DEPARTAMENTUL
CALCULATOARE
ȘI TEHNOLOGIA
INFORMAȚIEI

PROGRAMMING YOUR FUTURE. SINCE 1966.

UP Universitatea
Politehnica
Timișoara

Rețele de Calculatoare

Aplicații uzuale: DHCP, FTP, HTTP

NOKIA

Sumar al laboratorului

1

DHCP

Caracterstici generale
Mesajele transmise
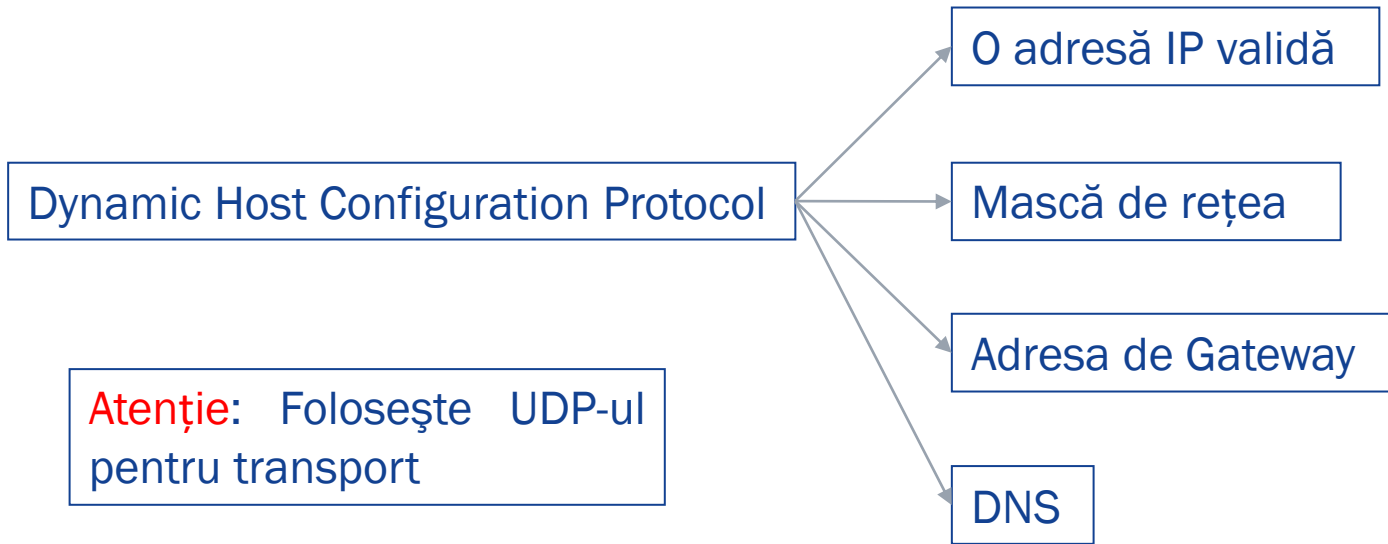Configurare DHCP

