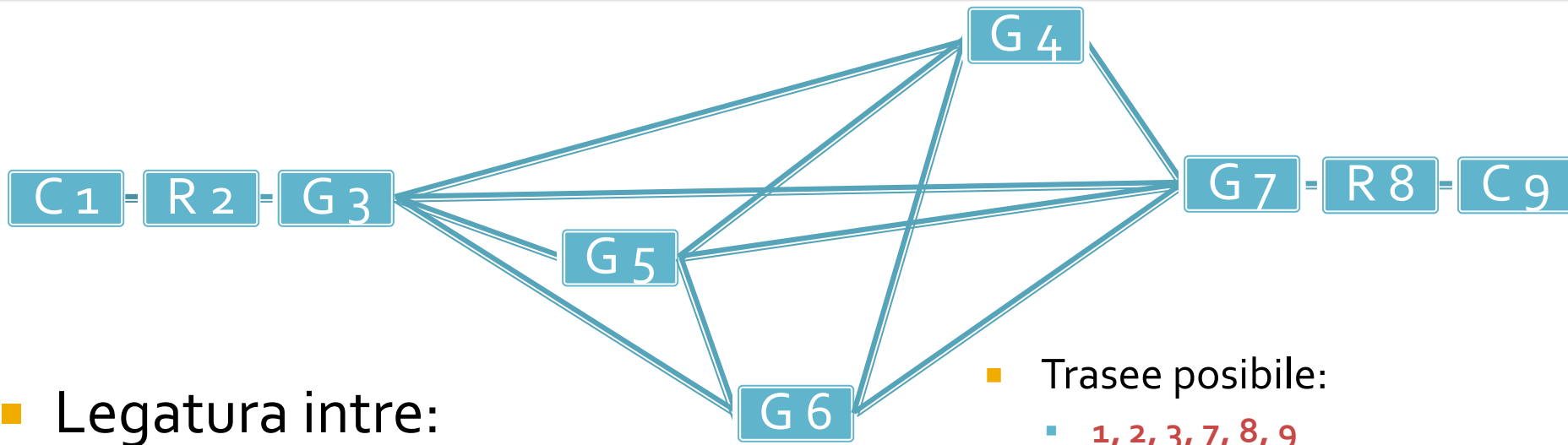


Curs 2

Utilizare Internet

Rutare pachete - TCP



■ Legatura între:

- Calculatorul C1 deservit de ruterul R2 si gateway-ul G3
- Calculatorul C9 deservit de ruterul R8 si gateway-ul G7

■ Noduri esentiale sunt :

