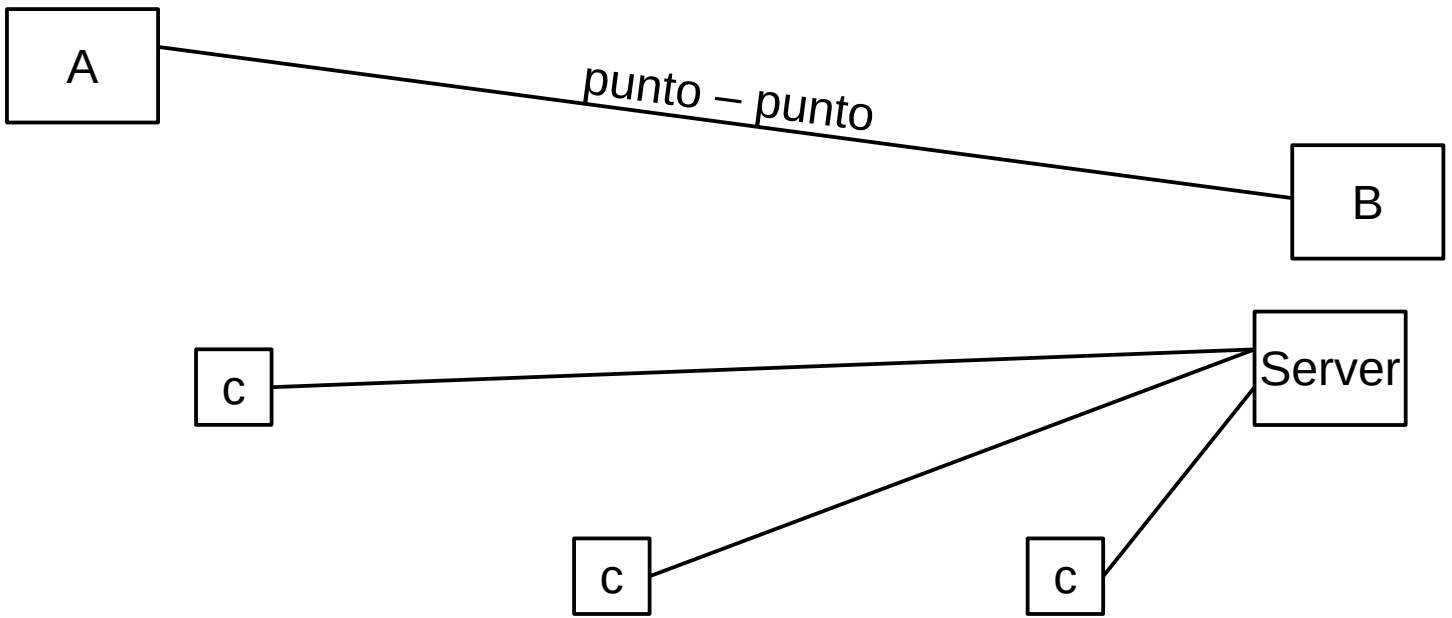
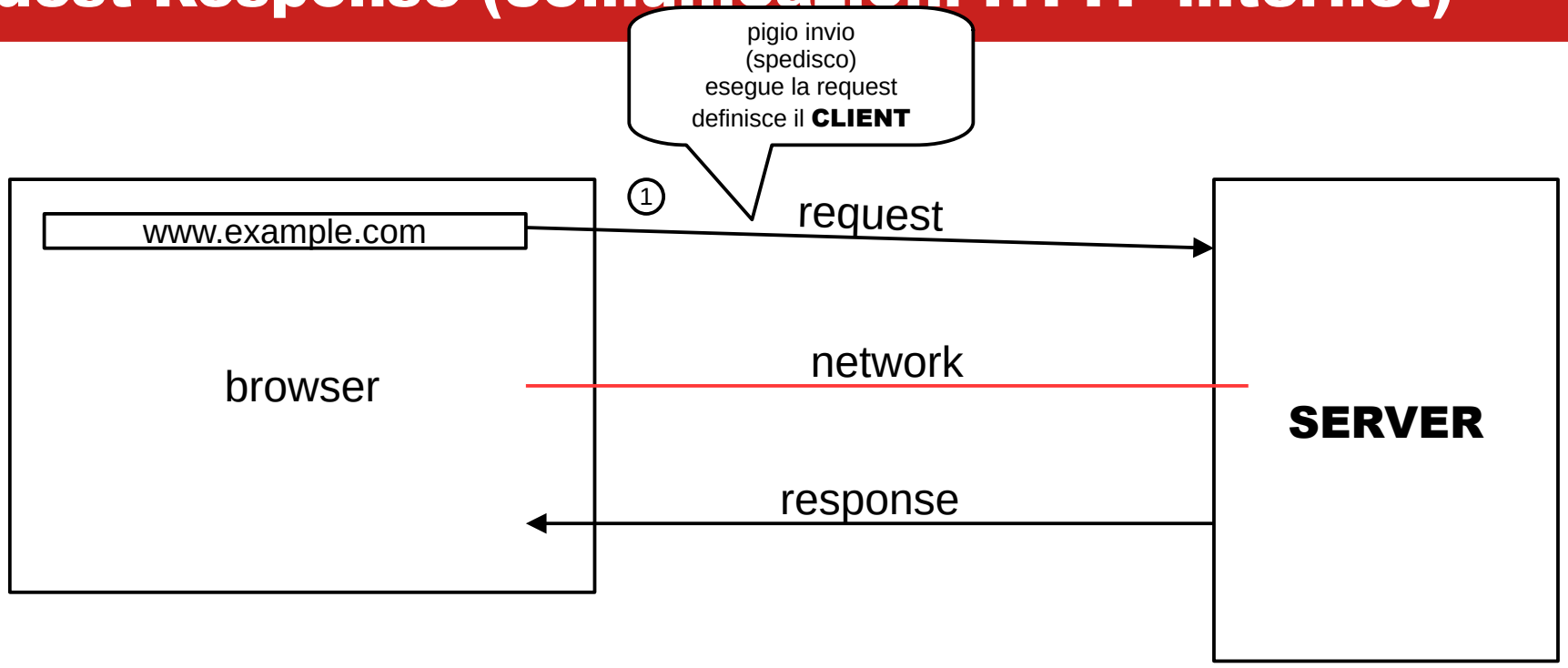
MPS - Reti

