

12. Configurarea Gazdelor (DHCP)

Adresele MAC sunt asignate de producator si acest proces este gandit in asa fel incat fiecare dispozitiv sa aiba o adresa unica. Este clar ca aceasta este o conditie suficienta ca orice de dispozitive grup oricat de mare ar fi sa aiba o adresa unica.

Adresa IP in contrast nu doar ca trebuie sa fie unic dar trebuie sa reflecte structura retelei interne, asa cum am mentionat in cursurile trecute o adresa ip are doua zone net id si host id in care net id trebuie sa fie aceasi pentru toate dispozitivele din retea. Astfel adresele IP nu pot fi scrise de producator, din acest motiv adresele IP trebuie sa fie configurabile.

Pe langa adresa IP mai avem nevoie si de alte setari pentru a putea trimite pachete, o configuratie de baza este adresa IP a gateway-ului (routerului) pentru a putea trimite pachetele in exteriorul retelei.

Majoritatea sistemelor de operare permit administratorului sau utilizatorului sa isi configureze manual setarile de retea dar exista multe dezavantaje in aceasta metoda. Pe langa faptul ca intr-o retea mare este nevoie de multa munca sunt sanse foarte mari sa se produca erori in configurare. Pentru aceste motive exista implementarea protocolului DHCP (Dynamic Host Configuration Protocol).

Serverul DHCP este responsabil de procurarea setarilor de retea dispozitivelor care se conecteaza in aceasta. In cel mai simplu mod acest server este o baza de date cu informatii de configurare a clientilor.

Un caz mai complex ajuta administratorul reteli sa aloci automat configurariile catre clienti. In acest model serverul detine o plaja de IP-uri si le furnizeaza gazdelor la cerere configuratii, asta nu inseamna ca administratorul nu poate seta pentru anumite hosturi o configuratie statica.

Atunci cand un dispozitiv intra in retea trimite ca broadcast cerere de asignare a configurarii.

Wi-Fi capture window showing DHCP traffic. The packet list shows a DHCP Discover (342) from 192.168.3.44 to 255.255.255.255. The details pane shows the Parameter Request List (Option 55) with 14 items: Subnet Mask, Router, Domain Name Server, Domain Name, Perform Router Discover, Static Route, Vendor-Specific Information, NetBIOS over TCP/IP Name Server, NetBIOS over TCP/IP Node Type, NetBIOS over TCP/IP Scope, Domain Search, Classless Static Route, Private/Classless Static Route (Microsoft), and Private/Proxy autodiscovery. The packet data shows the DHCP Discover packet structure.

Pentru a contacta un server de DHCP dispozitivul care intra in retea trimite un mesaj de tipul DHCPDISCOVER la IP-ul de broadcast 255.255.255.255 insemnand ca va fi receptionat de toate dispozitivele din retea inclusiv routere dar acestea nu redirectioneaza mesajele primite pe broadcast. Serverul DHCP va raspunde cu un measj de tip DHCPOFFER pe care restul nodurilor din retea il vor ignora.

Wi-Fi capture window showing DHCP traffic. The packet list shows a DHCP Offer (328) from 192.168.3.1 to 192.168.3.44. The details pane shows the Dynamic Host Configuration Protocol (Offer) details, including the Offer message type, hardware type (Ethernet), transaction ID (0xe7997638), and various options like DHCP Message Type (Offer), DHCP Server Identifier (192.168.3.1), and IP Address Lease Time (86400 seconds). The packet data shows the DHCP Offer packet structure.

- Length: 1
- DHCP: Offer (2)
- Option: (54) DHCP Server Identifier (192.168.3.1)
 - Length: 4
 - DHCP Server Identifier: 192.168.3.1
- Option: (51) IP Address Lease Time
 - Length: 4
 - IP Address Lease Time: (86400s) 1 day
- Option: (58) Renewal Time Value
 - Length: 4
 - Renewal Time Value: (43200s) 12 hours
- Option: (59) Rebinding Time Value
 - Length: 4
 - Rebinding Time Value: (75600s) 21 hours
- Option: (1) Subnet Mask (255.255.255.0)
 - Length: 4
 - Subnet Mask: 255.255.255.0
- Option: (3) Router
 - Length: 4
 - Router: 192.168.3.1
- Option: (6) Domain Name Server
 - Length: 4
 - Domain Name Server: 192.168.3.1
- Option: (255) End
 - Option End: 255

Dupa ce serverul DHCP a facut oferta de configurare asteapta un raspuns de confirmare de la client sub formatul de mesaj DHCPREQUEST.

The image shows a Wireshark packet capture of a DHCP transaction. The packet list on the left shows a sequence of events: a DHCP Request (67114), a DHCP ACK (67115), a DHCP Release (70866), a DHCP Discover (71628), a DHCP Offer (71629), a DHCP Request (71630), and a DHCP ACK (71631). The selected packet is the 71631st packet, a DHCP ACK from 192.168.3.1 to 0.0.0.0. The packet details pane on the left shows the structure of the DHCP message, including flags, transaction ID, and a list of requested parameters. The packet bytes pane on the right shows the raw data of the packet.

