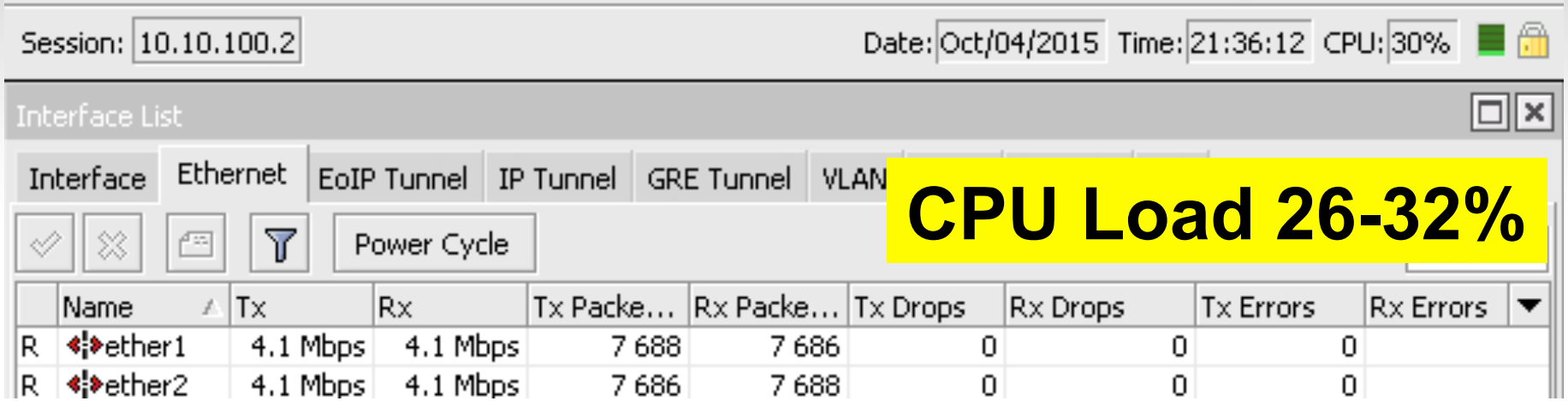
Result 2 : Basic Routing + FP



Test 3 : Mangle

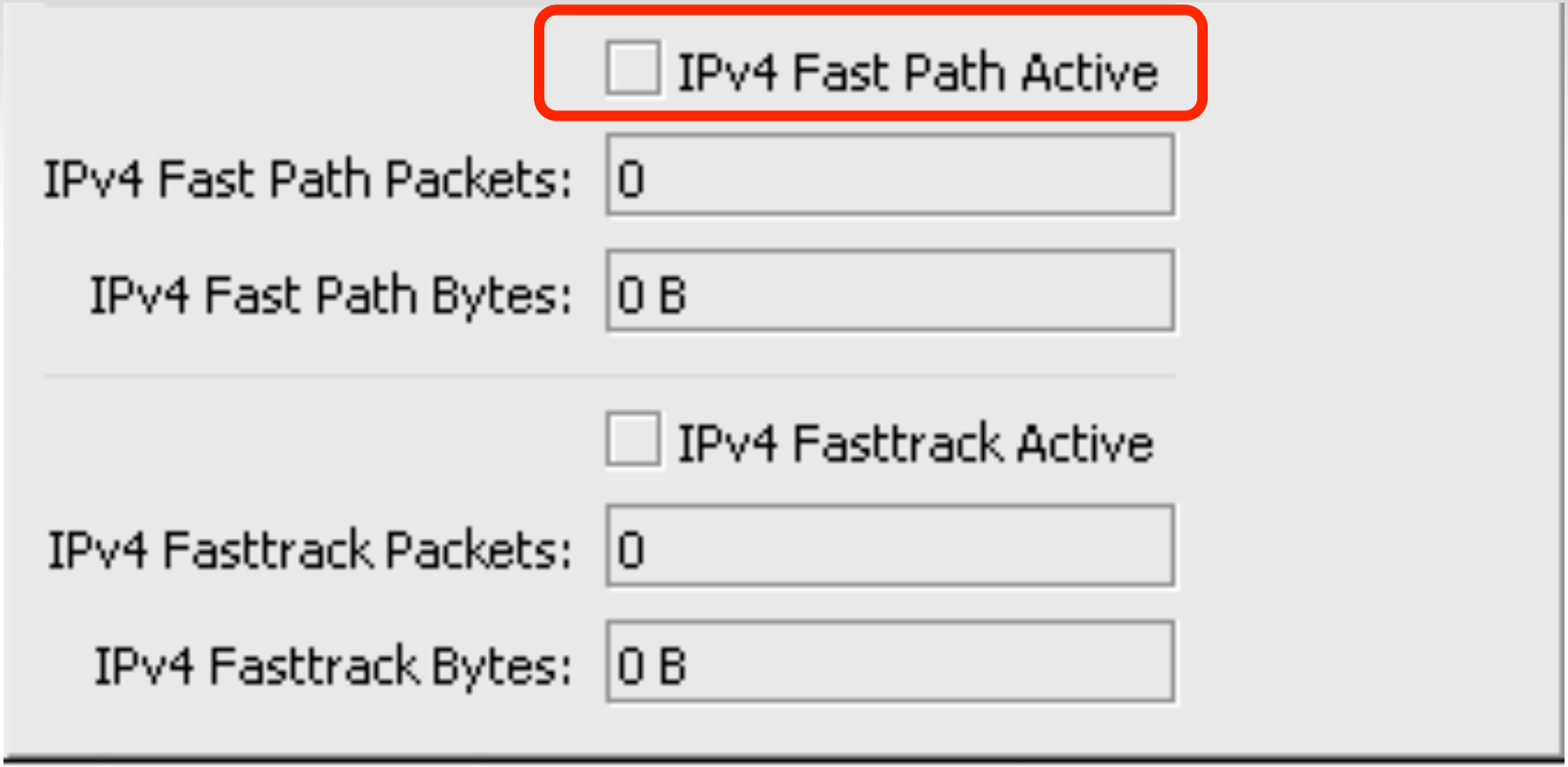


Result 3 : Mangle

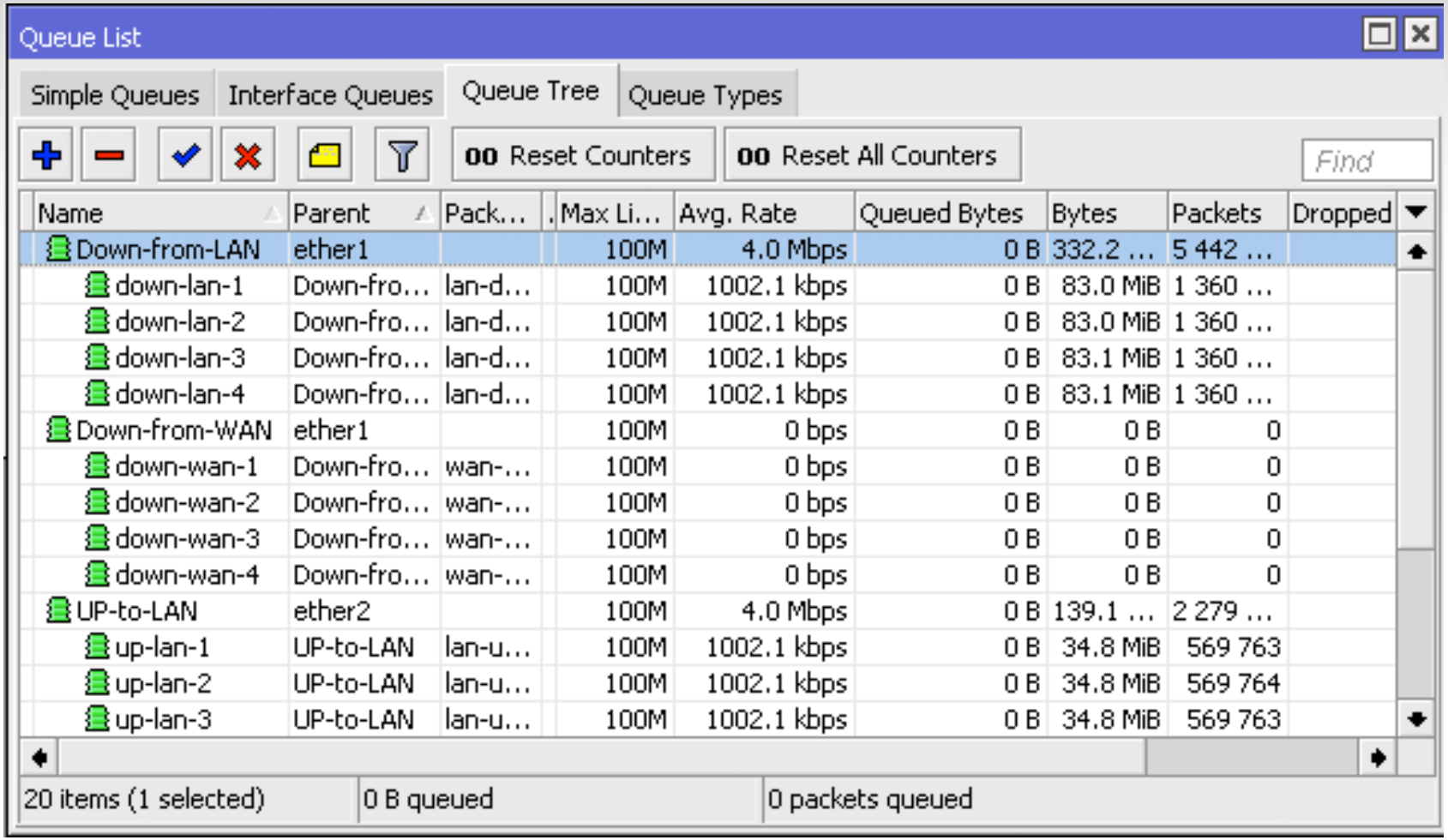


Lost Rate	Lat. Min.	Lat. Avg.	Lat. Max.	Jitter
838 bps	48.1us	237us	12.7ms	12.7ms