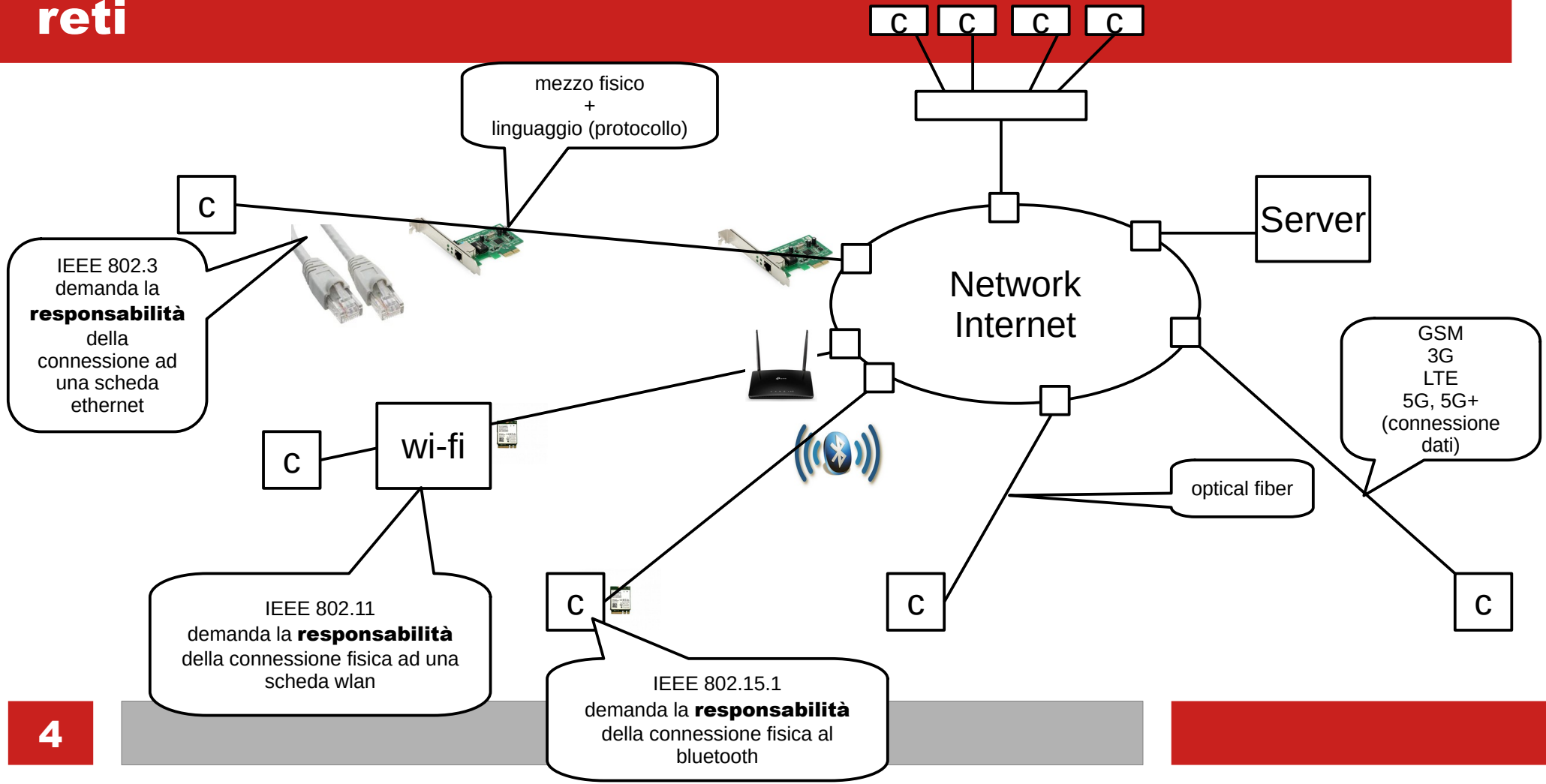
reti



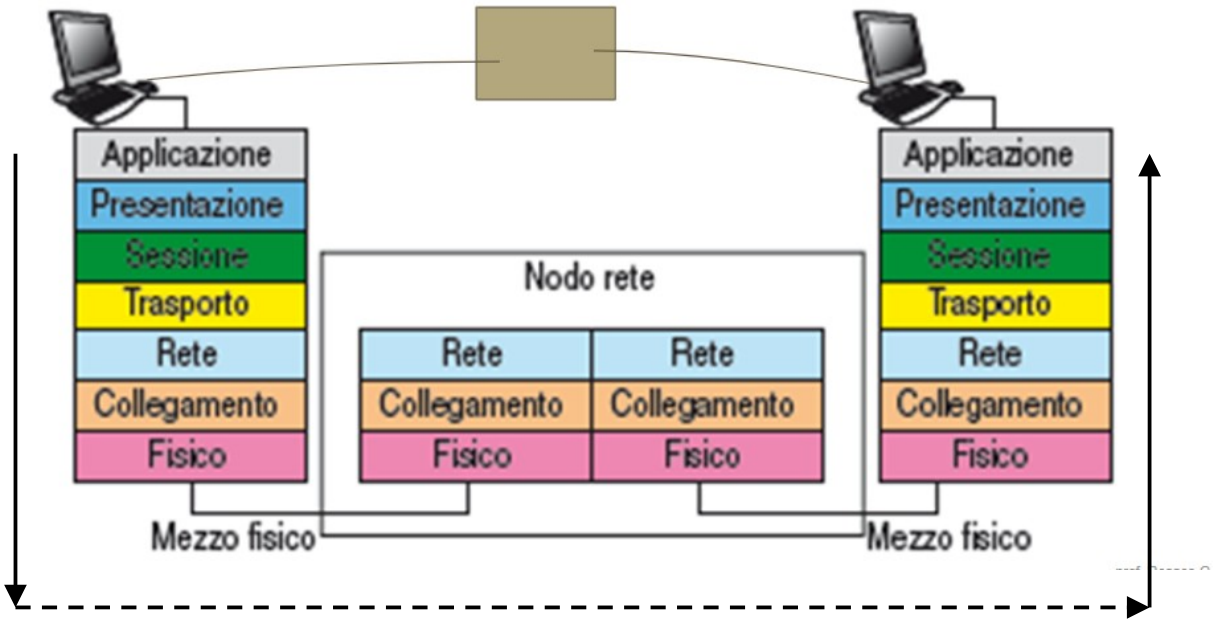
Request Response (comunicazioni HTTP internet)



