

Bits	0	3	4	7	9	15	16	31
Version	Header length		Type of service			Total length		
Identification						Flags	Fragment offset	
Time to live			Protocol			Header checksum		
32-bit source address								
32-bit destination address								
Options							Padding	



CC5308-I, Redes y Subredes

Rodrigo Arenas, roarenas@nic.cl

Bits	0	3	4	7	9	15	16	31
Version	Header length		Type of service			Total length		
Identification						Flags	Fragment offset	
Time to live			Protocol			Header checksum		
32-bit source address								
32-bit destination address								
Options							Padding	



Temas

- ★ IPv4
- ★ ARP
- ★ Enrutamiento básico
- ★ IPv6
- ★ ICMPv6
- ★ Enrutamiento básico

Bits	0	3	4	7	9	15	16	31
Version	Header length		Type of service			Total length		
Identification					Flags		Fragment offset	
Time to live			Protocol			Header checksum		
32-bit source address								
32-bit destination address								
Options							Padding	



Clases de direcciones

★ A -> 7f.ff.ff.ff

★ 0.0.0.0 -> 127.255.255.255

★ 126 redes y 16,777,215 números IP c/u

★ B -> bf.ff.ff.ff

★ 127.0.0.0 -> 191.0.0.0

★ 16,382 redes y 65,535 números Ip c/u

★ C -> 3f.ff.ff.ff

★ 192.0.0.0 -> 223.0.0.0

★ 2,097,150 redes y 255 números IP c/u

★ D -> 1f.ff.ff.ff

★ 224.0.0.0 -> 239.0.0.0

★ MulticasT

Bits	0	3	4	7	9	15	16	31
Version	Header length		Type of service			Total length		
Identification					Flags		Fragment offset	
Time to live			Protocol			Header checksum		
32-bit source address								
32-bit destination address								
Options							Padding	



tipos de direcciones ipv4

★ Locales

★ 127.0.0.0/8

★ 169.254.0.0/16

★ privadas

★ 10.0.0.0/8

★ 172.16.0.0/12

★ 192.168.0.0/16

★ globales

★ RESERVADAS

★ 0.0.0.0, SOLO COMO IP ORIGEN

★ 255.255.255.255, BROADCAST

Bits	0	3	4	7	9	15	16	31
Version	Header length		Type of service			Total length		
Identification					Flags		Fragment offset	
Time to live		Protocol			Header checksum			
32-bit source address								
32-bit destination address								
Options							Padding	



tipos de direcciones ipv6

★ Locales

★ `::/128`, solo para software

★ `::1/128`, loopback

★ `fe80::/10`, link local address

★ privadas -> unique

★ `fc00::/7`

★ multicast

★ `ff00::/8`

★ Globales

Bits	0	3	4	7	9	15	16	31
Version	Header length		Type of service			Total length		
Identification					Flags	Fragment offset		
Time to live		Protocol			Header checksum			
32-bit source address								
32-bit destination address								
Options							Padding	



tipos de direcciones ipv6

★ Gateway

★ Equipos que enrutan paquetes entre distintos medios físicos

★ Enrutamiento

★ Proceso de que decide el medio físico por el cual enviar determinado paquete para que este llegue a su destino

Bits	0	3	4	7	9	15	16	31
Version	Header length		Type of service			Total length		
Identification						Flags	Fragment offset	
Time to live			Protocol			Header checksum		
32-bit source address								
32-bit destination address								
Options							Padding	

Tabla de ARP



arp -an

? (172.30.10.1) at 0:15:17:71:30:8d on en0 ifscope [ethernet]
 ? (172.30.10.5) at 0:1e:c9:38:fe:e5 on en0 ifscope [ethernet]
 ? (172.30.10.62) at 0:1a:92:b2:b9:f7 on en0 ifscope [ethernet]
 ? (172.30.10.169) at 0:1e:c9:6b:ff:78 on en0 ifscope [ethernet]
 ? (172.30.10.193) at 0:4:23:b8:4a:c9 on en0 ifscope [ethernet]
 ? (172.30.10.233) at 54:52:0:7b:3b:c6 on en0 ifscope [ethernet]
 ? (172.30.10.255) at ff:ff:ff:ff:ff:ff on en0 ifscope [ethernet]

Bits	0	3	4	7	9	15	16	31
Version	Header length		Type of service			Total length		
Identification						Flags	Fragment offset	
Time to live			Protocol			Header checksum		
32-bit source address								
32-bit destination address								
Options							Padding	



Tabla de rutas estandar IPv4

netstat -rnf inet

Routing tables

Internet:

Destination	Gateway	Flags	Refs	Use	Netif	Expire
default	172.30.10.1	UGSc	11	0	en0	
127	127.0.0.1	UCS	0	0	lo0	
127.0.0.1	127.0.0.1	UH	1	1460	lo0	
169.254	link#6	UCS	0	0	en0	
172.30.10/24	link#6	UCS	7	0	en0	
172.30.10.1	0:15:17:71:30:8d	UHLWI	11	59	en0	1194
172.30.10.5	0:1e:c9:38:fe:e5	UHLWI	12	1533	en0	1138
172.30.10.62	0:1a:92:b2:b9:f7	UHLWI	1	220274	en0	925
172.30.10.165	127.0.0.1	UHS	0	0	lo0	
172.30.10.169	0:1e:c9:6b:ff:78	UHLWI	0	1326	en0	1156
172.30.10.193	0:4:23:b8:4a:c9	UHLWI	0	0	en0	1084
172.30.10.233	54:52:0:7b:3b:c6	UHLWI	0	3296	en0	1127
172.30.10.255	ff:ff:ff:ff:ff:ff	UHLWbI	0	5	en0	

Bits	0	3	4	7	9	15	16	31
Version	Header length		Type of service			Total length		
Identification					Flags		Fragment offset	
Time to live			Protocol		Header checksum			
32-bit source address								
32-bit destination address								
Options							Padding	



Tabla de rutas IPv6

netstat -rn -f inet6

Routing tables

Internet6:

Destination	Gateway	Flags	Netif	Expire
default	fe80::215:17ff:fe71:308d%en0	UGSc	en0	
::1	::1	UH	lo0	
2001:1398:4:1::/64	link#6	UC	en0	
2001:1398:4:1:21f:5bff:fee9:d42c	0:1f:5b:e9:d4:2c		UHL	lo0
fe80::%lo0/64	fe80::1%lo0	Uc	lo0	
fe80::1%lo0	link#1	UHL	lo0	
fe80::%en1/64	link#5	UC	en1	
fe80::215:17ff:fe73:293d%en1	0:15:17:73:29:3d		UHLW	en1
fe80::%en0/64	link#6	UC	en0	
fe80::215:17ff:fe71:308d%en0	0:15:17:71:30:8d		UHLW	en0
fe80::21f:5bff:fee9:d42c%en0	0:1f:5b:e9:d4:2c		UHL	lo0
ff01::/32	::1	Um	lo0	
ff02::/32	::1	UmC	lo0	
ff02::/32	link#5	UmC	en1	
ff02::/32	link#6	UmC	en0	
ff02::fb	link#6	UHmLW	en0	

Bits	0	3	4	7	9	15	16	31
Version	Header length		Type of service			Total length		
Identification						Flags	Fragment offset	
Time to live			Protocol			Header checksum		
32-bit source address								
32-bit destination address								
Options					Padding			



Diagrama de trabajo



Server Tower



IO