Network and System Defence

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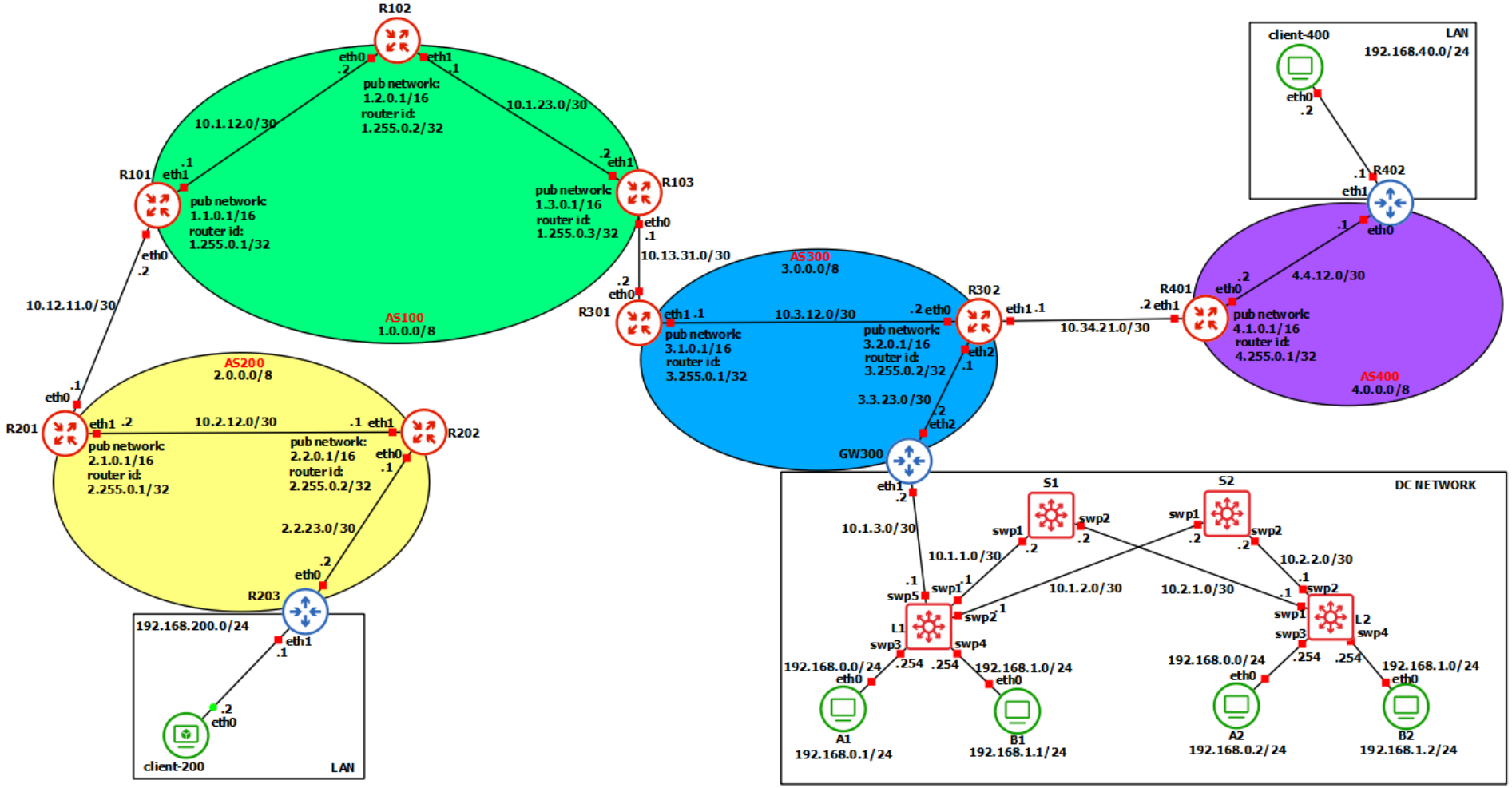
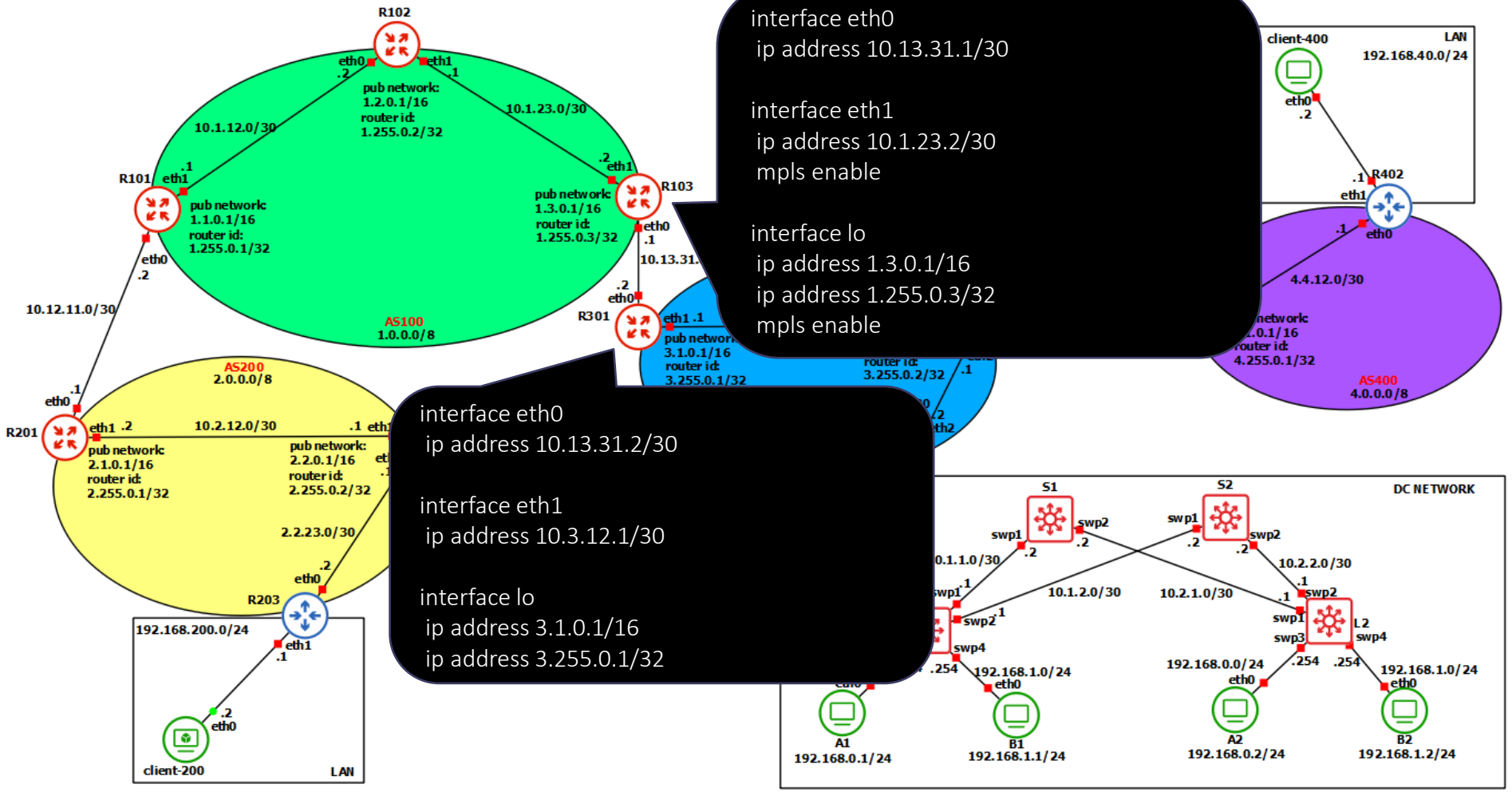
Topologia


R102
eth0
.2
eth1
.1
pub network:
1.2.0.1/16
router id:
1.255.0.2/32
10.1.12.0/30
10.1.23.0/30
R101
.1
eth1
pub network:
1.1.0.1/16
router id:
1.255.0.1/32
.2
eth1
R103
pub network:
1.3.0.1/16
router id:
1.255.0.3/32
eth0
.2
eth0
.1
10.13.31.0/30
10.12.11.0/30
AS100
1.0.0.0/8
AS300
3.0.0.0/8
.2
eth0
R301
eth1 .1
10.3.12.0/30
.2 eth0
R302
eth1.1
10.34.21.0/30
pub network:
3.1.0.1/16
router id:
3.255.0.1/32
pub network:
3.2.0.1/16
router id:
3.255.0.2/32
eth2
.1
3.3.23.0/30
.2
eth2
client-400
LAN
192.168.40.0/24
eth0
.2
.1
R402
eth1
.1
eth0
R401
.2
eth0
.2 eth1
4.4.12.0/30
pub network
4.1.0.1/16
router id:
4.255.0.1/32
AS400
4.0.0.0/8
AS200
2.0.0.0/8
.1
eth0
R201
eth1 .2
10.2.12.0/30
.1 eth1
R202
pub network:
2.1.0.1/16
router id:
2.255.0.1/32
pub network:
2.2.0.1/16
router id:
2.255.0.2/32
eth0
.1
2.2.23.0/30
.2
eth0
R203
GW300
eth1
.2
DC NETWORK
S1
S2
swp1
.2
swp2
.2
10.1.3.0/30
10.1.1.0/30
10.1.2.0/30
10.2.1.0/30
10.2.2.0/30
.1
swp5
swp1
swp2
L1
swp3
swp4
L2
192.168.0.0/24
.254
192.168.1.0/24
eth0
A1
192.168.0.1/24
B1
192.168.1.1/24
A2
192.168.0.2/24
B2
192.168.1.2/24
192.168.200.0/24
eth1
.1
.2
eth0
client-200
LAN

Configurazione interfacce




```
interface eth0
 ip address 10.13.31.1/30

interface eth1
 ip address 10.1.23.2/30
 mpls enable

interface lo
 ip address 1.3.0.1/16
 ip address 1.255.0.3/32
 mpls enable
```

```
interface eth0
 ip address 10.13.31.2/30

interface eth1
 ip address 10.3.12.1/30

interface lo
 ip address 3.1.0.1/16
 ip address 3.255.0.1/32
```

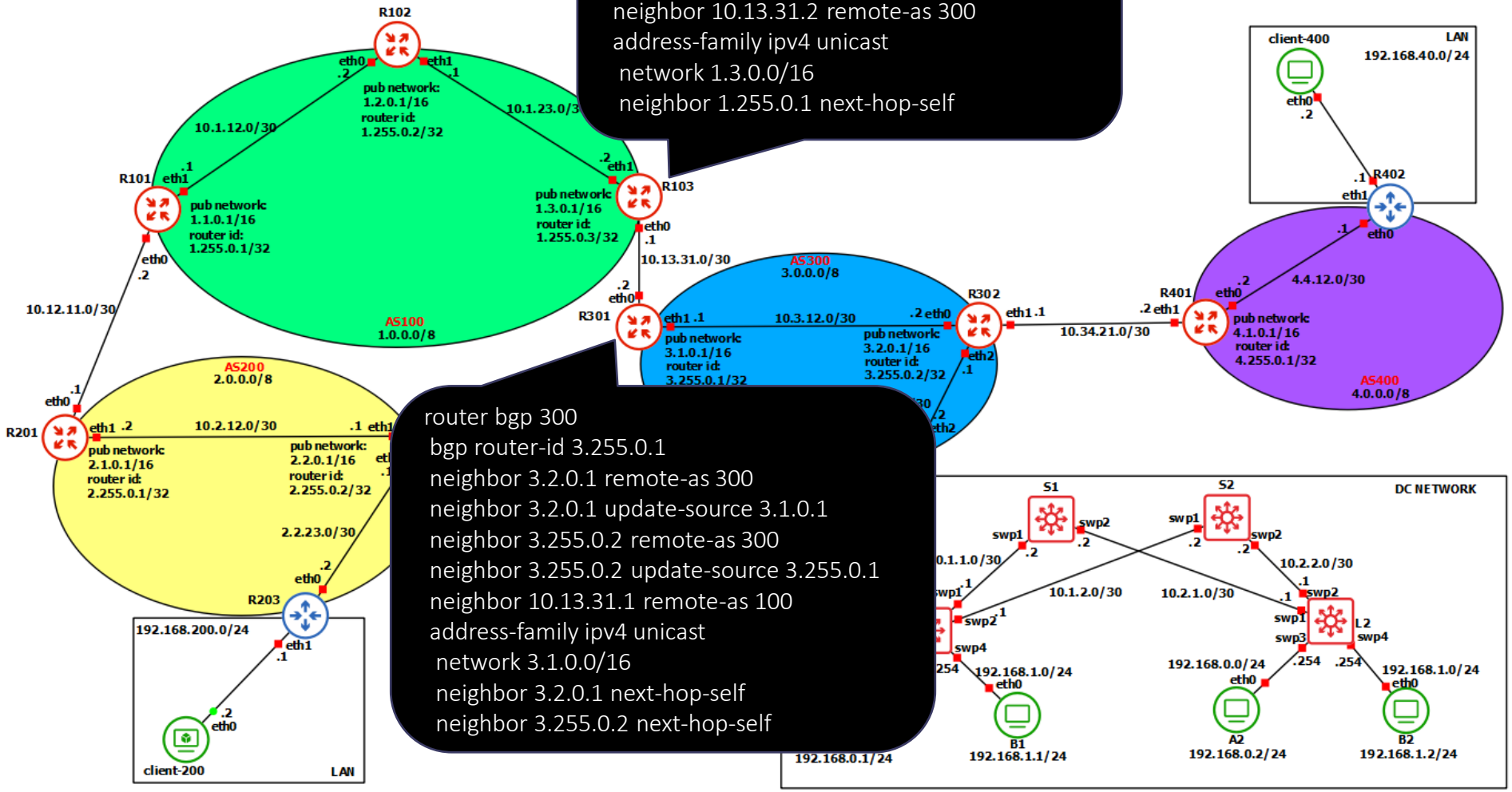
Protocolli – BGP (Border Gateway Protocol)

- BGP è un protocollo di instradamento, di tipo *distance vector,* utilizzato su Internet per scambiare informazioni di routing tra Autonomous Systems (AS).
- Consente a reti diverse di comunicare e instradare il traffico da un punto all'altro su larga scala;
- Individua i migliori percorsi per il traffico di rete basandosi su criteri come il numero di hop (salti) tra router o specifiche politiche di routing;
- Scambia informazioni di routing sotto forma di annunci di rotte, permettendo ai vari router di aggiornarsi reciprocamente sui migliori percorsi;

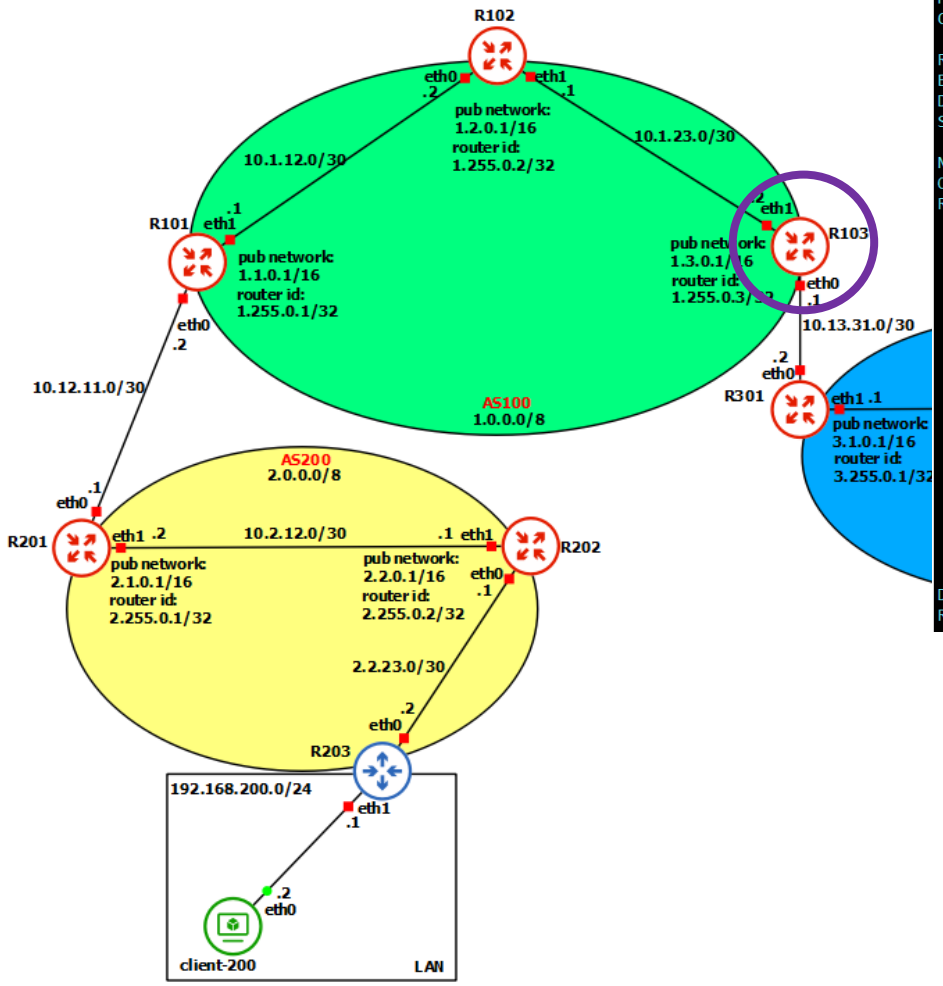
BGP

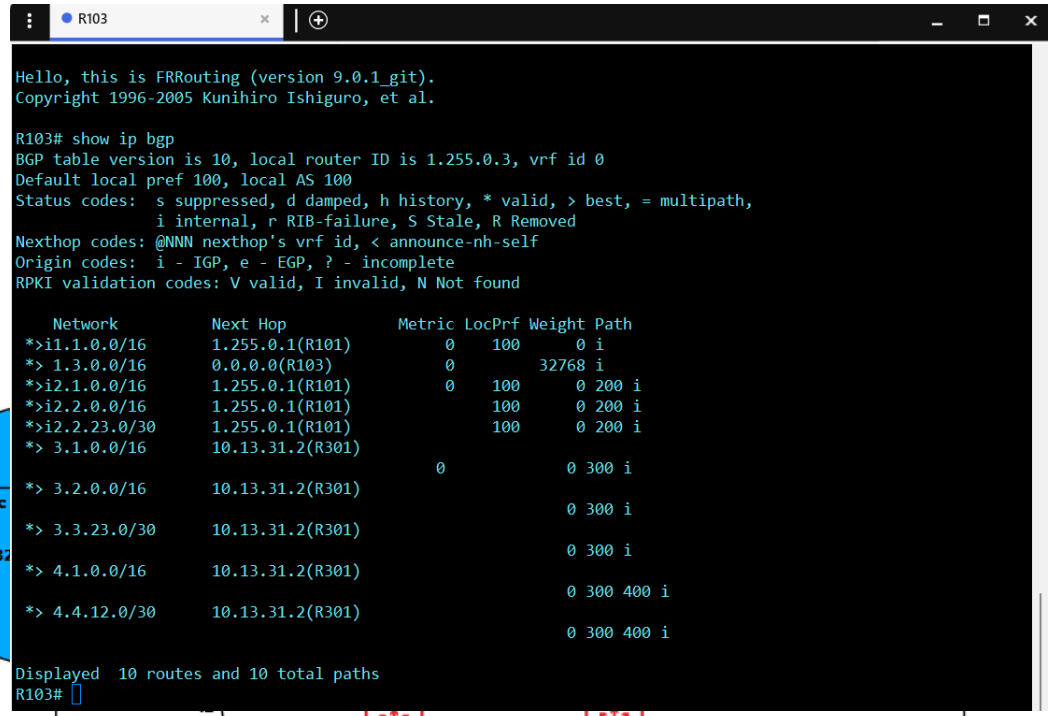
```
router bgp 100
 bgp router-id 1.255.0.3
 neighbor 1.255.0.1 remote-as 100
 neighbor 1.255.0.1 update-source 1.255.0.3
 neighbor 10.13.31.2 remote-as 300
 address-family ipv4 unicast
  network 1.3.0.0/16
  neighbor 1.255.0.1 next-hop-self
```

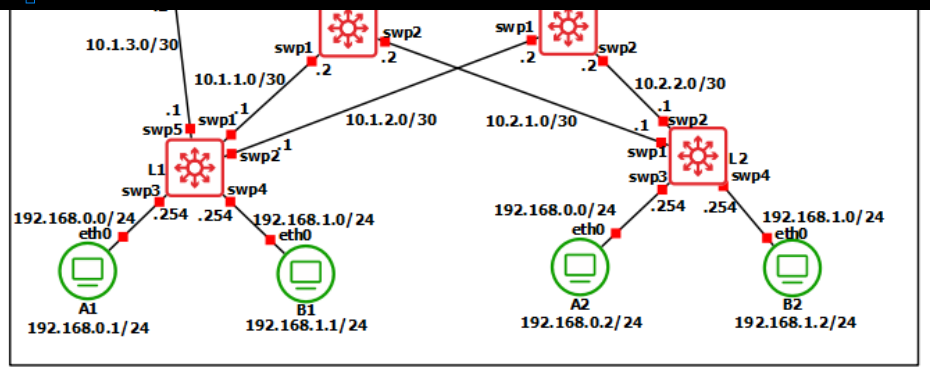
```
router bgp 300
 bgp router-id 3.255.0.1
 neighbor 3.2.0.1 remote-as 300
 neighbor 3.2.0.1 update-source 3.1.0.1
 neighbor 3.255.0.2 remote-as 300
 neighbor 3.255.0.2 update-source 3.255.0.1
 neighbor 10.13.31.1 remote-as 100
 address-family ipv4 unicast
  network 3.1.0.0/16
  neighbor 3.2.0.1 next-hop-self
  neighbor 3.255.0.2 next-hop-self
```



BGP


R102
eth0
.2
eth1
.1
pub network:
1.2.0.1/16
router id:
1.255.0.2/32
10.1.12.0/30
10.1.23.0/30
R101
.1
eth1
pub network:
1.1.0.1/16
router id:
1.255.0.1/32
eth0
.2
R103
eth1
.2
pub network:
1.3.0.1/16
router id:
1.255.0.3/32
eth0
.1
10.13.31.0/30
10.12.11.0/30
AS100
1.0.0.0/8
.2
eth0
R301
eth1 .1
pub network:
3.1.0.1/16
router id:
3.255.0.1/32
AS200
2.0.0.0/8
.1
eth0
R201
eth1 .2
10.2.12.0/30
.1 eth1
R202
pub network:
2.1.0.1/16
router id:
2.255.0.1/32
pub network:
2.2.0.1/16
router id:
2.255.0.2/32
eth0
.1
2.2.23.0/30
.2
eth0
R203
192.168.200.0/24
eth1
.1
.2
eth0
client-200
LAN


R103
Hello, this is FRRouting (version 9.0.1_git).
Copyright 1996-2005 Kunihiro Ishiguro, et al.
R103# show ip bgp
BGP table version is 10, local router ID is 1.255.0.3, vrf id 0
Default local pref 100, local AS 100
Status codes: s suppressed, d damped, h history, * valid, > best, = multipath,
i internal, r RIB-failure, S Stale, R Removed
Nexthop codes: @NNN nexthop's vrf id, < announce-nh-self
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found
Network Next Hop Metric LocPrf Weight Path
*>i1.1.0.0/16 1.255.0.1(R101) 0 100 0 i
*> 1.3.0.0/16 0.0.0.0(R103) 0 32768 i
*>i2.1.0.0/16 1.255.0.1(R101) 0 100 0 200 i
*>i2.2.0.0/16 1.255.0.1(R101) 100 0 200 i
*>i2.2.23.0/30 1.255.0.1(R101) 100 0 200 i
*> 3.1.0.0/16 10.13.31.2(R301) 0 0 300 i
*> 3.2.0.0/16 10.13.31.2(R301) 0 300 i
*> 3.3.23.0/30 10.13.31.2(R301) 0 300 i
*> 4.1.0.0/16 10.13.31.2(R301) 0 300 400 i
*> 4.4.12.0/30 10.13.31.2(R301) 0 300 400 i
Displayed 10 routes and 10 total paths
R103#


10.1.3.0/30
swp1
swp2
.2
.2
swp1
swp2
.2
.2
10.1.1.0/30
10.2.2.0/30
.1
.1
.1
.1
swp5
swp1
swp1
swp2
10.1.2.0/30
10.2.1.0/30
swp2
L1
swp2
1
swp1
L2
swp3
swp4
swp3
swp4
192.168.0.0/24
.254
.254
192.168.1.0/24
192.168.0.0/24
.254
.254
192.168.1.0/24
eth0
eth0
eth0
eth0
A1
192.168.0.1/24
B1
192.168.1.1/24
A2
192.168.0.2/24
B2
192.168.1.2/24

Protocolli – OSPF (Open Shortest Path First)

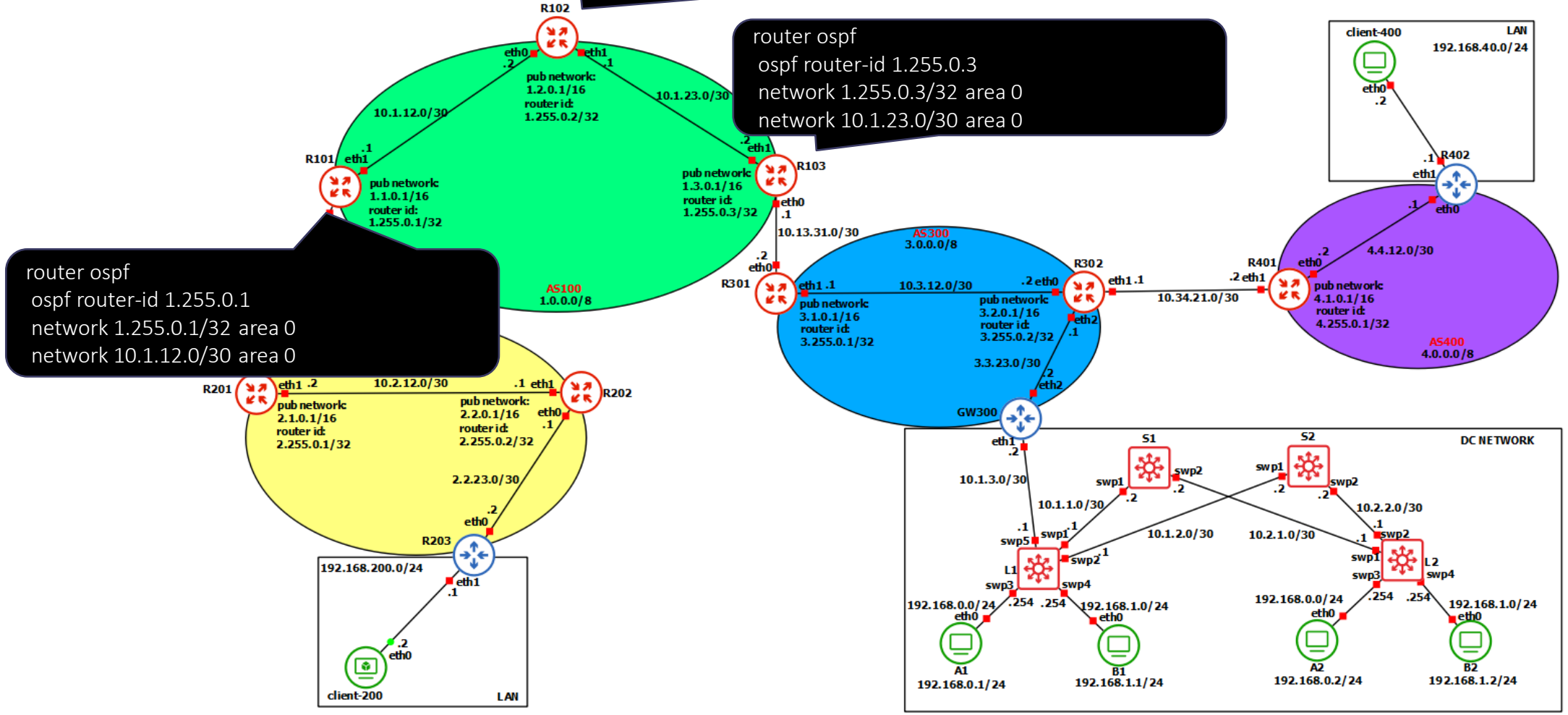
- OSPF è un protocollo IGP (Interior Gateway Protocol) di routing dinamico utilizzato all'interno di un AS;
- Protocollo Link-State, in cui ogni router ha una mappa completa della rete (topologia) e calcola il percorso più breve (Shortest Path First) verso ogni destinazione utilizzando l'algoritmo di Dijkstra;
- Uno dei vantaggi di OSPF è la sua capacità di convergere rapidamente, cioè di aggiornare la tabella di routing di tutti i router in risposta a cambiamenti nella rete;
- È altamente scalabile e supporta reti di grandi dimensioni suddivise in aree per migliorare l'efficienza e ridurre il traffico di aggiornamento;