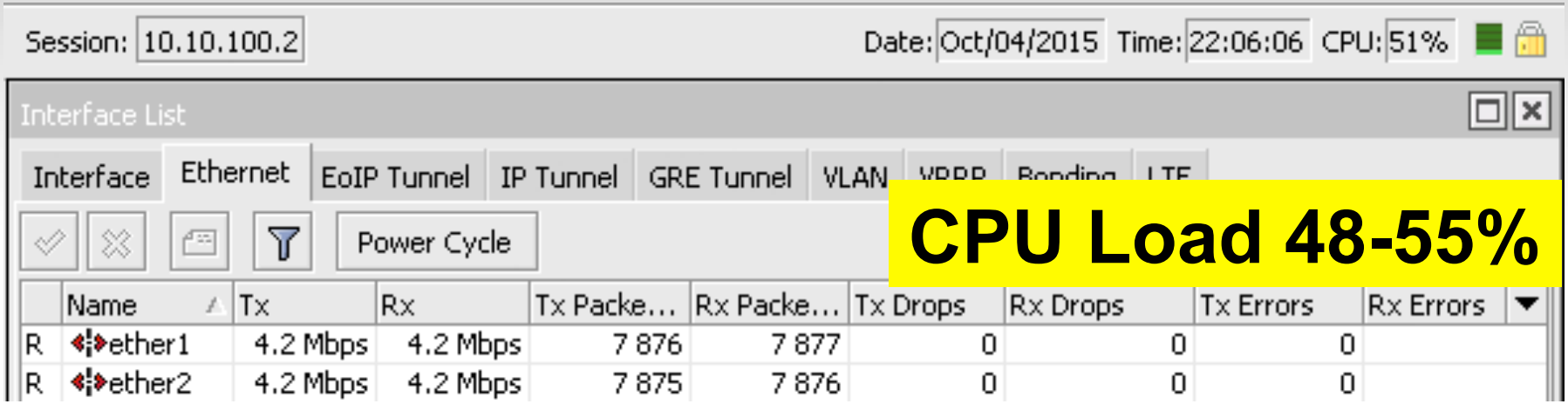
Result 3 : Mangle



Result 4 : Queue Aktif

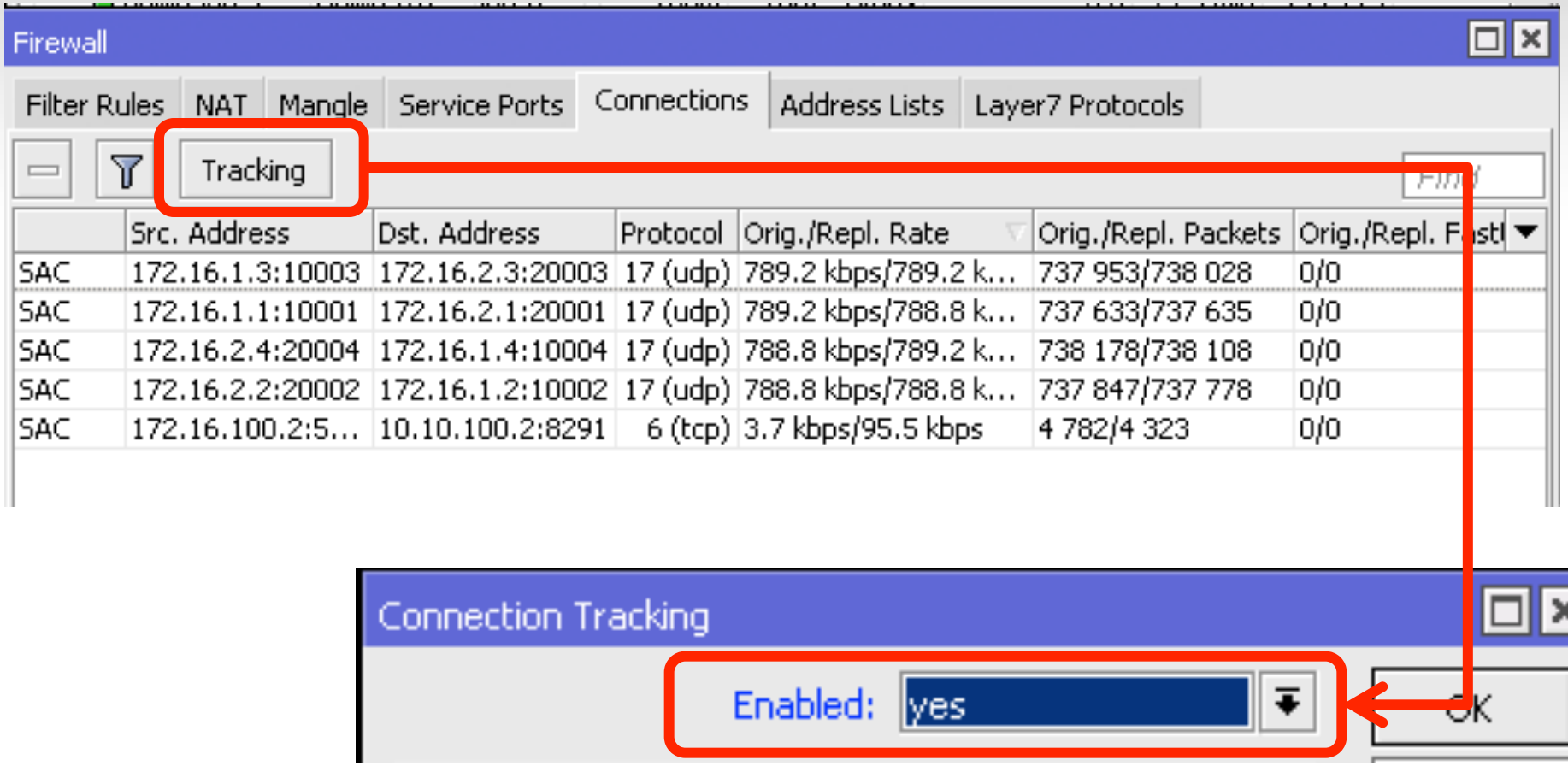


Result 4 : Queue Aktif

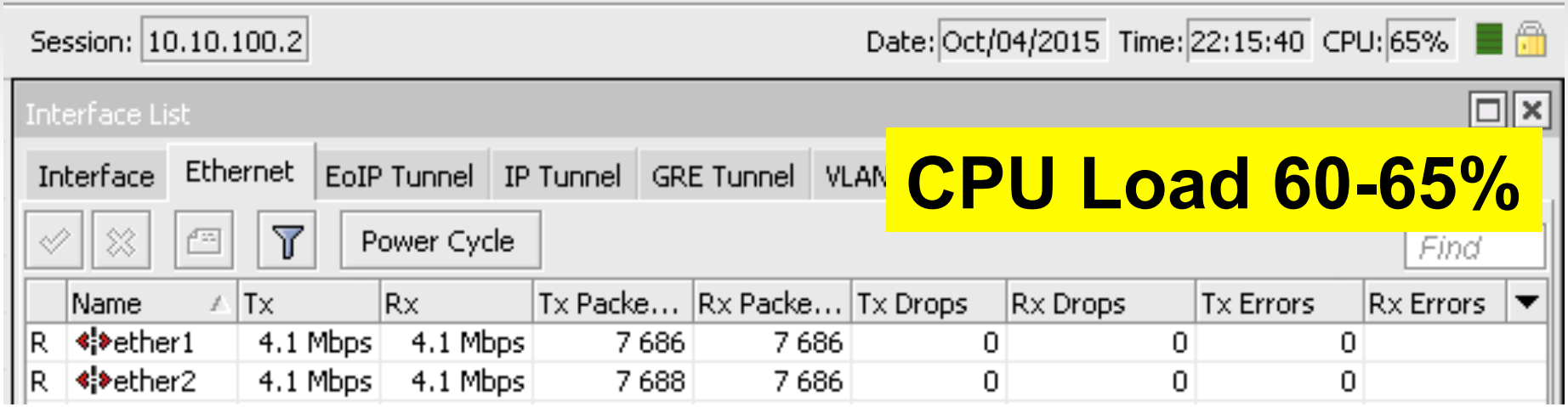


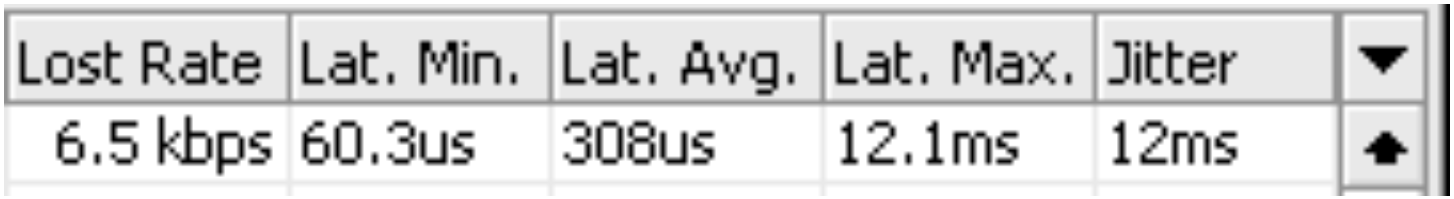
Lost Rate	Lat. Min.	Lat. Avg.	Lat. Max.	Jitter
2.4 kbps	57.5us	267us	12.2ms	12.2ms