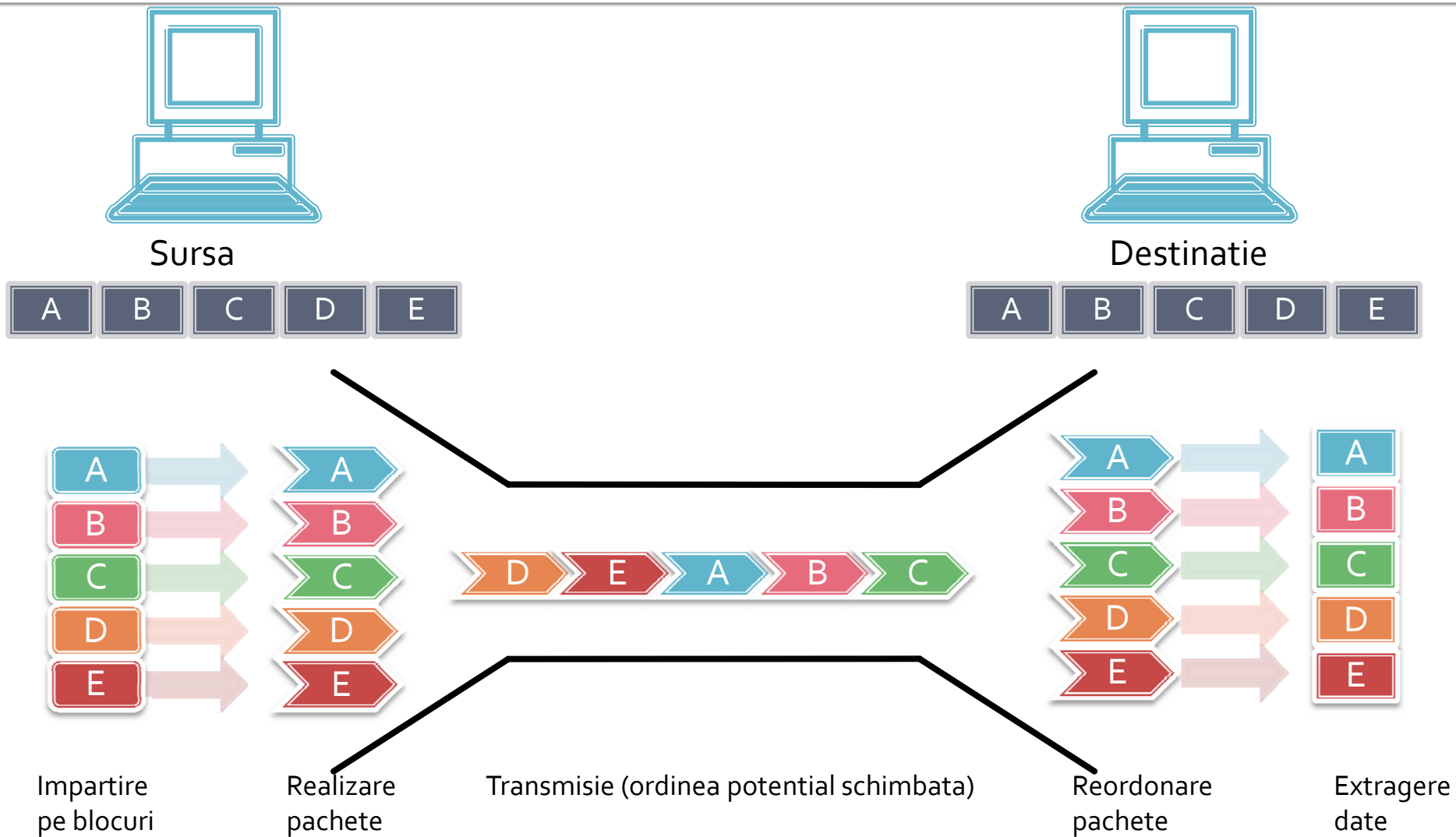
- R2, G3,
- G7, R8

■ Trasee posibile:

- 1, 2, 3, 7, 8, 9
- 1, 2, 3, 4, 7, 8, 9
- 1, 2, 3, 5, 7, 8, 9
- 1, 2, 3, 6, 7, 8, 9
- 1, 2, 3, 5, 6, 7, 8, 9
- 1, 2, 3, 5, 4, 7, 8, 9
- 1, 2, 3, 5, 6, 4, 7, 8, 9

- Traseul e ales in functie de ocupare **in acel moment** si de disponibilitatea nodurilor

Pachet TCP



Aplicatii trace route (tracert)

```
Administrator: C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.0.6001]
Copyright (c) 2006 Microsoft Corporation. All rights reserved.

C:\Users\Radu>tracert 81.180.222.13

Tracing route to webhost.etc.tuiasi.ro [81.180.222.13]
over a maximum of 30 hops:

  0  <1 ms    <1 ms    <1 ms    192.168.0.1
  1  5 ms     5 ms     6 ms     10.132.0.1
  2  5 ms     5 ms     5 ms     ro-is01a-rd1-v200.astralnet.ro [193.226.30.89]
  3  204 ms   348 ms   23 ms    ro-buh01a-rd1-v819.astralnet.ro [85.186.212.2]
  4  18 ms    14 ms    15 ms    ro-buh01a-ri1-v790.astralnet.ro [82.208.175.102]

  5  14 ms    23 ms    15 ms    83.103.173.102
  6  24 ms    23 ms    21 ms    89.37.0.141
  7  22 ms    23 ms    22 ms    ten-4-3.core1.buc3.roedu2.net [89.37.0.5]
  8  22 ms    23 ms    23 ms    89.37.0.254
  9  21 ms    22 ms    24 ms    89.37.0.74
 10  23 ms    21 ms    21 ms    ten-2-1.acc1.ias.roedu2.net [89.37.1.130]
 11  47 ms    41 ms    44 ms    217.73.168.15
 12  62 ms    54 ms    67 ms    217.73.168.14
 13  49 ms    48 ms    61 ms    gw-etc.tuiasi.ro [81.180.222.251]
 14  44 ms    77 ms    51 ms    webhost.etc.tuiasi.ro [81.180.222.13]

Trace complete.
C:\Users\Radu>
```

tracert (Windows)