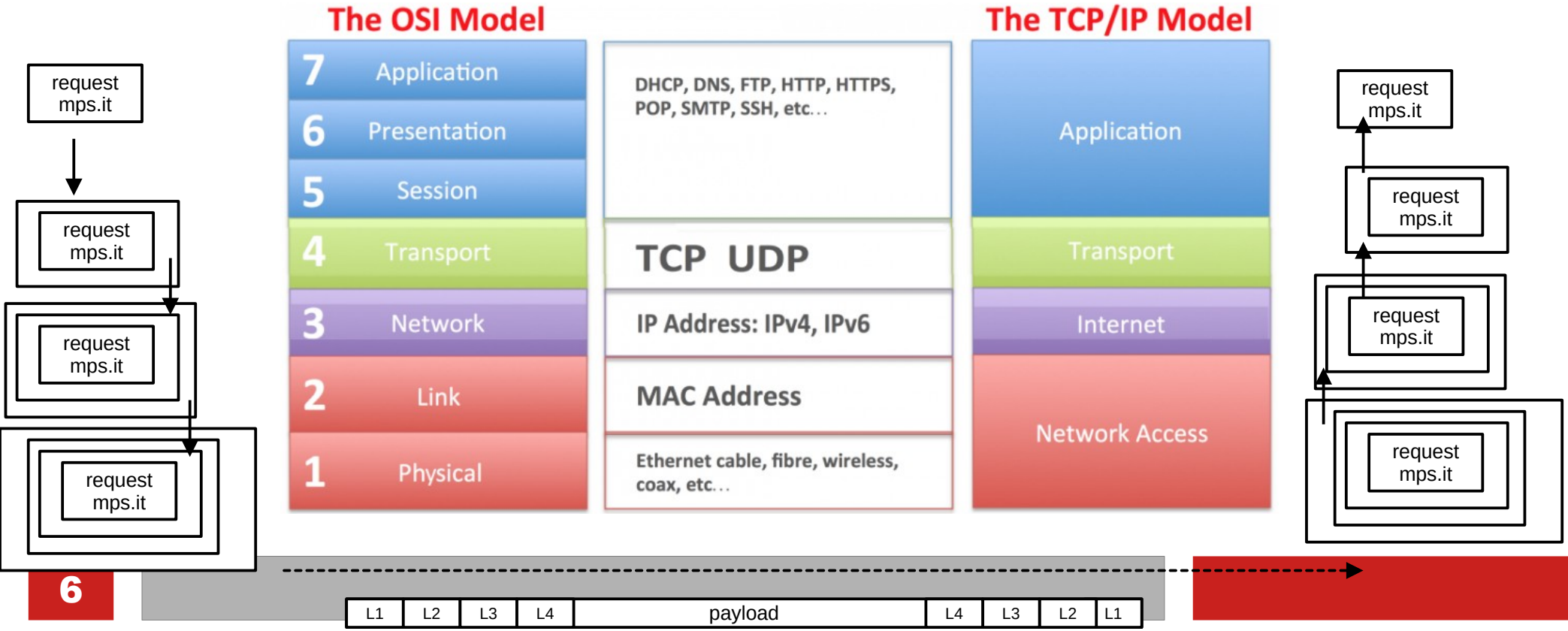
reti


C
C
C
C
mezzo fisico
+
linguaggio (protocollo)
C
IEEE 802.3
demanda la
responsabilità
della
connessione ad
una scheda
ethernet
Server
Network
Internet
GSM
3G
LTE
5G, 5G+
(connessione
dati)
C
wi-fi
optical fiber
IEEE 802.11
demanda la **responsabilità**
della connessione fisica ad una
scheda wlan
C
C
C
IEEE 802.15.1
demanda la **responsabilità**
della connessione fisica al
bluetooth