OSPF

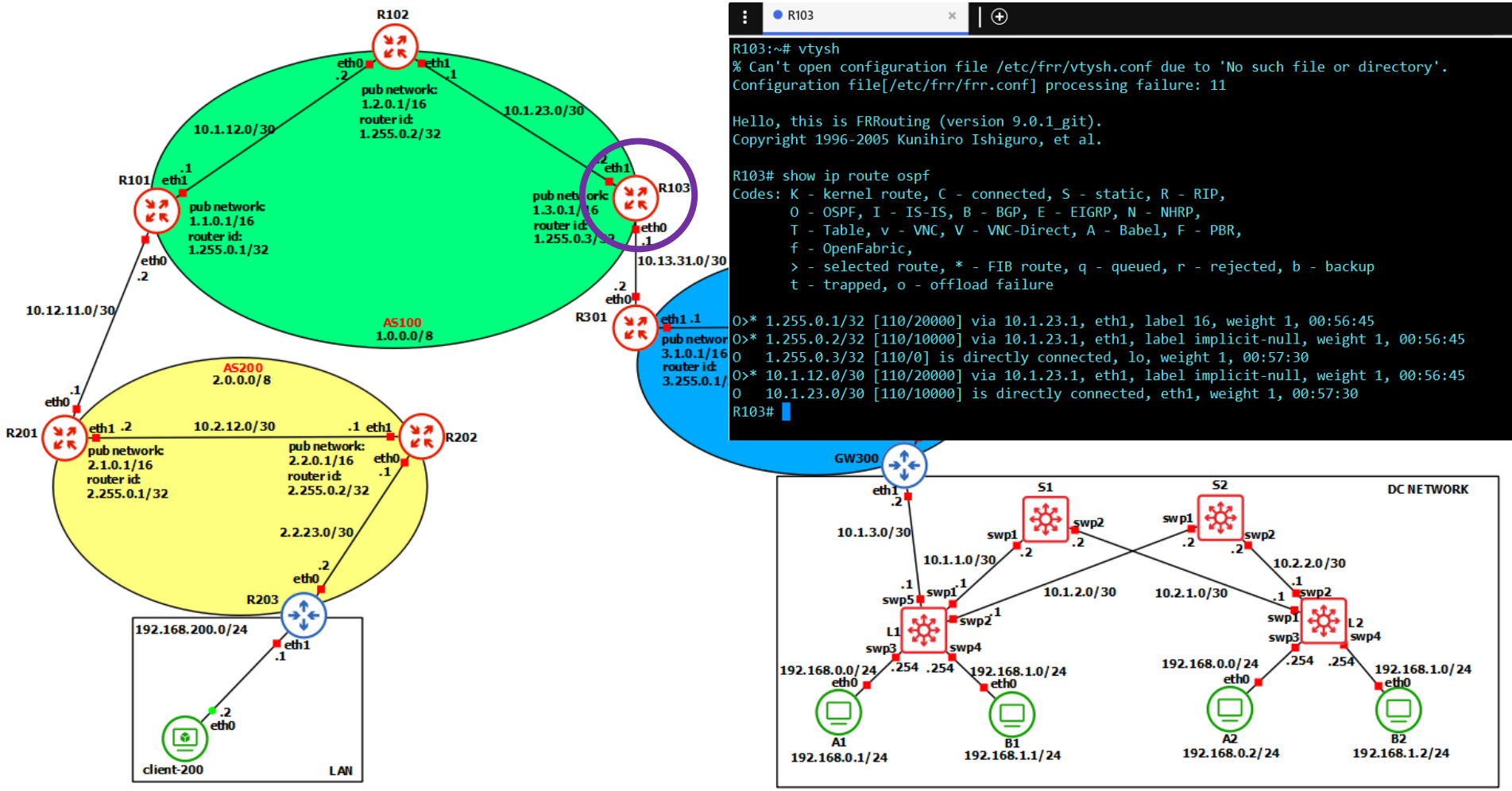
```
router ospf
 ospf router-id 1.255.0.2
 network 1.255.0.2/32 area 0
 network 10.1.12.0/30 area 0
 network 10.1.23.0/30 area 0
```

```
router ospf
 ospf router-id 1.255.0.3
 network 1.255.0.3/32 area 0
 network 10.1.23.0/30 area 0
```

```
router ospf
 ospf router-id 1.255.0.1
 network 1.255.0.1/32 area 0
 network 10.1.12.0/30 area 0
```



OSPF




```
R103
R103:~# vtysh
% Can't open configuration file /etc/frr/vtysh.conf due to 'No such file or directory'.
Configuration file[/etc/frr/frr.conf] processing failure: 11

Hello, this is FRRouting (version 9.0.1_git).
Copyright 1996-2005 Kunihiro Ishiguro, et al.

R103# show ip route ospf
Codes: K - kernel route, C - connected, S - static, R - RIP,
       O - OSPF, I - IS-IS, B - BGP, E - EIGRP, N - NHRP,
       T - Table, v - VNC, V - VNC-Direct, A - Babel, F - PBR,
       f - OpenFabric,
       > - selected route, * - FIB route, q - queued, r - rejected, b - backup
       t - trapped, o - offload failure

O>* 1.255.0.1/32 [110/20000] via 10.1.23.1, eth1, label 16, weight 1, 00:56:45
O>* 1.255.0.2/32 [110/10000] via 10.1.23.1, eth1, label implicit-null, weight 1, 00:56:45
O   1.255.0.3/32 [110/0] is directly connected, lo, weight 1, 00:57:30
O>* 10.1.12.0/30 [110/20000] via 10.1.23.1, eth1, label implicit-null, weight 1, 00:56:45
O   10.1.23.0/30 [110/10000] is directly connected, eth1, weight 1, 00:57:30
R103#
```

Protocolli – MPLS/LDP

- MPLS (Multiprotocol Label Switching) è utilizzato per instradare dati in modo efficiente attraverso una rete utilizzando delle labels. Migliora la velocità di instradamento e la qualità del servizio (QoS), specialmente in reti di grandi dimensioni;

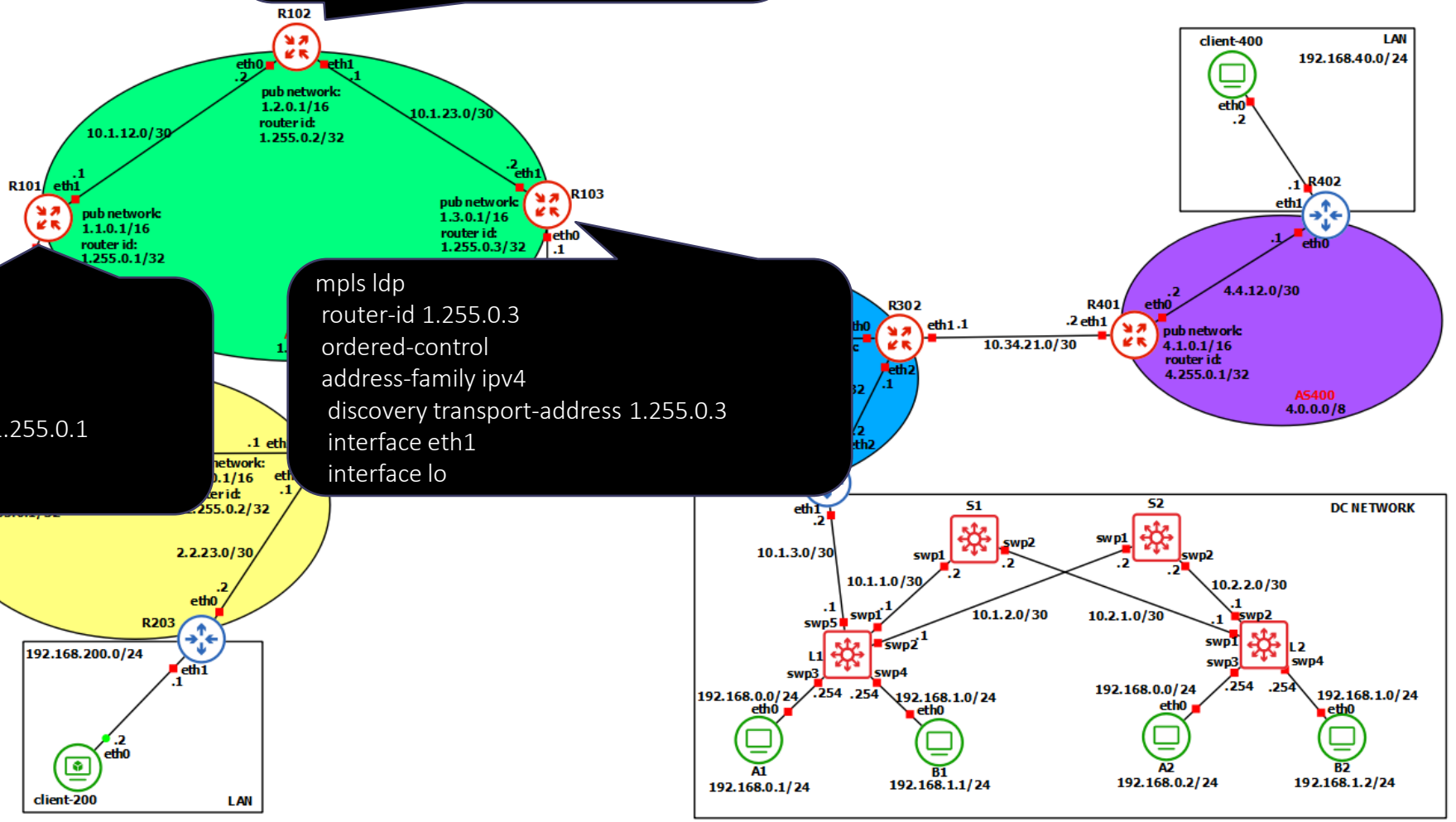
- LDP (Label Distribution Protocol), è un protocollo utilizzato nelle reti MPLS per la distribuzione delle etichette (labels) tra i router;

MPLS/LDP

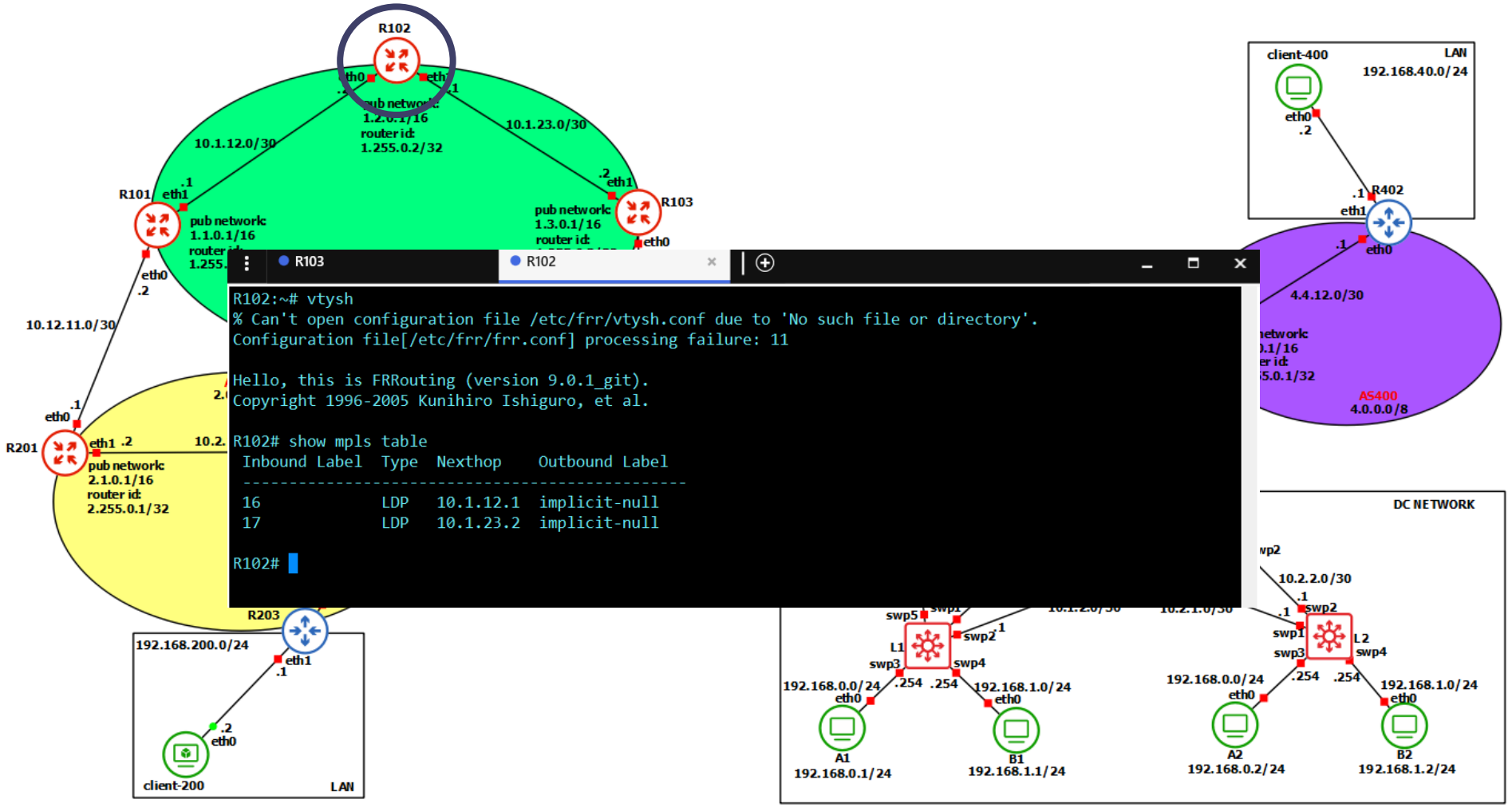
```
mpls ldp
 router-id 1.255.0.2
 ordered-control
 address-family ipv4
  discovery transport-address 1.255.0.2
  interface eth0
  interface eth1
  interface lo
```

```
mpls ldp
 router-id 1.255.0.1
 ordered-control
 address-family ipv4
  discovery transport-address 1.255.0.1
  interface eth1
  interface lo
```

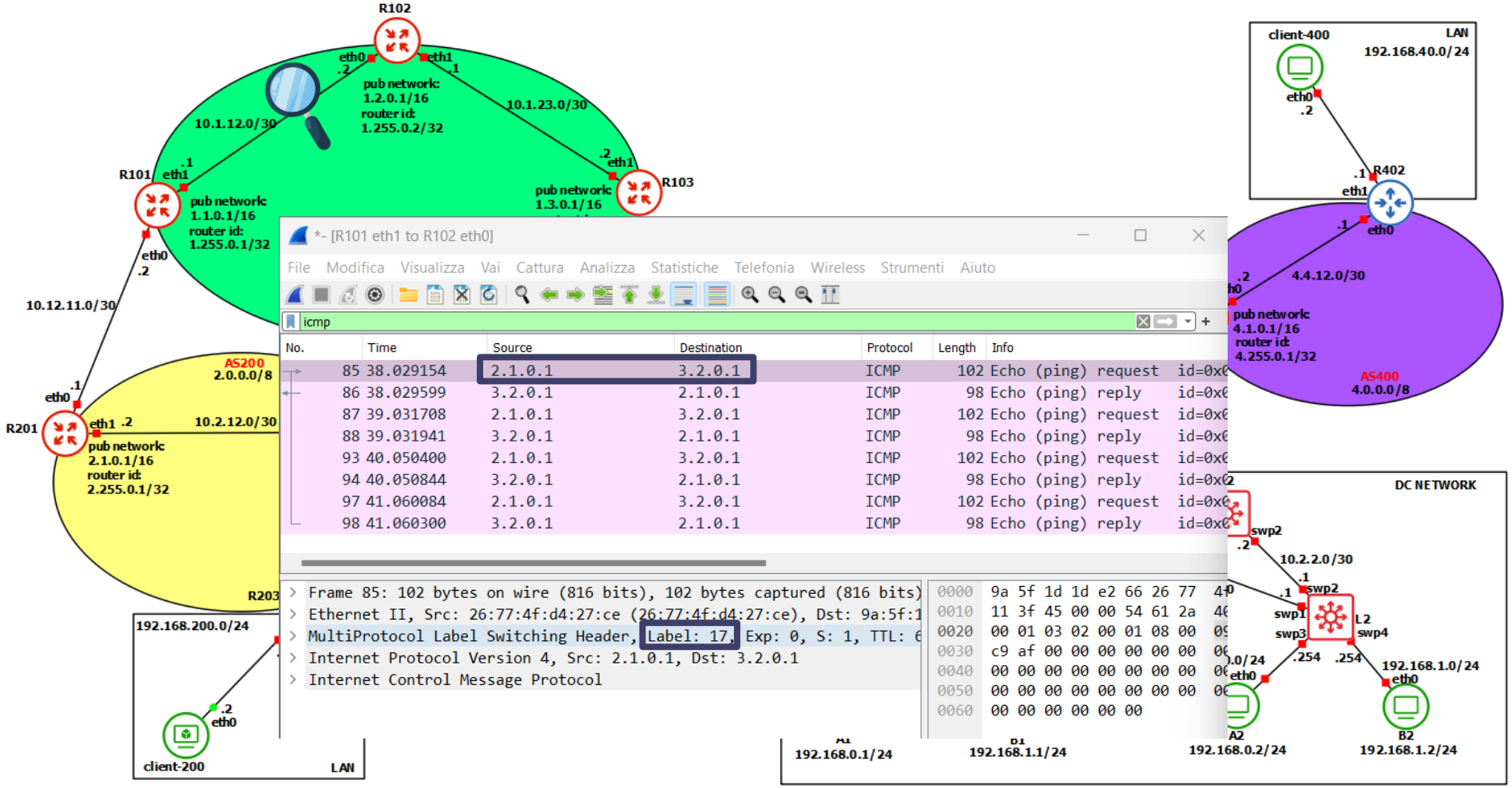
```
mpls ldp
 router-id 1.255.0.3
 ordered-control
 address-family ipv4
  discovery transport-address 1.255.0.3
  interface eth1
  interface lo
```



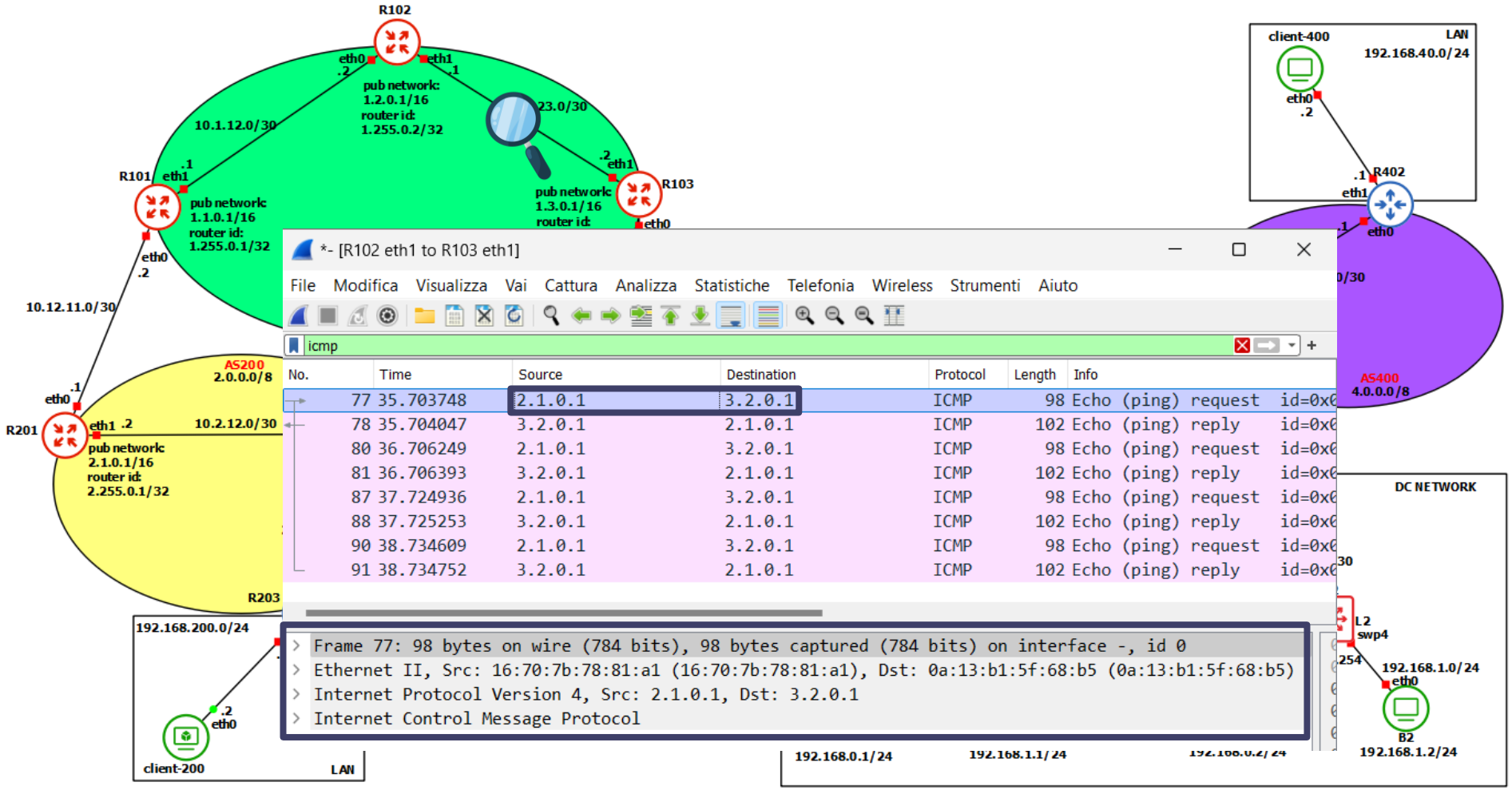
MPLS/LDP


R102
R103
R101
R201
R203
R402
client-400
LAN
192.168.40.0/24
10.1.12.0/30
10.1.23.0/30
10.12.11.0/30
4.4.12.0/30
AS400
4.0.0.0/8
pub network
1.1.0.1/16
pub network
2.1.0.1/16
router id:
2.255.0.1/32
router id:
1.255.0.2/32
pub network
1.3.0.1/16
192.168.200.0/24
client-200
LAN
DC NETWORK
10.2.2.0/30
L1
L2
192.168.0.0/24
192.168.1.0/24
A1
192.168.0.1/24
B1
192.168.1.1/24
A2
192.168.0.2/24
B2
192.168.1.2/24
R103
R102
R102:~# vtysh
% Can't open configuration file /etc/frr/vtysh.conf due to 'No such file or directory'.
Configuration file[/etc/frr/frr.conf] processing failure: 11
Hello, this is FRRouting (version 9.0.1_git).
Copyright 1996-2005 Kunihiro Ishiguro, et al.
R102# show mpls table
Inbound Label Type Nexthop Outbound Label
16 LDP 10.1.12.1 implicit-null
17 LDP 10.1.23.2 implicit-null
R102#

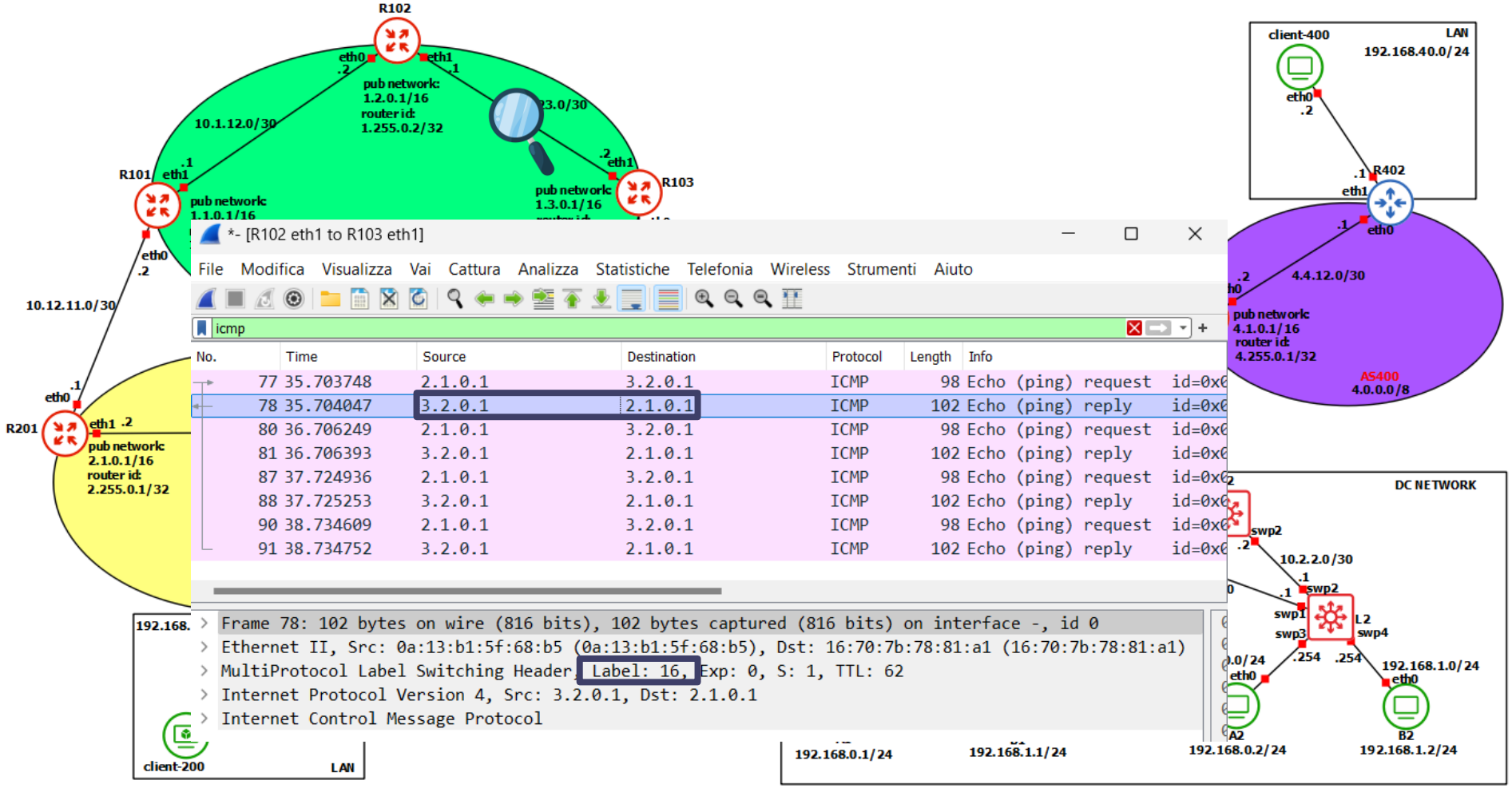
MPLS/LDP


R102
eth0
.2
eth1
.1
pub network:
1.2.0.1/16
router id:
1.255.0.2/32
10.1.12.0/30
10.1.23.0/30
R101
.1
eth1
pub network:
1.1.0.1/16
router id:
1.255.0.1/32
.2
eth1
R103
pub network
1.3.0.1/16
eth0
.2
10.12.11.0/30
AS200
2.0.0.0/8
.1
eth0
R201
eth1 .2
10.2.12.0/30
pub network:
2.1.0.1/16
router id:
2.255.0.1/32
R203
*- [R101 eth1 to R102 eth0]
File Modifica Visualizza Vai Cattura Analizza Statistiche Telefonia Wireless Strumenti Aiuto
icmp
No. Time Source Destination Protocol Length Info
85 38.029154 2.1.0.1 3.2.0.1 ICMP 102 Echo (ping) request id=0x
86 38.029599 3.2.0.1 2.1.0.1 ICMP 98 Echo (ping) reply id=0x
87 39.031708 2.1.0.1 3.2.0.1 ICMP 102 Echo (ping) request id=0x
88 39.031941 3.2.0.1 2.1.0.1 ICMP 98 Echo (ping) reply id=0x
93 40.050400 2.1.0.1 3.2.0.1 ICMP 102 Echo (ping) request id=0x
94 40.050844 3.2.0.1 2.1.0.1 ICMP 98 Echo (ping) reply id=0x
97 41.060084 2.1.0.1 3.2.0.1 ICMP 102 Echo (ping) request id=0x
98 41.060300 3.2.0.1 2.1.0.1 ICMP 98 Echo (ping) reply id=0x
Frame 85: 102 bytes on wire (816 bits), 102 bytes captured (816 bits)
Ethernet II, Src: 26:77:4f:d4:27:ce (26:77:4f:d4:27:ce), Dst: 9a:5f:1
MultiProtocol Label Switching Header, Label: 17, Exp: 0, S: 1, TTL: 6
Internet Protocol Version 4, Src: 2.1.0.1, Dst: 3.2.0.1
Internet Control Message Protocol
0000 9a 5f 1d 1d e2 66 26 77
0010 11 3f 45 00 00 54 61 2a
0020 00 01 03 02 00 01 08 00
0030 c9 af 00 00 00 00 00 00
0040 00 00 00 00 00 00 00 00
0050 00 00 00 00 00 00 00 00
0060 00 00 00 00 00 00
192.168.200.0/24
.2
eth0
client-200
LAN
client-400
LAN
192.168.40.0/24
eth0
.2
.1
R402
eth1
eth0
.2
4.4.12.0/30
pub network
4.1.0.1/16
router id:
4.255.0.1/32
AS400
4.0.0.0/8
DC NETWORK
swp2
.2
10.2.2.0/30
.1
swp2
swp1
swp3
L2
swp4
.254
.254
192.168.1.0/24
eth0
A2
192.168.0.2/24
B2
192.168.1.2/24
192.168.0.1/24
192.168.1.1/24