2

FTP

Ce transferăm

Cum transferăm

3

HTTP

Cadrele HTTP
Cum se încarcă o pagină web
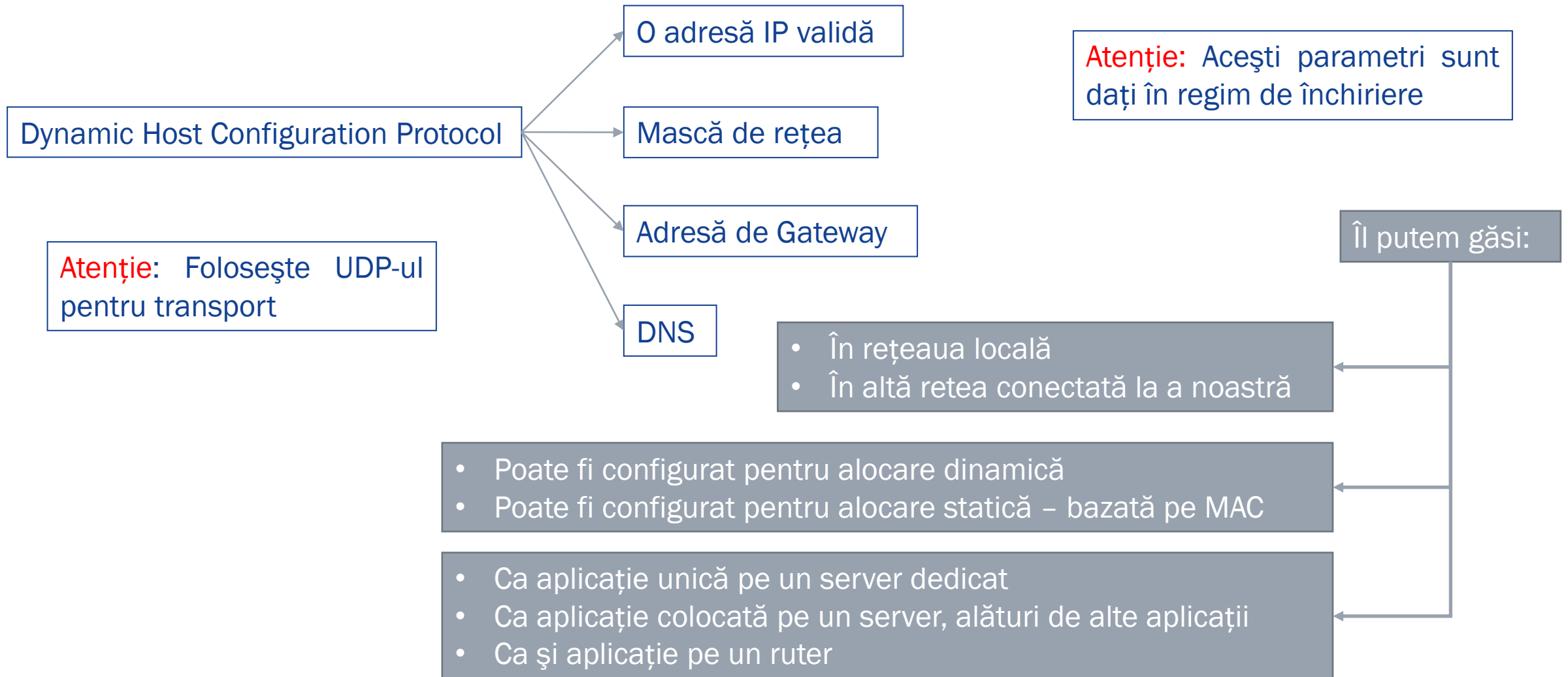
DHCP
Caracteristici generale

Dynamic Host Configuration Protocol

→ O adresă IP validă

→ Mască de rețea

→ Adresa de Gateway

→ DNS

Atenție: Foloseşte UDP-ul pentru transport

Atenție: Aceşti parametri sunt dați în regim de închiriere

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DHCP
Caracteristici generale

Dynamic Host Configuration Protocol

O adresă IP validă

Mască de rețea

Adresă de Gateway

DNS

Atenție: Aceşti parametri sunt dați în regim de închiriere

Atenție: Foloseşte UDP-ul pentru transport

Îl putem găsi:

- În rețeaua locală
- În altă retea conectată la a noastră

- Poate fi configurat pentru alocare dinamică
- Poate fi configurat pentru alocare statică – bazată pe MAC

- Ca aplicație unică pe un server dedicat
- Ca aplicație colocată pe un server, alături de alte aplicații
- Ca şi aplicație pe un ruter