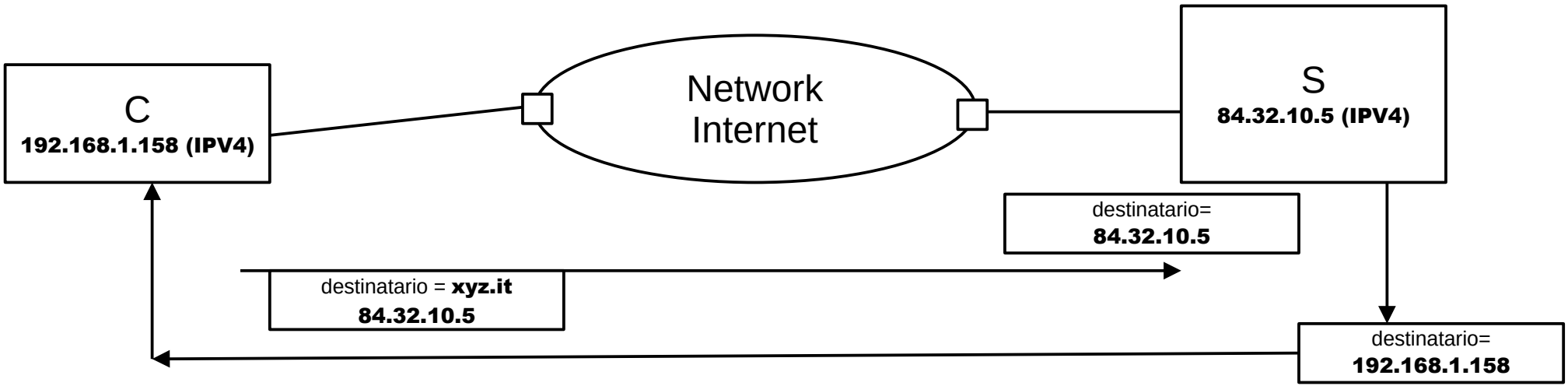
Modello ISO/OSI



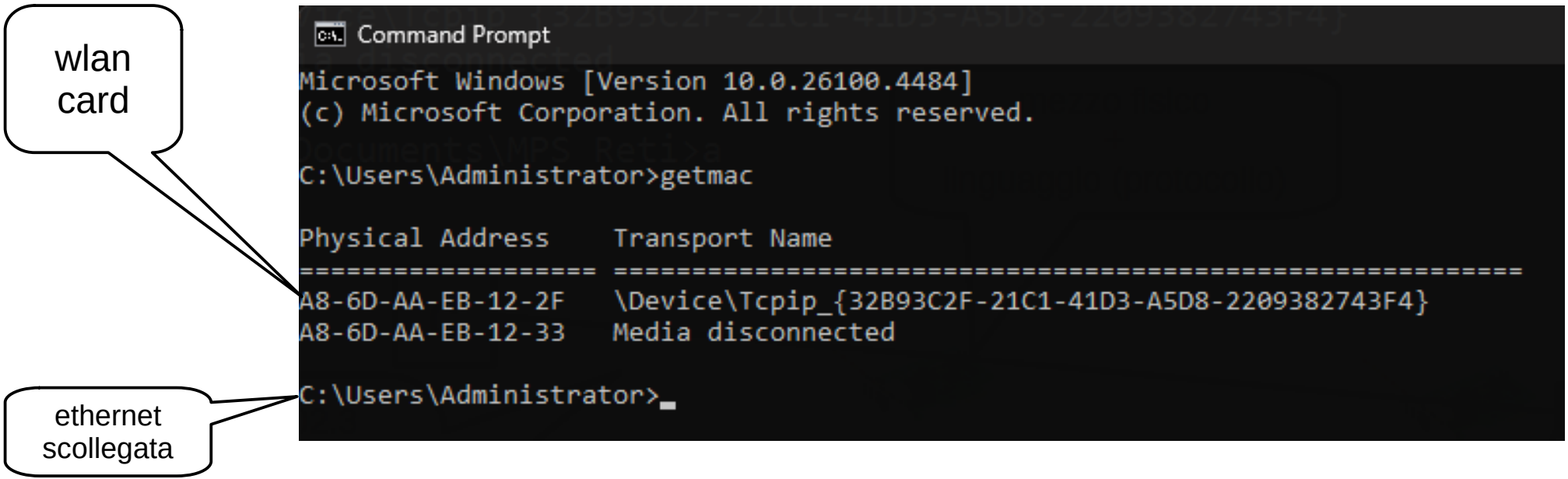
INTERNET - TCP/IP



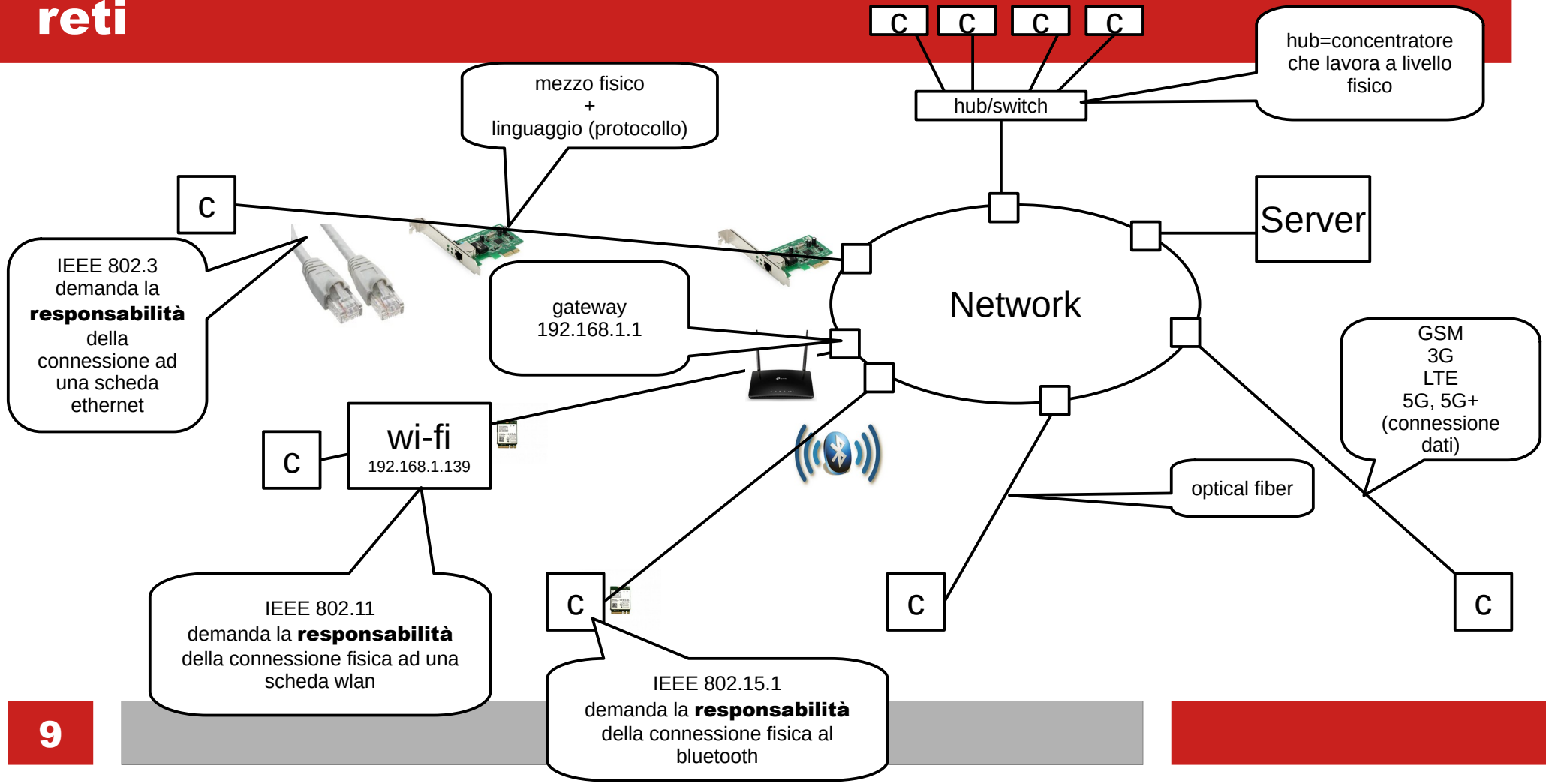
TCP/IP network address



getmac (mostra i mac address disponibili)



reti


C
C
C
C
hub=concentratore
che lavora a livello
fisico
hub/switch
mezzo fisico
+
linguaggio (protocollo)
C
IEEE 802.3
demanda la
responsabilità
della
connessione ad
una scheda
ethernet
gateway
192.168.1.1
Network
Server
GSM
3G
LTE
5G, 5G+
(connessione
dati)
C
wi-fi
192.168.1.139
optical fiber
IEEE 802.11
demanda la **responsabilità**
della connessione fisica ad una
scheda wlan
C
C
C
IEEE 802.15.1
demanda la **responsabilità**
della connessione fisica al
bluetooth

ipconfig (mostra indirizzi di rete)

```
C:\Users\Administrator\Documents\MPS Reti>ipconfig

Windows IP Configuration


Wireless LAN adapter Local Area Connection* 1:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Wireless LAN adapter Local Area Connection* 10:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . : lan
   IPv6 Address. . . . . . . . . . . : fd2c:e314:a697::d93
   IPv6 Address. . . . . . . . . . . : fd2c:e314:a697:0:2b29:54ed:1abc:7e52
   Temporary IPv6 Address. . . . . . : fd2c:e314:a697:0:f006:6867:bb93:553e
   Link-local IPv6 Address . . . . . : fe80::2ae9:b2a9:8f2c:da4%9
   IPv4 Address. . . . . . . . . . . : 192.168.1.139
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.1.1

Ethernet adapter Bluetooth Network Connection:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
```