No.	Time	Source	Destination	Protocol	Length	Info
67114	1853.237744	192.168.3.44	192.168.3.1	DHCP	348	DHCP Request - Transaction ID 0x17b577c1
67115	1853.241879	192.168.3.1	192.168.3.44	DHCP	378	DHCP ACK - Transaction ID 0x17b577c1
70866	1979.780236	192.168.3.44	192.168.3.1	DHCP	342	DHCP Release - Transaction ID 0xb1911ae7
71628	2014.254734	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xe7997638
71629	2014.362922	192.168.3.1	255.255.255.255	DHCP	328	DHCP Offer - Transaction ID 0xe7997638
71630	2014.364090	0.0.0.0	255.255.255.255	DHCP	360	DHCP Request - Transaction ID 0xe7997638
71631	2014.464687	192.168.3.1	255.255.255.255	DHCP	378	DHCP ACK - Transaction ID 0xe7997638

Packet 71631 Details:

- Flags: 0x00
- A-RR result: 0
- PTR-RR result: 0
- Client name: Abaddon-PC
- Option: (60) Vendor class identifier
 - Length: 8
 - Vendor class identifier: MSFT 5.0
- Option: (55) Parameter Request List
 - Length: 14
 - Parameter Request List Item: (1) Subnet Mask
 - Parameter Request List Item: (3) Router
 - Parameter Request List Item: (6) Domain Name Server
 - Parameter Request List Item: (15) Domain Name
 - Parameter Request List Item: (31) Perform Router Discover
 - Parameter Request List Item: (33) Static Route
 - Parameter Request List Item: (43) Vendor-Specific Information
 - Parameter Request List Item: (44) NetBIOS over TCP/IP Name Server
 - Parameter Request List Item: (46) NetBIOS over TCP/IP Node Type
 - Parameter Request List Item: (47) NetBIOS over TCP/IP Scope
 - Parameter Request List Item: (119) Domain Search
 - Parameter Request List Item: (121) Classless Static Route
 - Parameter Request List Item: (249) Private/Classless Static Route (Microsoft)
 - Parameter Request List Item: (252) Private/Proxy autodiscovery
- Option: (255) End
 - Option End: 255

Iar la sfarsit serverul raspunde clientului cu un ultim mesaj de tipul DHCPACK (acknowledge) si se termina tranzactia si aprobarea configrarii de retea atat de partea serverului cat si de partea clientului.

Wi-Fi

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dhc

No.	Time	Source	Destination	Protocol	Length	Info
67114	1853.237744	192.168.3.44	192.168.3.1	DHCP	348	DHCP Request - Transaction ID 0x17b577c1
67115	1853.241879	192.168.3.1	192.168.3.44	DHCP	378	DHCP ACK - Transaction ID 0x17b577c1
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71631	2014.464687	192.168.3.1	255.255.255.255	DHCP	378	DHCP ACK - Transaction ID 0xe7997638

DHCP Server Identifier: 192.168.3.1

Option: (51) IP Address Lease Time

Length: 4

IP Address Lease Time: (86400s) 1 day

Option: (58) Renewal Time Value

Length: 4

Renewal Time Value: (43200s) 12 hours

Option: (59) Rebinding Time Value

Length: 4

Rebinding Time Value: (75600s) 21 hours

Option: (1) Subnet Mask (255.255.255.0)

Length: 4

Subnet Mask: 255.255.255.0

Option: (3) Router

Length: 4

Router: 192.168.3.1

Option: (6) Domain Name Server

Length: 4

Domain Name Server: 192.168.3.1

Option: (213) V4 Access Domain

Length: 47

Value: 75726e3a777772d6875617765692d636f6d3a736572766963653a4e6574776f726b5379...

Option: (255) End

Option End: 255

Padding: 00

DHCP/BOOTP option value (dhcp.option.value), 47 bytes

Packets: 796705 - Displayed: 7 (0.0%)

Profile: Default

Atunci cand clientul vrea sa renunte sau sa ceara alte setari de retea va initiliza comunicarea cu serverul DHCP printr-un mesaj de DHCPREQUEST serverul va raspunde cu un mesaj de DHCPACK iar clientul va trimite un mesaj de DHCPRELEASE.

Wi-Fi

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dhc

No.	Time	Source	Destination	Protocol	Length	Info
67114	1853.237744	192.168.3.44	192.168.3.1	DHCP	348	DHCP Request - Transaction ID 0x17b577c1
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71631	2014.464687	192.168.3.1	255.255.255.255	DHCP	378	DHCP ACK - Transaction ID 0xe7997638

> Frame 70866: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface \Device\NPF_{6B321C6...}

> Ethernet II, Src: CloudNet_7d:84:13 (dc:e9:94:7d:84:13), Dst: HuaweiDe_6c:12:06 (00:94:ec:6c:12:06)

> Internet Protocol Version 4, Src: 192.168.3.44, Dst: 192.168.3.1

> User Datagram Protocol, Src Port: 68, Dst Port: 67

> Dynamic Host Configuration Protocol (Release)

Message type: Boot Request (1)

Hardware type: Ethernet (0x01)

Hardware address length: 6

Hops: 0

Transaction ID: 0xb1911ae7

Seconds elapsed: 0

> Bootp flags: 0x0000 (Unicast)

Client IP address: 192.168.3.44

Your (client) IP address: 0.0.0.0

Next server IP address: 0.0.0.0

Relay agent IP address: 0.0.0.0

Client MAC address: CloudNet_7d:84:13 (dc:e9:94:7d:84:13)

Client hardware address padding: 00000000000000000000

Server host name not given

Boot file name not given

Magic cookie: DHCP

> Option: (53) DHCP Message Type (Release)

Length: 1

DHCP: Release (7)

> Option: (54) DHCP Server Identifier (192.168.3.1)

Length: 4

Dynamic Host Configuration Protocol: Protocol

Packets: 800224 - Displayed: 7 (0.0%)

Profile: Default

Modul in care un server DHCP inchiriaza adresele si configuratiile in cazul clientilor dinamici este pe baza de timp iar clientul daca este inca activ cerea un re lease sau o reinchiriere a configuratiei la jumtatea timpului setat in cazul in care nu a putut in acest timp sa primeasca un raspuns mai incearca la $\frac{7}{8}$ din timp daca nici atunci nu primeste un raspuns, clientul va renunta la configurarea existenta si va relua procesul de cerere al unui config.