DHCP
Mesajele transmise

Prima închiriere

Client   Server

1. DHCP Discover
   (Broadcast)
   → Source port: 68
   Dest. port: 67

2. DHCP Offer
   (Broadcast/Unicast)
   ← Source port: 67
   Dest. port: 68

3. DHCP Request
   (Broadcast)
   → Source port: 68
   Dest. port: 67

4. DHCP Ack
   (Broadcast/Unicast)
   ← Source port: 67
   Dest. port: 68

Reînnoirea

Client   Server

1. DHCP Request
   (Unicast)
   → Source port: 68
   Dest. port: 67

2. DHCP Ack
   (Unicast)
   ← Source port: 67
   Dest. port: 68
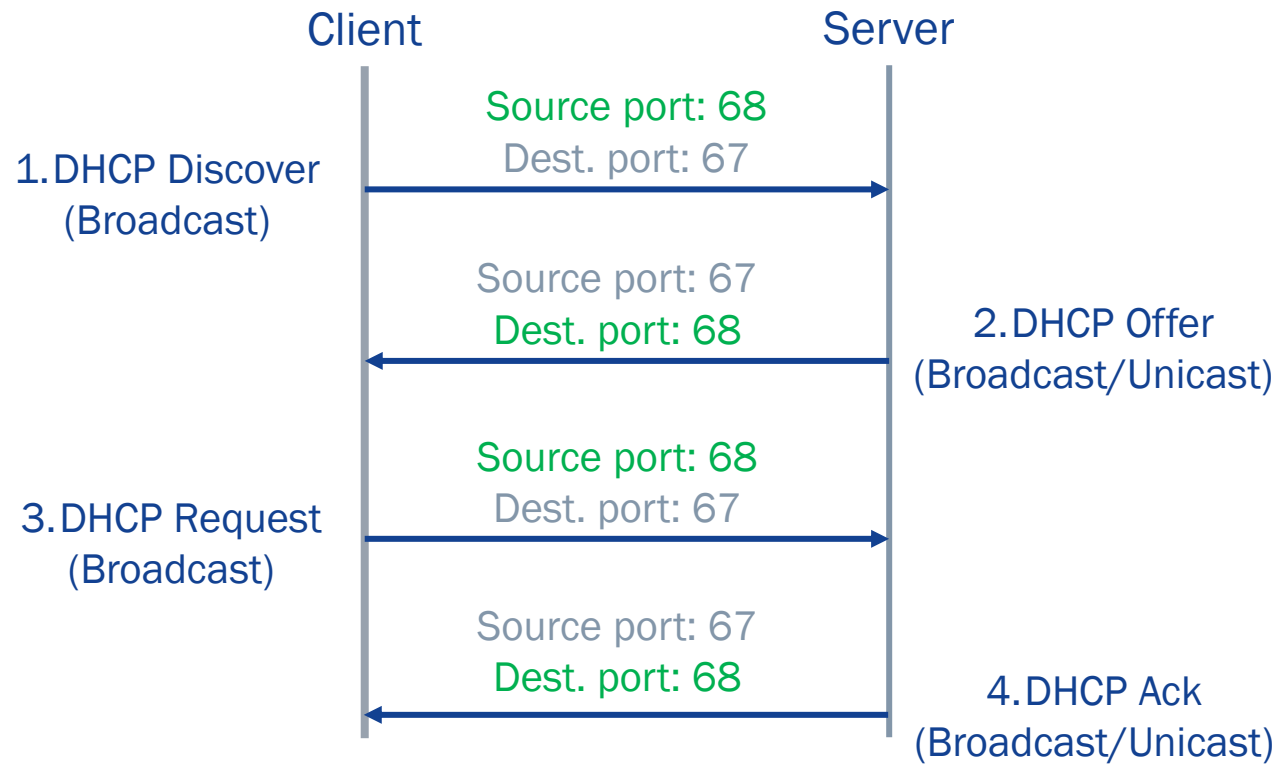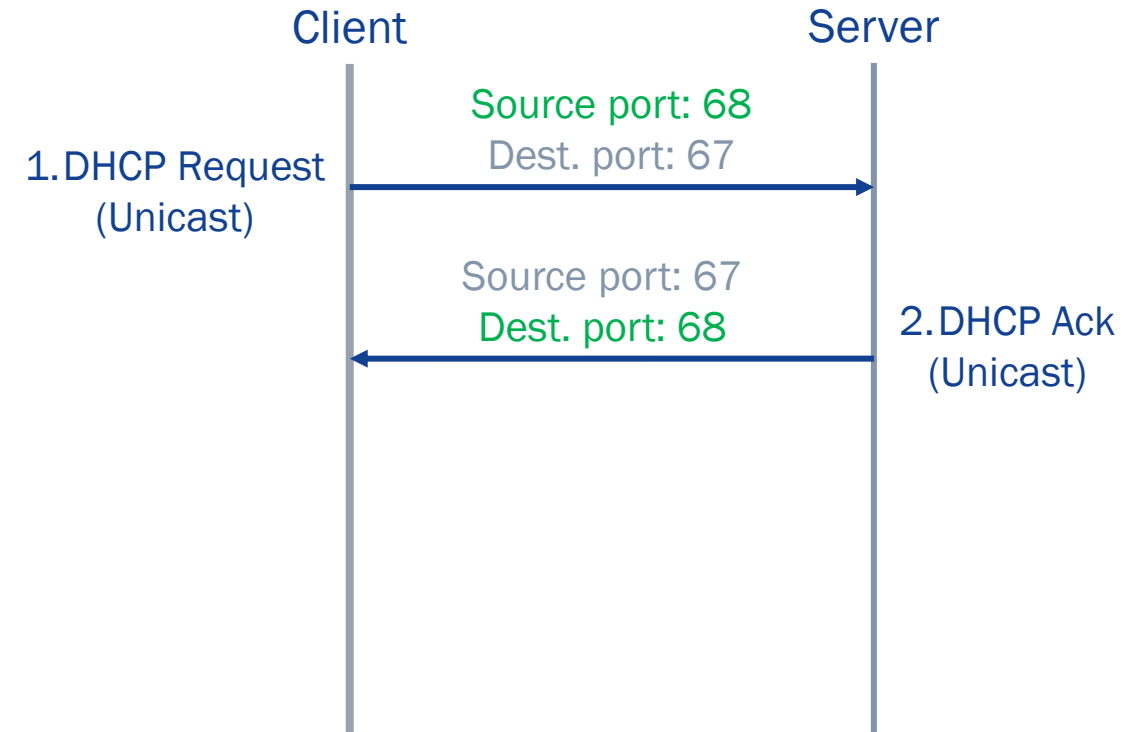
DHCP
Antetul protocolului