arp -a (rivela mac add

```
C:\Users\Administrator\Documents\MPS Reti>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:
Reply from 192.168.1.1: bytes=32 time=1ms TTL=64
Reply from 192.168.1.1: bytes=32 time=2ms TTL=64
Reply from 192.168.1.1: bytes=32 time=3ms TTL=64
Reply from 192.168.1.1: bytes=32 time=1ms TTL=64

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 3ms, Average = 1ms

C:\Users\Administrator\Documents\MPS Reti>arp -a

Interface: 192.168.1.139 --- 0x9
  Internet Address      Physical Address      Type
  192.168.1.1           00-1e-42-60-e2-a5     dynamic
  192.168.1.255         ff-ff-ff-ff-ff-ff     static
  224.0.0.22            01-00-5e-00-00-16     static
  224.0.0.251           01-00-5e-00-00-fb     static
  224.0.0.252           01-00-5e-00-00-fc     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static
```

ipconfig /all

```
Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . : lan
   Description . . . . . . . . . . . : Intel(R) Wireless-AC 9260 160MHz
   Physical Address. . . . . . . . . : A8-6D-AA-EB-12-2F
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   IPv6 Address. . . . . . . . . . . : fd2c:e314:a697::d93(Preferred)
   Lease Obtained. . . . . . . . . . : lunedì 22 settembre 2025 09:44:48
   Lease Expires . . . . . . . . . . : lunedì 22 settembre 2025 21:44:47
   IPv6 Address. . . . . . . . . . . : fd2c:e314:a697:0:2b29:54ed:1abc:7e52(Preferred)
   Temporary IPv6 Address. . . . . . : fd2c:e314:a697:0:f006:6867:bb93:553e(Preferred)
   Link-local IPv6 Address . . . . . : fe80::2ae9:b2a9:8f2c:da4%9(Preferred)
   IPv4 Address. . . . . . . . . . . : 192.168.1.139(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Lease Obtained. . . . . . . . . . : lunedì 22 settembre 2025 09:44:54
   Lease Expires . . . . . . . . . . : lunedì 22 settembre 2025 21:44:53
   Default Gateway . . . . . . . . . : 192.168.1.1
   DHCP Server . . . . . . . . . . . : 192.168.1.1
   DHCPv6 IAID . . . . . . . . . . . : 94924202
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-2D-41-61-7C-A8-6D-AA-EB-12-2F
   DNS Servers . . . . . . . . . . . : fd2c:e314:a697::1
                                       192.168.1.1
                                       fd2c:e314:a697::1
   NetBIOS over Tcpip. . . . . . . . : Enabled
```

L1 Connettori a livello di network

Hub = concentratore ethernet, consente di unire piu macchine su un medesimo cavo

Repeater = estendono la lunghezza della rete

Modem = converte i segnali digitali in analogici (per esempio verso il provider telefonico)

L2 Collegamento dati

Switch: che ruota i collegamenti in base al mac address, ottimizza

Bridge: uniscono 2 segmenti di rete, in genere insieme agli switch

L3 Rete

Router: importantissimo perché consente di unire reti diverse (con diversi indirizzi) perché lavora tramite indirizzi IP

Switch layer 3: con qualche capacità di routing

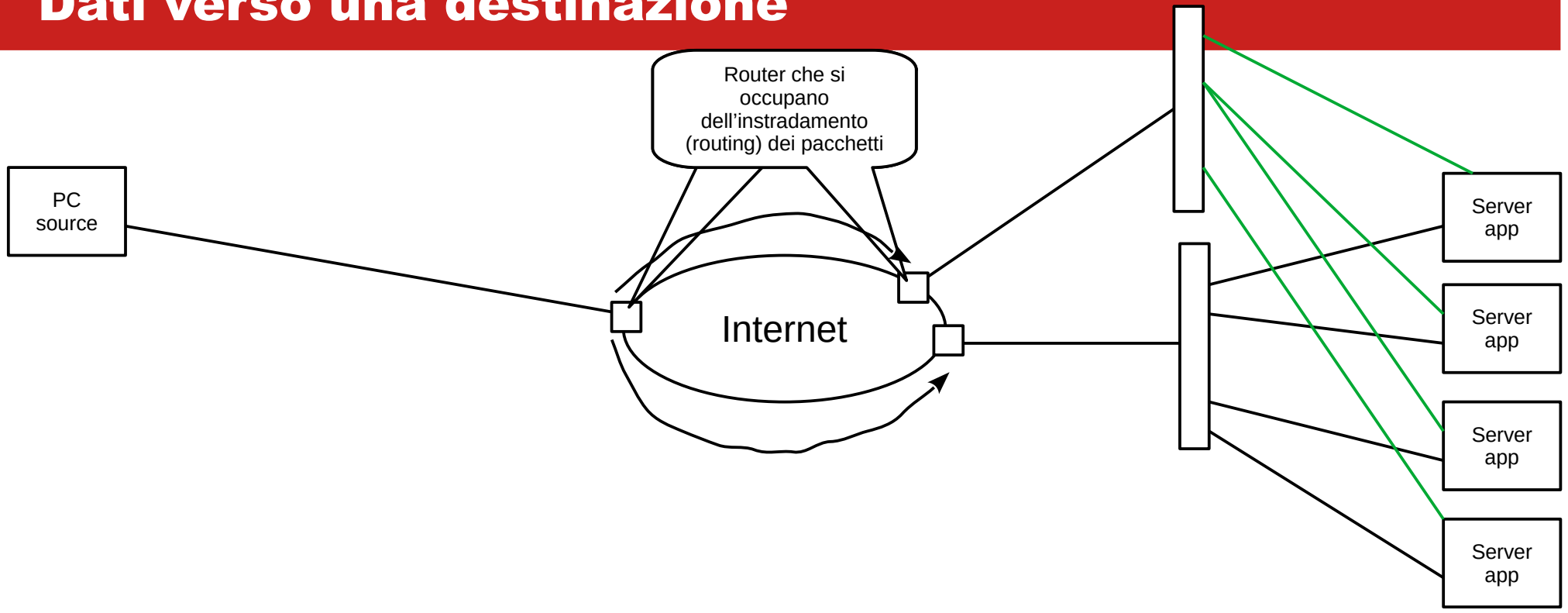
L4 applicazione

Firewall: filtrano i pacchetti e costituiscono parte dei meccanismi di sicurezza della rete

Proxy: lavorano a stretto contatto delle applicazioni e/o dei protocolli applicativi