Adresa IP destinatie

Router

Gateway ETC (ETTI)

Nume de domenii

- Reprezinta traducerea literara a adreselor IP in vederea manipularii usoare de catre utilizatorii umani
- Calculatoare dedicate (DNS – Domain Name Server) realizeaza o retea complementara, ierarhizata, pentru realizarea in regim client-server a traducerii ND ↔ IP

DNS

- **Domain Name System**
- Caractere permise:
 - literele alfabetului englez
 - cifre
 - “_”
- Fully Qualified Domain Name
 - nume_domeniu.top_level_domain.
 - tipic punctul final (semnificatie = root) se omite
- Top Level Domain
 - cod tara: ro, fr, uk, us, etc.
 - generice: biz, com, info, name, net, org, pro (IANA)
 - sponsorizate: gov, edu, mil, int etc.

DNS - achizitie

- ICANN – Internet Corporation for Assigned Names and Numbers
 - RIPE – Réseaux IP Européens
 - RoTLD – Romania Top Level Domain www.rotld.ro
 - ARIN – American Registry for Internet Numbers
 - APNIC – Asia-Pacific Network Information Center
- Cost
 - .ro – 61\$ (TVA inclus) pe viata:
 - .com, .eu – 10\$/an
- “primul venit primul servit”
- Lamentarea lui Harris: “toate cele bune sunt ocupate deja”
- In caz de conflict, arbitrare ROTLD, RIPE, IANA + justitie

DNS - subdomenii

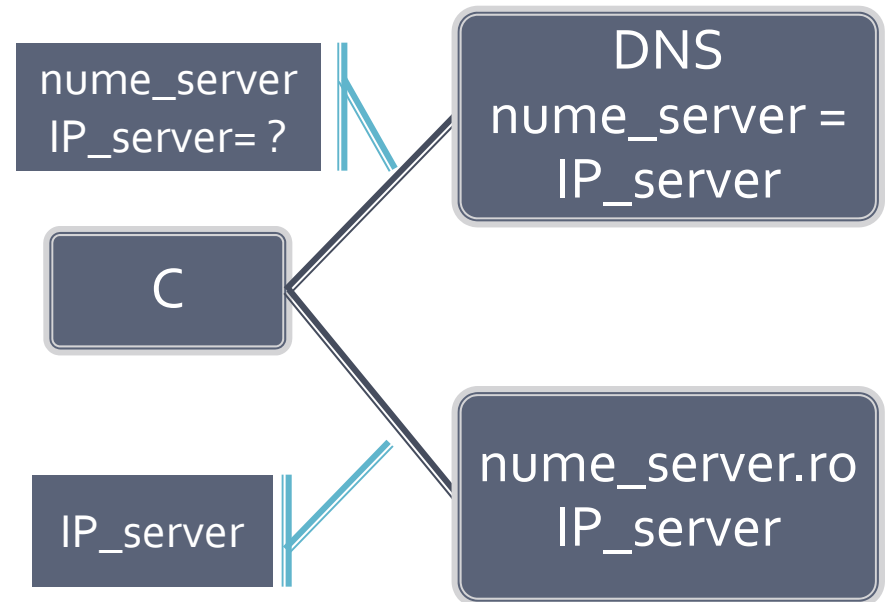
- Subdomeniile sunt la latitudinea proprietarului domeniului
 - "tuiasi.ro" domeniu inregistrat de TUlasi, controlat de RoTLD
 - "etc.tuiasi.ro" subdomeniu implementat de TUlasi, controlat de ETC (ETTI)
 - "rf-opto.etc.tuiasi.ro" subdomeniu implementat de ETC (ETTI)
- Tipic prefixul (automat sau nu) e o indicatie a tipului de date oferite: www, ftp, gopher etc.
- Mai multe nume de domeniu/subdomeniu pot imparti o adresa IP
 - **rf-opto.etc.tuiasi.ro** = 81.180.222.13
 - **www.etc.tuiasi.ro** = 81.180.222.13