8	16	24	32
OP code (1)	Hardware Type (1)	Hw address length (1)	Hops (1)
Transaction Identifier (4)			
Seconds (2)		Flags (2)	
Client Ip Address (4)			
Your Ip Address (4)			
Server Ip Address (4)			
Gateway Ip Address (4)			
Client Hardware Address (16)			
Server Name (64)			
Boot Filename (128)			
DHCP Options (variabil)			

Transaction Identifier – Câmp unic pentru fiecare schimb de mesaje cu un host

Boot Filename –
Fişier ce poate folosi la pornirea unor dispozitive

DHCP options –
Aici vedem tipul de mesaj transmis

DHCP
Alocare adresă IP - Windows
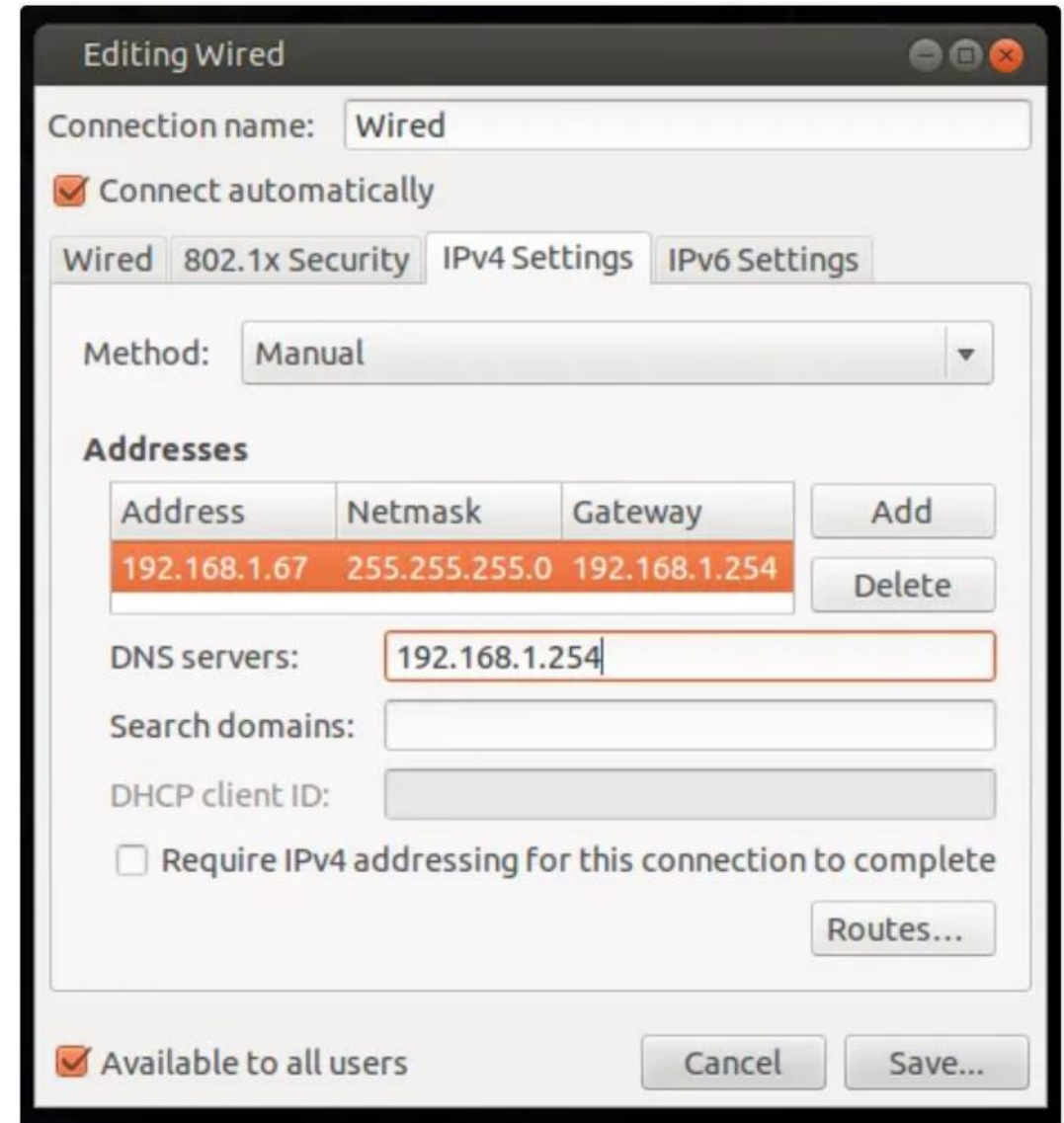

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DHCP
Alocare adresă IP - Linux

```
network:
 version: 2
 renderer: networkd
 ethernets:
   ens33:
     dhcp4: no
     dhcp6: no
     addresses: [192.168.1.100/24]
     gateway4: 192.168.1.1
     nameservers:
        addresses: [8.8.8.8,8.8.4.4]
root@server1:/#
```

Prin editarea fişierului de networking – de ex cu vi, nano, etc.

Prin interfața grafică

DHCP
Alocare statică – bazată pe MAC

Devices

	Address	MAC	Source Device	Source Type
	10.5.8.82	00:1D:7D:90:75:08	10.5.8.1	snmp dhcp lease
	10.5.8.82	00:1D:7D:90:75:08	10.5.8.1	snmp arp
	10.5.8.92	00:1D:92:B0:C7:56	10.5.8.1	snmp dhcp lease
	10.5.8.4	00:1F:29:26:4F:30	10.5.8.1	snmp dhcp lease
	10.5.6.233	00:1F:29:26:4F:30	10.5.8.1	snmp dhcp lease
	10.5.8.105	00:1F:5B:E7:23:F7	10.5.8.1	snmp dhcp lease
	192.168.88.254	00:1F:D0:5F:58:A1	192.168.88.1	snmp arp
	10.5.8.177	00:1F:D0:5F:58:A1	10.5.8.1	snmp dhcp lease
	192.168.88.254	00:1F:D0:5F:58:A1	192.168.88.1	ros arp
	10.5.8.3	00:21:5A:E6:E0:32	10.5.8.1	snmp dhcp lease
	10.5.8.3	00:21:5A:E6:E0:32	10.5.8.1	snmp arp
	10.5.8.3	00:21:5A:E6:E0:32	192.168.88.1	ros arp

Ruter Microtik

Maparea statică pe
Win2016 Server

New Reservation

Provide information for a reserved client.