Gateway: general purpose

Dati verso una destinazione



netstat -r (tabelle di routing)

```
C:\Users\Administrator\Documents\MPS Reti>netstat -r
===========================================================================
Interface List
 17...a8 6d aa eb 12 30 ......Microsoft Wi-Fi Direct Virtual Adapter
  4...aa 6d aa eb 12 2f ......Microsoft Wi-Fi Direct Virtual Adapter #2
  9...a8 6d aa eb 12 2f ......Intel(R) Wireless-AC 9260 160MHz
  2...a8 6d aa eb 12 33 ......Bluetooth Device (Personal Area Network)
  1...........................Software Loopback Interface 1
===========================================================================

IPv4 Route Table
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0      192.168.1.1    192.168.1.139     35
        127.0.0.0        255.0.0.0         On-link         127.0.0.1    331
        127.0.0.1  255.255.255.255         On-link         127.0.0.1    331
  127.255.255.255  255.255.255.255         On-link         127.0.0.1    331
      192.168.1.0    255.255.255.0         On-link     192.168.1.139    291
    192.168.1.139  255.255.255.255         On-link     192.168.1.139    291
    192.168.1.255  255.255.255.255         On-link     192.168.1.139    291
        224.0.0.0        240.0.0.0         On-link         127.0.0.1    331
        224.0.0.0        240.0.0.0         On-link     192.168.1.139    291
  255.255.255.255  255.255.255.255         On-link         127.0.0.1    331
  255.255.255.255  255.255.255.255         On-link     192.168.1.139    291
===========================================================================
Persistent Routes:
  None
```

ping <indirizzo | hostName>

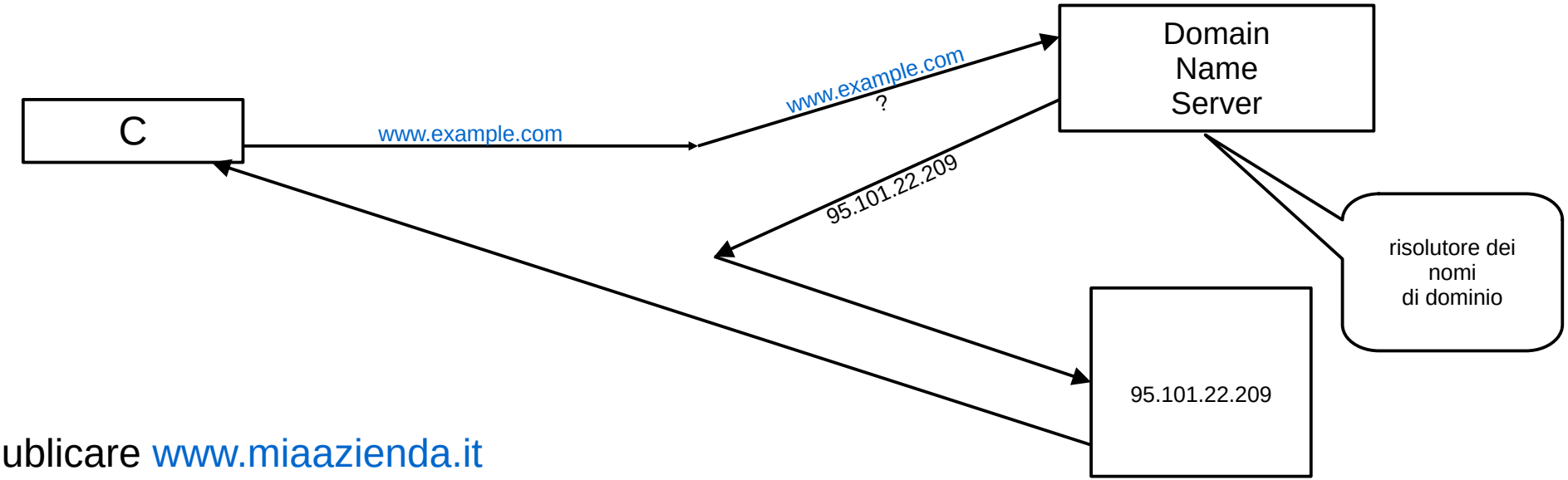
```
C:\Users\Administrator\Documents\MPS Reti>ping www.example.com

Pinging a1422.dscr.akamai.net [2.23.231.94] with 32 bytes of data:
Reply from 2.23.231.94: bytes=32 time=28ms TTL=50
Reply from 2.23.231.94: bytes=32 time=138ms TTL=50
Reply from 2.23.231.94: bytes=32 time=89ms TTL=50
Reply from 2.23.231.94: bytes=32 time=25ms TTL=50

Ping statistics for 2.23.231.94:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 25ms, Maximum = 138ms, Average = 70ms
```

Ogni macchina vede sé stessa come 127.0.0.1 oppure localhost (local)

DNS è risolutore dei nomi di rete
traduce da nome simbolico ad indirizzo ip



devo publicare www.miaazienda.it

miazienda.it è il domain

www un server che appartiene al mio dominio quindi www.miazienda.it ==> ip_address

mail server di posta elettronica mail.miaazienda.it ==> ip_address

DNS

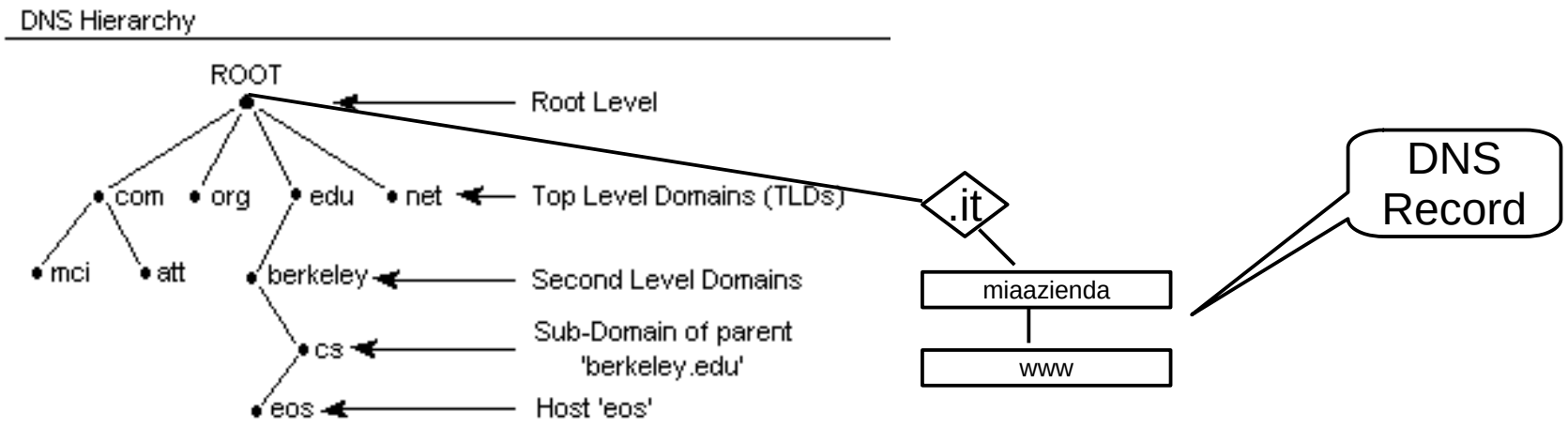
devo publicare www.miaazienda.it

miazienda.it è il domain

www un server che appartiene al mio dominio quindi www.miazienda.it ==> ip_address