Test 5 : Connection Tracking



Result 5 : Connection Tracking





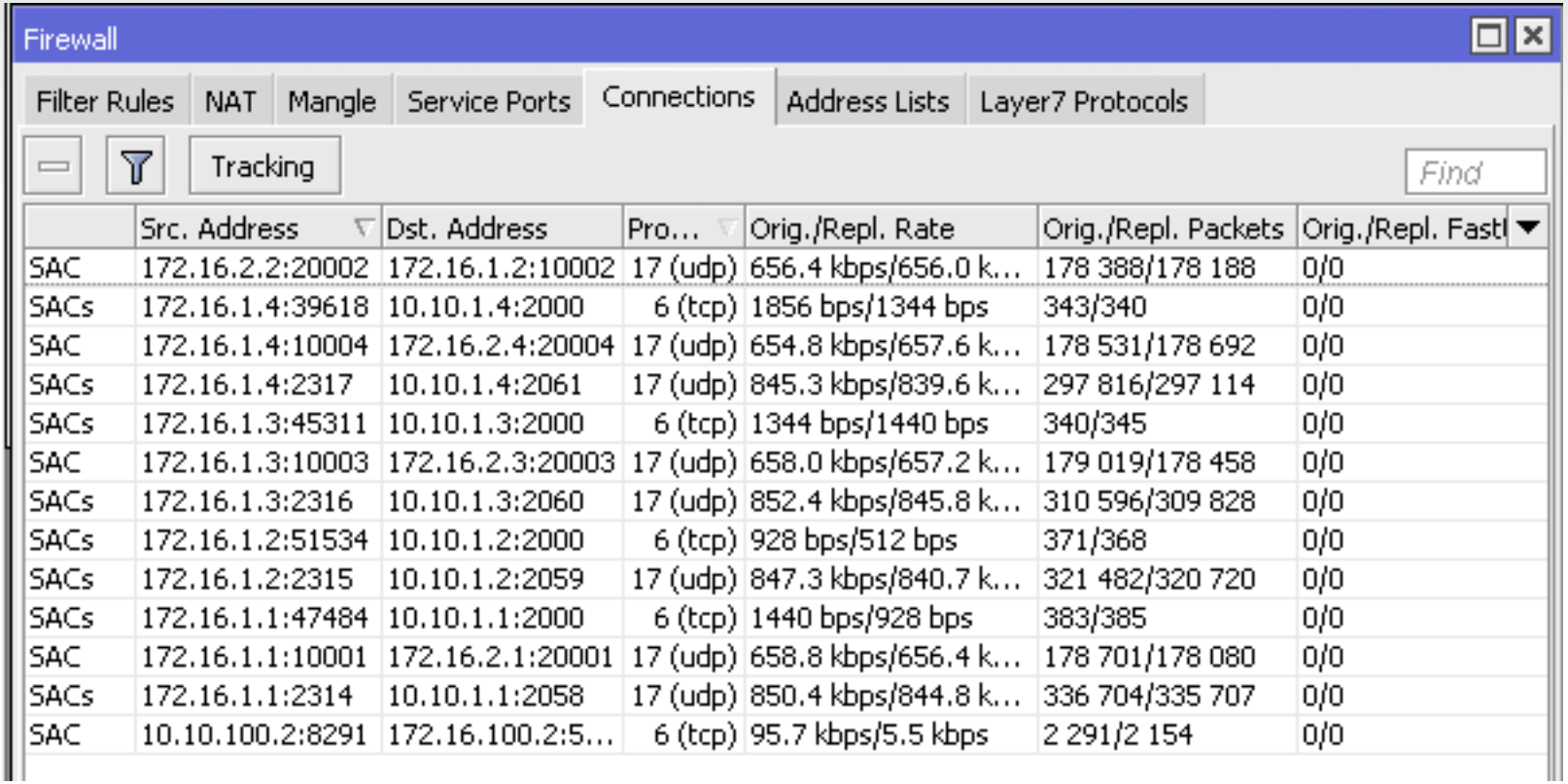
Test 6 : Masquerade

#	Action	Chain	Out. Interface
0	masquerade	srcnat	ether5

Terminal

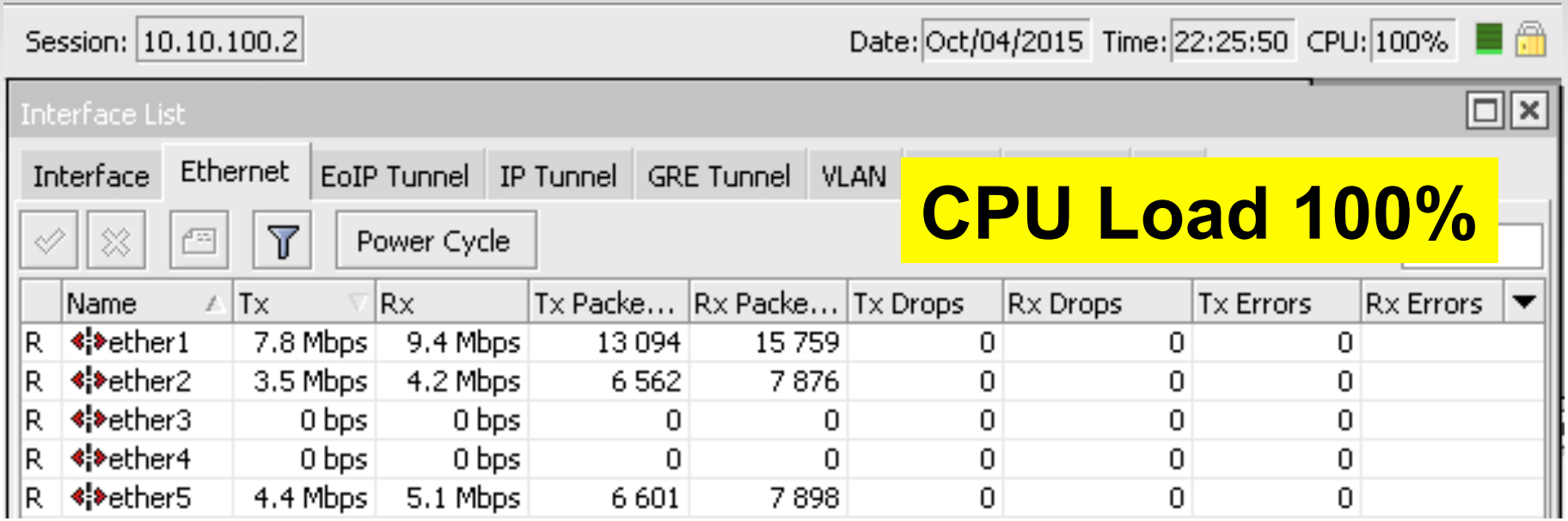
```
[admin@R2-TGEN] > tool bandwidth-test user=admin \
\... direction=both \
\... local-udp-tx-size=64 remote-udp-tx-size=64 \
\... local-tx-speed=1M remote-tx-speed=1M \
\... address=10.10.1.2
                  status: running
                duration: 20s
              tx-current: 999.9kbps
    tx-10-second-average: 1000.0kbps
        tx-total-average: 1000.0kbps
              rx-current: 999.9kbps
    rx-10-second-average: 999.9kbps
        rx-total-average: 996.2kbps
            lost-packets: 0
             random-data: no
               direction: both
                 tx-size: 64
                 rx-size: 64
-- [Q quit|D dump|C-z pause]
```

Test 6 : Masquerade



	Src. Address	Dst. Address	Pro...	Orig./Repl. Rate	Orig./Repl. Packets	Orig./Repl. Fastl
SAC	172.16.2.2:20002	172.16.1.2:10002	17 (udp)	656.4 kbps/656.0 k...	178 388/178 188	0/0
SACs	172.16.1.4:39618	10.10.1.4:2000	6 (tcp)	1856 bps/1344 bps	343/340	0/0
SAC	172.16.1.4:10004	172.16.2.4:20004	17 (udp)	654.8 kbps/657.6 k...	178 531/178 692	0/0
SACs	172.16.1.4:2317	10.10.1.4:2061	17 (udp)	845.3 kbps/839.6 k...	297 816/297 114	0/0
SACs	172.16.1.3:45311	10.10.1.3:2000	6 (tcp)	1344 bps/1440 bps	340/345	0/0
SAC	172.16.1.3:10003	172.16.2.3:20003	17 (udp)	658.0 kbps/657.2 k...	179 019/178 458	0/0
SACs	172.16.1.3:2316	10.10.1.3:2060	17 (udp)	852.4 kbps/845.8 k...	310 596/309 828	0/0
SACs	172.16.1.2:51534	10.10.1.2:2000	6 (tcp)	928 bps/512 bps	371/368	0/0
SACs	172.16.1.2:2315	10.10.1.2:2059	17 (udp)	847.3 kbps/840.7 k...	321 482/320 720	0/0
SACs	172.16.1.1:47484	10.10.1.1:2000	6 (tcp)	1440 bps/928 bps	383/385	0/0
SAC	172.16.1.1:10001	172.16.2.1:20001	17 (udp)	658.8 kbps/656.4 k...	178 701/178 080	0/0
SACs	172.16.1.1:2314	10.10.1.1:2058	17 (udp)	850.4 kbps/844.8 k...	336 704/335 707	0/0
SAC	10.10.100.2:8291	172.16.100.2:5...	6 (tcp)	95.7 kbps/5.5 kbps	2 291/2 154	0/0