Reservation name: hr printer

IP address: 10 . 0 . 0 . 150

MAC address: 00-11-22-33-44-55

Description: Printer for HR

Supported types
- ○ Both
- ● DHCP
- ○ BOOTP

[Add] [Close]

Configurare pe un ruter

R1(config)#service dhcp   > Enables DHCP
R1(config)#ip dhcp pool mydhcp   > Create a DHCP pool
R1(dhcp-config)#network 192.168.100.0 255.255.255.0   > The network used to get IP address from Router
R1(dhcp-config)#default-router 192.168.100.254   > Default gateway of Hosts
R1(dhcp-config)#dns-server 192.168.100.250   > DNS Server of Hosts
R1(dhcp-config)#exit
R1(config)#
R1(config)#ip dhcp excluded-address 192.168.100.1 192.168.100.50   > The address that we want to excluded from DHCP pool. These address
never been used by Router to lease.

Configurarea DHCP pe un ruter
Cisco

Configurarea DHCP pe un ruter Tenda

Status

Internet Connection Setup

MAC Clone

WAN Speed

WAN Medium Type

LAN Settings

DNS Settings

DHCP Server

DHCP Client List

DHCP Server

DHCP Server   ☑ Enable

IP Pool Start Address   192.168.0. 100

IP Pool End Address   192.168.0. 150

Lease Time   One day   ▼

OK   Cancel

FTP
Ce transferăm?

FTP:
File
Transfer
Protocol

Sursa:
https://medium.com/@ExaVault/what-is-ftp-tutorial-overview-and-business-use-cases-e865c8c766d5

FTP
Cum transferăm
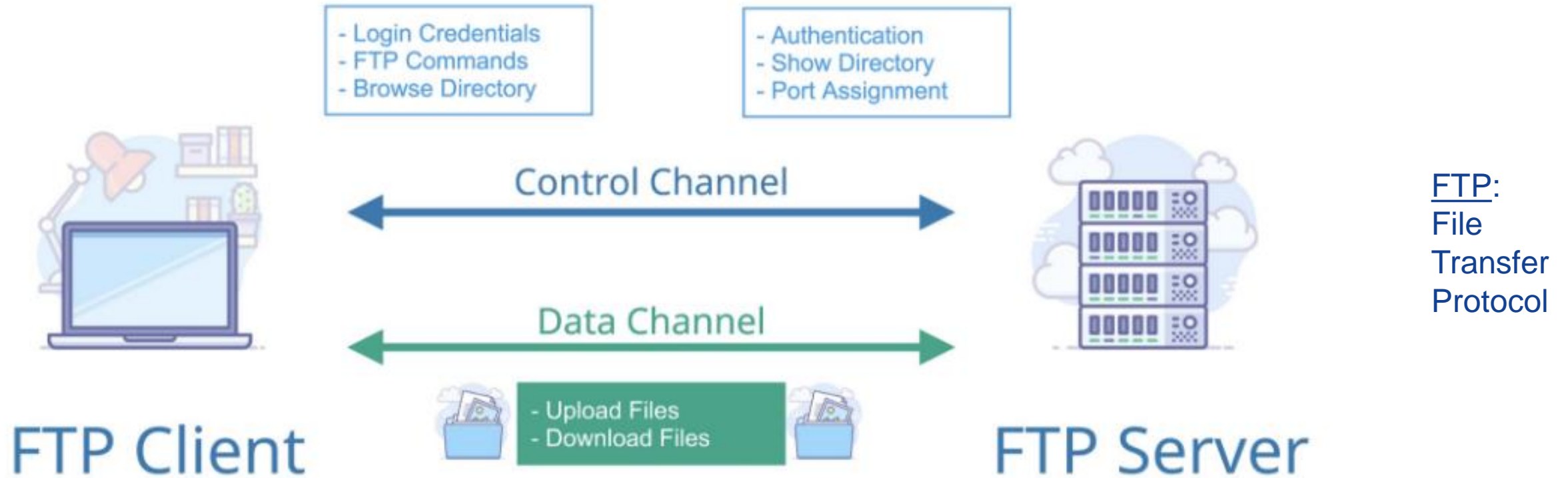
Folosim clienți.