mail server di posta elettronica mail.miaazienda.it ==> ip_address

DNS

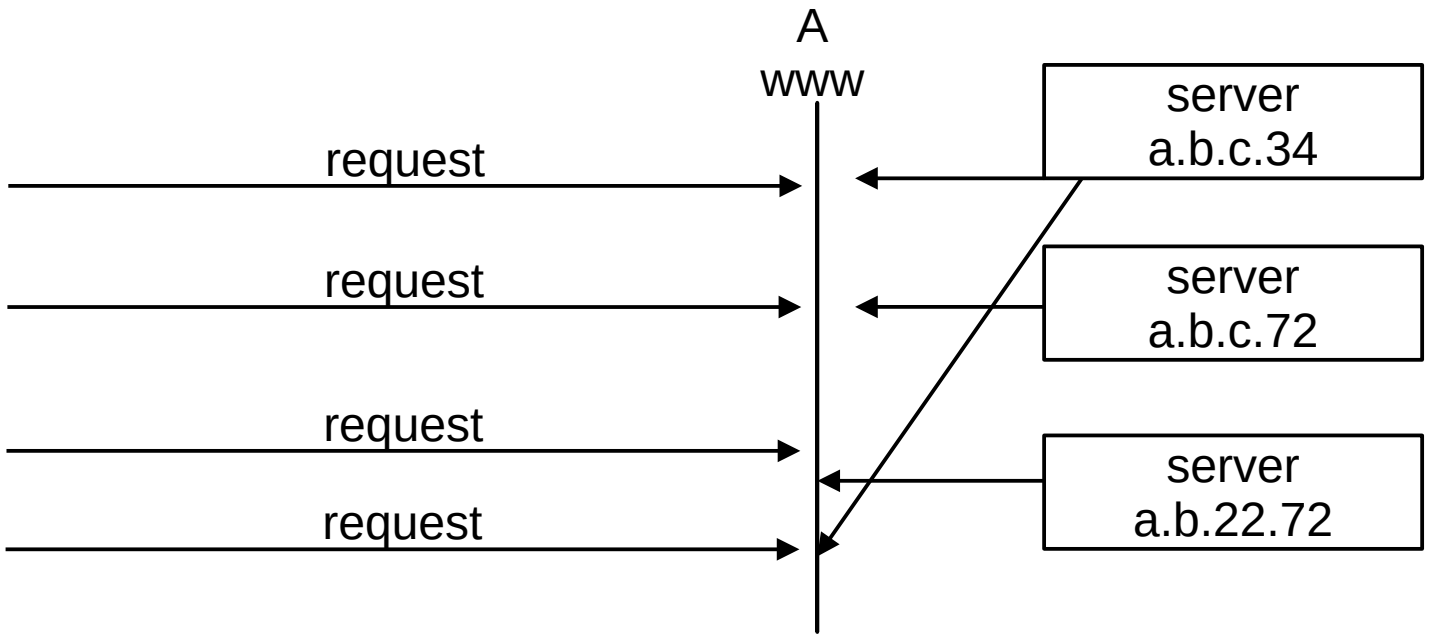

DNS Hierarchy
ROOT
Root Level
com
org
edu
net
Top Level Domains (TLDs)
mci
att
berkeley
Second Level Domains
cs
Sub-Domain of parent
'berkeley.edu'
eos
Host 'eos'
.it
miaazienda
www
DNS
Record

nslookup

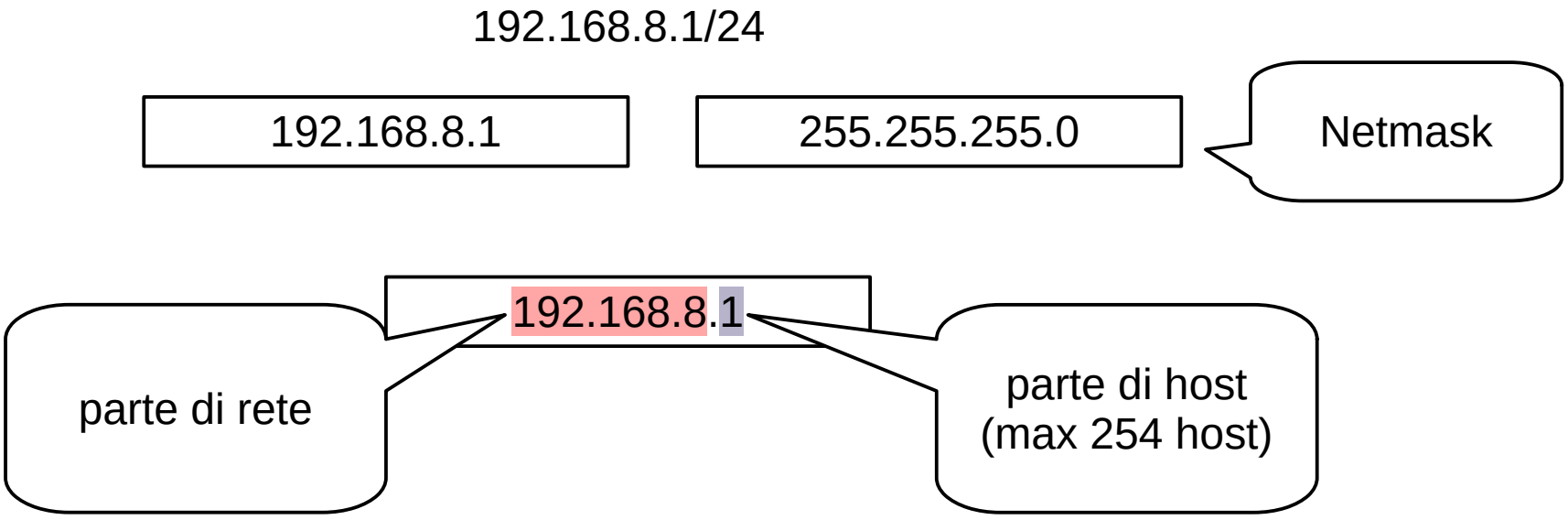
```
Server:  [1.1.1.1]
Address:  1.1.1.1

Non-authoritative answer:
Name:    a1422.dscr.akamai.net
Addresses:  2a02:26f0:8d00:3c::5f64:b584
          2a02:26f0:8d00:3c::5f64:b58b
          23.55.104.151
          23.55.104.155
Aliases:  www.example.com
          www.example.com-v4.edgesuite.net
```