MPLS/LDP


R102
eth0
.2
eth1
.1
pub network:
1.2.0.1/16
router id:
1.255.0.2/32
10.1.12.0/30
23.0/30
.2
eth1
R103
pub network:
1.3.0.1/16
router id:
eth0
R101
.1
eth1
pub network:
1.1.0.1/16
router id:
1.255.0.1/32
eth0
.2
10.12.11.0/30
client-400
LAN
192.168.40.0/24
eth0
.2
.1
R402
eth1
eth0
/30
AS400
4.0.0.0/8
*- [R102 eth1 to R103 eth1]
File Modifica Visualizza Vai Cattura Analizza Statistiche Telefonia Wireless Strumenti Aiuto
icmp
No. Time Source Destination Protocol Length Info
77 35.703748 2.1.0.1 3.2.0.1 ICMP 98 Echo (ping) request id=0x0
78 35.704047 3.2.0.1 2.1.0.1 ICMP 102 Echo (ping) reply id=0x0
80 36.706249 2.1.0.1 3.2.0.1 ICMP 98 Echo (ping) request id=0x0
81 36.706393 3.2.0.1 2.1.0.1 ICMP 102 Echo (ping) reply id=0x0
87 37.724936 2.1.0.1 3.2.0.1 ICMP 98 Echo (ping) request id=0x0
88 37.725253 3.2.0.1 2.1.0.1 ICMP 102 Echo (ping) reply id=0x0
90 38.734609 2.1.0.1 3.2.0.1 ICMP 98 Echo (ping) request id=0x0
91 38.734752 3.2.0.1 2.1.0.1 ICMP 102 Echo (ping) reply id=0x0
Frame 77: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface -, id 0
Ethernet II, Src: 16:70:7b:78:81:a1 (16:70:7b:78:81:a1), Dst: 0a:13:b1:5f:68:b5 (0a:13:b1:5f:68:b5)
Internet Protocol Version 4, Src: 2.1.0.1, Dst: 3.2.0.1
Internet Control Message Protocol
AS200
2.0.0.0/8
.1
eth0
R201
eth1 .2
10.2.12.0/30
pub network:
2.1.0.1/16
router id:
2.255.0.1/32
R203
192.168.200.0/24
.2
eth0
client-200
LAN
DC NETWORK
L2
swp4
254
192.168.1.0/24
eth0
B2
192.168.1.2/24
192.168.0.1/24
192.168.1.1/24

MPLS/LDP



*- [R102 eth1 to R103 eth1]

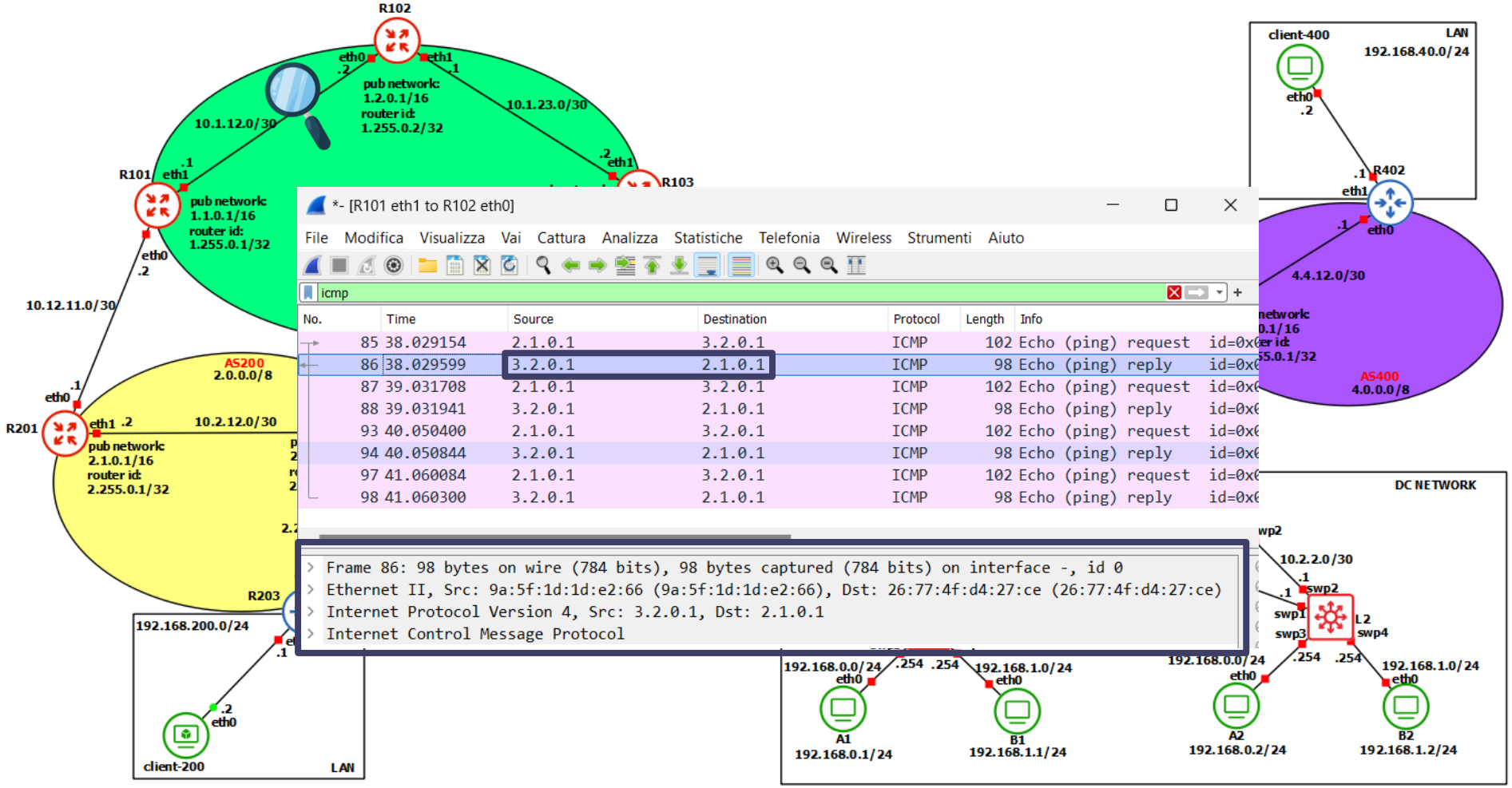
File Modifica Visualizza Vai Cattura Analizza Statistiche Telefonia Wireless Strumenti Aiuto

icmp

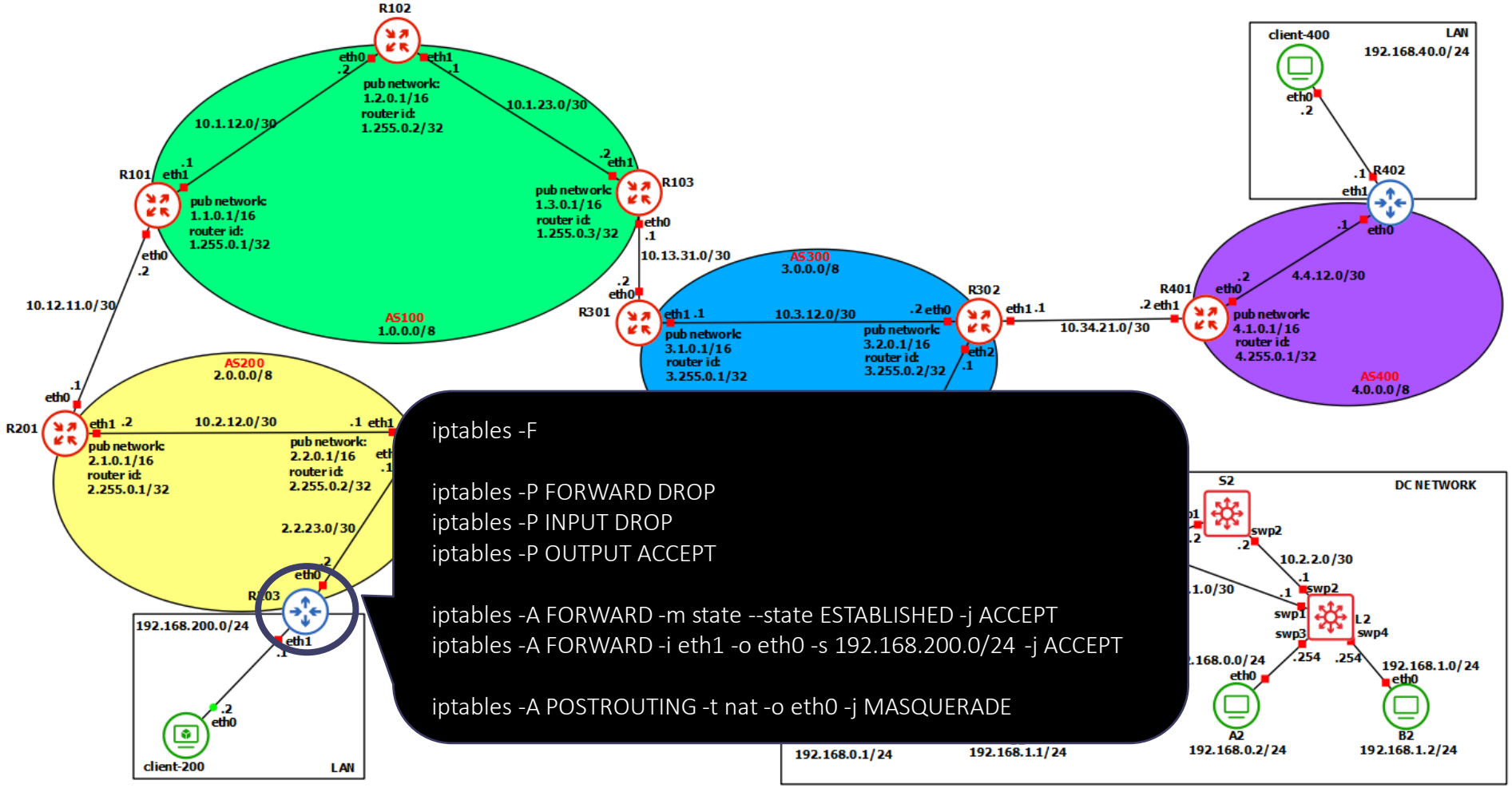
No.	Time	Source	Destination	Protocol	Length	Info
77	35.703748	2.1.0.1	3.2.0.1	ICMP	98	Echo (ping) request id=0x0
78	35.704047	3.2.0.1	2.1.0.1	ICMP	102	Echo (ping) reply id=0x0
80	36.706249	2.1.0.1	3.2.0.1	ICMP	98	Echo (ping) request id=0x0
81	36.706393	3.2.0.1	2.1.0.1	ICMP	102	Echo (ping) reply id=0x0
87	37.724936	2.1.0.1	3.2.0.1	ICMP	98	Echo (ping) request id=0x0
88	37.725253	3.2.0.1	2.1.0.1	ICMP	102	Echo (ping) reply id=0x0
90	38.734609	2.1.0.1	3.2.0.1	ICMP	98	Echo (ping) request id=0x0
91	38.734752	3.2.0.1	2.1.0.1	ICMP	102	Echo (ping) reply id=0x0

> Frame 78: 102 bytes on wire (816 bits), 102 bytes captured (816 bits) on interface -, id 0
> Ethernet II, Src: 0a:13:b1:5f:68:b5 (0a:13:b1:5f:68:b5), Dst: 16:70:7b:78:81:a1 (16:70:7b:78:81:a1)
> MultiProtocol Label Switching Header, Label: 16, Exp: 0, S: 1, TTL: 62
> Internet Protocol Version 4, Src: 3.2.0.1, Dst: 2.1.0.1
> Internet Control Message Protocol

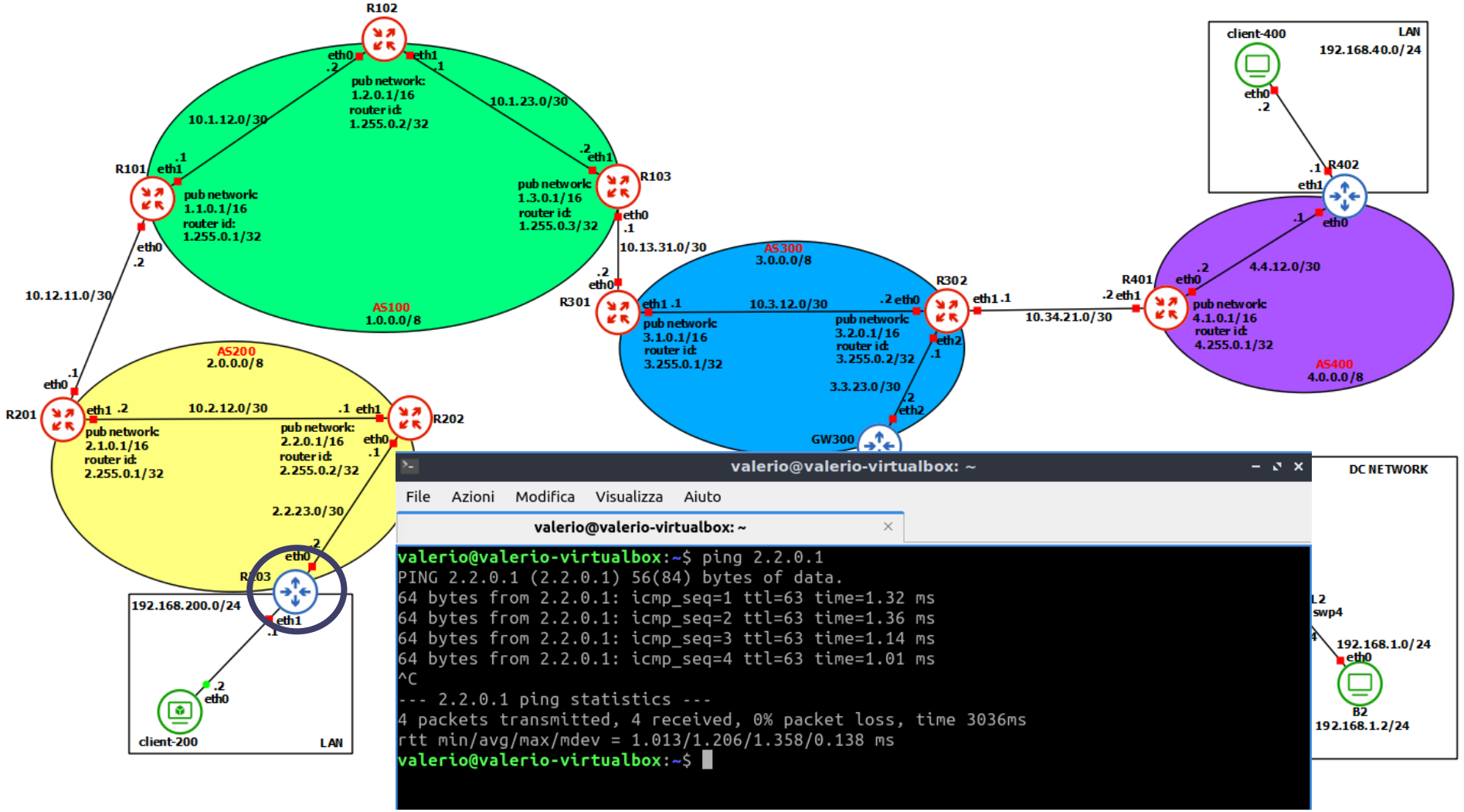
MPLS/LDP


R102
eth0
.2
eth1
.1
pub network:
1.2.0.1/16
router id:
1.255.0.2/32
10.1.12.0/30
10.1.23.0/30
R101
.1
eth1
pub network:
1.1.0.1/16
router id:
1.255.0.1/32
eth0
.2
10.12.11.0/30
R103
.2
eth1
client-400
LAN
192.168.40.0/24
eth0
.2
.1
R402
eth1
eth0
4.4.12.0/30
AS400
4.0.0.0/8
*- [R101 eth1 to R102 eth0]
File Modifica Visualizza Vai Cattura Analizza Statistiche Telefonia Wireless Strumenti Aiuto
icmp
No. Time Source Destination Protocol Length Info
85 38.029154 2.1.0.1 3.2.0.1 ICMP 102 Echo (ping) request id=0x
86 38.029599 3.2.0.1 2.1.0.1 ICMP 98 Echo (ping) reply id=0x
87 39.031708 2.1.0.1 3.2.0.1 ICMP 102 Echo (ping) request id=0x
88 39.031941 3.2.0.1 2.1.0.1 ICMP 98 Echo (ping) reply id=0x
93 40.050400 2.1.0.1 3.2.0.1 ICMP 102 Echo (ping) request id=0x
94 40.050844 3.2.0.1 2.1.0.1 ICMP 98 Echo (ping) reply id=0x
97 41.060084 2.1.0.1 3.2.0.1 ICMP 102 Echo (ping) request id=0x
98 41.060300 3.2.0.1 2.1.0.1 ICMP 98 Echo (ping) reply id=0x
Frame 86: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface -, id 0
Ethernet II, Src: 9a:5f:1d:1d:e2:66 (9a:5f:1d:1d:e2:66), Dst: 26:77:4f:d4:27:ce (26:77:4f:d4:27:ce)
Internet Protocol Version 4, Src: 3.2.0.1, Dst: 2.1.0.1
Internet Control Message Protocol
AS200
2.0.0.0/8
R201
eth0
.1
eth1
.2
10.2.12.0/30
pub network:
2.1.0.1/16
router id:
2.255.0.1/32
R203
192.168.200.0/24
.1
.2
eth0
client-200
LAN
DC NETWORK
wp2
10.2.2.0/30
.1
.1
swp2
swp1
swp3
L2
swp4
.254
.254
192.168.0.0/24
eth0
A1
192.168.0.1/24
.254
.254
192.168.1.0/24
eth0
B1
192.168.1.1/24
192.168.0.0/24
eth0
A2
192.168.0.2/24
192.168.1.0/24
eth0
B2
192.168.1.2/24

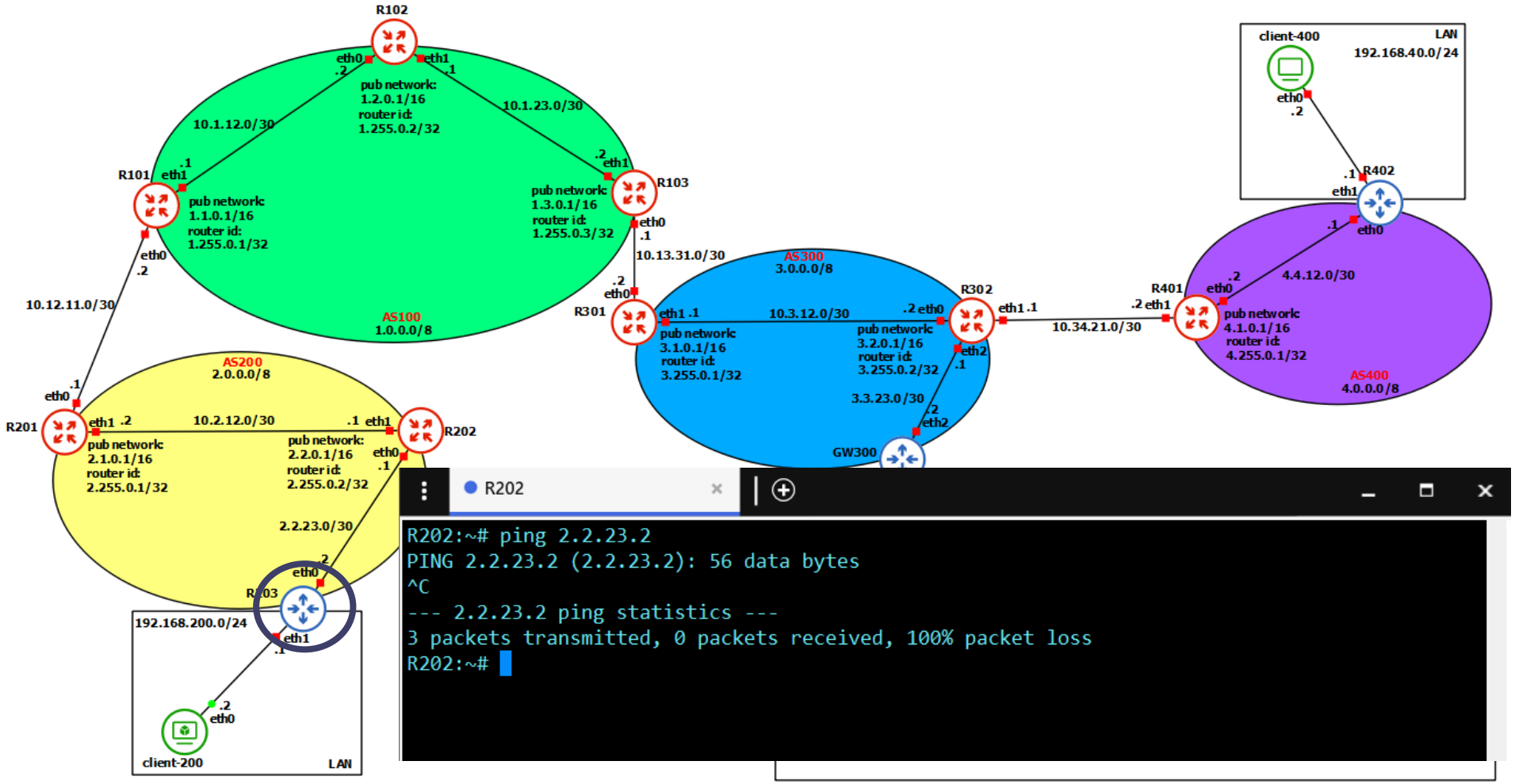
Firewall


R102
eth0 .2
eth1 .1
pub network:
1.2.0.1/16
router id:
1.255.0.2/32
10.1.12.0/30
10.1.23.0/30
R101
eth1 .1
pub network:
1.1.0.1/16
router id:
1.255.0.1/32
eth0 .2
R103
.2 eth1
pub network:
1.3.0.1/16
router id:
1.255.0.3/32
eth0 .1
10.13.31.0/30
AS100
1.0.0.0/8
10.12.11.0/30
AS300
3.0.0.0/8
R301
.2 eth0
eth1 .1
10.3.12.0/30
pub network:
3.1.0.1/16
router id:
3.255.0.1/32
R302
.2 eth0
pub network:
3.2.0.1/16
router id:
3.255.0.2/32
eth2 .1
eth1 .1
10.34.21.0/30
client-400
LAN
192.168.40.0/24
eth0 .2
.1 R402
eth1
.1 eth0
R401
.2 eth1
.2 eth0
4.4.12.0/30
pub network
4.1.0.1/16
router id:
4.255.0.1/32
AS400
4.0.0.0/8
AS200
2.0.0.0/8
R201
.1 eth0
eth1 .2
10.2.12.0/30
.1 eth1
pub network:
2.1.0.1/16
router id:
2.255.0.1/32
pub network:
2.2.0.1/16
router id:
2.255.0.2/32
2.2.23.0/30
.2 eth0
R203
eth1 .1
192.168.200.0/24
.2 eth0
client-200
LAN
iptables -F
iptables -P FORWARD DROP
iptables -P INPUT DROP
iptables -P OUTPUT ACCEPT
iptables -A FORWARD -m state --state ESTABLISHED -j ACCEPT
iptables -A FORWARD -i eth1 -o eth0 -s 192.168.200.0/24 -j ACCEPT
iptables -A POSTROUTING -t nat -o eth0 -j MASQUERADE
S2
DC NETWORK
swp2
.2
10.2.2.0/30
.1
swp2
swp1
swp3
L2
swp4
.254
.254
192.168.1.0/24
eth0
A2
192.168.0.2/24
B2
192.168.1.2/24
192.168.0.1/24
192.168.1.1/24

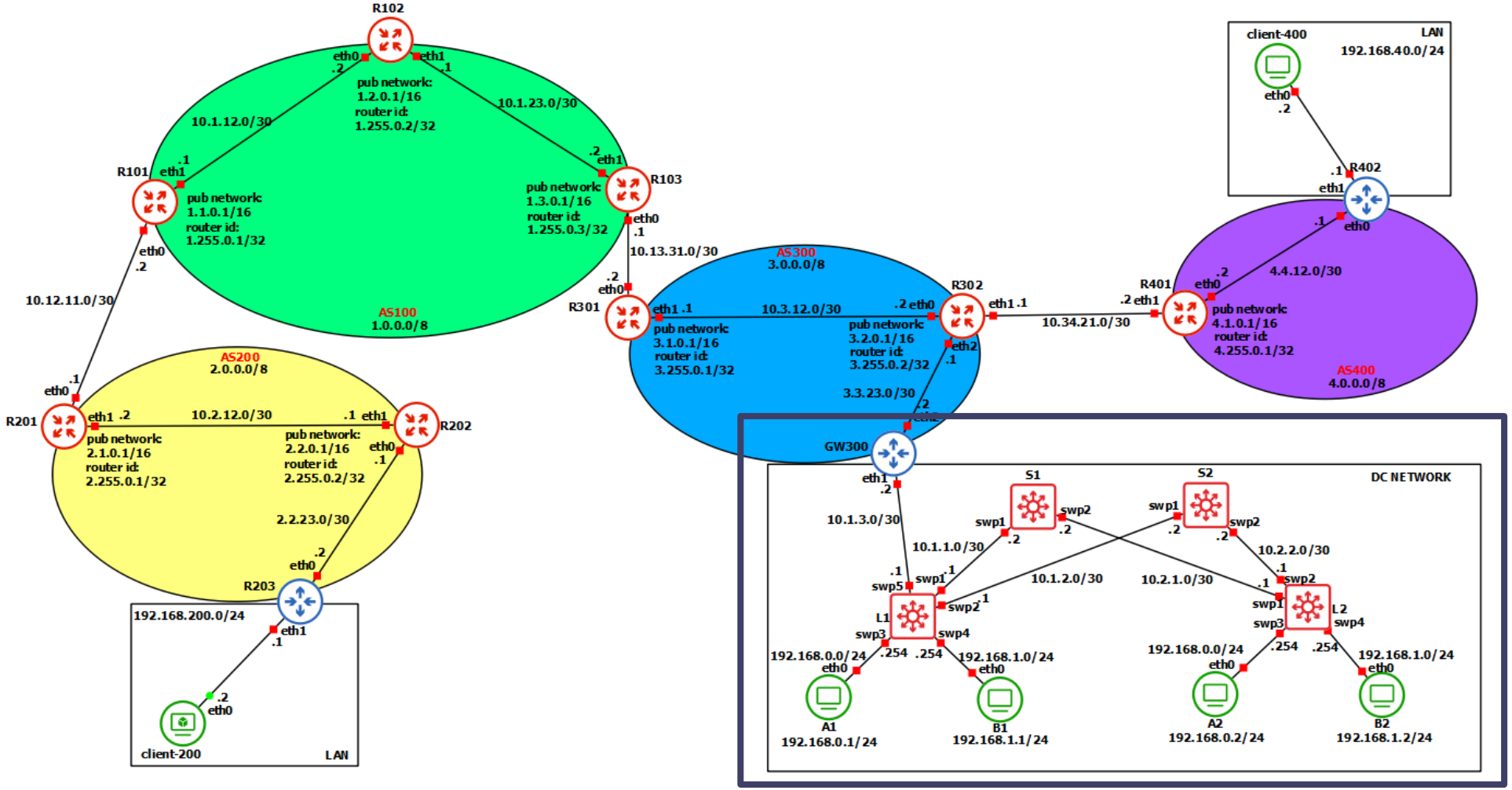
Firewall


R102
eth0 .2
eth1 .1
pub network:
1.2.0.1/16
router id:
1.255.0.2/32
10.1.12.0/30
10.1.23.0/30
R101
eth1 .1
pub network:
1.1.0.1/16
router id:
1.255.0.1/32
eth0 .2
10.12.11.0/30
AS100
1.0.0.0/8
R103
.2 eth1
pub network:
1.3.0.1/16
router id:
1.255.0.3/32
eth0 .1
10.13.31.0/30
AS300
3.0.0.0/8
R301
.2 eth0
eth1 .1
10.3.12.0/30
.2 eth0
R302
pub network:
3.1.0.1/16
router id:
3.255.0.1/32
pub network:
3.2.0.1/16
router id:
3.255.0.2/32
eth2 .1
3.3.23.0/30
.2 eth2
GW300
eth1.1
10.34.21.0/30
client-400
LAN
192.168.40.0/24
eth0 .2
.1 R402
eth1
.1 eth0
R401
.2 eth1
.2 eth0
4.4.12.0/30
pub network
4.1.0.1/16
router id:
4.255.0.1/32
AS400
4.0.0.0/8
AS200
2.0.0.0/8
R201
.1 eth0
eth1 .2
10.2.12.0/30
.1 eth1
R202
pub network:
2.1.0.1/16
router id:
2.255.0.1/32
pub network:
2.2.0.1/16
router id:
2.255.0.2/32
eth0 .1
2.2.23.0/30
.2 eth0
R203
eth1 .1
192.168.200.0/24
.2 eth0
client-200
LAN
valerio@valerio-virtualbox: ~
File Azioni Modifica Visualizza Aiuto
valerio@valerio-virtualbox: ~
valerio@valerio-virtualbox:~$ ping 2.2.0.1
PING 2.2.0.1 (2.2.0.1) 56(84) bytes of data.
64 bytes from 2.2.0.1: icmp_seq=1 ttl=63 time=1.32 ms
64 bytes from 2.2.0.1: icmp_seq=2 ttl=63 time=1.36 ms
64 bytes from 2.2.0.1: icmp_seq=3 ttl=63 time=1.14 ms
64 bytes from 2.2.0.1: icmp_seq=4 ttl=63 time=1.01 ms
^C
--- 2.2.0.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3036ms
rtt min/avg/max/mdev = 1.013/1.206/1.358/0.138 ms
valerio@valerio-virtualbox:~$
DC NETWORK
L2
swp4
4
192.168.1.0/24
eth0
B2
192.168.1.2/24