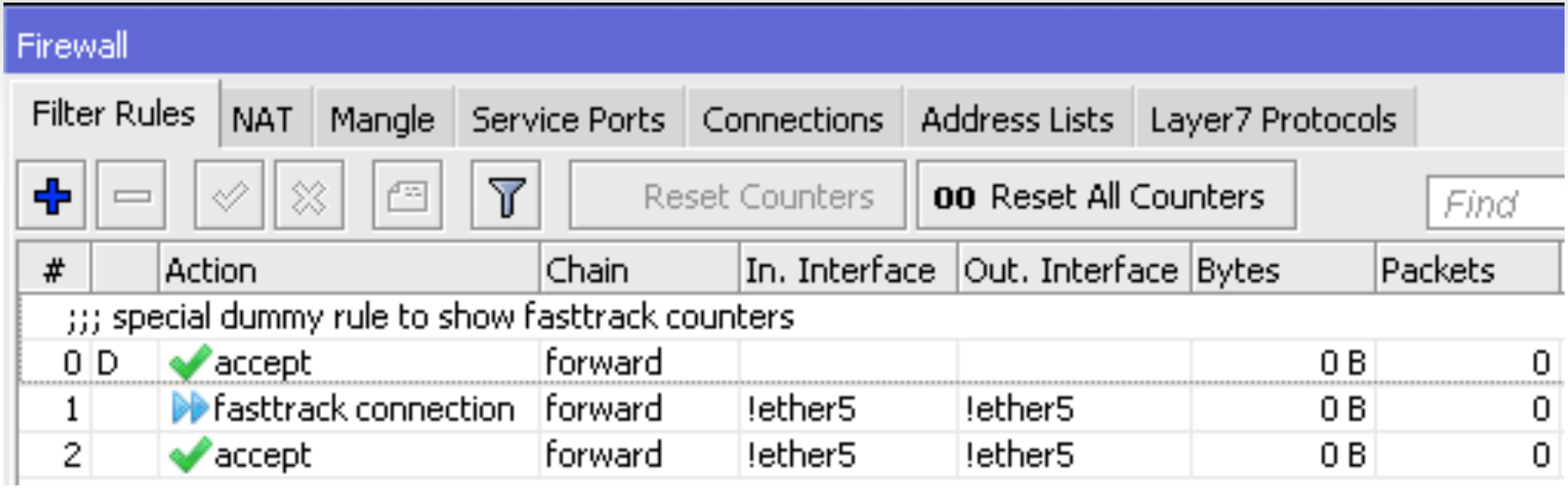
Result 6 : Masquerade



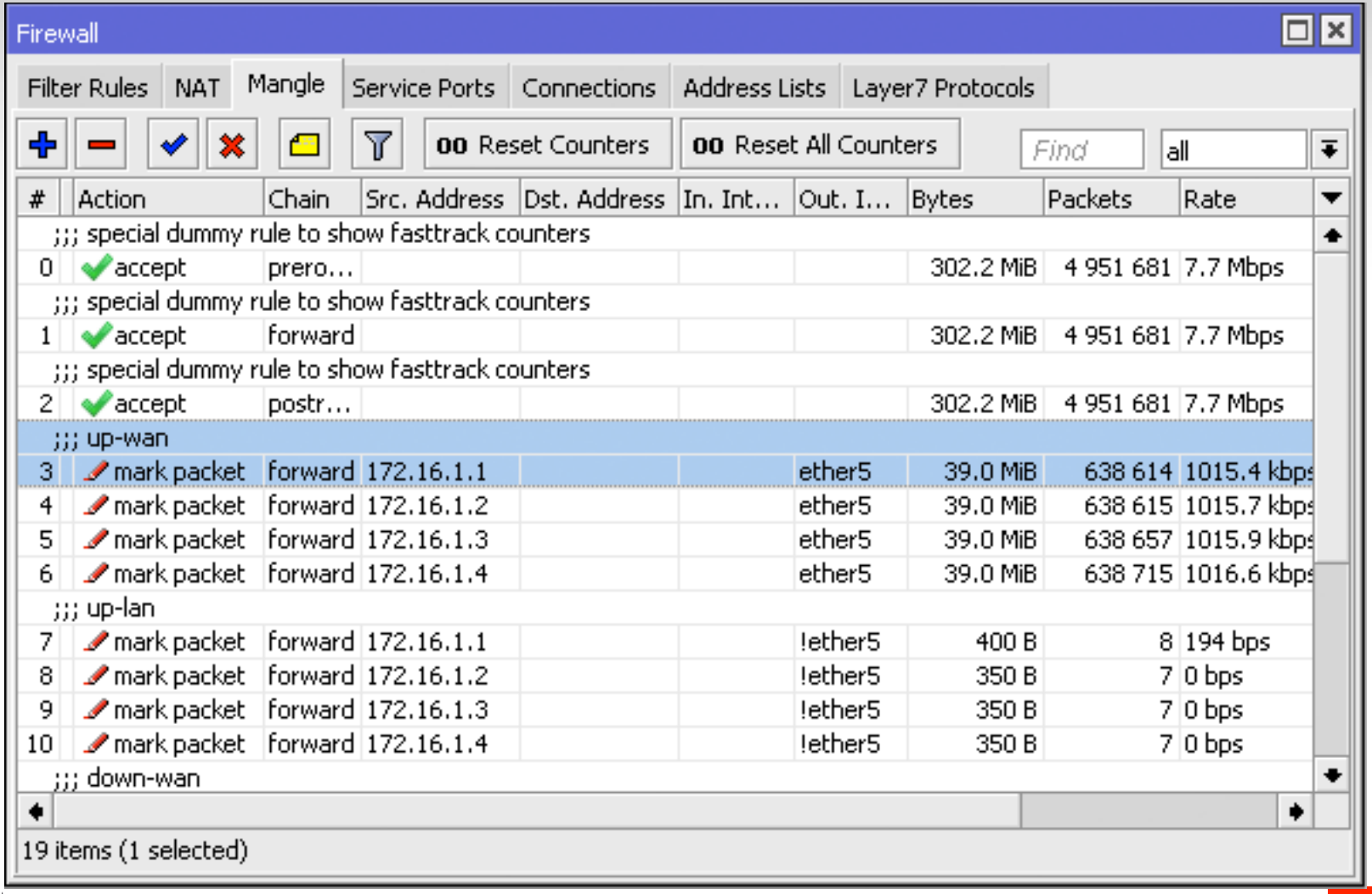
	Name	Tx	Rx	Tx Packe...	Rx Packe...	Tx Drops	Rx Drops	Tx Errors	Rx Errors
R	ether1	7.8 Mbps	9.4 Mbps	13 094	15 759	0	0	0	
R	ether2	3.5 Mbps	4.2 Mbps	6 562	7 876	0	0	0	
R	ether3	0 bps	0 bps	0	0	0	0	0	
R	ether4	0 bps	0 bps	0	0	0	0	0	
R	ether5	4.4 Mbps	5.1 Mbps	6 601	7 898	0	0	0	

Lost Rate	Lat. Min.	Lat. Avg.	Lat. Max.	Jitter
1329.8...	70.6us	1.85ms	20.7ms	20.7ms