Vom utiliza 2 porturi

Portul 21 - control

Portul 20 - datele

Ambele țin de TCP

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HTTP
Cadrul cerere

5 0.060942	192.168.0.87	148.251.41.80	HTTP	529	GET /black-cat-images.html HTTP/1.1
12 0.127709	148.251.41.80	192.168.0.87	HTTP	895	HTTP/1.1 200 OK (text/html)
14 0.412051	192.168.0.87	148.251.41.80	HTTP	472	GET /images/6TpLybM7c.jpg HTTP/1.1
15 0.415979	192.168.0.87	148.251.41.80	HTTP	474	GET /image_gallery/3256.png HTTP/1.1
37 0.479489	192.168.0.87	148.251.41.80	HTTP	472	GET /images/5iRrpzKxT.jpg HTTP/1.1
39 0.479965	192.168.0.87	148.251.41.80	HTTP	482	GET /new_gallery/bus-clipart-49.jpg HTTP/1.1
56 0.485528	192.168.0.87	148.251.41.80	HTTP	476	GET /image_gallery/389987.jpg HTTP/1.1
84 0.540391	148.251.41.80	192.168.0.87	HTTP	542	HTTP/1.1 200 OK (PNG)

> Transmission Control Protocol, Src Port: 61807, Dst Port: 80, Seq: 1, Ack: 1, Len: 475
> Hypertext Transfer Protocol
>> GET /black-cat-images.html HTTP/1.1\r\n ← Elementul căutat
> Host: clipart-library.com\r\n ← Site-ul originar al informaţiei
> Connection: keep-alive\r\n
> Upgrade-Insecure-Requests: 1\r\n
> User-Agent: Mozilla/5.0 (Windows NT 10.0; WOW64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/86.0.4240.111 Safari/537.36\r\n ← Varianta minimă de browser
> Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.9\r\n ← Tipul de informaţie pe care îl acceptăm
> Accept-Encoding: gzip, deflate\r\n
> Accept-Language: ro-RO,ro;q=0.9,en-US;q=0.8,en;q=0.7\r\n
> \r\n
> [Full request URI: http://clipart-library.com/black-cat-images.html] ← URL-ul pe care îl căutăm
> [HTTP request 1/3]
> [Response in frame: 12] ← Cadrul în care vine răspunsul
> [Next request in frame: 14]

HTTP
Cadrul răspuns

5 0.060942	192.168.0.87	148.251.41.80	HTTP	529	GET /black-cat-images.html HTTP/1.1
12 0.127709	148.251.41.80	192.168.0.87	HTTP	895	HTTP/1.1 200 OK (text/html)
14 0.412051	192.168.0.87	148.251.41.80	HTTP	472	GET /images/6TpLybM7c.jpg HTTP/1.1
15 0.415979	192.168.0.87	148.251.41.80	HTTP	474	GET /image_gallery/3256.png HTTP/1.1
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56 0.485528	192.168.0.87	148.251.41.80	HTTP	476	GET /image_gallery/389987.jpg HTTP/1.1
84 0.540391	148.251.41.80	192.168.0.87	HTTP	542	HTTP/1.1 200 OK (PNG)

```
> HTTP/1.1 200 OK\r\n
  Server: nginx/1.10.2\r\n
  Date: Wed, 04 Nov 2020 14:55:13 GMT\r\n         ← Data şi ora la care am primit răspunsul
  Content-Type: text/html; charset=UTF-8\r\n      ← Care e tipul de conţinut: text, imagine, etc
  Transfer-Encoding: chunked\r\n
  Connection: keep-alive\r\n
  Vary: Accept-Encoding\r\n
  Content-Encoding: gzip\r\n
  \r\n
  [HTTP response 1/3]
  [Time since request: 0.066767000 seconds]
  [Request in frame: 5]                          ← Cadrul în care a fost făcută cererea
  [Next request in frame: 14]
  [Next response in frame: 270]
  [Request URI: http://clipart-library.com/images/6TpLybM7c.jpg]
```

HTTP
Cum se încarcă o pagină web

https://developers.google.com/speed/pagespeed/insights/

https://webpagetest.org/

Lab Data

|			
■ First Contentful Paint	3.8 s	▲ Time to Interactive	12.0 s
■ Speed Index	4.8 s	■ Total Blocking Time	530 ms
▲ Largest Contentful Paint 🔖	13.3 s	▲ Cumulative Layout Shift 🔖	0.397

Opportunity	Estimated Savings
▲ Serve images in next-gen formats	8.25 s ⌄
▲ Remove unused JavaScript	2.1 s ⌄
▲ Preload key requests	2.1 s ⌄
▲ Eliminate render-blocking resources	1.14 s ⌄
■ Remove unused CSS	0.6 s ⌄

Astfel de aplicații ne pot oferi informații despre cum anume este populat un site de web şi despre cum l-am face mai usor accesibil.