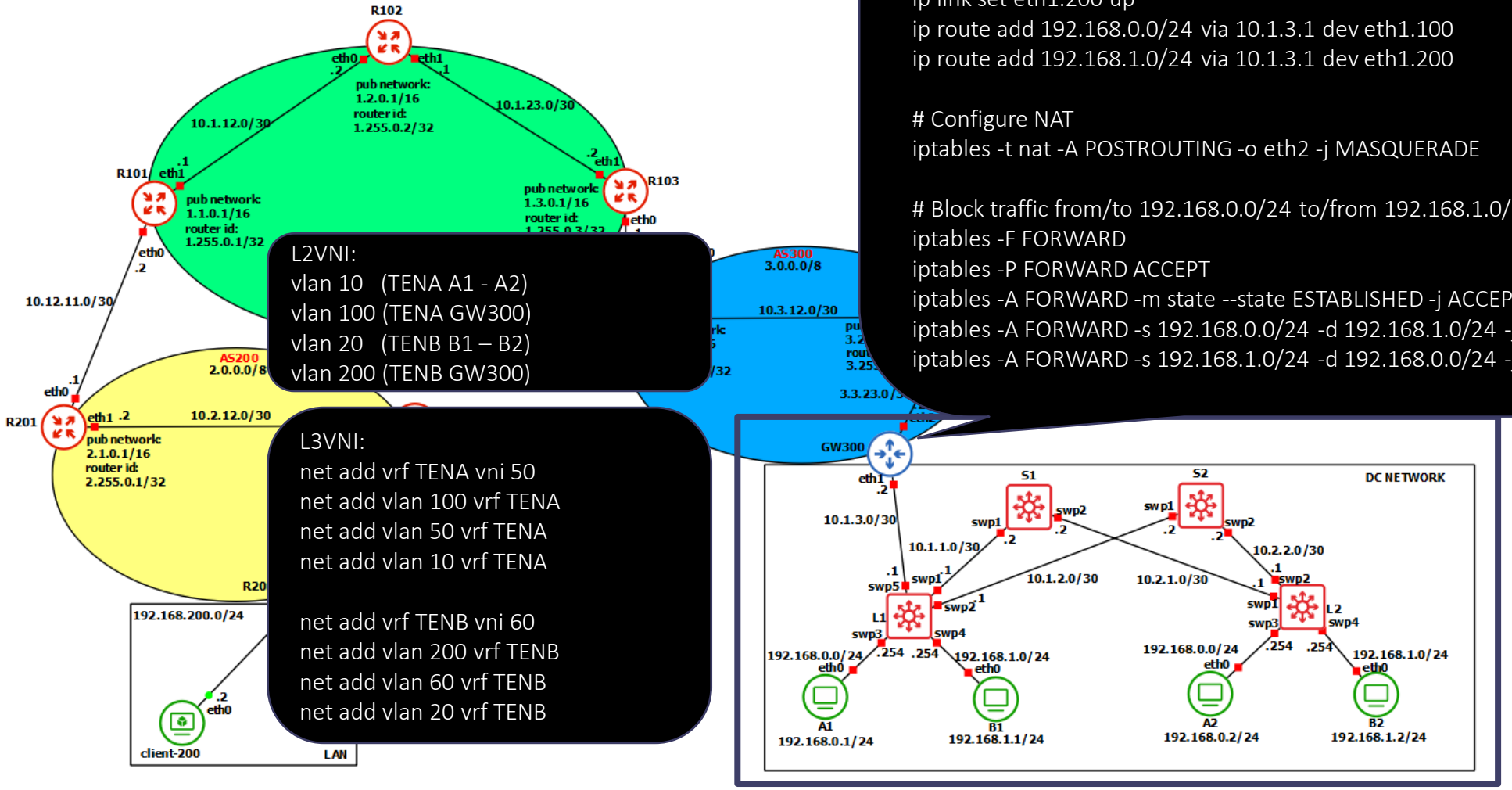
Firewall


R102
eth0
.2
eth1
.1
pub network:
1.2.0.1/16
router id:
1.255.0.2/32
10.1.12.0/30
10.1.23.0/30
R101
.1
eth1
pub network:
1.1.0.1/16
router id:
1.255.0.1/32
.2
eth1
R103
pub network:
1.3.0.1/16
router id:
1.255.0.3/32
eth0
.2
eth0
.1
10.13.31.0/30
AS100
1.0.0.0/8
AS300
3.0.0.0/8
.2
eth0
R301
eth1 .1
10.3.12.0/30
.2 eth0
R302
pub network:
3.1.0.1/16
router id:
3.255.0.1/32
pub network:
3.2.0.1/16
router id:
3.255.0.2/32
eth1 .1
10.34.21.0/30
eth2
.1
3.3.23.0/30
.2
eth2
GW300
client-400
LAN
192.168.40.0/24
eth0
.2
.1
R402
eth1
.1
eth0
R401
.2
eth0
.2 eth1
4.4.12.0/30
pub network
4.1.0.1/16
router id:
4.255.0.1/32
AS400
4.0.0.0/8
10.12.11.0/30
eth0
.2
.1
eth0
R201
eth1 .2
10.2.12.0/30
.1 eth1
R202
AS200
2.0.0.0/8
pub network:
2.1.0.1/16
router id:
2.255.0.1/32
pub network:
2.2.0.1/16
router id:
2.255.0.2/32
eth0
.1
2.2.23.0/30
.2
eth0
R203
eth1
.1
192.168.200.0/24
.2
eth0
client-200
LAN
R202
R202:~# ping 2.2.23.2
PING 2.2.23.2 (2.2.23.2): 56 data bytes
^C
--- 2.2.23.2 ping statistics ---
3 packets transmitted, 0 packets received, 100% packet loss
R202:~#

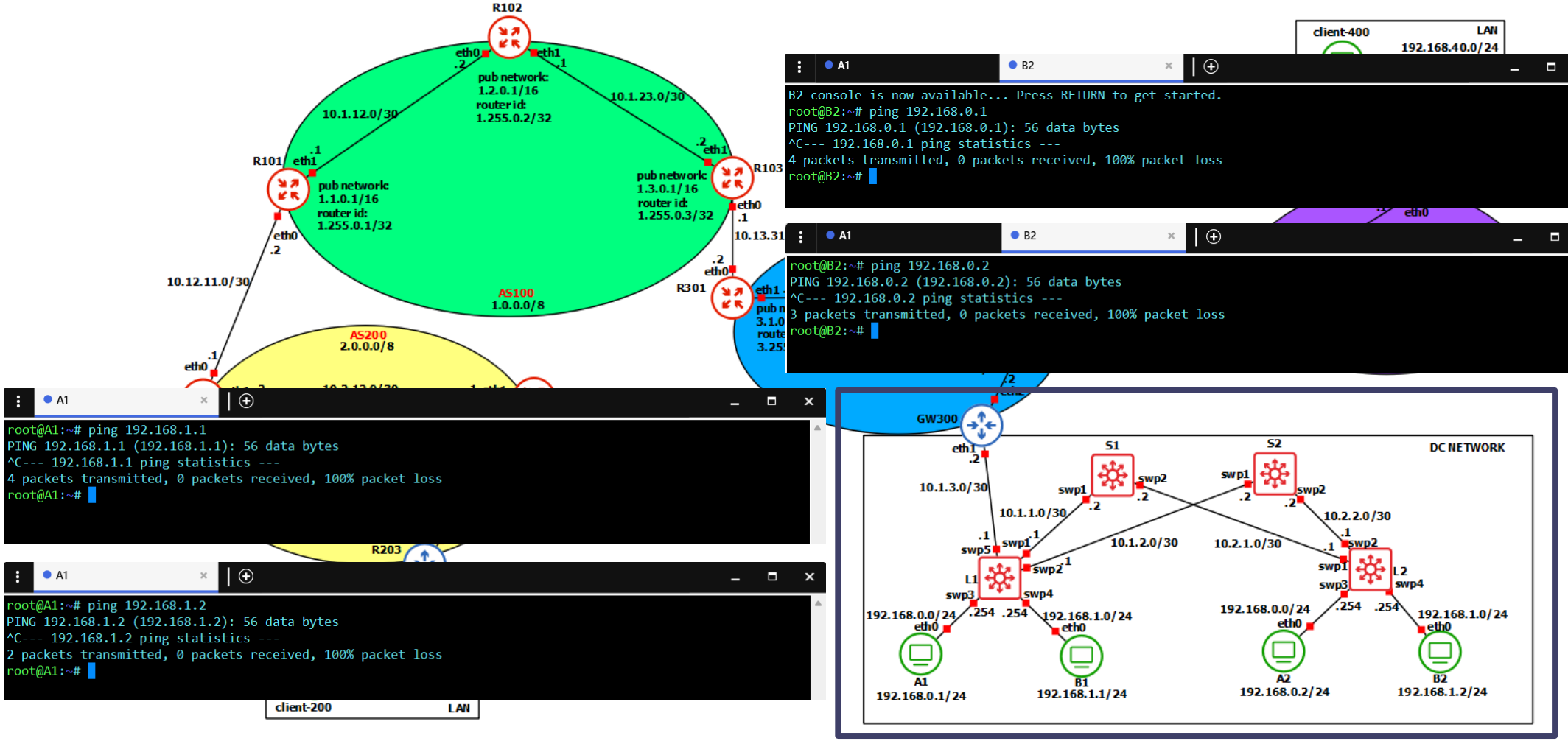
DC Network


R102
eth0 .2
eth1 .1
pub network:
1.2.0.1/16
router id:
1.255.0.2/32
10.1.12.0/30
10.1.23.0/30
R101
.1 eth1
pub network:
1.1.0.1/16
router id:
1.255.0.1/32
.2 eth1
R103
pub network:
1.3.0.1/16
router id:
1.255.0.3/32
eth0 .2
eth0 .1
10.13.31.0/30
10.12.11.0/30
AS100
1.0.0.0/8
AS300
3.0.0.0/8
.2 eth0
R301
eth1 .1
pub network:
3.1.0.1/16
router id:
3.255.0.1/32
10.3.12.0/30
.2 eth0
R302
pub network:
3.2.0.1/16
router id:
3.255.0.2/32
eth1 .1
10.34.21.0/30
eth2
.1
3.3.23.0/30
.2
client-400
LAN
192.168.40.0/24
eth0
.2
.1 R402
eth1
.1
eth0
R401
.2 eth1
.2
eth0
4.4.12.0/30
pub network
4.1.0.1/16
router id:
4.255.0.1/32
AS400
4.0.0.0/8
AS200
2.0.0.0/8
.1
eth0
R201
eth1 .2
10.2.12.0/30
.1 eth1
R202
pub network:
2.1.0.1/16
router id:
2.255.0.1/32
pub network:
2.2.0.1/16
router id:
2.255.0.2/32
eth0
.1
2.2.23.0/30
.2
eth0
R203
192.168.200.0/24
eth1
.1
.2
eth0
client-200
LAN
GW300
eth1
.2
S1
S2
DC NETWORK
swp1
.2
swp2
.2
10.1.3.0/30
10.1.1.0/30
10.1.2.0/30
10.2.1.0/30
10.2.2.0/30
.1
swp5
swp1
swp2
L1
swp3
swp4
.254
192.168.0.0/24
192.168.1.0/24
eth0
A1
192.168.0.1/24
B1
192.168.1.1/24
L2
A2
192.168.0.2/24
B2
192.168.1.2/24

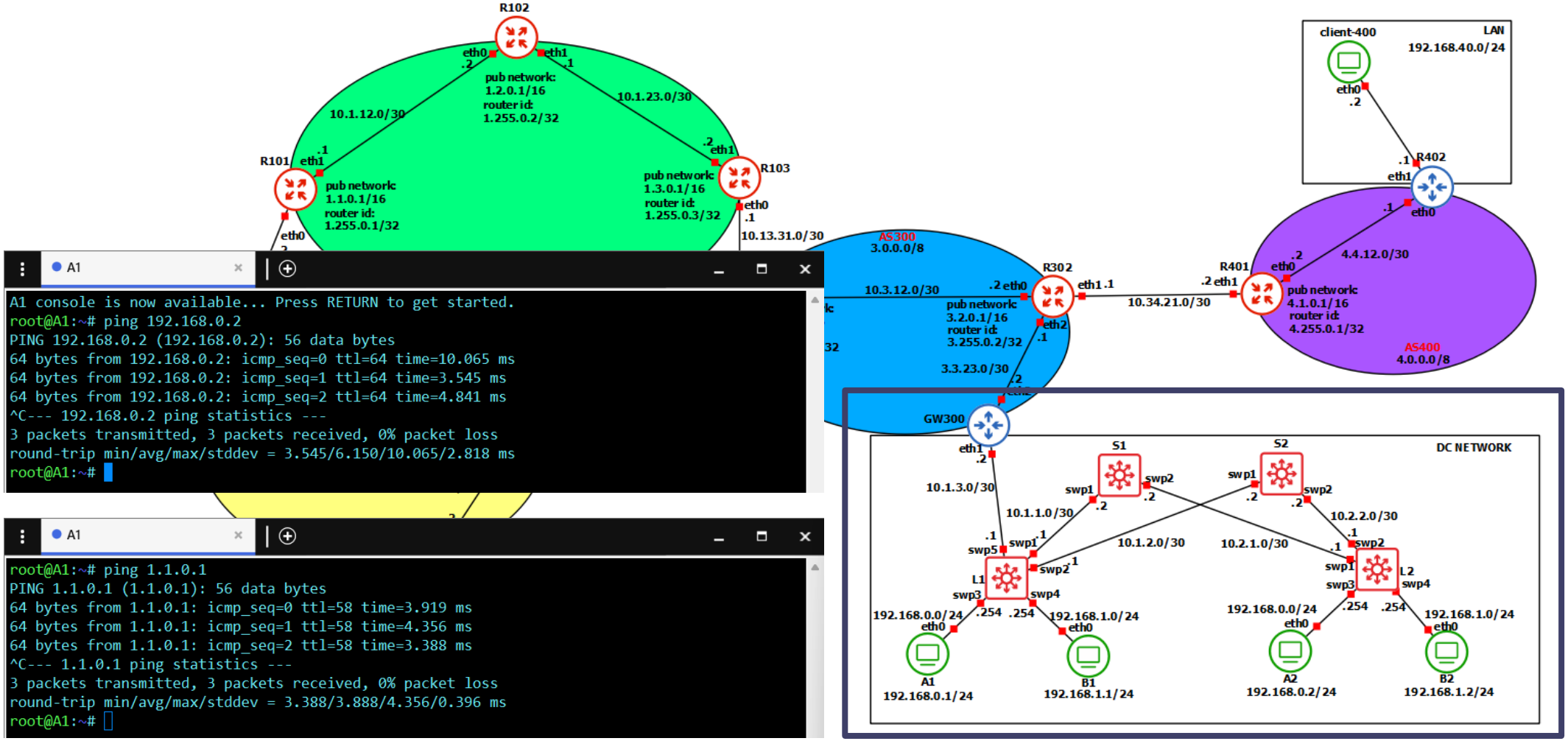
DC Network


R102
eth0
.2
eth1
.1
pub network:
1.2.0.1/16
router id:
1.255.0.2/32
10.1.12.0/30
10.1.23.0/30
R101
.1
eth1
pub network:
1.1.0.1/16
router id:
1.255.0.1/32
.2
eth1
R103
pub network:
1.3.0.1/16
router id:
eth0
eth0
.2
10.12.11.0/30
AS300
3.0.0.0/8
10.3.12.0/30
AS200
2.0.0.0/8
.1
eth0
R201
eth1
.2
10.2.12.0/30
pub network:
2.1.0.1/16
router id:
2.255.0.1/32
R20
192.168.200.0/24
.2
eth0
client-200
LAN
L2VNI:
vlan 10 (TENA A1 - A2)
vlan 100 (TENA GW300)
vlan 20 (TENB B1 – B2)
vlan 200 (TENB GW300)
L3VNI:
net add vrf TENA vni 50
net add vlan 100 vrf TENA
net add vlan 50 vrf TENA
net add vlan 10 vrf TENA
net add vrf TENB vni 60
net add vlan 200 vrf TENB
net add vlan 60 vrf TENB
net add vlan 20 vrf TENB
Links with DC-Network
ip link add link eth1 name eth1.100 type vlan id 100
ip link add link eth1 name eth1.200 type vlan id 200
ip addr add 10.1.3.2/30 dev eth1.100
ip addr add 10.1.3.2/30 dev eth1.200
ip link set eth1.100 up
ip link set eth1.200 up
ip route add 192.168.0.0/24 via 10.1.3.1 dev eth1.100
ip route add 192.168.1.0/24 via 10.1.3.1 dev eth1.200
Configure NAT
iptables -t nat -A POSTROUTING -o eth2 -j MASQUERADE
Block traffic from/to 192.168.0.0/24 to/from 192.168.1.0/24
iptables -F FORWARD
iptables -P FORWARD ACCEPT
iptables -A FORWARD -m state --state ESTABLISHED -j ACCEPT
iptables -A FORWARD -s 192.168.0.0/24 -d 192.168.1.0/24 -j DROP
iptables -A FORWARD -s 192.168.1.0/24 -d 192.168.0.0/24 -j DROP
GW300
eth1
.2
S1
S2
DC NETWORK
10.1.3.0/30
swp1
swp2
.2
10.1.1.0/30
10.1.2.0/30
10.2.1.0/30
10.2.2.0/30
.1
swp5
L1
L2
swp3
swp4
192.168.0.0/24
192.168.1.0/24
.254
eth0
A1
192.168.0.1/24
B1
192.168.1.1/24
A2
192.168.0.2/24
B2
192.168.1.2/24

DC Network


R102
eth0
.2
eth1
.1
pub network:
1.2.0.1/16
router id:
1.255.0.2/32
10.1.12.0/30
10.1.23.0/30
R101
.1
eth1
pub network:
1.1.0.1/16
router id:
1.255.0.1/32
R103
.2
eth1
pub network:
1.3.0.1/16
router id:
1.255.0.3/32
eth0
.2
eth0
.1
10.13.31
10.12.11.0/30
.2
eth0
R301
eth1
AS100
1.0.0.0/8
AS200
2.0.0.0/8
.1
eth0
R203
client-400
LAN
192.168.40.0/24
eth0
A1
B2
B2 console is now available... Press RETURN to get started.
root@B2:~# ping 192.168.0.1
PING 192.168.0.1 (192.168.0.1): 56 data bytes
^C--- 192.168.0.1 ping statistics ---
4 packets transmitted, 0 packets received, 100% packet loss
root@B2:~#
A1
B2
root@B2:~# ping 192.168.0.2
PING 192.168.0.2 (192.168.0.2): 56 data bytes
^C--- 192.168.0.2 ping statistics ---
3 packets transmitted, 0 packets received, 100% packet loss
root@B2:~#
A1
root@A1:~# ping 192.168.1.1
PING 192.168.1.1 (192.168.1.1): 56 data bytes
^C--- 192.168.1.1 ping statistics ---
4 packets transmitted, 0 packets received, 100% packet loss
root@A1:~#
A1
root@A1:~# ping 192.168.1.2
PING 192.168.1.2 (192.168.1.2): 56 data bytes
^C--- 192.168.1.2 ping statistics ---
2 packets transmitted, 0 packets received, 100% packet loss
root@A1:~#
client-200
LAN
GW300
eth1
.2
S1
S2
DC NETWORK
swp1
swp2
.2
10.1.3.0/30
10.1.1.0/30
10.1.2.0/30
10.2.1.0/30
10.2.2.0/30
.1
swp5
swp1
swp2
L1
L2
swp3
swp4
.254
192.168.0.0/24
192.168.1.0/24
eth0
A1
192.168.0.1/24
B1
192.168.1.1/24
A2
192.168.0.2/24
B2
192.168.1.2/24

DC Network



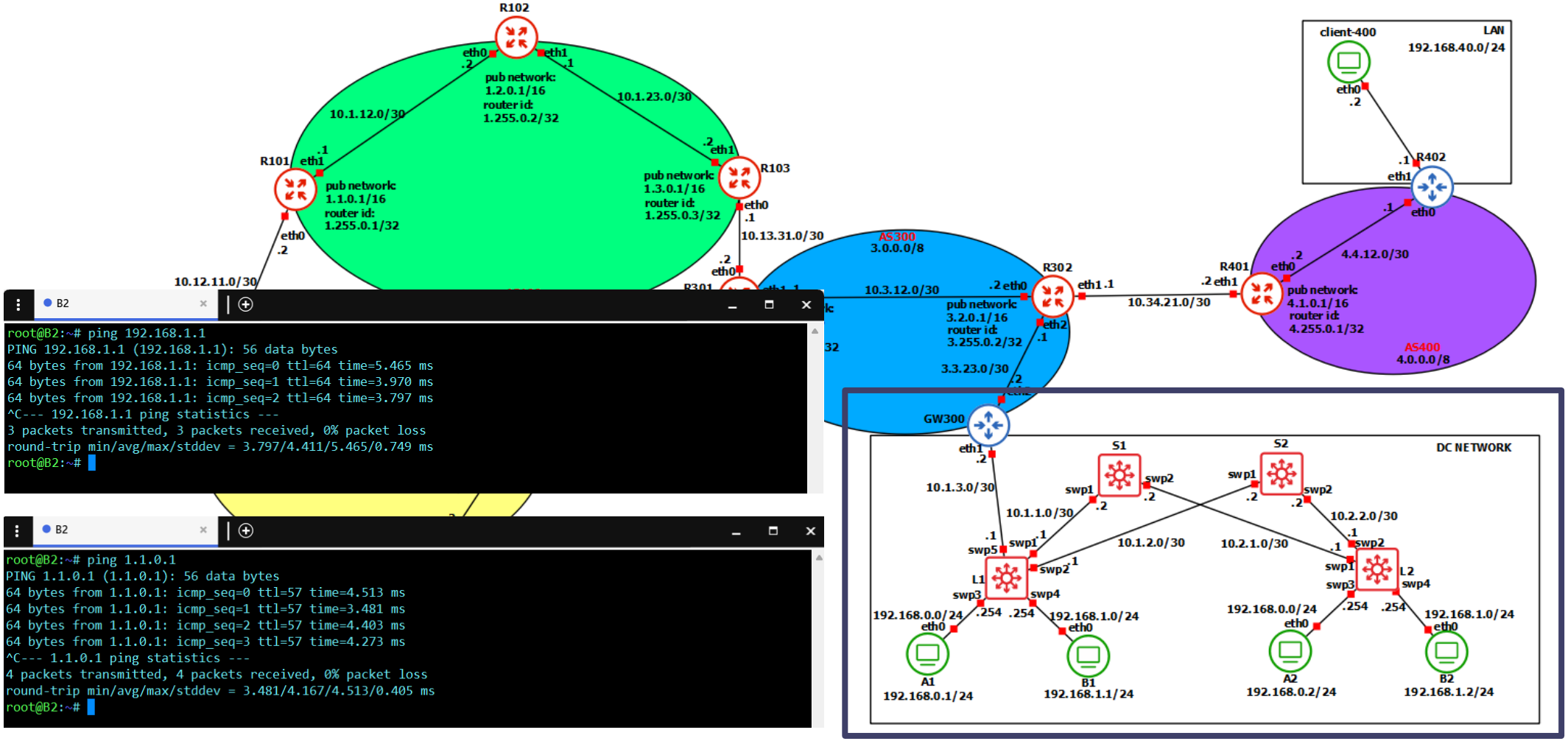
A1

```
A1 console is now available... Press RETURN to get started.
root@A1:~# ping 192.168.0.2
PING 192.168.0.2 (192.168.0.2): 56 data bytes
64 bytes from 192.168.0.2: icmp_seq=0 ttl=64 time=10.065 ms
64 bytes from 192.168.0.2: icmp_seq=1 ttl=64 time=3.545 ms
64 bytes from 192.168.0.2: icmp_seq=2 ttl=64 time=4.841 ms
^C--- 192.168.0.2 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max/stddev = 3.545/6.150/10.065/2.818 ms
root@A1:~#
```

A1

```
root@A1:~# ping 1.1.0.1
PING 1.1.0.1 (1.1.0.1): 56 data bytes
64 bytes from 1.1.0.1: icmp_seq=0 ttl=58 time=3.919 ms
64 bytes from 1.1.0.1: icmp_seq=1 ttl=58 time=4.356 ms
64 bytes from 1.1.0.1: icmp_seq=2 ttl=58 time=3.388 ms
^C--- 1.1.0.1 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max/stddev = 3.388/3.888/4.356/0.396 ms
root@A1:~#
```

DC Network



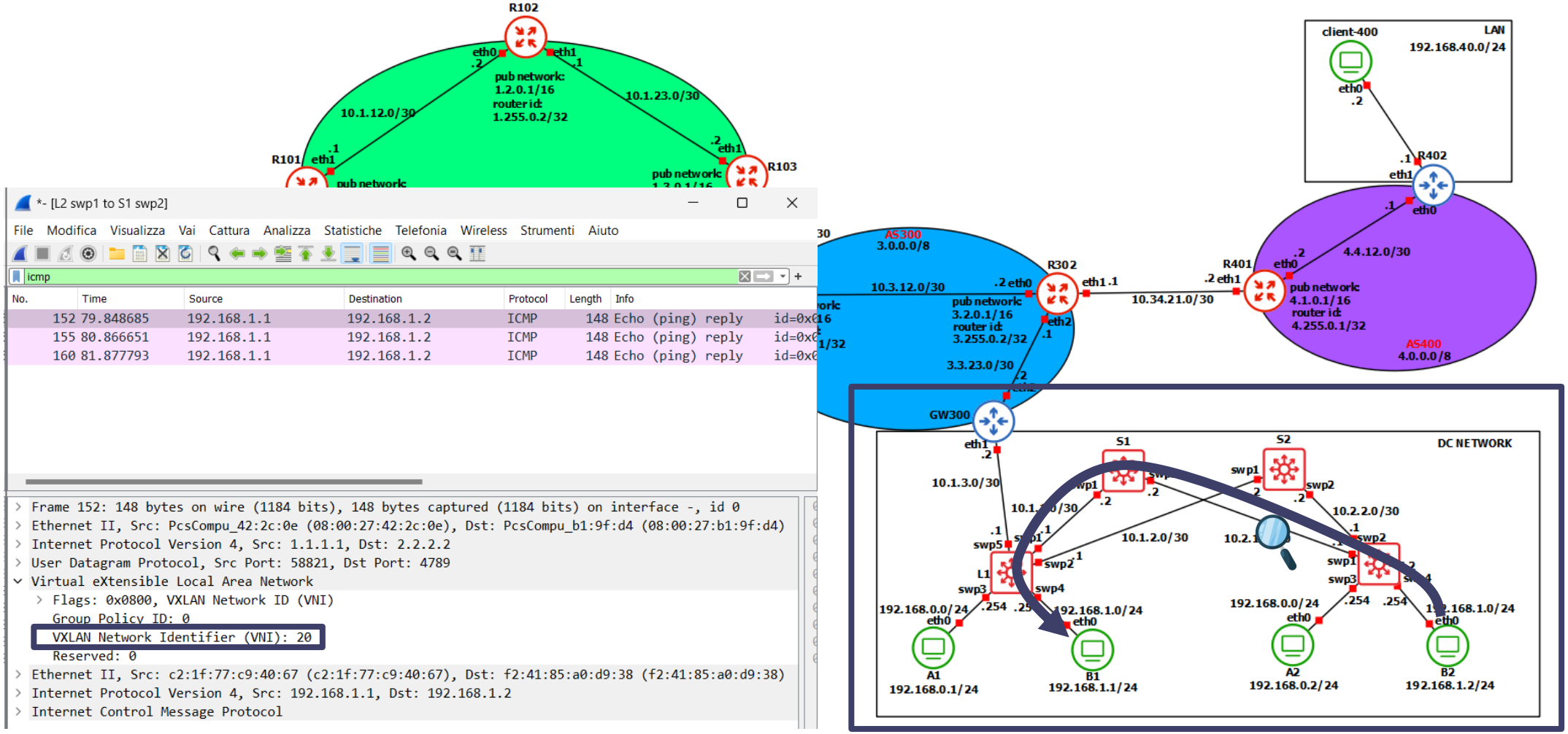
B2

```
root@B2:~# ping 192.168.1.1
PING 192.168.1.1 (192.168.1.1): 56 data bytes
64 bytes from 192.168.1.1: icmp_seq=0 ttl=64 time=5.465 ms
64 bytes from 192.168.1.1: icmp_seq=1 ttl=64 time=3.970 ms
64 bytes from 192.168.1.1: icmp_seq=2 ttl=64 time=3.797 ms
^C--- 192.168.1.1 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max/stddev = 3.797/4.411/5.465/0.749 ms
root@B2:~#
```