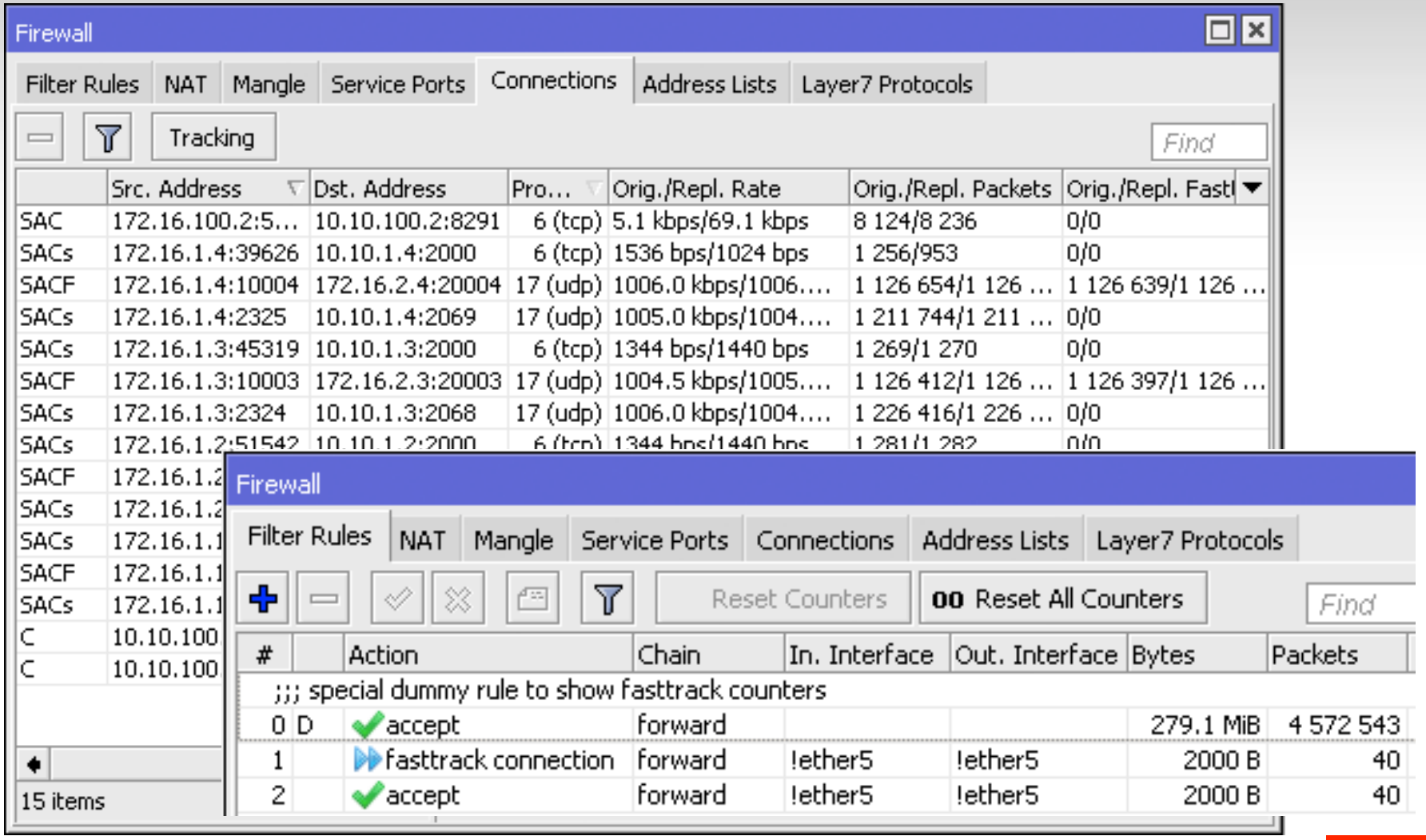
Test 7 : Fasttrack



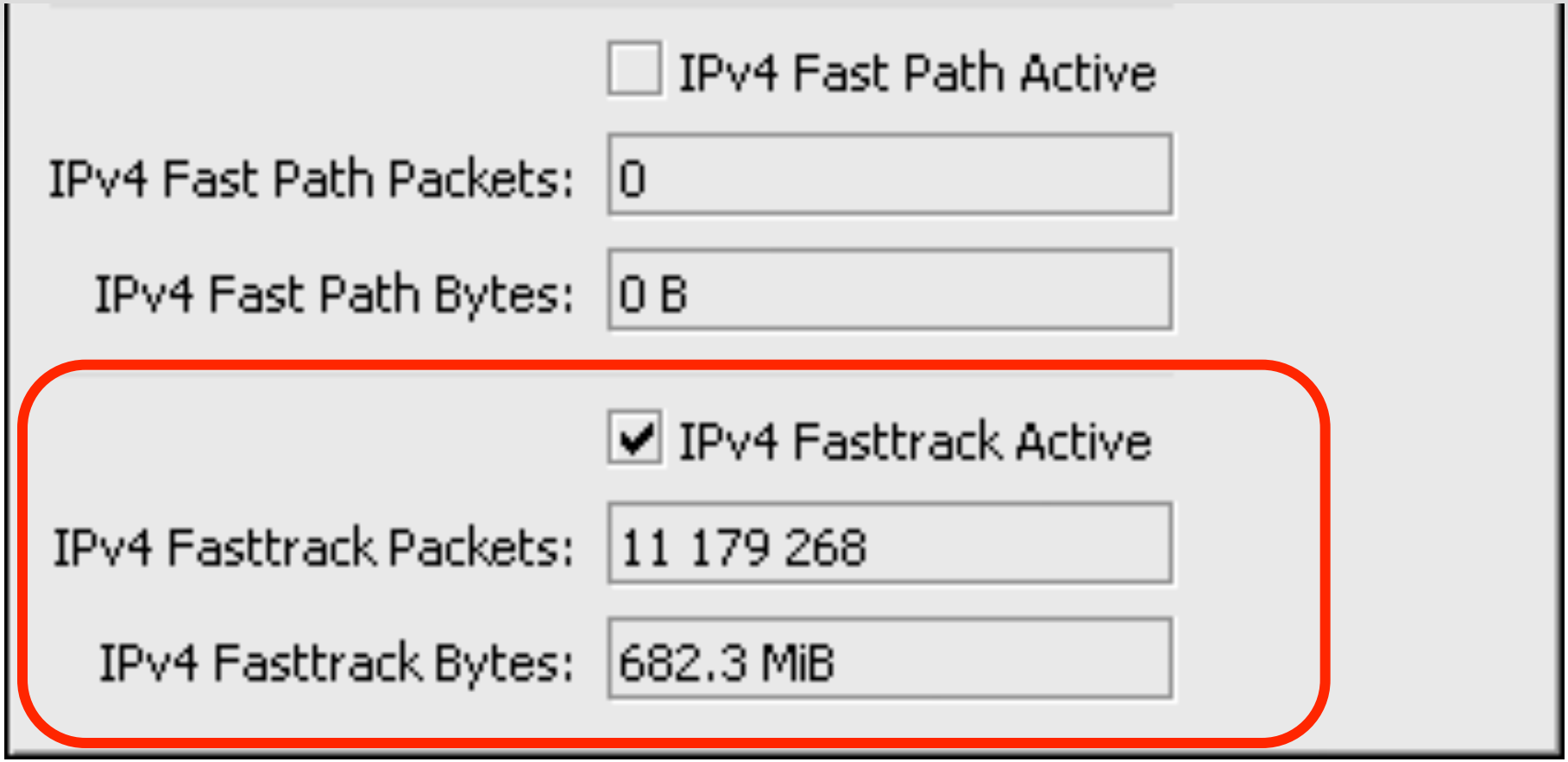
Result 7 : Fasttrack



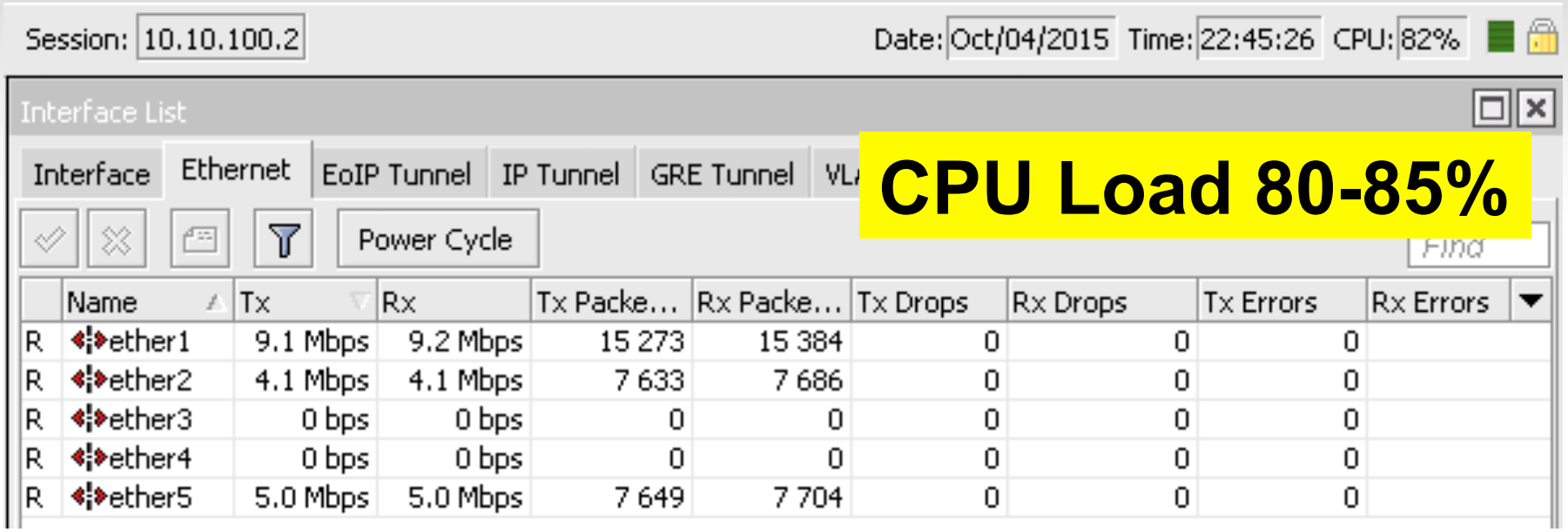
Result 7 : Fasttrack



Result 7 : Fasttrack

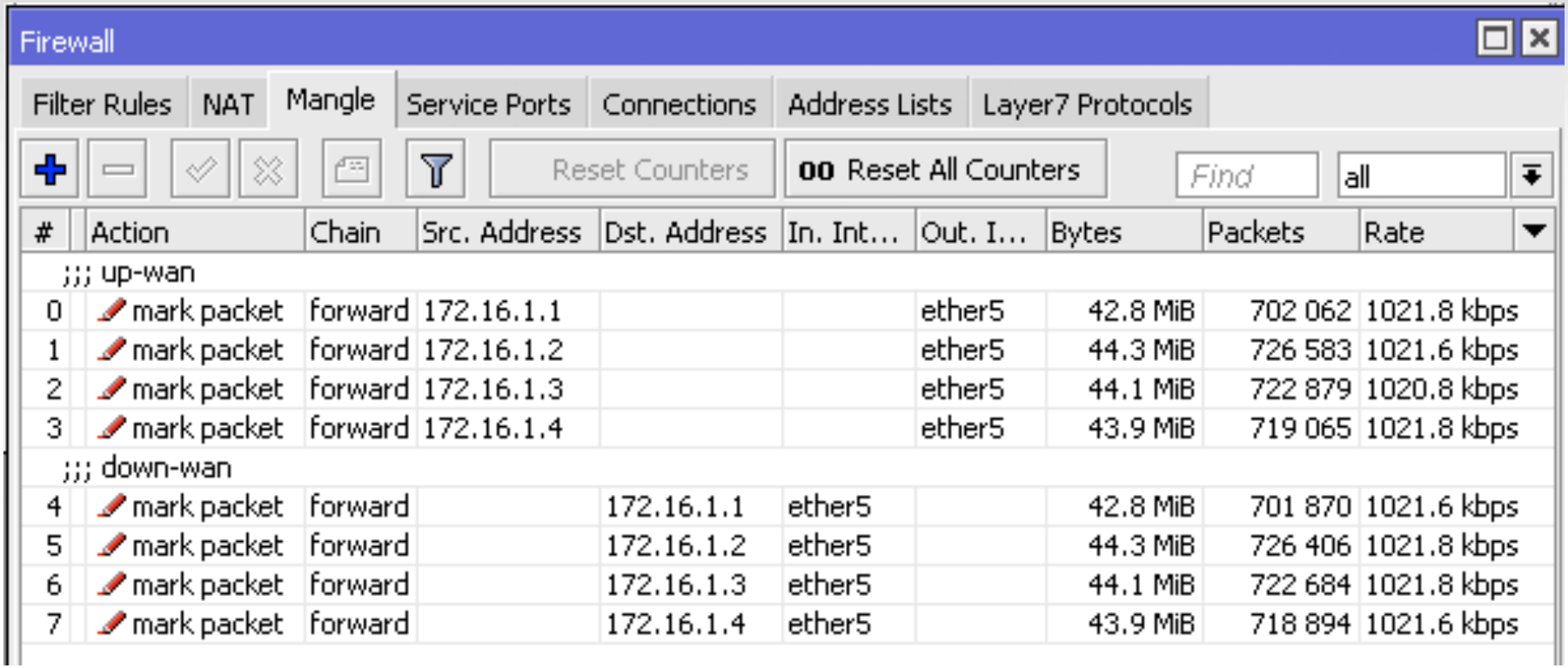


Result 7 : Fasttrack



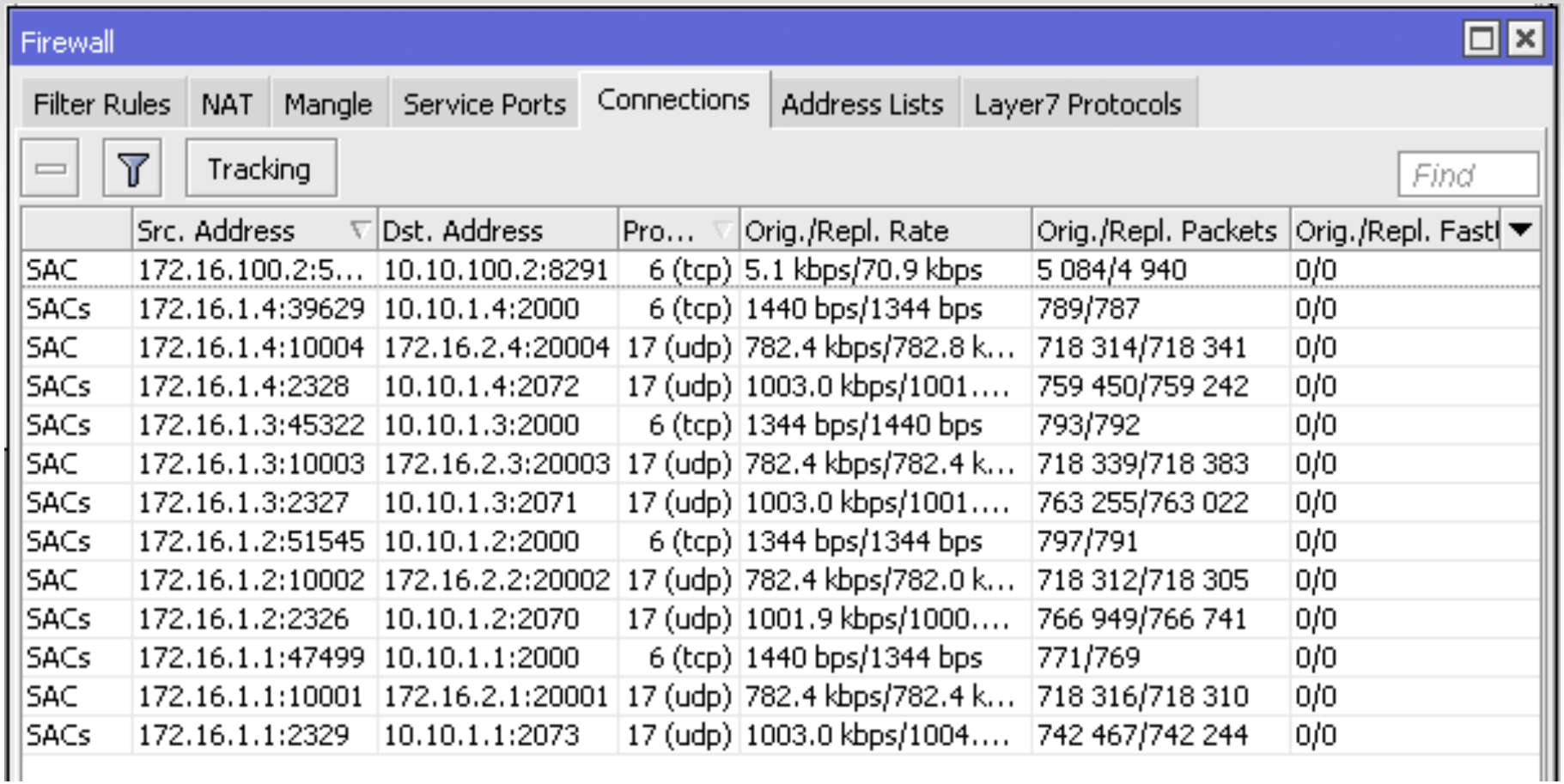
Lost Rate	Lat. Min.	Lat. Avg.	Lat. Max.	Jitter
44.0 kbps	36.9us	362us	18.7ms	18.7ms