Acces utilizand nume de domeniu

- In momentul accesului la **rf-opto.etc.tuiasi.ro**:



- Toate server-ele DNS realizeaza un cache al tablei ND \Leftrightarrow IP pentru utilizare mai rapida
- ipconfig /flushdns

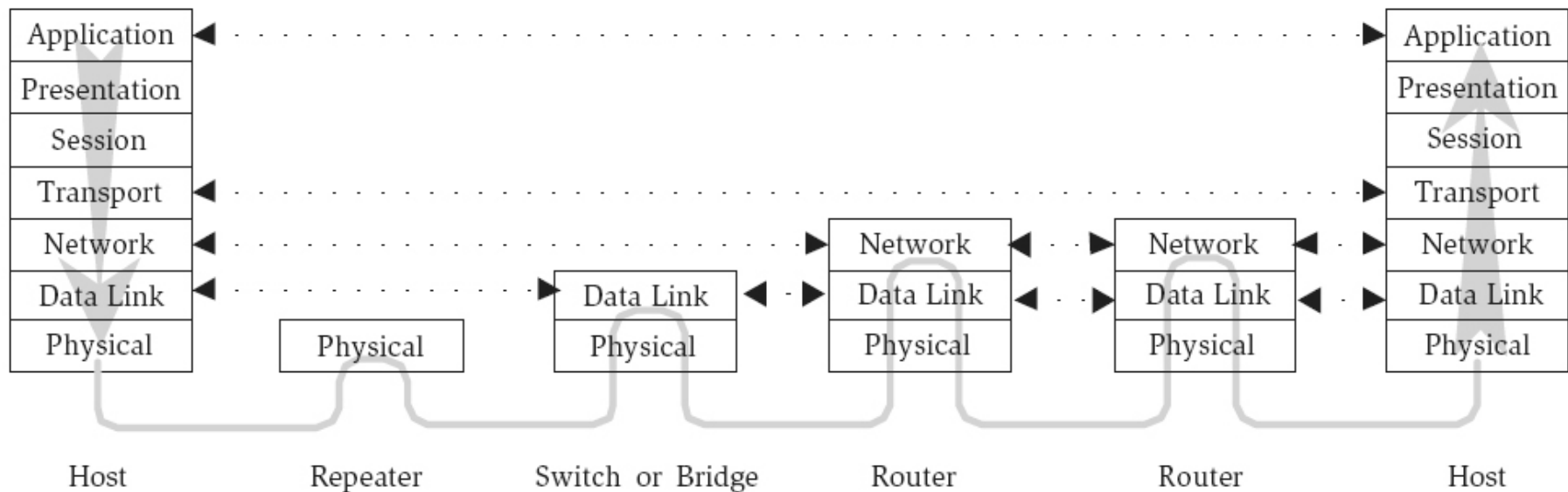


URL

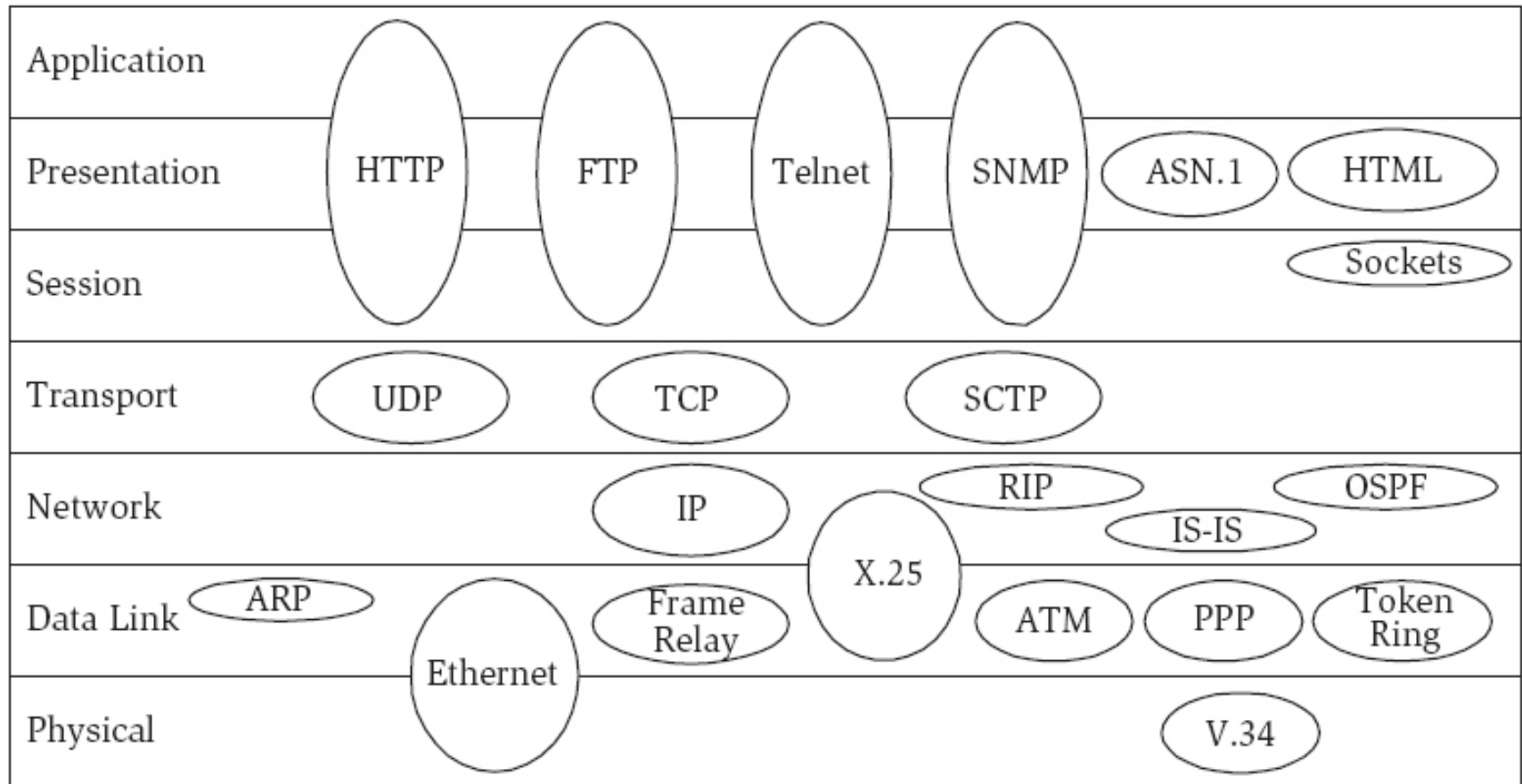
- **Uniform Resource Locator**
- Forma: `serviciu://gazda:port/cale/fisier.ext`
 - `serviciu://` – aplicatia (protocolul) care se acceseaza de pe gazda: `http://`, `ftp://`, `telnet://`, `file://`
 - `gazda` – nume de domeniu sau adresa IP
 - `:port` – portul utilizat in comunicare: unele implicite: (ftp – 21, http – 80, ssh – 22, telnet – 23)
 - `cale` – cale de directoare plecand de la radacina serviciului pe gazda
 - `fisier.ext` numele fisierului pe gazda
- Exemplu:
`http://rf-opto.etc.tuiasi.ro:80/ui/Lucrari/Lucrarea1/Lucrarea1.html`