B2

```
root@B2:~# ping 1.1.0.1
PING 1.1.0.1 (1.1.0.1): 56 data bytes
64 bytes from 1.1.0.1: icmp_seq=0 ttl=57 time=4.513 ms
64 bytes from 1.1.0.1: icmp_seq=1 ttl=57 time=3.481 ms
64 bytes from 1.1.0.1: icmp_seq=2 ttl=57 time=4.403 ms
64 bytes from 1.1.0.1: icmp_seq=3 ttl=57 time=4.273 ms
^C--- 1.1.0.1 ping statistics ---
4 packets transmitted, 4 packets received, 0% packet loss
round-trip min/avg/max/stddev = 3.481/4.167/4.513/0.405 ms
root@B2:~#
```

DC Network (B2 -> B1)



*- [L2 swp1 to S1 swp2]

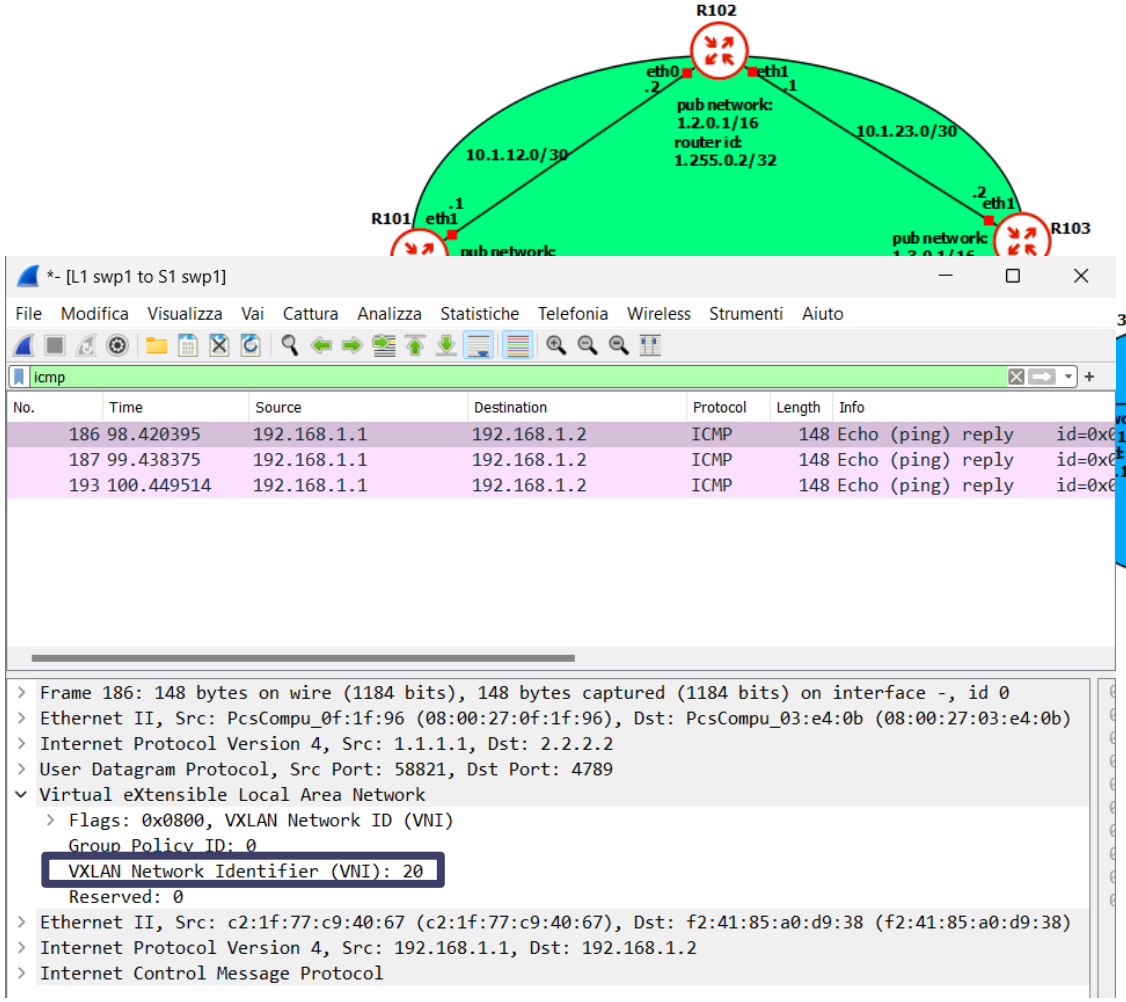
File Modifica Visualizza Vai Cattura Analizza Statistiche Telefonia Wireless Strumenti Aiuto

icmp

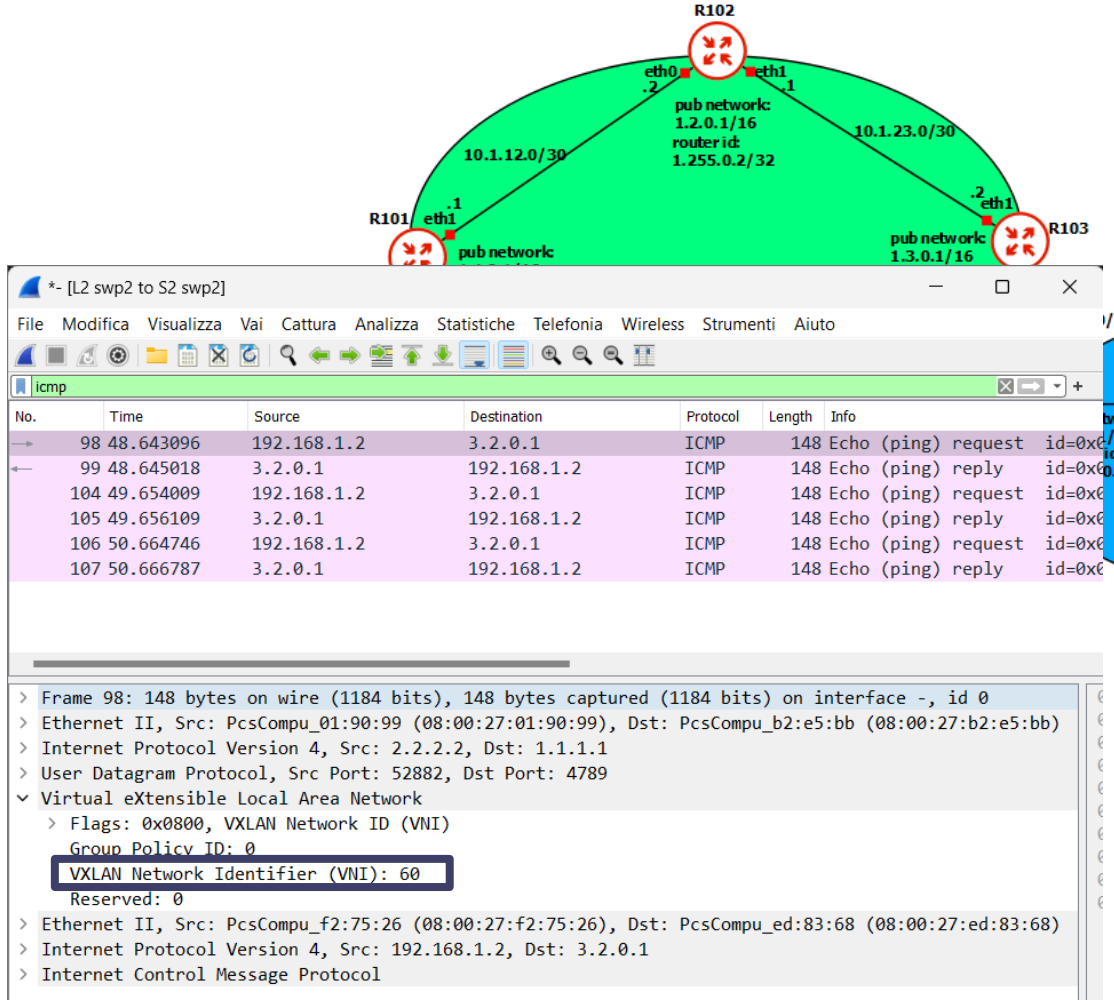
No.	Time	Source	Destination	Protocol	Length	Info
152	79.848685	192.168.1.1	192.168.1.2	ICMP	148	Echo (ping) reply id=0x0
155	80.866651	192.168.1.1	192.168.1.2	ICMP	148	Echo (ping) reply id=0x0
160	81.877793	192.168.1.1	192.168.1.2	ICMP	148	Echo (ping) reply id=0x0

```
> Frame 152: 148 bytes on wire (1184 bits), 148 bytes captured (1184 bits) on interface -, id 0
> Ethernet II, Src: PcsCompu_42:2c:0e (08:00:27:42:2c:0e), Dst: PcsCompu_b1:9f:d4 (08:00:27:b1:9f:d4)
> Internet Protocol Version 4, Src: 1.1.1.1, Dst: 2.2.2.2
> User Datagram Protocol, Src Port: 58821, Dst Port: 4789
v Virtual eXtensible Local Area Network
    > Flags: 0x0800, VXLAN Network ID (VNI)
      Group Policy ID: 0
      VXLAN Network Identifier (VNI): 20
      Reserved: 0
> Ethernet II, Src: c2:1f:77:c9:40:67 (c2:1f:77:c9:40:67), Dst: f2:41:85:a0:d9:38 (f2:41:85:a0:d9:38)
> Internet Protocol Version 4, Src: 192.168.1.1, Dst: 192.168.1.2
> Internet Control Message Protocol
```

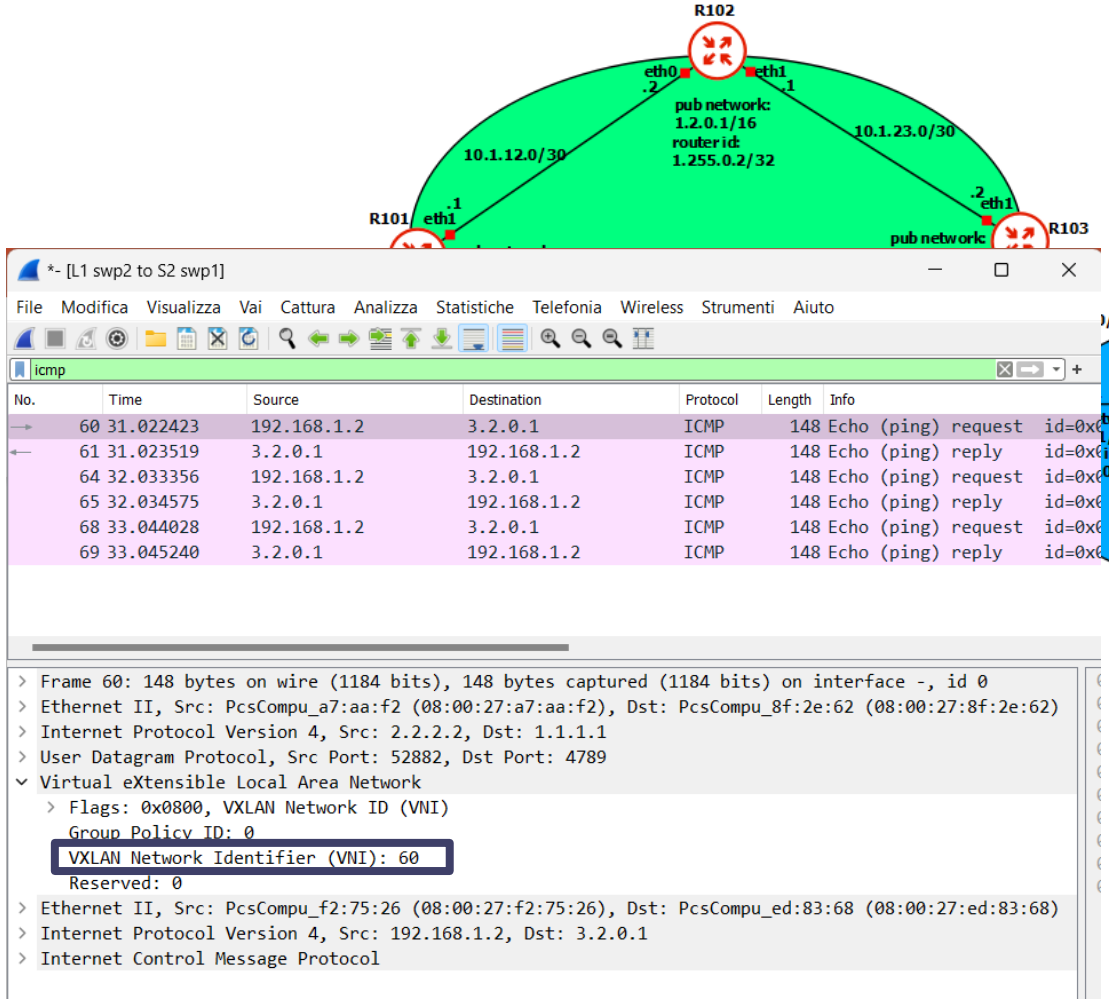
DC Network (B2 -> B1)

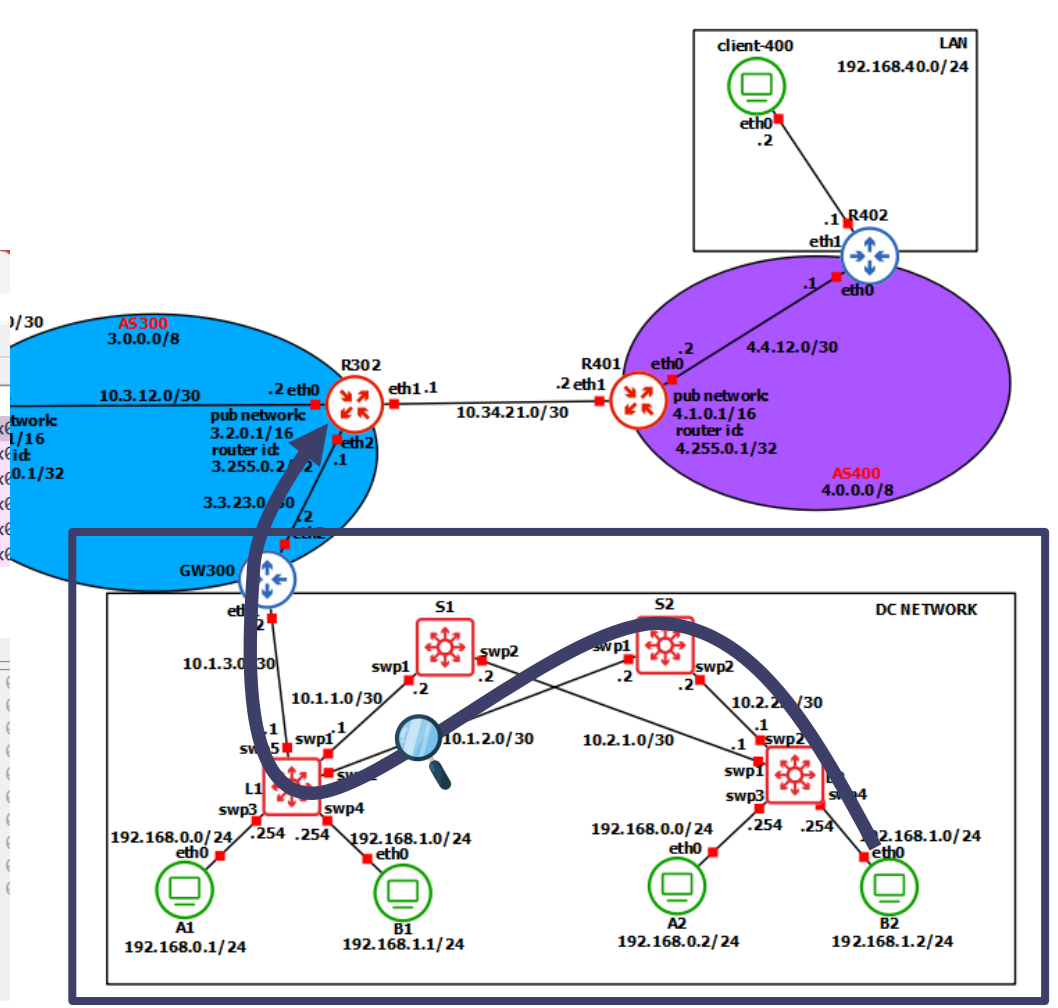


DC Network (B2 -> R302)

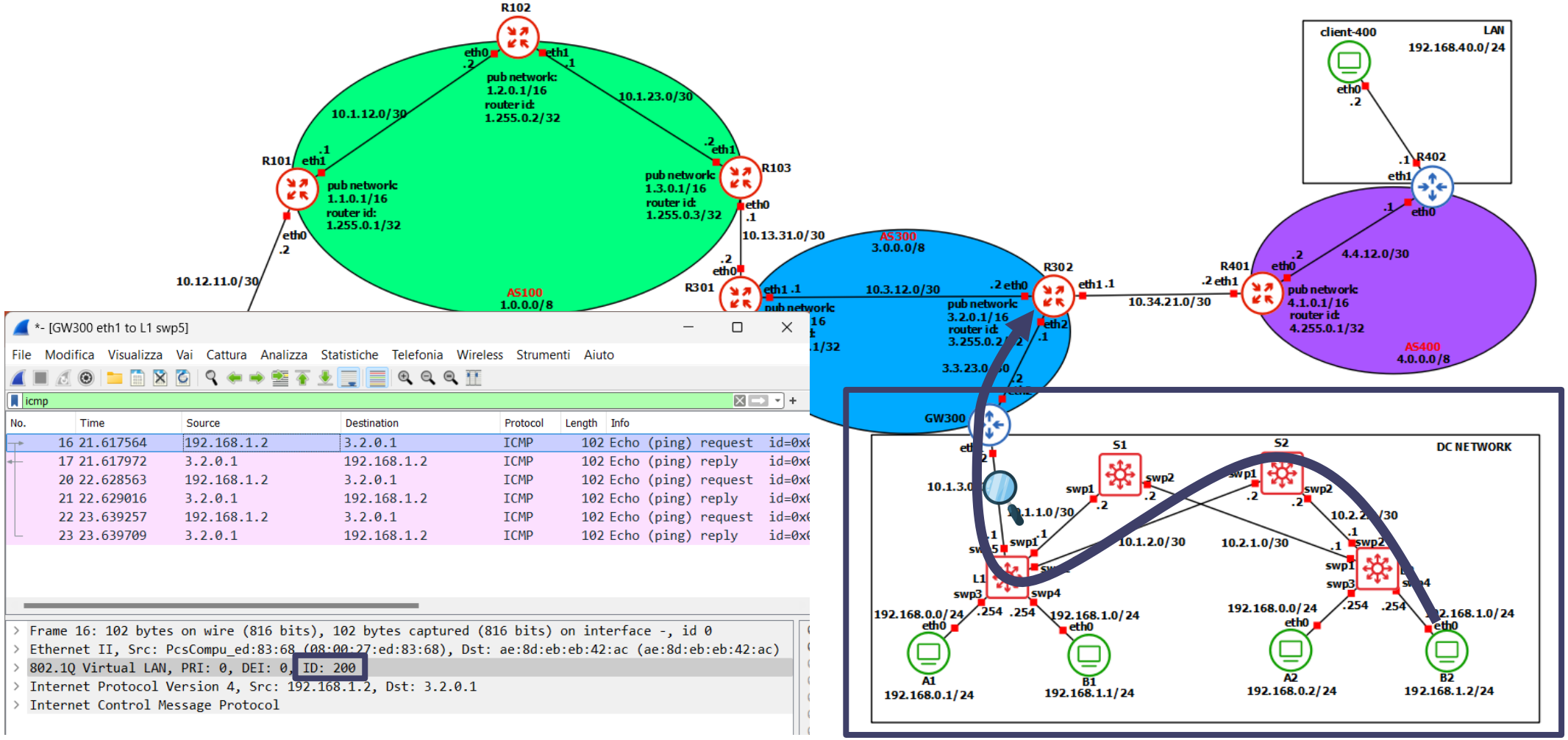


DC Network (B2 -> R302)

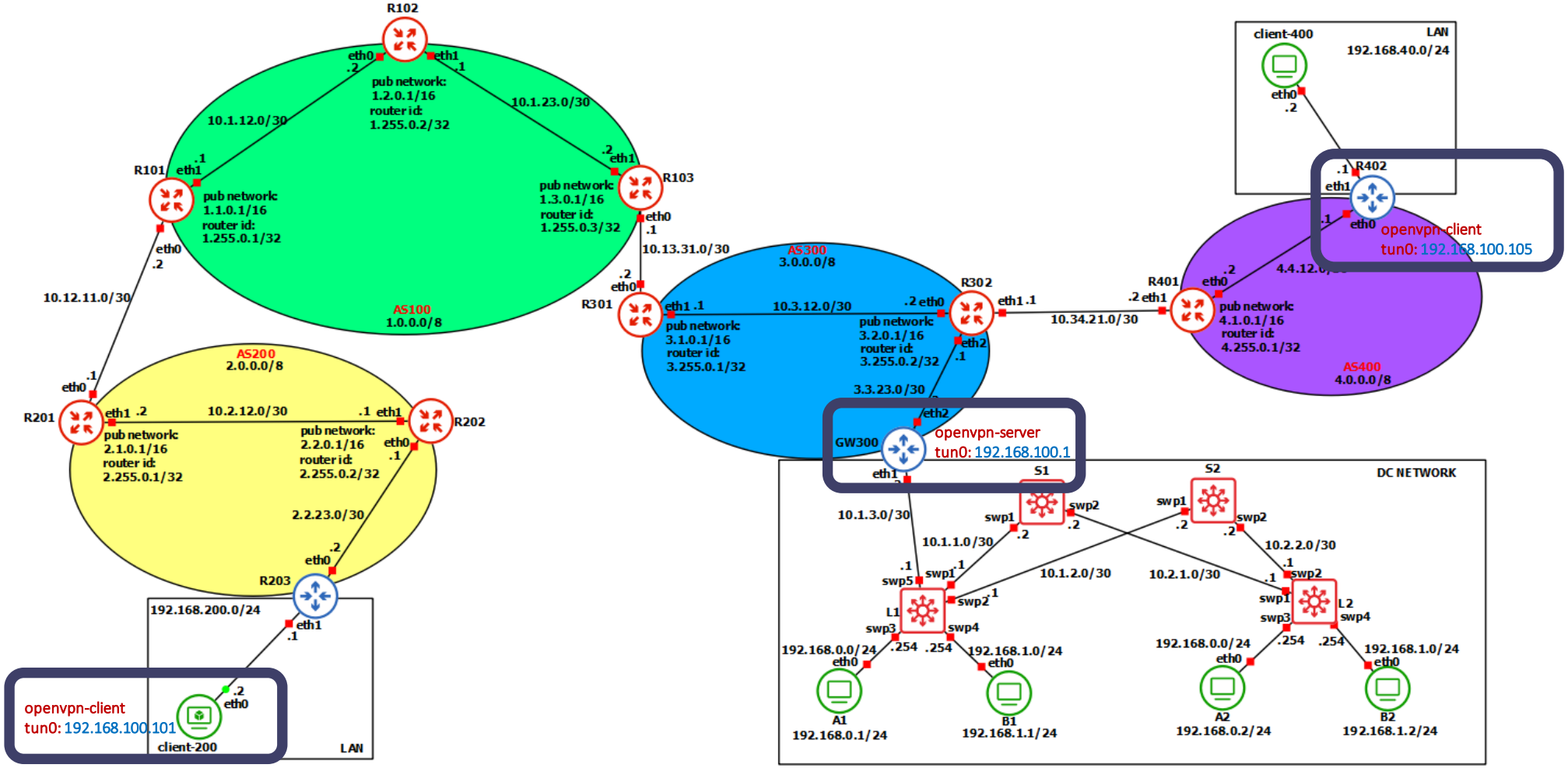




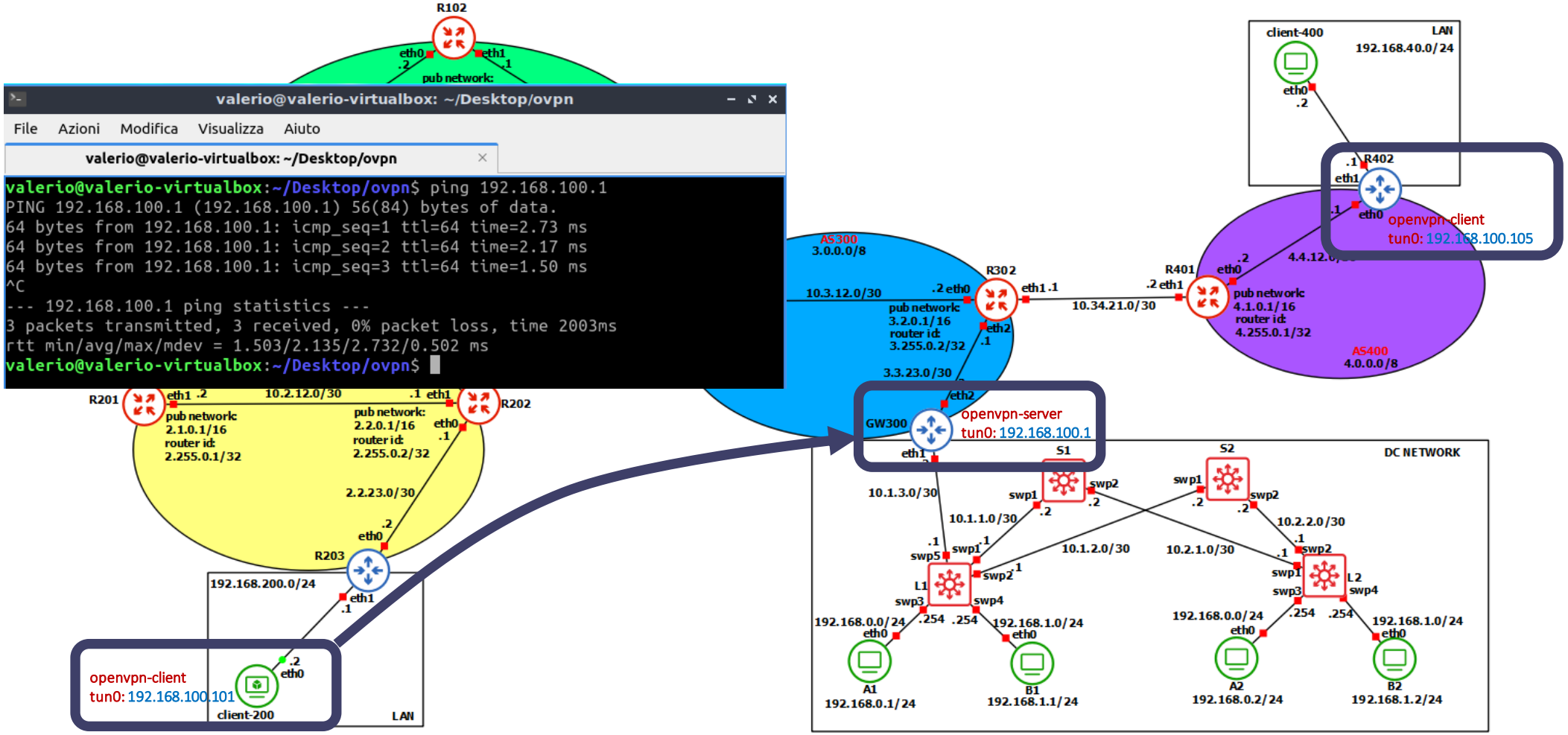
DC Network (B2 -> R302)