Test 8 : WAN Only - Fasttrack



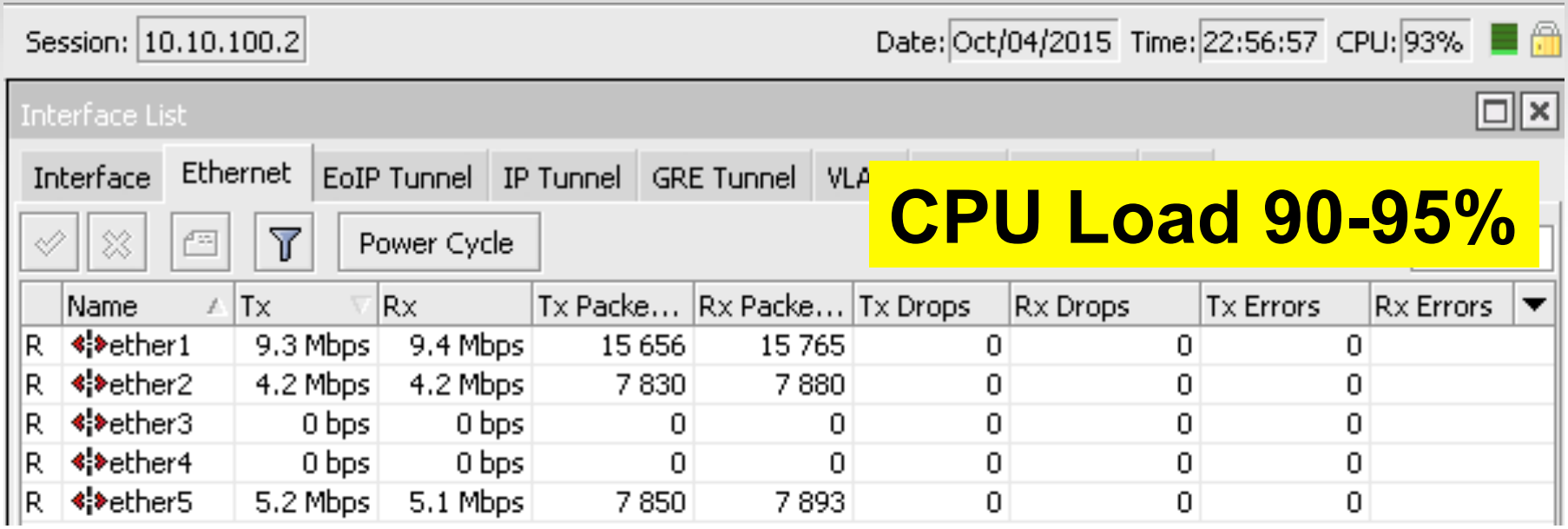
#	Action	Chain	Src. Address	Dst. Address	In. Int...	Out. I...	Bytes	Packets	Rate
;;; up-wan									
0	mark packet	forward	172.16.1.1			ether5	42.8 MiB	702 062	1021.8 kbps
1	mark packet	forward	172.16.1.2			ether5	44.3 MiB	726 583	1021.6 kbps
2	mark packet	forward	172.16.1.3			ether5	44.1 MiB	722 879	1020.8 kbps
3	mark packet	forward	172.16.1.4			ether5	43.9 MiB	719 065	1021.8 kbps
;;; down-wan									
4	mark packet	forward		172.16.1.1	ether5		42.8 MiB	701 870	1021.6 kbps
5	mark packet	forward		172.16.1.2	ether5		44.3 MiB	726 406	1021.8 kbps
6	mark packet	forward		172.16.1.3	ether5		44.1 MiB	722 684	1021.8 kbps
7	mark packet	forward		172.16.1.4	ether5		43.9 MiB	718 894	1021.6 kbps