Model de referinta ISO/OSI

- Open Systems Interconnection
- Structura stratificata pe 7 nivele



Protoçoale

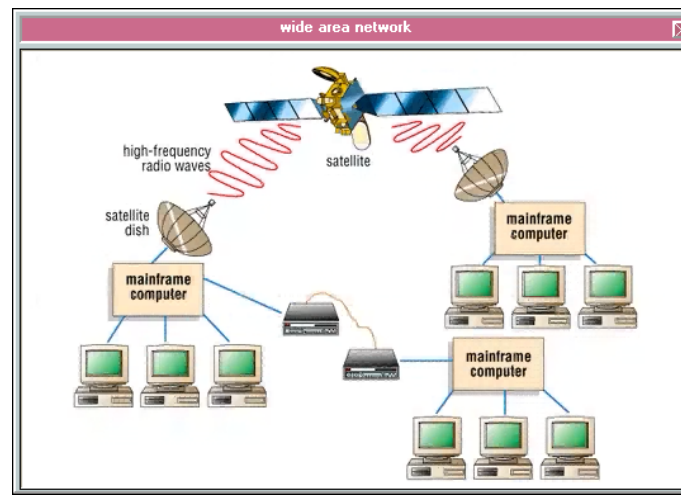
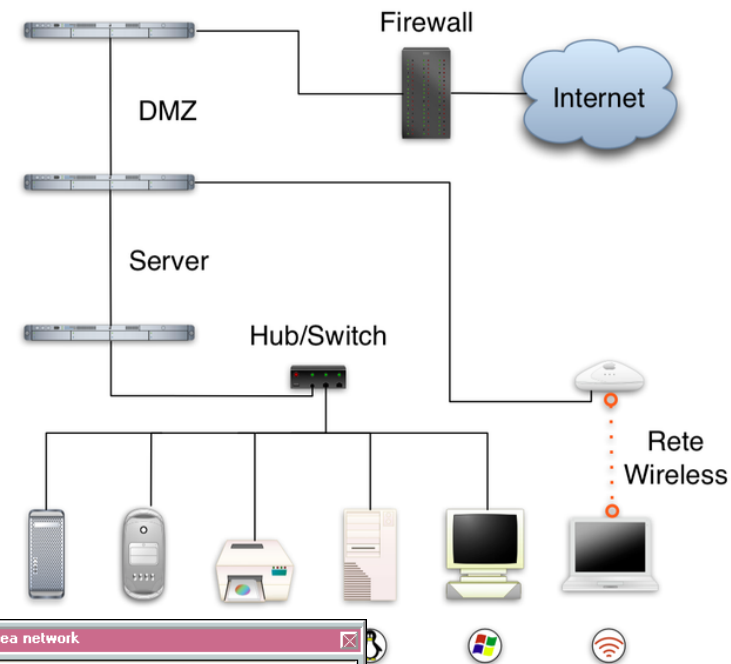


Protoocoale

- IP – Internet Protocol
- HTTP – Hyper Text Transfer Protocol
- FTP – File Transfer Protocol
- TCP – Transport Control Protocol
- SMTP – Simple Mail Transfer Protocol
- POP₃ – Post Office Protocol
- IMAP – Internet Message Access Protocol
- Telnet – **Telecommunication network**
(remote login)