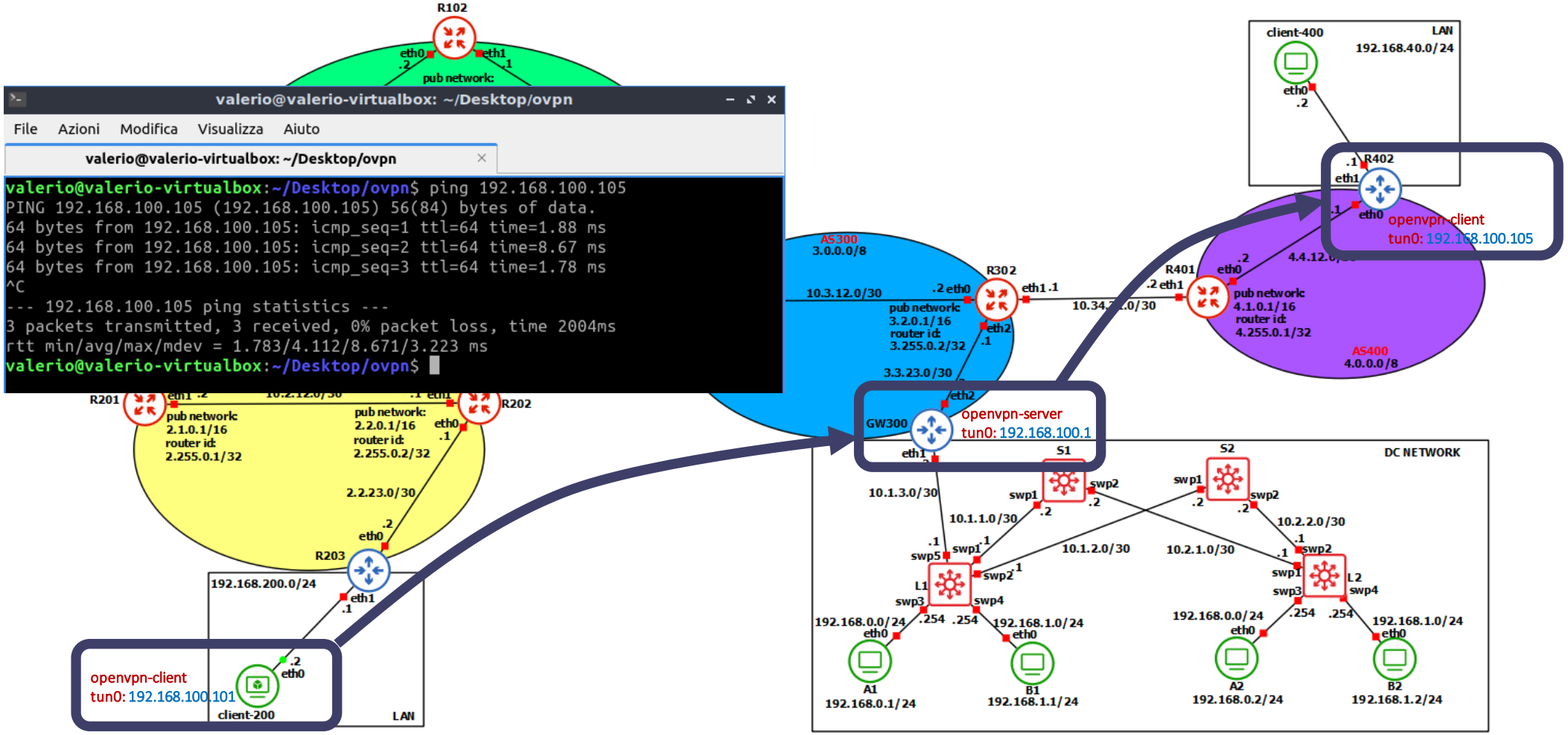
OpenVPN


R102
eth0 .2
eth1 .1
pub network:
1.2.0.1/16
router id:
1.255.0.2/32
10.1.12.0/30
10.1.23.0/30
R101
.1 eth1
pub network:
1.1.0.1/16
router id:
1.255.0.1/32
.2 eth1
R103
pub network:
1.3.0.1/16
router id:
1.255.0.3/32
eth0 .2
eth0 .1
10.13.31.0/30
AS100
1.0.0.0/8
10.12.11.0/30
AS300
3.0.0.0/8
.2 eth0
R301
eth1 .1
10.3.12.0/30
.2 eth0
R302
eth1 .1
pub network:
3.1.0.1/16
router id:
3.255.0.1/32
pub network:
3.2.0.1/16
router id:
3.255.0.2/32
eth2
.1
3.3.23.0/30
client-400
LAN
192.168.40.0/24
eth0
.2
.1
R402
eth1
eth0
openvpn-client
tun0: 192.168.100.105
10.34.21.0/30
R401
.2 eth1
.2
eth0
4.4.12.0/30
pub network
4.1.0.1/16
router id:
4.255.0.1/32
AS400
4.0.0.0/8
AS200
2.0.0.0/8
.1
eth0
R201
eth1 .2
10.2.12.0/30
.1 eth1
R202
pub network:
2.1.0.1/16
router id:
2.255.0.1/32
pub network:
2.2.0.1/16
router id:
2.255.0.2/32
eth0
.1
2.2.23.0/30
.2
eth0
R203
eth1
.1
GW300
openvpn-server
tun0: 192.168.100.1
eth1
S1
swp1
swp2
.2
.2
10.1.3.0/30
10.1.1.0/30
.1
swp5
.1
swp1
10.1.2.0/30
swp2
1
L1
swp3
swp4
192.168.0.0/24
.254
.254
192.168.1.0/24
eth0
eth0
A1
192.168.0.1/24
B1
192.168.1.1/24
S2
swp1
swp2
.2
.2
10.2.2.0/30
.1
.1
10.2.1.0/30
swp1
swp2
L2
swp3
swp4
192.168.0.0/24
.254
.254
192.168.1.0/24
eth0
eth0
A2
192.168.0.2/24
B2
192.168.1.2/24
DC NETWORK
192.168.200.0/24
eth1
.1
.2
eth0
openvpn-client
tun0: 192.168.100.101
client-200
LAN

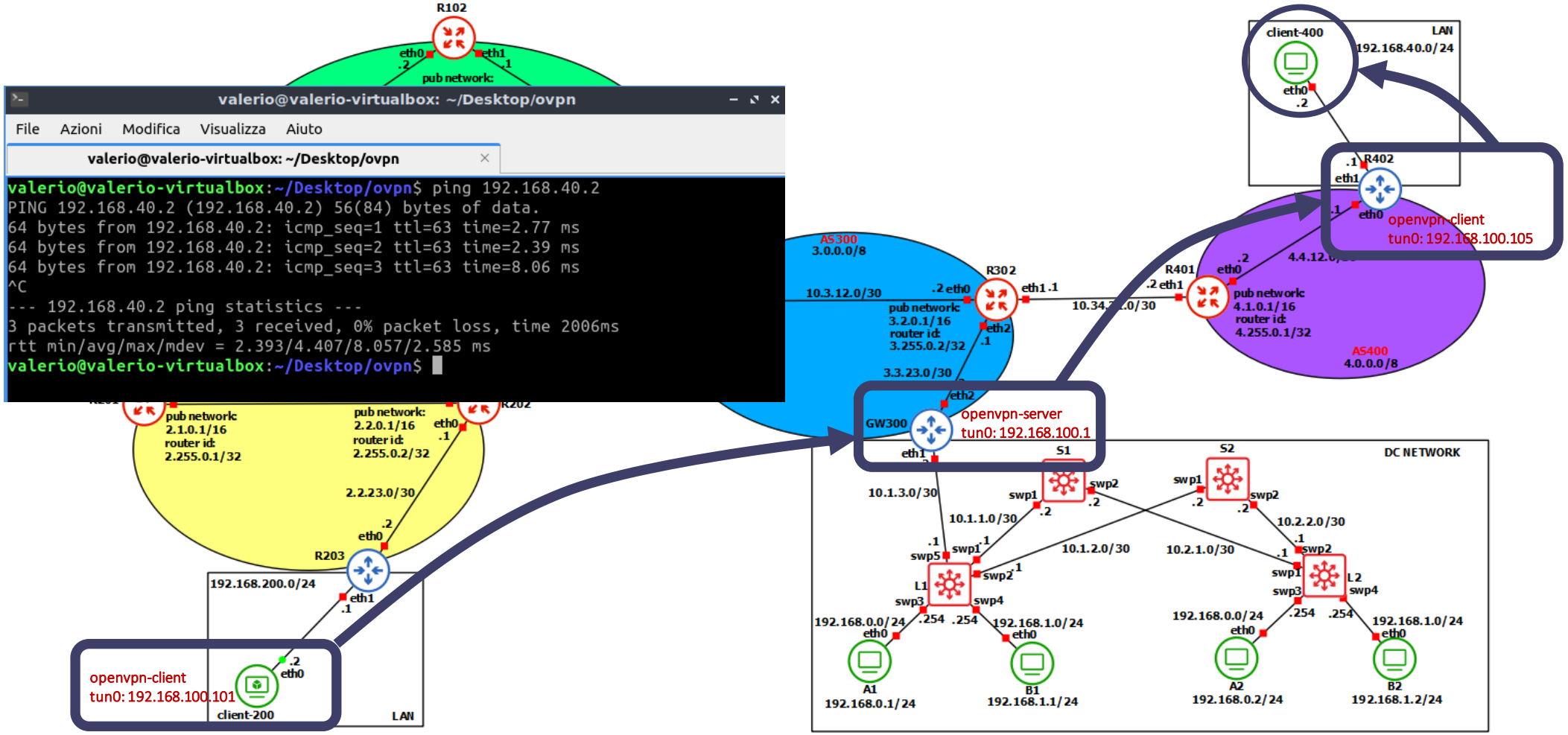
OpenVPN


valerio@valerio-virtualbox: ~/Desktop/ovpn
File Azioni Modifica Visualizza Aiuto
valerio@valerio-virtualbox: ~/Desktop/ovpn
valerio@valerio-virtualbox:~/Desktop/ovpn$ ping 192.168.100.1
PING 192.168.100.1 (192.168.100.1) 56(84) bytes of data.
64 bytes from 192.168.100.1: icmp_seq=1 ttl=64 time=2.73 ms
64 bytes from 192.168.100.1: icmp_seq=2 ttl=64 time=2.17 ms
64 bytes from 192.168.100.1: icmp_seq=3 ttl=64 time=1.50 ms
^C
--- 192.168.100.1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2003ms
rtt min/avg/max/mdev = 1.503/2.135/2.732/0.502 ms
valerio@valerio-virtualbox:~/Desktop/ovpn$
R102
pub network:
R201
R202
R203
R302
R401
R402
GW300
AS300
3.0.0.0/8
AS400
4.0.0.0/8
10.2.12.0/30
10.3.12.0/30
10.34.21.0/30
3.3.23.0/30
2.2.23.0/30
pub network:
2.1.0.1/16
router id:
2.255.0.1/32
pub network:
2.2.0.1/16
router id:
2.255.0.2/32
pub network:
3.2.0.1/16
router id:
3.255.0.2/32
pub network:
4.1.0.1/16
router id:
4.255.0.1/32
4.4.12.0/30
client-400
LAN
192.168.40.0/24
openvpn-client
tun0: 192.168.100.105
openvpn-server
tun0: 192.168.100.1
openvpn-client
tun0: 192.168.100.101
client-200
LAN
192.168.200.0/24
DC NETWORK
S1
S2
L1
L2
10.1.3.0/30
10.1.1.0/30
10.1.2.0/30
10.2.1.0/30
10.2.2.0/30
192.168.0.0/24
192.168.1.0/24
A1
192.168.0.1/24
B1
192.168.1.1/24
A2
192.168.0.2/24
B2
192.168.1.2/24

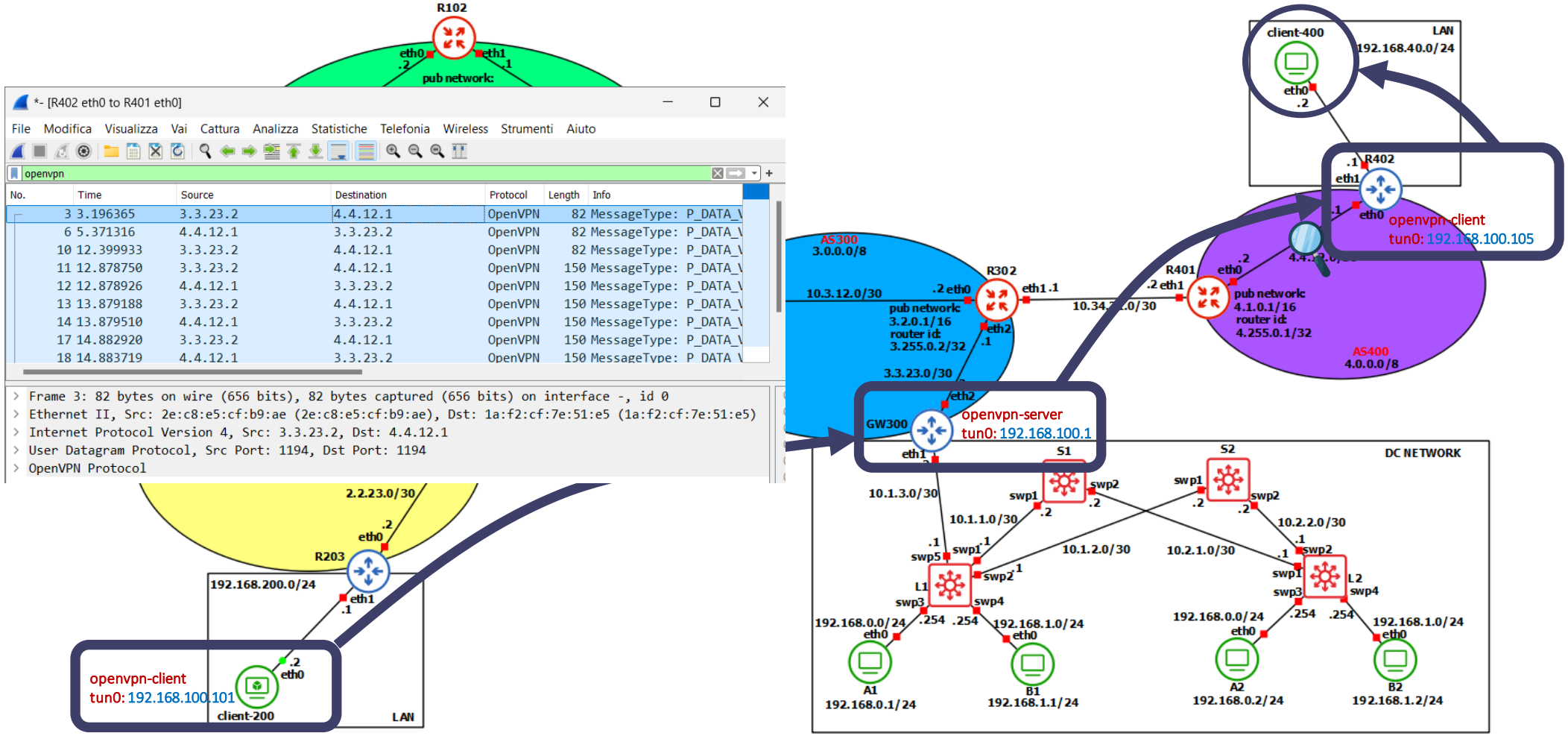
OpenVPN


valerio@valerio-virtualbox: ~/Desktop/ovpn
File Azioni Modifica Visualizza Aiuto
valerio@valerio-virtualbox: ~/Desktop/ovpn
valerio@valerio-virtualbox:~/Desktop/ovpn$ ping 192.168.100.105
PING 192.168.100.105 (192.168.100.105) 56(84) bytes of data.
64 bytes from 192.168.100.105: icmp_seq=1 ttl=64 time=1.88 ms
64 bytes from 192.168.100.105: icmp_seq=2 ttl=64 time=8.67 ms
64 bytes from 192.168.100.105: icmp_seq=3 ttl=64 time=1.78 ms
^C
--- 192.168.100.105 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2004ms
rtt min/avg/max/mdev = 1.783/4.112/8.671/3.223 ms
valerio@valerio-virtualbox:~/Desktop/ovpn$
R102
pub network:
client-400
LAN
192.168.40.0/24
R402
openvpn-client
tun0: 192.168.100.105
AS300
3.0.0.0/8
R302
10.3.12.0/30
pub network
3.2.0.1/16
router id:
3.255.0.2/32
3.3.23.0/30
R401
pub network
4.1.0.1/16
router id:
4.255.0.1/32
AS400
4.0.0.0/8
R201
pub network:
2.1.0.1/16
router id:
2.255.0.1/32
R202
pub network:
2.2.0.1/16
router id:
2.255.0.2/32
2.2.23.0/30
R203
GW300
openvpn-server
tun0: 192.168.100.1
S1
S2
DC NETWORK
10.1.3.0/30
10.1.1.0/30
10.1.2.0/30
10.2.1.0/30
10.2.2.0/30
L1
L2
192.168.0.0/24
192.168.1.0/24
A1
192.168.0.1/24
B1
192.168.1.1/24
A2
192.168.0.2/24
B2
192.168.1.2/24
192.168.200.0/24
openvpn-client
tun0: 192.168.100.101
client-200
LAN

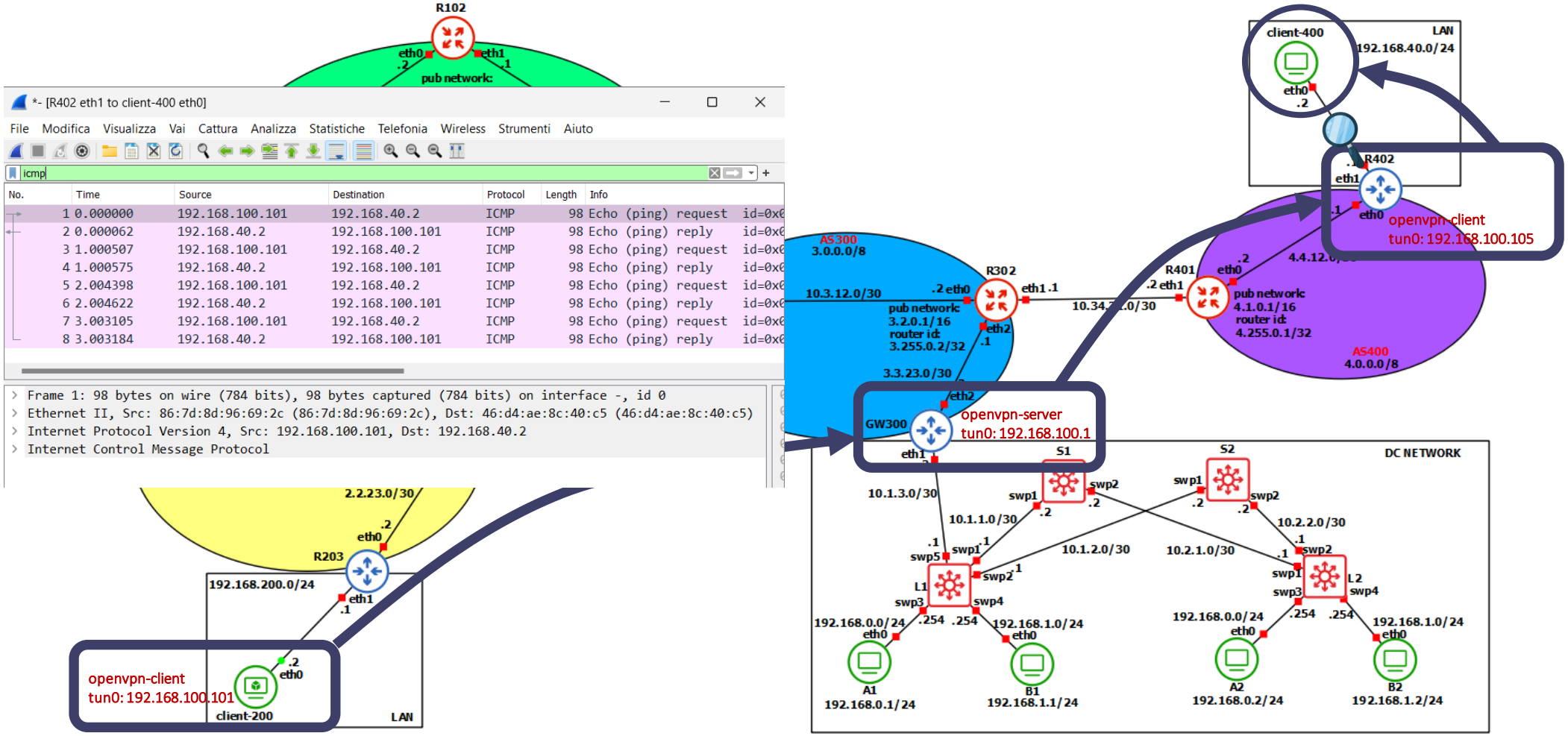
OpenVPN


valerio@valerio-virtualbox: ~/Desktop/ovpn
File Azioni Modifica Visualizza Aiuto
valerio@valerio-virtualbox: ~/Desktop/ovpn
valerio@valerio-virtualbox:~/Desktop/ovpn$ ping 192.168.40.2
PING 192.168.40.2 (192.168.40.2) 56(84) bytes of data.
64 bytes from 192.168.40.2: icmp_seq=1 ttl=63 time=2.77 ms
64 bytes from 192.168.40.2: icmp_seq=2 ttl=63 time=2.39 ms
64 bytes from 192.168.40.2: icmp_seq=3 ttl=63 time=8.06 ms
^C
--- 192.168.40.2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2006ms
rtt min/avg/max/mdev = 2.393/4.407/8.057/2.585 ms
valerio@valerio-virtualbox:~/Desktop/ovpn$
R102
pub network:
client-400
LAN
192.168.40.0/24
R402
openvpn-client
tun0: 192.168.100.105
AS300
3.0.0.0/8
R302
10.3.12.0/30
pub network
3.2.0.1/16
router id:
3.255.0.2/32
3.3.23.0/30
R401
pub network
4.1.0.1/16
router id:
4.255.0.1/32
AS400
4.0.0.0/8
pub network:
2.1.0.1/16
router id:
2.255.0.1/32
pub network:
2.2.0.1/16
router id:
2.255.0.2/32
2.2.23.0/30
R203
192.168.200.0/24
openvpn-client
tun0: 192.168.100.101
client-200
LAN
GW300
openvpn-server
tun0: 192.168.100.1
DC NETWORK
S1
S2
L1
L2
10.1.3.0/30
10.1.1.0/30
10.1.2.0/30
10.2.1.0/30
10.2.2.0/30
192.168.0.0/24
192.168.1.0/24
A1
192.168.0.1/24
B1
192.168.1.1/24
A2
192.168.0.2/24
B2
192.168.1.2/24

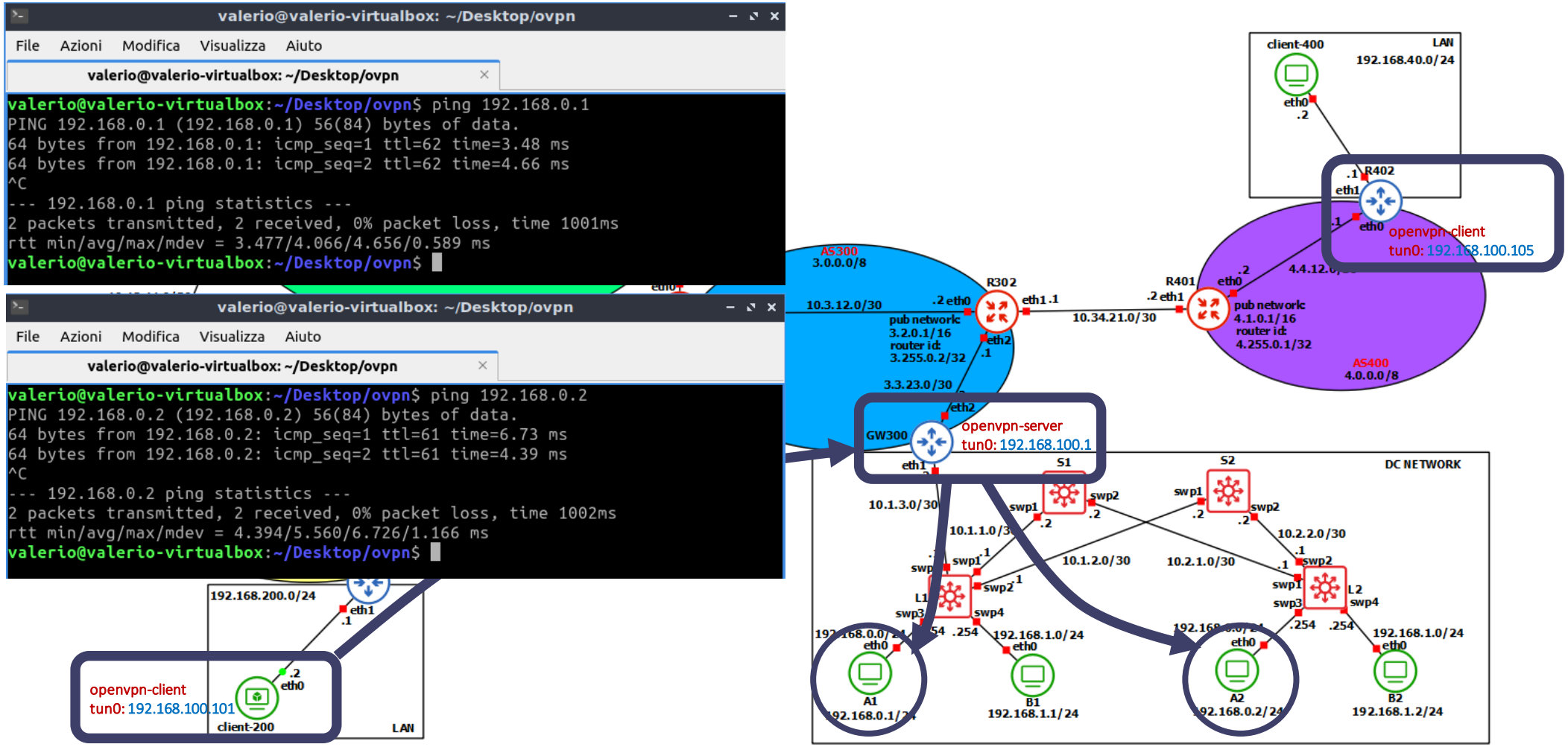
OpenVPN


R102
eth0
.2
eth1
.1
pub network:
*- [R402 eth0 to R401 eth0]
File Modifica Visualizza Vai Cattura Analizza Statistiche Telefonia Wireless Strumenti Aiuto
openvpn
No. Time Source Destination Protocol Length Info
3 3.196365 3.3.23.2 4.4.12.1 OpenVPN 82 MessageType: P_DATA_V
6 5.371316 4.4.12.1 3.3.23.2 OpenVPN 82 MessageType: P_DATA_V
10 12.399933 3.3.23.2 4.4.12.1 OpenVPN 82 MessageType: P_DATA_V
11 12.878750 3.3.23.2 4.4.12.1 OpenVPN 150 MessageType: P_DATA_V
12 12.878926 4.4.12.1 3.3.23.2 OpenVPN 150 MessageType: P_DATA_V
13 13.879188 3.3.23.2 4.4.12.1 OpenVPN 150 MessageType: P_DATA_V
14 13.879510 4.4.12.1 3.3.23.2 OpenVPN 150 MessageType: P_DATA_V
17 14.882920 3.3.23.2 4.4.12.1 OpenVPN 150 MessageType: P_DATA_V
18 14.883719 4.4.12.1 3.3.23.2 OpenVPN 150 MessageType: P_DATA_V
Frame 3: 82 bytes on wire (656 bits), 82 bytes captured (656 bits) on interface -, id 0
Ethernet II, Src: 2e:c8:e5:cf:b9:ae (2e:c8:e5:cf:b9:ae), Dst: 1a:f2:cf:7e:51:e5 (1a:f2:cf:7e:51:e5)
Internet Protocol Version 4, Src: 3.3.23.2, Dst: 4.4.12.1
User Datagram Protocol, Src Port: 1194, Dst Port: 1194
OpenVPN Protocol
2.2.23.0/30
.2
eth0
R203
192.168.200.0/24
eth1
.1
openvpn-client
tun0: 192.168.100.101
.2
eth0
client-200
LAN
client-400
LAN
192.168.40.0/24
eth0
.2
.1
R402
eth1
eth0
openvpn-client
tun0: 192.168.100.105
AS300
3.0.0.0/8
10.3.12.0/30
.2 eth0
R302
eth1 .1
pub network
3.2.0.1/16
router id:
3.255.0.2/32
eth2
.1
3.3.23.0/30
R401
.2 eth1
10.34.2.0/30
.2
eth0
pub network
4.1.0.1/16
router id:
4.255.0.1/32
AS400
4.0.0.0/8
eth2
GW300
eth1
openvpn-server
tun0: 192.168.100.1
S1
S2
DC NETWORK
swp1
swp2
.2
10.1.3.0/30
10.1.1.0/30
10.1.2.0/30
10.2.1.0/30
10.2.2.0/30
.1
swp5
swp1
swp2
L1
L2
swp3
swp4
.254
192.168.0.0/24
192.168.1.0/24
eth0
A1
192.168.0.1/24
B1
192.168.1.1/24
A2
192.168.0.2/24
B2
192.168.1.2/24