Result 8 : WAN Only - Fasttrack



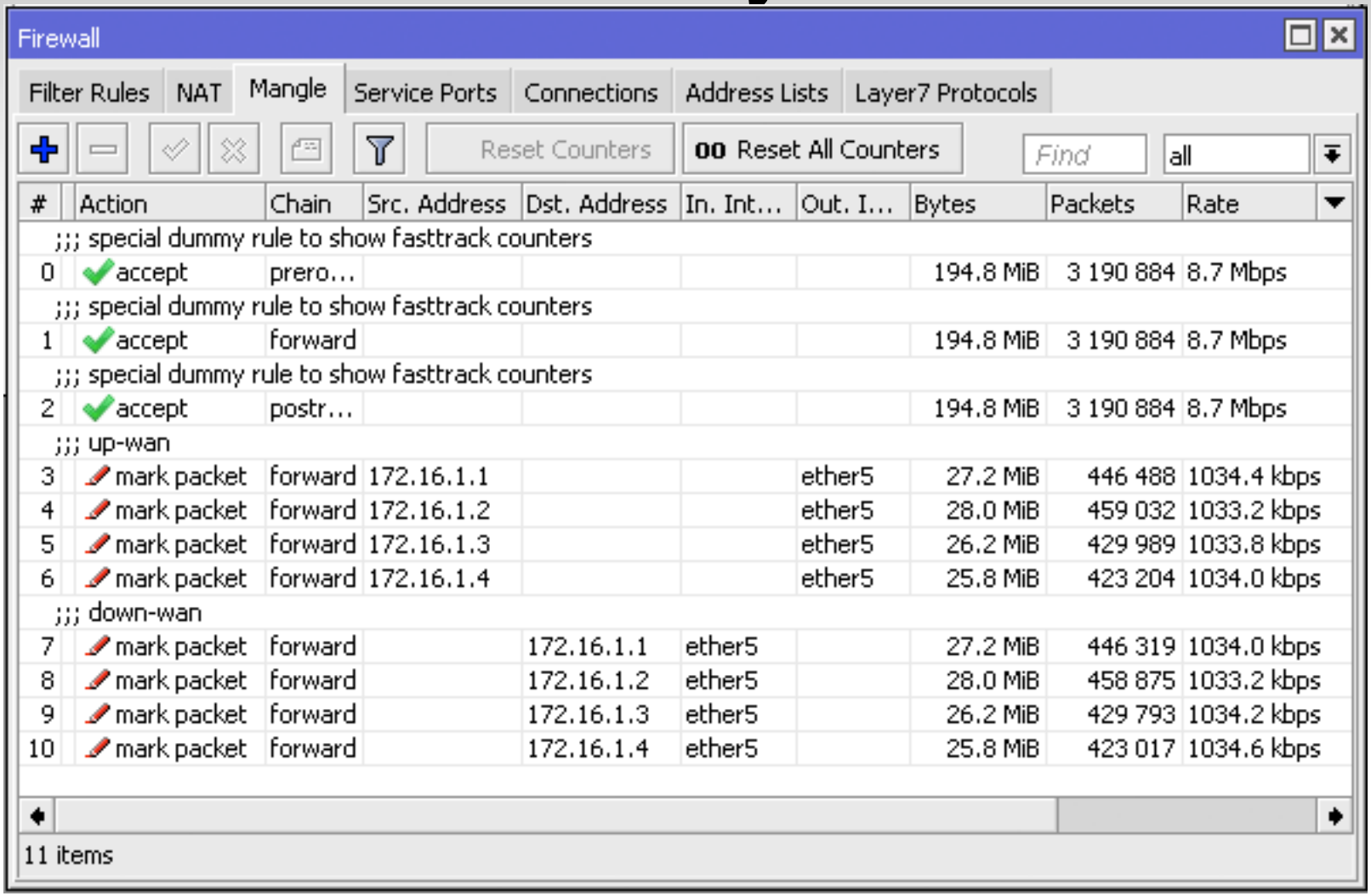
	Src. Address	Dst. Address	Pro...	Orig./Repl. Rate	Orig./Repl. Packets	Orig./Repl. Fastl
SAC	172.16.100.2:5...	10.10.100.2:8291	6 (tcp)	5.1 kbps/70.9 kbps	5 084/4 940	0/0
SACs	172.16.1.4:39629	10.10.1.4:2000	6 (tcp)	1440 bps/1344 bps	789/787	0/0
SAC	172.16.1.4:10004	172.16.2.4:20004	17 (udp)	782.4 kbps/782.8 k...	718 314/718 341	0/0
SACs	172.16.1.4:2328	10.10.1.4:2072	17 (udp)	1003.0 kbps/1001....	759 450/759 242	0/0
SACs	172.16.1.3:45322	10.10.1.3:2000	6 (tcp)	1344 bps/1440 bps	793/792	0/0
SAC	172.16.1.3:10003	172.16.2.3:20003	17 (udp)	782.4 kbps/782.4 k...	718 339/718 383	0/0
SACs	172.16.1.3:2327	10.10.1.3:2071	17 (udp)	1003.0 kbps/1001....	763 255/763 022	0/0
SACs	172.16.1.2:51545	10.10.1.2:2000	6 (tcp)	1344 bps/1344 bps	797/791	0/0
SAC	172.16.1.2:10002	172.16.2.2:20002	17 (udp)	782.4 kbps/782.0 k...	718 312/718 305	0/0
SACs	172.16.1.2:2326	10.10.1.2:2070	17 (udp)	1001.9 kbps/1000....	766 949/766 741	0/0
SACs	172.16.1.1:47499	10.10.1.1:2000	6 (tcp)	1440 bps/1344 bps	771/769	0/0
SAC	172.16.1.1:10001	172.16.2.1:20001	17 (udp)	782.4 kbps/782.4 k...	718 316/718 310	0/0
SACs	172.16.1.1:2329	10.10.1.1:2073	17 (udp)	1003.0 kbps/1004....	742 467/742 244	0/0

Result 8 : WAN Only - Fasttrack

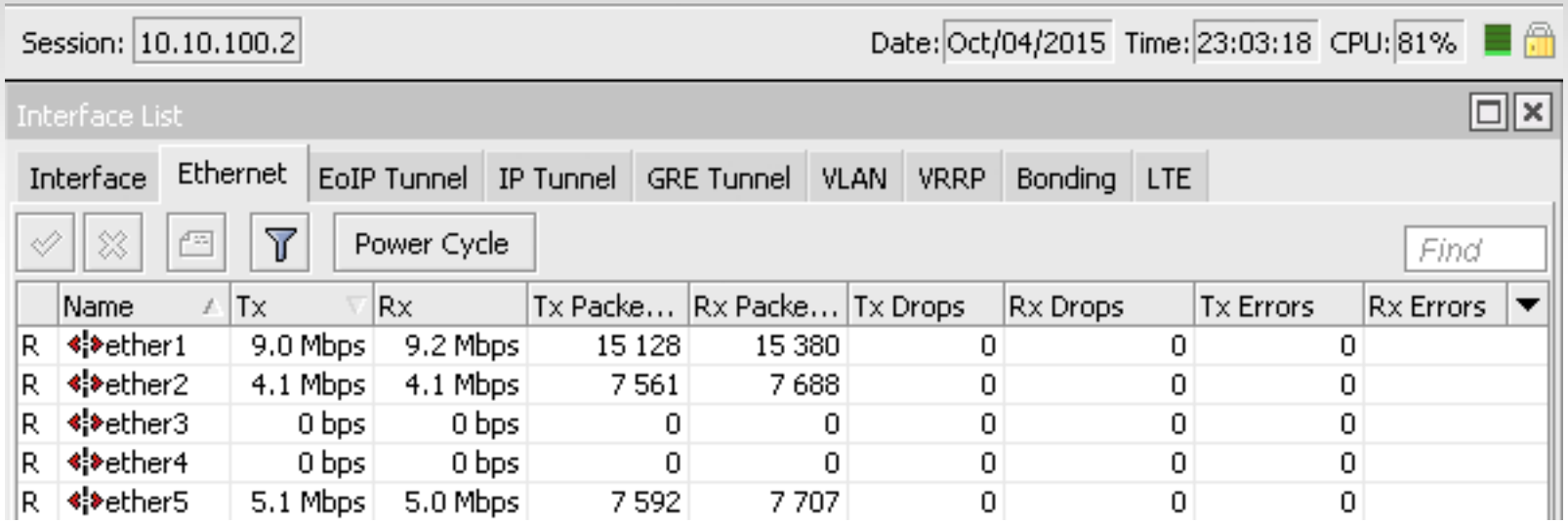


Lost Rate	Lat. Min.	Lat. Avg.	Lat. Max.	Jitter
60.3 kbps	49.6us	389us	14.2ms	14.2ms

Test 9 : WAN Only + Fasttrack



Result 9 : WAN Only + Fasttrack



Lost Rate	Lat. Min.	Lat. Avg.	Lat. Max.	Jitter
38.3 kbps	38us	377us	13.3ms	13.3ms

Matur Suwun mas dab!
Terima Kasih mas bro!