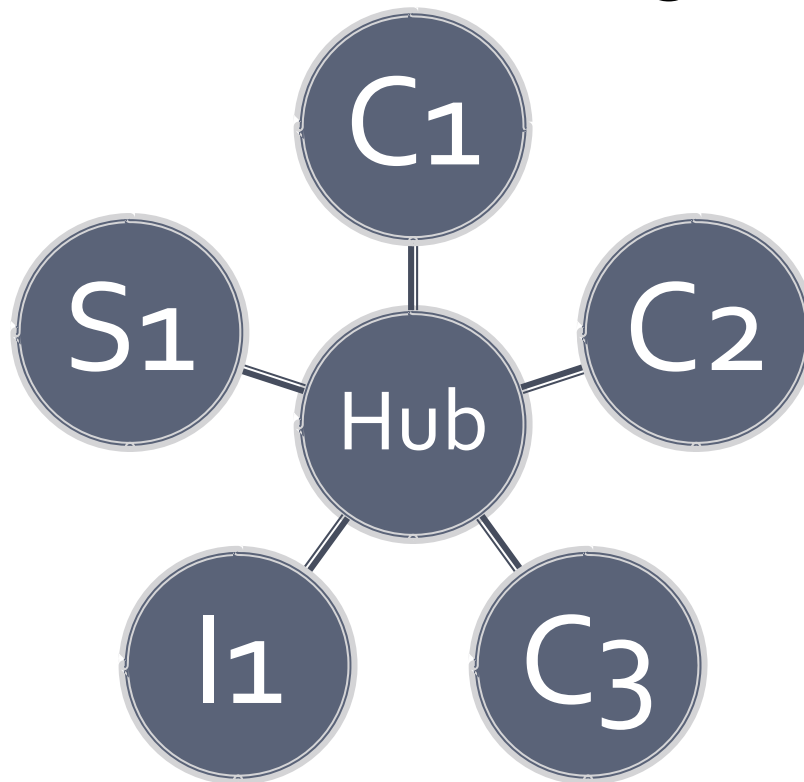
Tipuri de retele

- LAN – Local Area Network
 - acopera distante maxim de ordinul km
- WAN – Wide Area Network
 - poate acoperi intreaga lume
 - Internetul e cea mai mare WAN



Topologii de retea

- **Stea:** toate nodurile sunt conectate la un nod central numit hub (switching hub)



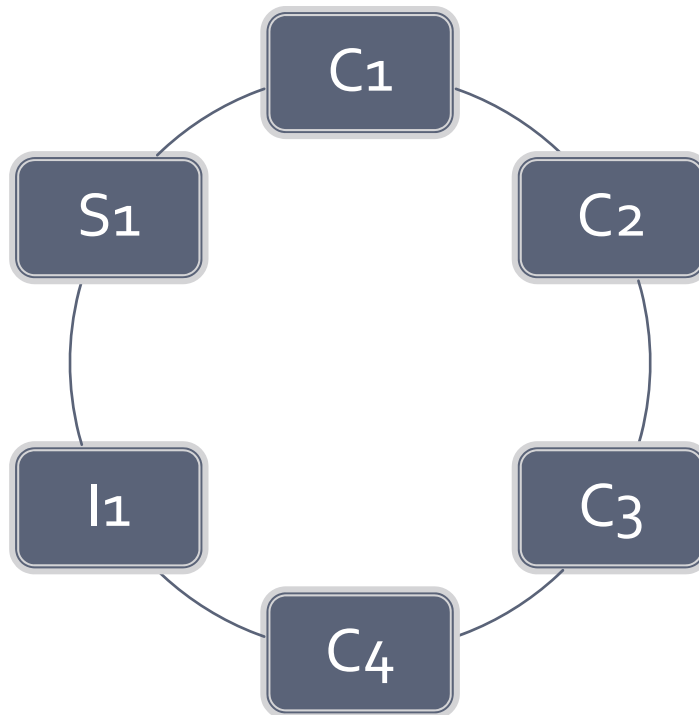
Topologii de retea

- **Bus** – toate nodurile sunt conectate la un singur cablu
 - obligatoriu trebuie sa apara terminatoare la capat



Topologii de retea

- **Inel** – toate nodurile sunt conectate la un singur cablu care realizeaza un inel
 - terminatoarele nu sunt necesare



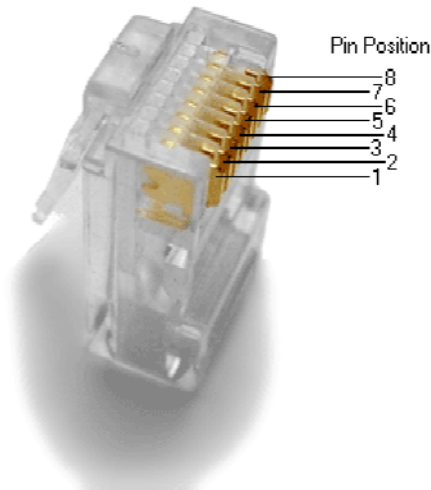
Implementarea rețelei

- Cablu
 - Coaxial: 185 m, 10 Mb/s
 - UTP – Unshielded twisted pair: 100 m,
 - Cat 5 100 Mb/s (5e – 1000Mb/s)
 - Cat 6 1000 Mb/s (6e – 10000Mb/s)
 - STP – Shielded twisted pair: distanta mai mare
 - fibra optica