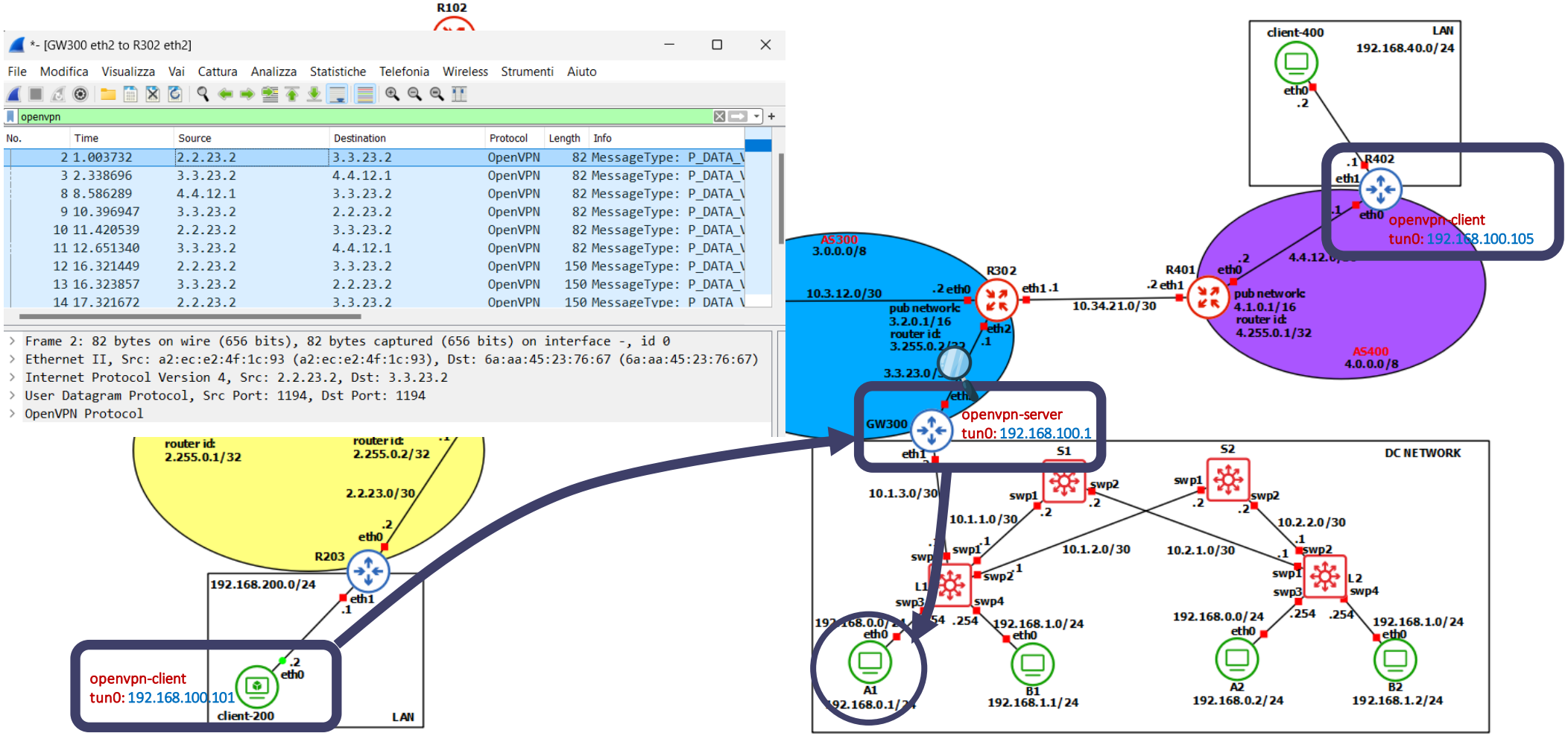
OpenVPN


R102
eth0
.2
eth1
.1
pub network:
*- [R402 eth1 to client-400 eth0]
File Modifica Visualizza Vai Cattura Analizza Statistiche Telefonia Wireless Strumenti Aiuto
icmp
No. Time Source Destination Protocol Length Info
1 0.000000 192.168.100.101 192.168.40.2 ICMP 98 Echo (ping) request id=0x
2 0.000062 192.168.40.2 192.168.100.101 ICMP 98 Echo (ping) reply id=0x
3 1.000507 192.168.100.101 192.168.40.2 ICMP 98 Echo (ping) request id=0x
4 1.000575 192.168.40.2 192.168.100.101 ICMP 98 Echo (ping) reply id=0x
5 2.004398 192.168.100.101 192.168.40.2 ICMP 98 Echo (ping) request id=0x
6 2.004622 192.168.40.2 192.168.100.101 ICMP 98 Echo (ping) reply id=0x
7 3.003105 192.168.100.101 192.168.40.2 ICMP 98 Echo (ping) request id=0x
8 3.003184 192.168.40.2 192.168.100.101 ICMP 98 Echo (ping) reply id=0x
Frame 1: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface -, id 0
Ethernet II, Src: 86:7d:8d:96:69:2c (86:7d:8d:96:69:2c), Dst: 46:d4:ae:8c:40:c5 (46:d4:ae:8c:40:c5)
Internet Protocol Version 4, Src: 192.168.100.101, Dst: 192.168.40.2
Internet Control Message Protocol
2.2.23.0/30
.2
eth0
R203
192.168.200.0/24
eth1
.1
openvpn-client
tun0: 192.168.100.101
.2
eth0
client-200
LAN
client-400
LAN
192.168.40.0/24
eth0
.2
R402
eth1
.1
eth0
openvpn-client
tun0: 192.168.100.105
AS300
3.0.0.0/8
10.3.12.0/30
.2 eth0
R302
eth1 .1
pub network
3.2.0.1/16
router id:
3.255.0.2/32
eth2
.1
3.3.23.0/30
R401
.2 eth1
10.34.2.0/30
.2
eth0
pub network
4.1.0.1/16
router id:
4.255.0.1/32
4.4.12.0/
AS400
4.0.0.0/8
eth2
GW300
eth1
openvpn-server
tun0: 192.168.100.1
S1
S2
DC NETWORK
swp1
swp2
.2
10.1.3.0/30
10.1.1.0/30
10.1.2.0/30
10.2.1.0/30
10.2.2.0/30
.1
swp5
L1
swp3
swp4
.254
L2
192.168.0.0/24
192.168.1.0/24
A1
192.168.0.1/24
B1
192.168.1.1/24
A2
192.168.0.2/24
B2
192.168.1.2/24

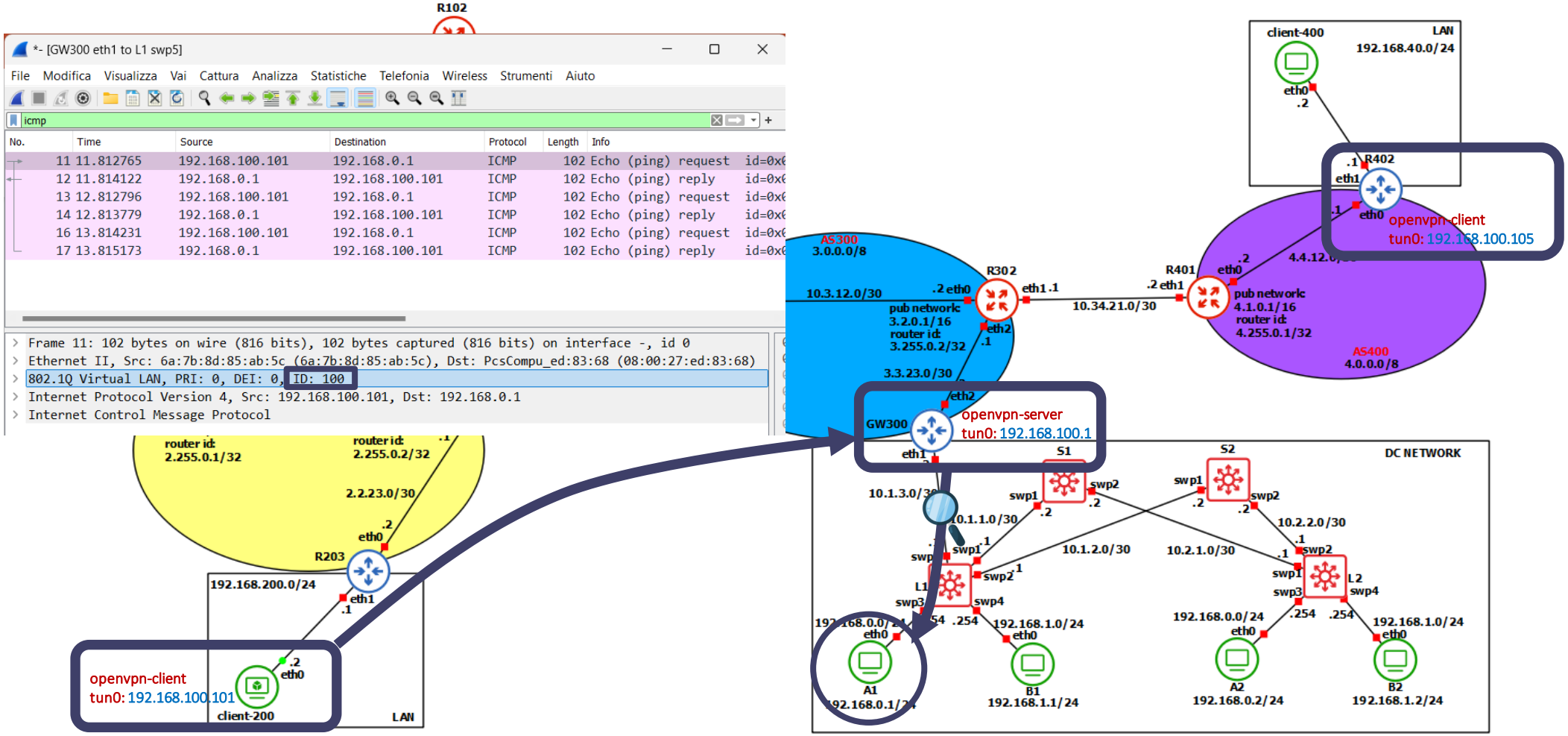
OpenVPN


valerio@valerio-virtualbox: ~/Desktop/ovpn
File Azioni Modifica Visualizza Aiuto
valerio@valerio-virtualbox: ~/Desktop/ovpn
valerio@valerio-virtualbox:~/Desktop/ovpn$ ping 192.168.0.1
PING 192.168.0.1 (192.168.0.1) 56(84) bytes of data.
64 bytes from 192.168.0.1: icmp_seq=1 ttl=62 time=3.48 ms
64 bytes from 192.168.0.1: icmp_seq=2 ttl=62 time=4.66 ms
^C
--- 192.168.0.1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
rtt min/avg/max/mdev = 3.477/4.066/4.656/0.589 ms
valerio@valerio-virtualbox:~/Desktop/ovpn$
valerio@valerio-virtualbox: ~/Desktop/ovpn
File Azioni Modifica Visualizza Aiuto
valerio@valerio-virtualbox: ~/Desktop/ovpn
valerio@valerio-virtualbox:~/Desktop/ovpn$ ping 192.168.0.2
PING 192.168.0.2 (192.168.0.2) 56(84) bytes of data.
64 bytes from 192.168.0.2: icmp_seq=1 ttl=61 time=6.73 ms
64 bytes from 192.168.0.2: icmp_seq=2 ttl=61 time=4.39 ms
^C
--- 192.168.0.2 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 4.394/5.560/6.726/1.166 ms
valerio@valerio-virtualbox:~/Desktop/ovpn$
192.168.200.0/24
eth1
.1
openvpn-client
tun0: 192.168.100.101
.2
eth0
client-200
LAN
client-400
LAN
192.168.40.0/24
eth0
.2
.1
R402
eth1
eth0
openvpn-client
tun0: 192.168.100.105
AS300
3.0.0.0/8
10.3.12.0/30
.2 eth0
R302
eth1.1
pub network
3.2.0.1/16
router id:
3.255.0.2/32
eth2
.1
3.3.23.0/30
10.34.21.0/30
R401
.2 eth1
.2
eth0
pub network
4.1.0.1/16
router id:
4.255.0.1/32
4.4.12.0/
AS400
4.0.0.0/8
GW300
eth2
openvpn-server
tun0: 192.168.100.1
eth1
S1
S2
DC NETWORK
10.1.3.0/30
swp1
.2
swp2
.2
swp1
.2
swp2
.2
10.1.1.0/3
10.1.2.0/30
10.2.1.0/30
10.2.2.0/30
.1
.1
swp1
swp2
L1
swp3
swp4
.254
.254
192.168.1.0/24
eth0
A1
192.168.0.1/
B1
192.168.1.1/24
swp1
swp2
L2
swp3
swp4
.254
.254
192.168.1.0/24
eth0
A2
192.168.0.2/24
B2
192.168.1.2/24

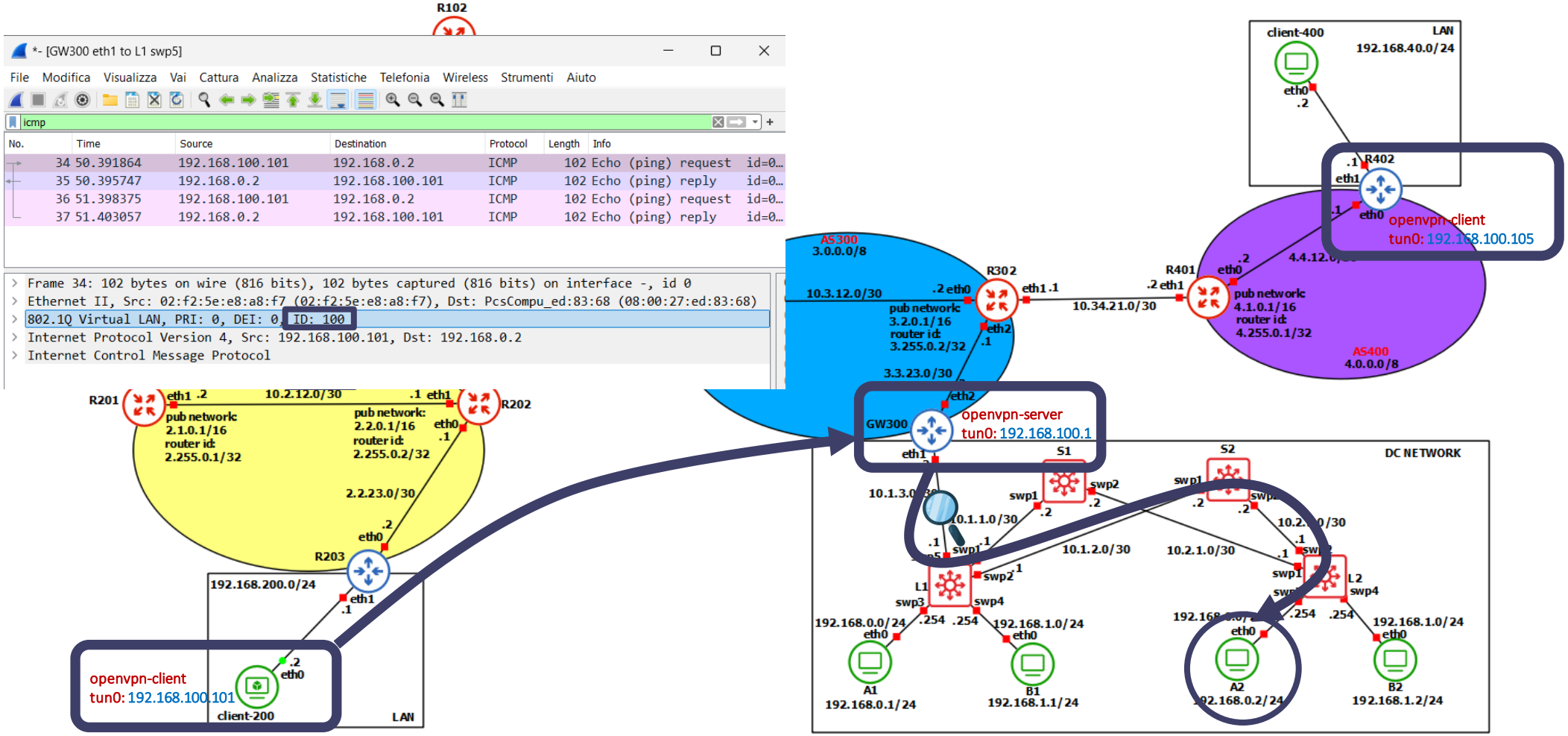
OpenVPN


R102
*- [GW300 eth2 to R302 eth2]
File Modifica Visualizza Vai Cattura Analizza Statistiche Telefonia Wireless Strumenti Aiuto
openvpn
No. Time Source Destination Protocol Length Info
2 1.003732 2.2.23.2 3.3.23.2 OpenVPN 82 MessageType: P_DATA_V
3 2.338696 3.3.23.2 4.4.12.1 OpenVPN 82 MessageType: P_DATA_V
8 8.586289 4.4.12.1 3.3.23.2 OpenVPN 82 MessageType: P_DATA_V
9 10.396947 3.3.23.2 2.2.23.2 OpenVPN 82 MessageType: P_DATA_V
10 11.420539 2.2.23.2 3.3.23.2 OpenVPN 82 MessageType: P_DATA_V
11 12.651340 3.3.23.2 4.4.12.1 OpenVPN 82 MessageType: P_DATA_V
12 16.321449 2.2.23.2 3.3.23.2 OpenVPN 150 MessageType: P_DATA_V
13 16.323857 3.3.23.2 2.2.23.2 OpenVPN 150 MessageType: P_DATA_V
14 17.321672 2.2.23.2 3.3.23.2 OpenVPN 150 MessageType: P_DATA_V
Frame 2: 82 bytes on wire (656 bits), 82 bytes captured (656 bits) on interface -, id 0
Ethernet II, Src: a2:ec:e2:4f:1c:93 (a2:ec:e2:4f:1c:93), Dst: 6a:aa:45:23:76:67 (6a:aa:45:23:76:67)
Internet Protocol Version 4, Src: 2.2.23.2, Dst: 3.3.23.2
User Datagram Protocol, Src Port: 1194, Dst Port: 1194
OpenVPN Protocol
router id: 2.255.0.1/32
router id: 2.255.0.2/32
2.2.23.0/30
.2
eth0
R203
192.168.200.0/24
eth1
.1
openvpn-client
tun0: 192.168.100.101
.2
eth0
client-200
LAN
client-400
LAN
192.168.40.0/24
eth0
.2
.1
R402
eth1
eth0
openvpn-client
tun0: 192.168.100.105
AS300
3.0.0.0/8
10.3.12.0/30
.2 eth0
R302
eth1.1
10.34.21.0/30
R401
.2 eth1
.2
eth0
4.4.12.0/
pub network
3.2.0.1/16
router id:
3.255.0.2/32
eth2
.1
3.3.23.0/
eth1
pub network
4.1.0.1/16
router id:
4.255.0.1/32
AS400
4.0.0.0/8
GW300
eth1
openvpn-server
tun0: 192.168.100.1
S1
S2
DC NETWORK
10.1.3.0/30
swp1
.2
swp2
.2
swp1
.2
swp2
.2
10.1.1.0/30
10.1.2.0/30
10.2.1.0/30
10.2.2.0/30
.1
swp1
swp2
L1
swp3
swp4
L2
swp1
swp2
swp3
swp4
.254
.254
.254
.254
192.168.0.0/24
eth0
192.168.1.0/24
eth0
A1
192.168.0.1/24
B1
192.168.1.1/24
192.168.0.0/24
eth0
192.168.1.0/24
eth0
A2
192.168.0.2/24
B2
192.168.1.2/24

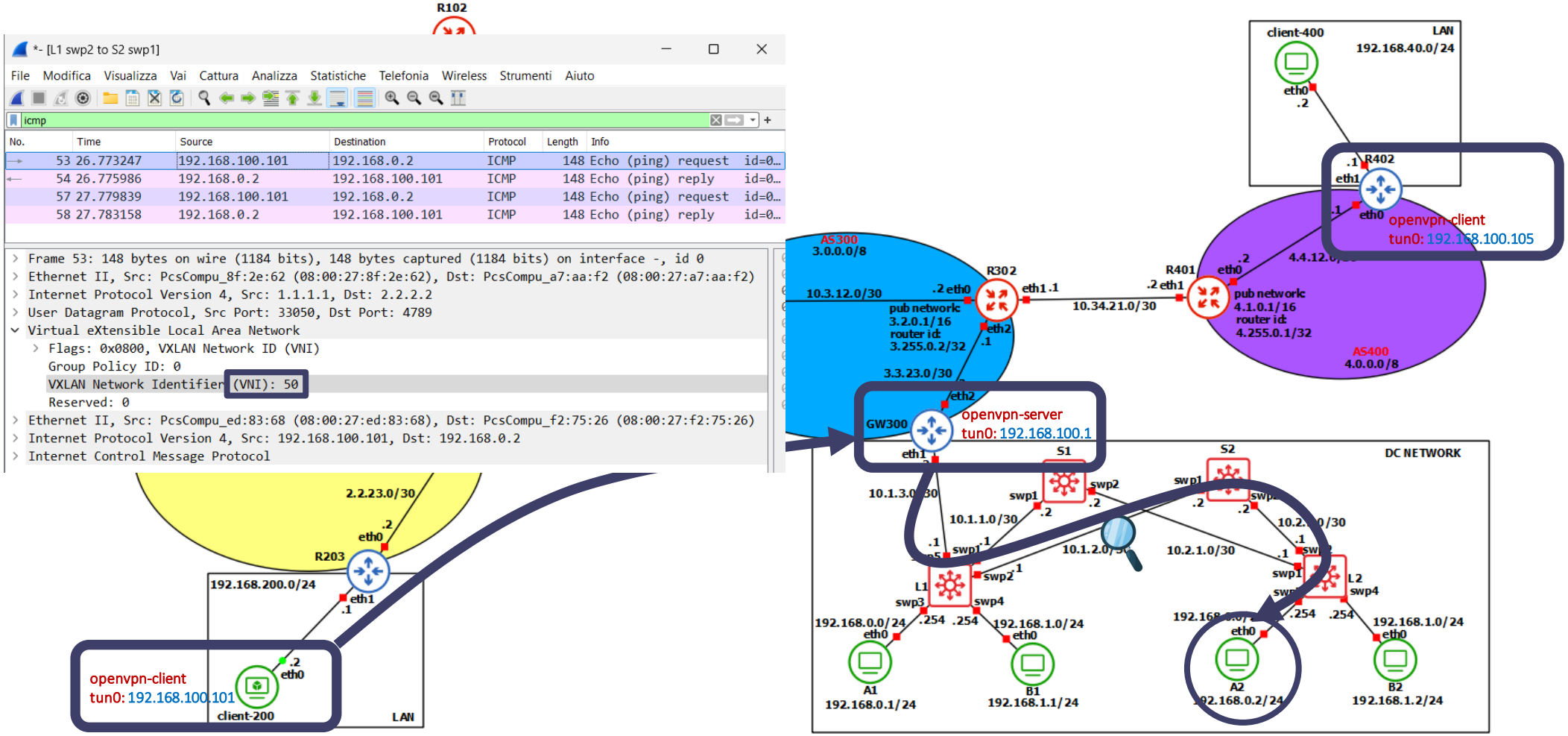
OpenVPN


R102
*- [GW300 eth1 to L1 swp5]
File Modifica Visualizza Vai Cattura Analizza Statistiche Telefonia Wireless Strumenti Aiuto
icmp
No. Time Source Destination Protocol Length Info
11 11.812765 192.168.100.101 192.168.0.1 ICMP 102 Echo (ping) request id=0x
12 11.814122 192.168.0.1 192.168.100.101 ICMP 102 Echo (ping) reply id=0x
13 12.812796 192.168.100.101 192.168.0.1 ICMP 102 Echo (ping) request id=0x
14 12.813779 192.168.0.1 192.168.100.101 ICMP 102 Echo (ping) reply id=0x
16 13.814231 192.168.100.101 192.168.0.1 ICMP 102 Echo (ping) request id=0x
17 13.815173 192.168.0.1 192.168.100.101 ICMP 102 Echo (ping) reply id=0x
Frame 11: 102 bytes on wire (816 bits), 102 bytes captured (816 bits) on interface -, id 0
Ethernet II, Src: 6a:7b:8d:85:ab:5c (6a:7b:8d:85:ab:5c), Dst: PcsCompu_ed:83:68 (08:00:27:ed:83:68)
802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 100
Internet Protocol Version 4, Src: 192.168.100.101, Dst: 192.168.0.1
Internet Control Message Protocol
client-400
LAN
192.168.40.0/24
eth0
.2
.1
R402
eth1
eth0
openvpn-client
tun0: 192.168.100.105
AS300
3.0.0.0/8
10.3.12.0/30
.2 eth0
R302
eth1 .1
10.34.21.0/30
R401
.2 eth1
.2
eth0
pub network
3.2.0.1/16
router id:
3.255.0.2/32
eth2
.1
3.3.23.0/30
pub network
4.1.0.1/16
router id:
4.255.0.1/32
4.4.12.0/
AS400
4.0.0.0/8
GW300
eth2
openvpn-server
tun0: 192.168.100.1
eth1
router id:
2.255.0.1/32
router id:
2.255.0.2/32
2.2.23.0/30
.2
eth0
R203
192.168.200.0/24
eth1
.1
openvpn-client
tun0: 192.168.100.101
.2
eth0
client-200
LAN
S1
S2
DC NETWORK
swp1
swp2
.2
10.1.3.0/30
10.1.1.0/30
10.1.2.0/30
10.2.1.0/30
10.2.2.0/30
.1
L1
L2
swp3
swp4
.254
192.168.0.0/24
192.168.1.0/24
eth0
A1
B1
A2
B2
192.168.1.1/24
192.168.0.2/24
192.168.1.2/24