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HTTP
Analiză

În această imagine puteți vedea o analiză a site-ului cv.upt.ro

Lab Work
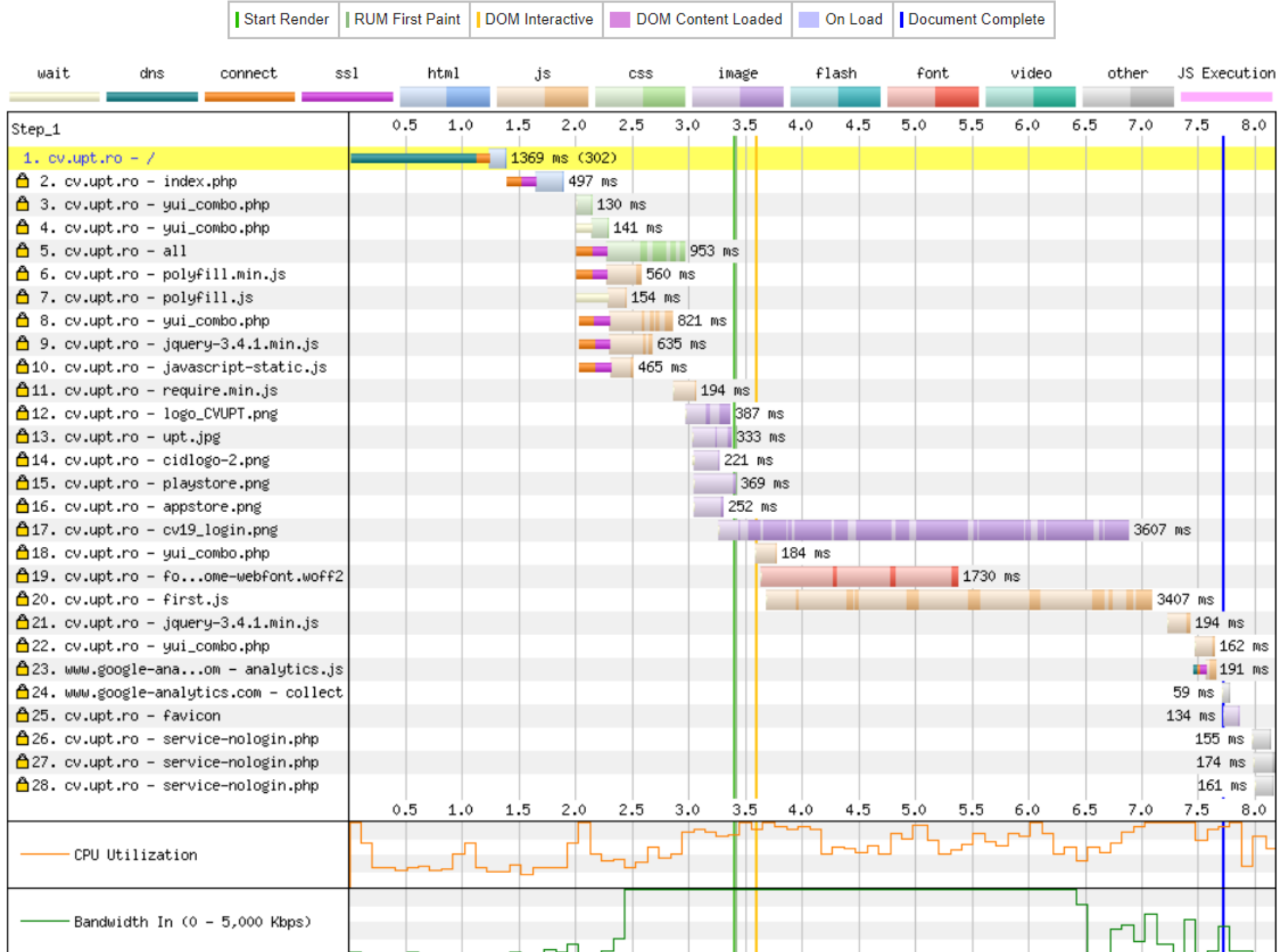
That's all for today, see you next time!