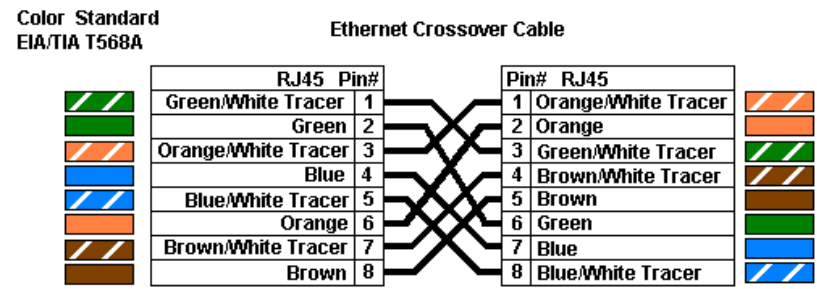
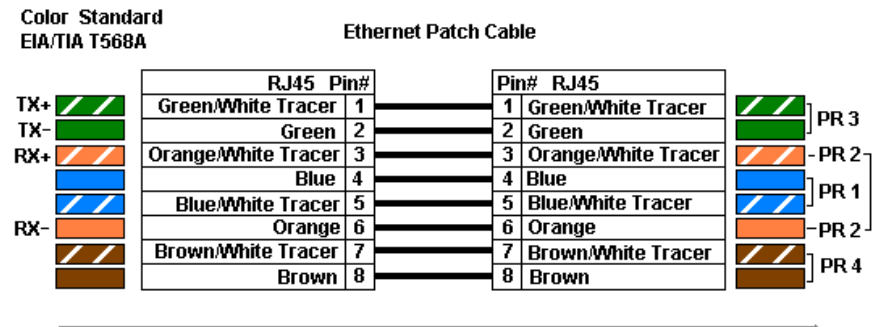
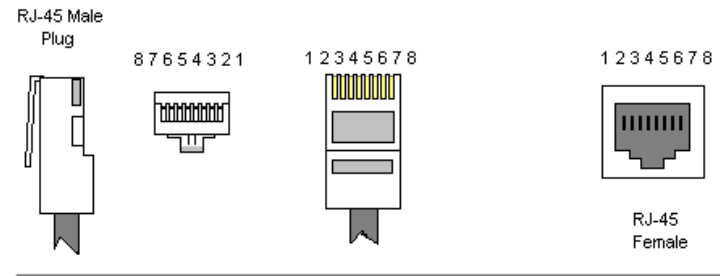
Implementarea rețelei

- Conectori
 - BNC – Bayonet Neill Concelman
 - RJ45 – UTP
 - RJ22 – Telefonie (RJ11)



Realizare cablu UTP

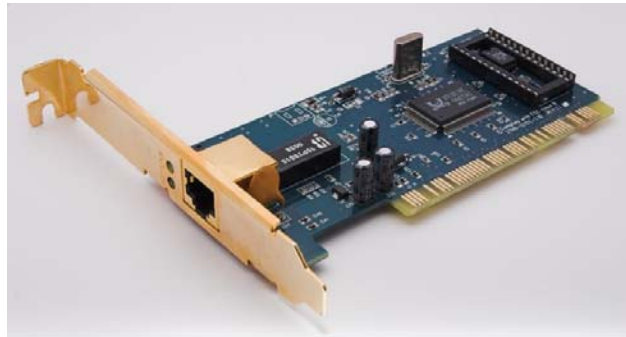
- Cablu Ethernet
 - Conectare calculator – switch, calculator modem
- Crossover
 - Conectare directa intre 2 calculatoare



"A" is earlier

Conexiune fizica

- NIC – Network Interface Card – placa de retea
 - 10Mb/s, 100Mb/s , 1000Mb/s
 - Ethernet
 - RJ45
- Modem
 - 56 kb/s
 - RJ22
 - Inlocuit de Cable Modem
- Viteze de acces
 - garantat
 - best effort
 - tipic, pentru aplicatii $v[B/s] \sim v[b/s] / 10$



Contact

- Laboratorul de microunde si optoelectronica
- <http://rf-opto.etc.tuiasi.ro>
- rdamian@etc.tuiasi.ro