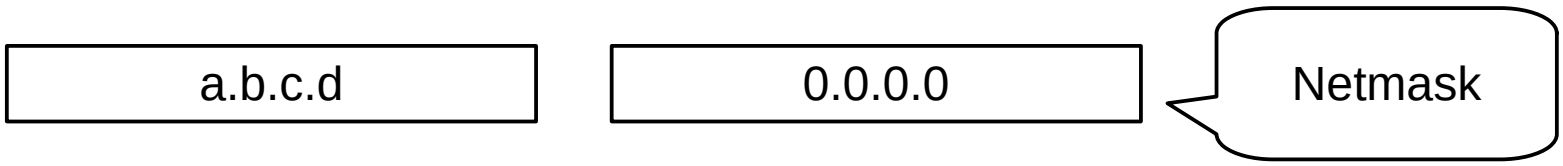
DNS – Round Robin (load balancer)



subnet


192.168.8.1/24
192.168.8.1
255.255.255.0
Netmask
192.168.8.1
parte di rete
parte di host
(max 254 host)

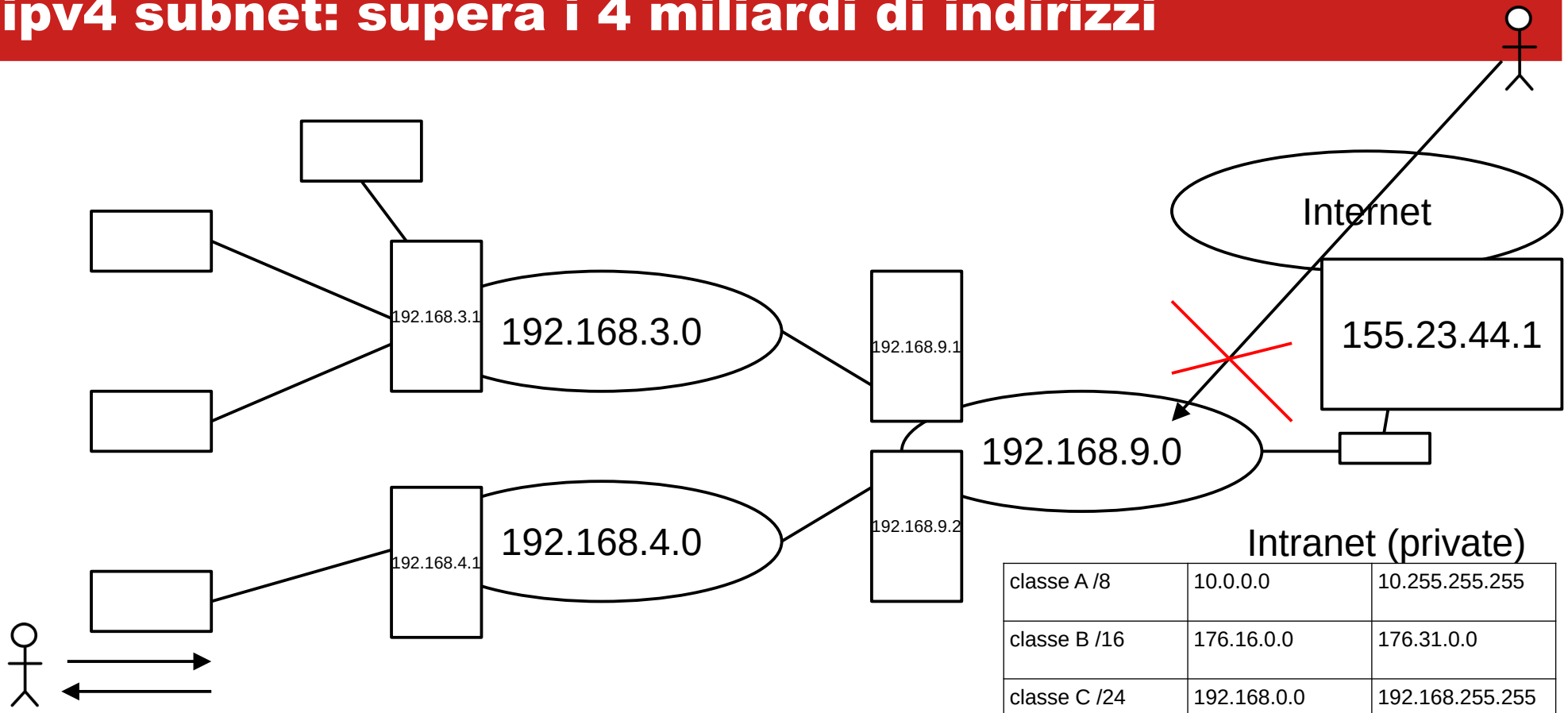
subnet IPV4



La parte di rete non esiste, tutti sono hosts
in totale 4.294.967.294

da IPV4 a IPV6 passano 340 trilioni di trilioni di trilioni di indirizzi

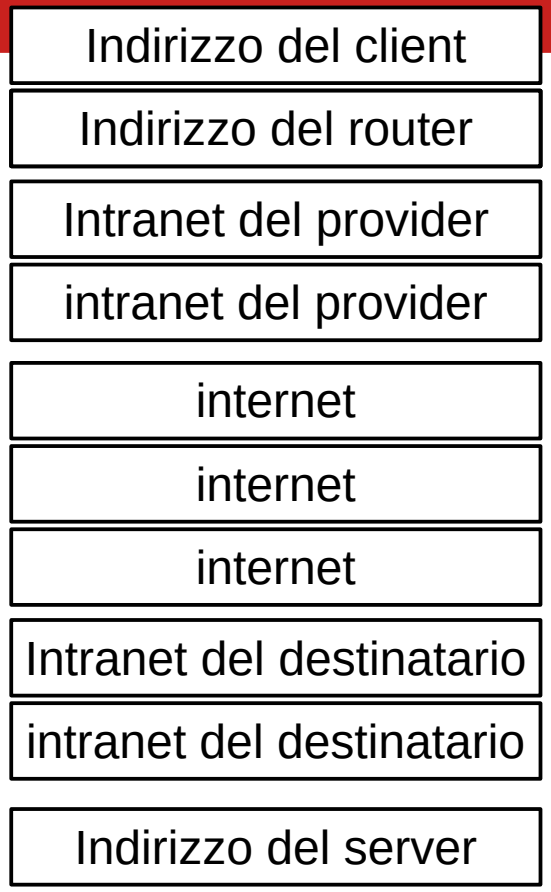
ipv4 subnet: supera i 4 miliardi di indirizzi



Intranet (private)

classe A /8	10.0.0.0	10.255.255.255
classe B /16	176.16.0.0	176.31.0.0
classe C /24	192.168.0.0	192.168.255.255

traceroute



classe A	10.0.0.0	10.255.255.255
classe B	176.16.0.0	176.31.0.0
classe C	192.168.0.0	192.168.255.255

Servizi IP (TCP/UDP)