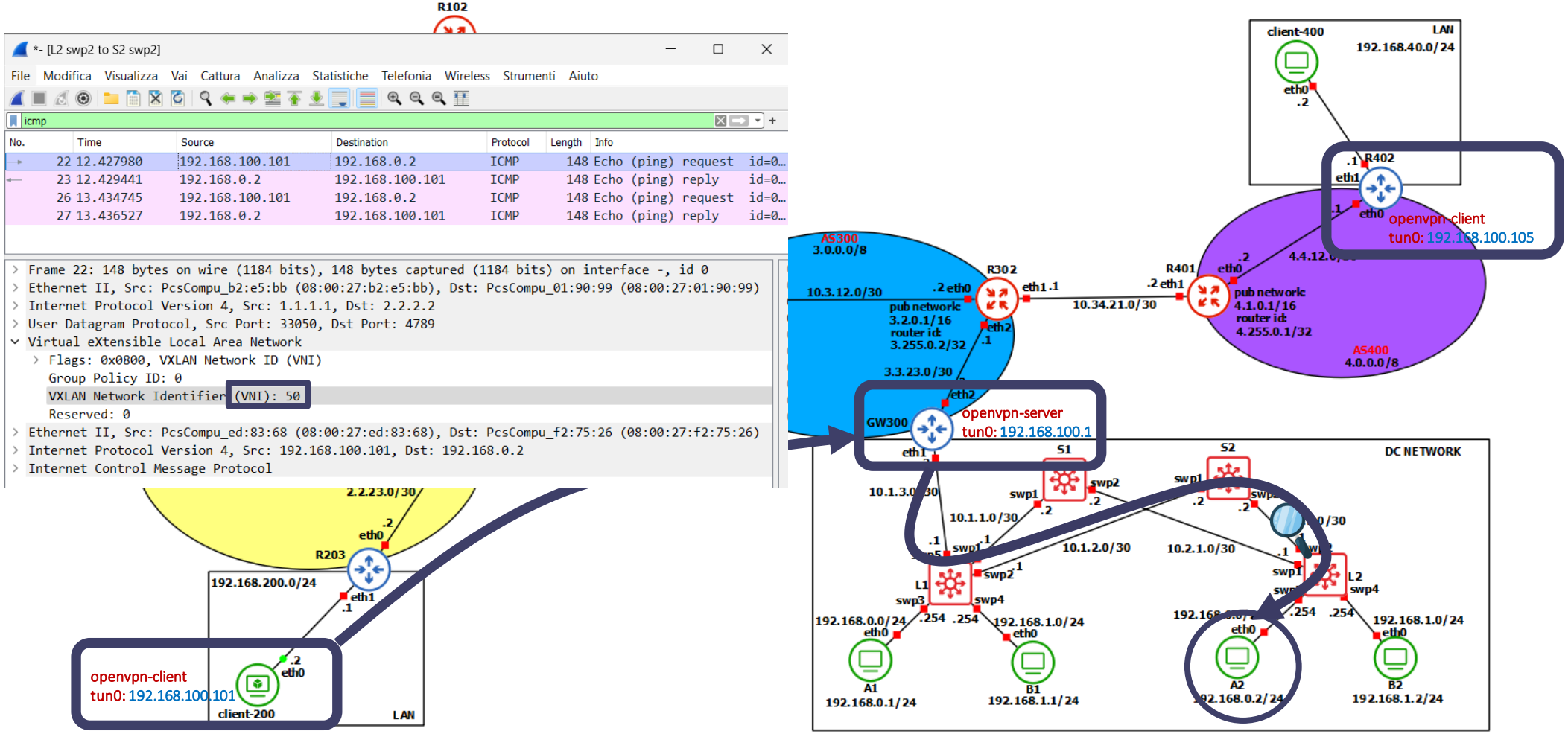
OpenVPN


R102
*- [GW300 eth1 to L1 swp5]
File Modifica Visualizza Vai Cattura Analizza Statistiche Telefonia Wireless Strumenti Aiuto
icmp
No. Time Source Destination Protocol Length Info
34 50.391864 192.168.100.101 192.168.0.2 ICMP 102 Echo (ping) request id=0…
35 50.395747 192.168.0.2 192.168.100.101 ICMP 102 Echo (ping) reply id=0…
36 51.398375 192.168.100.101 192.168.0.2 ICMP 102 Echo (ping) request id=0…
37 51.403057 192.168.0.2 192.168.100.101 ICMP 102 Echo (ping) reply id=0…
Frame 34: 102 bytes on wire (816 bits), 102 bytes captured (816 bits) on interface -, id 0
Ethernet II, Src: 02:f2:5e:e8:a8:f7 (02:f2:5e:e8:a8:f7), Dst: PcsCompu_ed:83:68 (08:00:27:ed:83:68)
802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 100
Internet Protocol Version 4, Src: 192.168.100.101, Dst: 192.168.0.2
Internet Control Message Protocol
client-400
LAN
192.168.40.0/24
eth0
.2
.1
R402
eth1
openvpn-client
tun0: 192.168.100.105
AS300
3.0.0.0/8
10.3.12.0/30
.2 eth0
R302
eth1 .1
10.34.21.0/30
R401
.2 eth1
.2
eth0
pub network
3.2.0.1/16
router id:
3.255.0.2/32
pub network
4.1.0.1/16
router id:
4.255.0.1/32
4.4.12.0/30
AS400
4.0.0.0/8
eth2
.1
3.3.23.0/30
R201
eth1 .2
10.2.12.0/30
.1 eth1
R202
pub network:
2.1.0.1/16
router id:
2.255.0.1/32
pub network:
2.2.0.1/16
router id:
2.255.0.2/32
eth0
.1
2.2.23.0/30
.2
eth0
R203
192.168.200.0/24
eth1
.1
openvpn-client
tun0: 192.168.100.101
.2
eth0
client-200
LAN
GW300
openvpn-server
tun0: 192.168.100.1
eth1
S1
swp1
swp2
.2
10.1.3.0/30
10.1.1.0/30
.1
swp1
10.1.2.0/30
L1
swp2
swp3
swp4
.254
192.168.0.0/24
eth0
A1
192.168.0.1/24
192.168.1.0/24
eth0
B1
192.168.1.1/24
S2
swp1
swp2
.2
10.2.1.0/30
10.2.2.0/30
.1
L2
swp1
swp4
.254
192.168.2.0/24
eth0
A2
192.168.0.2/24
192.168.1.0/24
eth0
B2
192.168.1.2/24
DC NETWORK

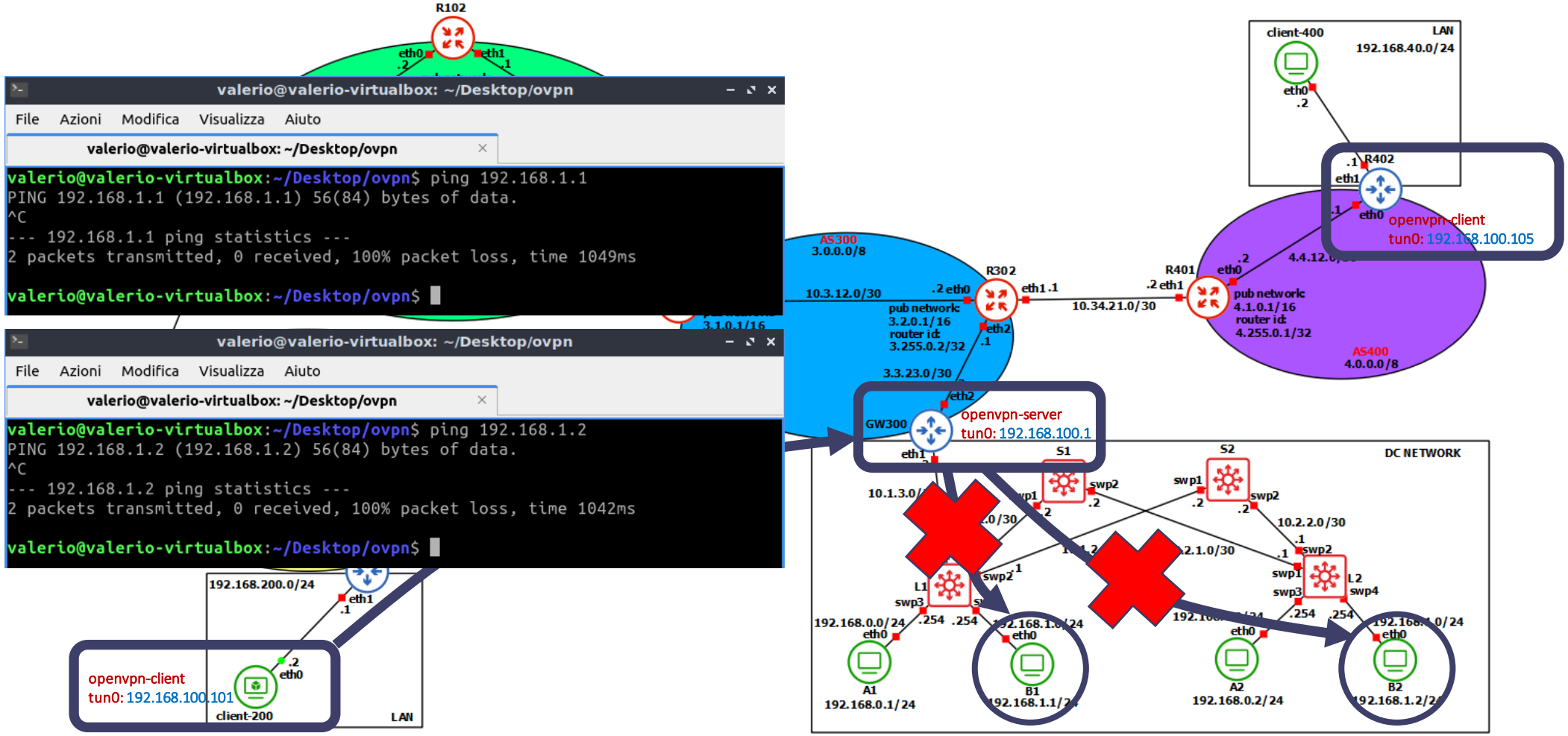
OpenVPN


R102
*- [L1 swp2 to S2 swp1]
File Modifica Visualizza Vai Cattura Analizza Statistiche Telefonia Wireless Strumenti Aiuto
icmp
No. Time Source Destination Protocol Length Info
53 26.773247 192.168.100.101 192.168.0.2 ICMP 148 Echo (ping) request id=0…
54 26.775986 192.168.0.2 192.168.100.101 ICMP 148 Echo (ping) reply id=0…
57 27.779839 192.168.100.101 192.168.0.2 ICMP 148 Echo (ping) request id=0…
58 27.783158 192.168.0.2 192.168.100.101 ICMP 148 Echo (ping) reply id=0…
Frame 53: 148 bytes on wire (1184 bits), 148 bytes captured (1184 bits) on interface -, id 0
Ethernet II, Src: PcsCompu_8f:2e:62 (08:00:27:8f:2e:62), Dst: PcsCompu_a7:aa:f2 (08:00:27:a7:aa:f2)
Internet Protocol Version 4, Src: 1.1.1.1, Dst: 2.2.2.2
User Datagram Protocol, Src Port: 33050, Dst Port: 4789
Virtual eXtensible Local Area Network
Flags: 0x0800, VXLAN Network ID (VNI)
Group Policy ID: 0
VXLAN Network Identifier (VNI): 50
Reserved: 0
Ethernet II, Src: PcsCompu_ed:83:68 (08:00:27:ed:83:68), Dst: PcsCompu_f2:75:26 (08:00:27:f2:75:26)
Internet Protocol Version 4, Src: 192.168.100.101, Dst: 192.168.0.2
Internet Control Message Protocol
2.2.23.0/30
.2
eth0
R203
192.168.200.0/24
eth1
.1
openvpn-client
tun0: 192.168.100.101
.2
eth0
client-200
LAN
client-400
LAN
192.168.40.0/24
eth0
.2
.1
R402
eth1
eth0
openvpn-client
tun0: 192.168.100.105
AS300
3.0.0.0/8
10.3.12.0/30
.2 eth0
R302
eth1.1
pub network
3.2.0.1/16
router id:
3.255.0.2/32
eth2
.1
3.3.23.0/30
10.34.21.0/30
R401
.2 eth1
.2
eth0
4.4.12.0/
pub network
4.1.0.1/16
router id:
4.255.0.1/32
AS400
4.0.0.0/8
eth2
GW300
openvpn-server
tun0: 192.168.100.1
eth1
S1
S2
DC NETWORK
swp1
swp2
.2
10.1.3.0/30
10.1.1.0/30
10.1.2.0/30
10.2.1.0/30
.1
L1
L2
swp3
swp4
.254
192.168.0.0/24
192.168.1.0/24
192.168.0.1/24
192.168.1.1/24
192.168.0.2/24
192.168.1.2/24
A1
B1
A2
B2

OpenVPN


R102
*- [L2 swp2 to S2 swp2]
File Modifica Visualizza Vai Cattura Analizza Statistiche Telefonia Wireless Strumenti Aiuto
icmp
No. Time Source Destination Protocol Length Info
22 12.427980 192.168.100.101 192.168.0.2 ICMP 148 Echo (ping) request id=0…
23 12.429441 192.168.0.2 192.168.100.101 ICMP 148 Echo (ping) reply id=0…
26 13.434745 192.168.100.101 192.168.0.2 ICMP 148 Echo (ping) request id=0…
27 13.436527 192.168.0.2 192.168.100.101 ICMP 148 Echo (ping) reply id=0…
Frame 22: 148 bytes on wire (1184 bits), 148 bytes captured (1184 bits) on interface -, id 0
Ethernet II, Src: PcsCompu_b2:e5:bb (08:00:27:b2:e5:bb), Dst: PcsCompu_01:90:99 (08:00:27:01:90:99)
Internet Protocol Version 4, Src: 1.1.1.1, Dst: 2.2.2.2
User Datagram Protocol, Src Port: 33050, Dst Port: 4789
Virtual eXtensible Local Area Network
Flags: 0x0800, VXLAN Network ID (VNI)
Group Policy ID: 0
VXLAN Network Identifier (VNI): 50
Reserved: 0
Ethernet II, Src: PcsCompu_ed:83:68 (08:00:27:ed:83:68), Dst: PcsCompu_f2:75:26 (08:00:27:f2:75:26)
Internet Protocol Version 4, Src: 192.168.100.101, Dst: 192.168.0.2
Internet Control Message Protocol
2.2.23.0/30
.2
eth0
R203
192.168.200.0/24
eth1
.1
openvpn-client
tun0: 192.168.100.101
.2
eth0
client-200
LAN
client-400
LAN
192.168.40.0/24
eth0
.2
.1
R402
eth1
eth0
openvpn-client
tun0: 192.168.100.105
AS300
3.0.0.0/8
10.3.12.0/30
.2 eth0
R302
eth1.1
pub network
3.2.0.1/16
router id:
3.255.0.2/32
eth2
.1
10.34.21.0/30
R401
.2 eth1
.2
eth0
4.4.12.0/
pub network
4.1.0.1/16
router id:
4.255.0.1/32
AS400
4.0.0.0/8
3.3.23.0/30
eth2
GW300
openvpn-server
tun0: 192.168.100.1
eth1
S1
S2
DC NETWORK
swp1
swp2
.2
10.1.3.0/30
10.1.1.0/30
10.1.2.0/30
10.2.1.0/30
.1
L1
swp3
swp4
.254
192.168.0.0/24
192.168.1.0/24
eth0
A1
192.168.0.1/24
B1
192.168.1.1/24
L2
A2
192.168.0.2/24
B2
192.168.1.2/24

OpenVPN


valerio@valerio-virtualbox: ~/Desktop/ovpn
File Azioni Modifica Visualizza Aiuto
valerio@valerio-virtualbox: ~/Desktop/ovpn
valerio@valerio-virtualbox:~/Desktop/ovpn$ ping 192.168.1.1
PING 192.168.1.1 (192.168.1.1) 56(84) bytes of data.
^C
--- 192.168.1.1 ping statistics ---
2 packets transmitted, 0 received, 100% packet loss, time 1049ms
valerio@valerio-virtualbox:~/Desktop/ovpn$
valerio@valerio-virtualbox: ~/Desktop/ovpn
File Azioni Modifica Visualizza Aiuto
valerio@valerio-virtualbox: ~/Desktop/ovpn
valerio@valerio-virtualbox:~/Desktop/ovpn$ ping 192.168.1.2
PING 192.168.1.2 (192.168.1.2) 56(84) bytes of data.
^C
--- 192.168.1.2 ping statistics ---
2 packets transmitted, 0 received, 100% packet loss, time 1042ms
valerio@valerio-virtualbox:~/Desktop/ovpn$
R102
client-400
LAN
192.168.40.0/24
R402
openvpn-client
tun0: 192.168.100.105
AS300
3.0.0.0/8
R302
10.3.12.0/30
pub network
3.2.0.1/16
router id:
3.255.0.2/32
10.34.21.0/30
R401
pub network
4.1.0.1/16
router id:
4.255.0.1/32
AS400
4.0.0.0/8
3.3.23.0/30
GW300
openvpn-server
tun0: 192.168.100.1
DC NETWORK
S1
S2
L1
L2
A1
192.168.0.1/24
A2
192.168.0.2/24
B1
B2
192.168.200.0/24
openvpn-client
tun0: 192.168.100.101
client-200
LAN

MAC - AppArmor

- AppArmor si basa sulla creazione di profili al fine di confinare un programma ad un insieme di file, capabilities, accessi di rete ed insieme di risorse.
- AppArmor può lavorare in due modalità: enforcement (applica le regole di sicurezza definite nel profilo bloccando qualsiasi tentativo di accesso a risorse non consentite), oppure, complain (monitora le violazioni delle regole definite, registrando però un avviso nel log del sistema).
- Il profilo creato è relativo al programma /usr/bin/nano.

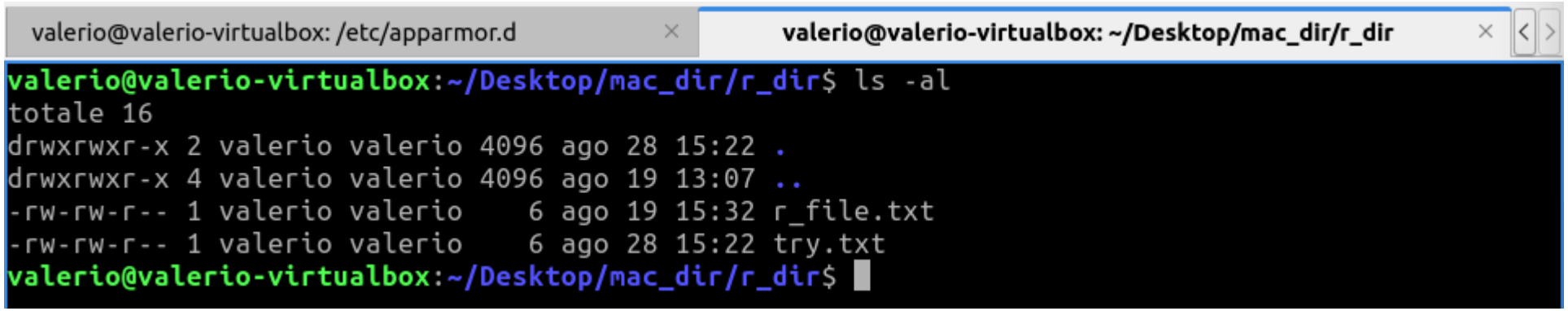
MAC - AppArmor

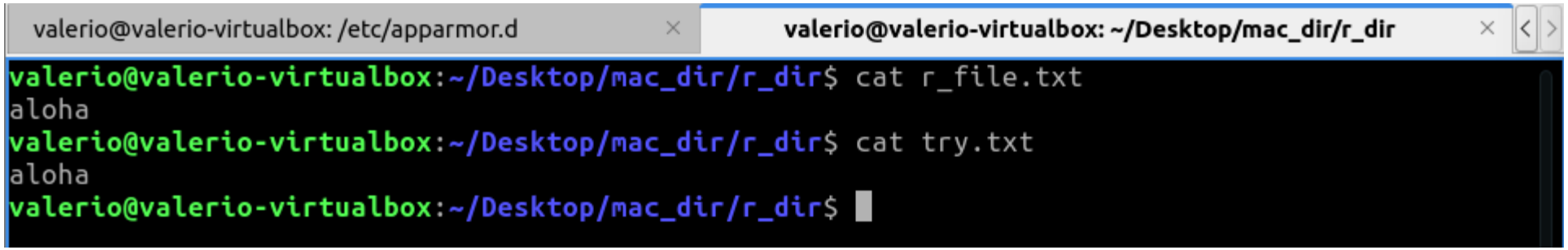
Nel profilo troviamo:

- dei *files* e *cartelle* accessibili in sola lettura (e.g: r_dir, r_file.txt);
- dei *files* e *cartelle* accessibili in sola scrittura (e.g: w_dir);
- restrizioni in lettura e scrittura sulle principali cartelle di sistema (e.g: /root, /etc, /var, /bin, /sbin, /proc, /sys);

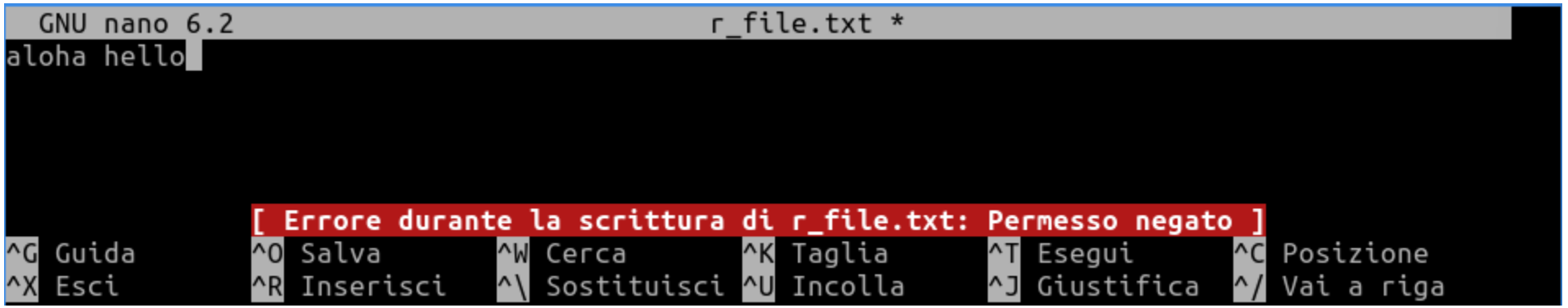
```
/usr/bin/nano {
  include <abstractions/base>
  include <abstractions/bash>
  include <abstractions/consoles>

  capability dac_override,
  capability dac_read_search,

  /usr/bin/nano mwrix,

  deny /home/*/Desktop/mac_dir/r_dir/** w,
  deny /home/*/Desktop/mac_dir/w_dir/** r,
  /home/*/Desktop/mac_dir/r_dir/** r,
  /home/*/Desktop/mac_dir/w_dir/** w,
  /home/*/Desktop/mac_dir/r_dir/r_file.txt r,
  /home/*/** rw,
  owner /home/*/** rw,

  # Permessi di base
  /lib/** r,
  /usr/lib/** r,
  /usr/share/nano/ r,
  /usr/share/nano/** r,
  /tmp/** rw,
  /run/** rw,
  /dev/tty rw,
  /dev/pts/ rw,
  /etc/** r,
  /var/** r,

  # Bloccare l'accesso ad altre directory sensibili del sistema
  deny /root/** rw,
  deny /etc/** w,
  deny /var/** rw,
  deny /bin/** rw,
  deny /sbin/** rw,
  deny /proc/** rw,
  deny /sys/** rw,

}
```

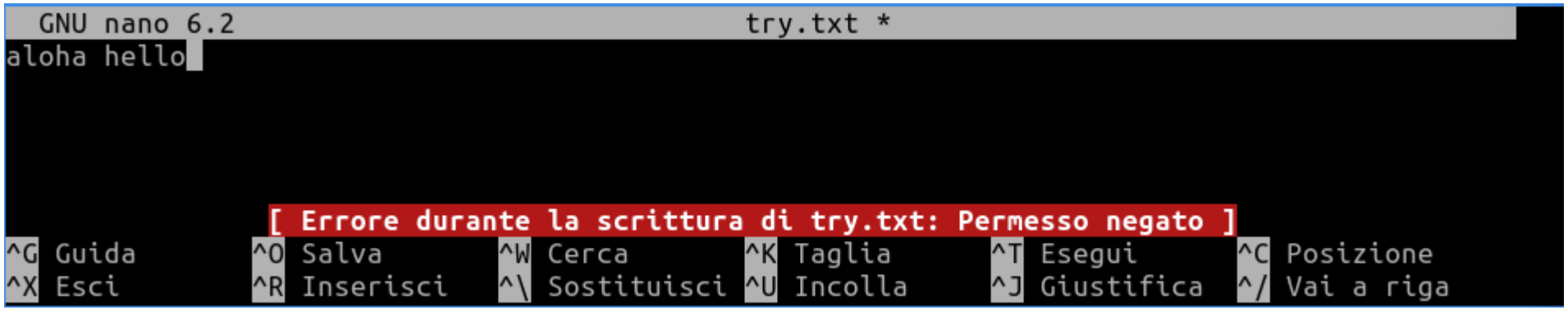
MAC - AppArmor



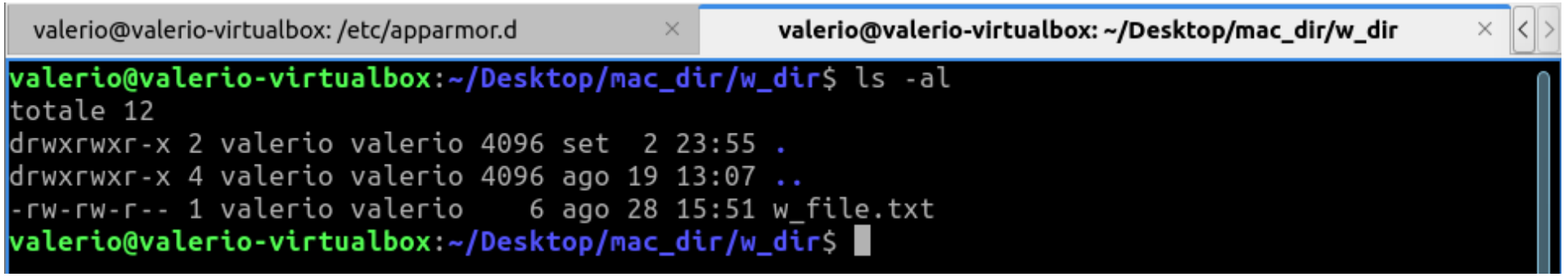


MAC - AppArmor

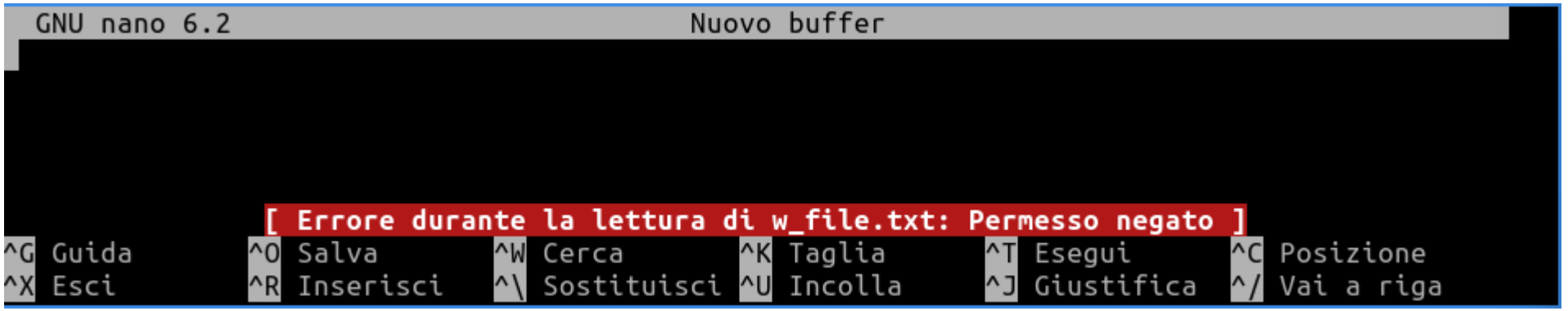




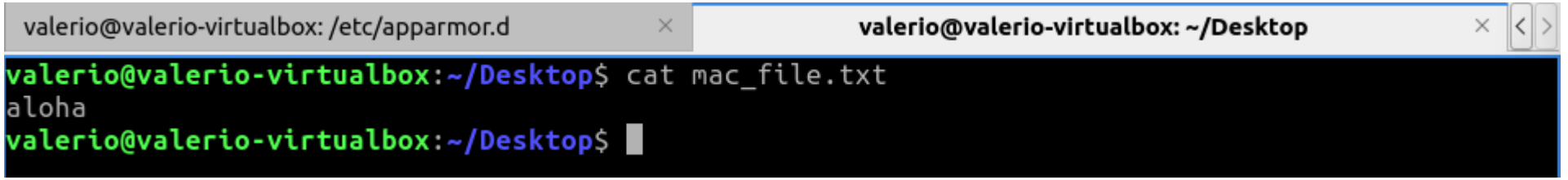
MAC - AppArmor

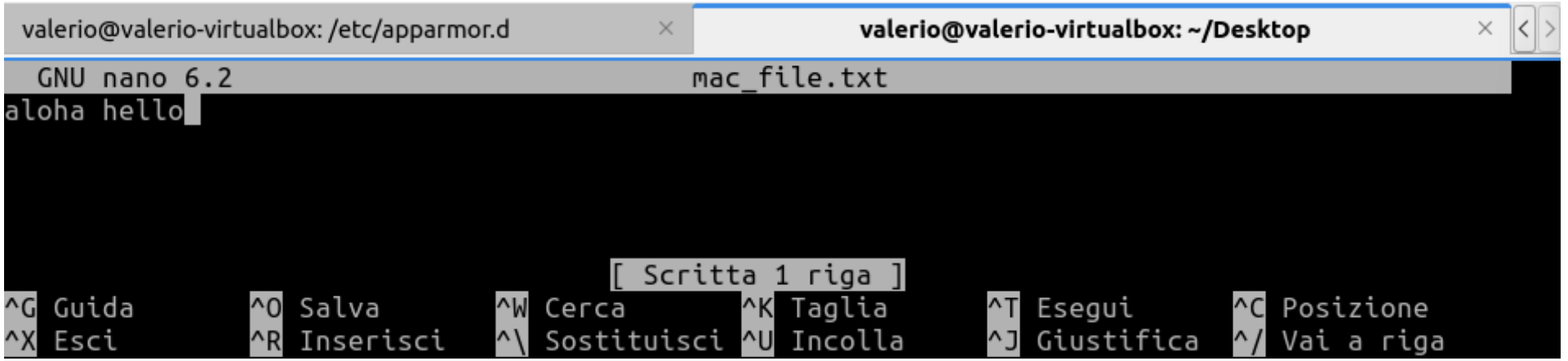


MAC - AppArmor



MAC - AppArmor





Grazie per l’attenzione!

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