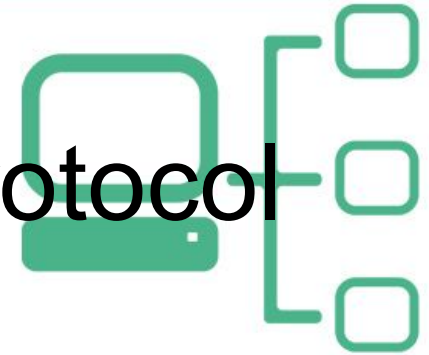




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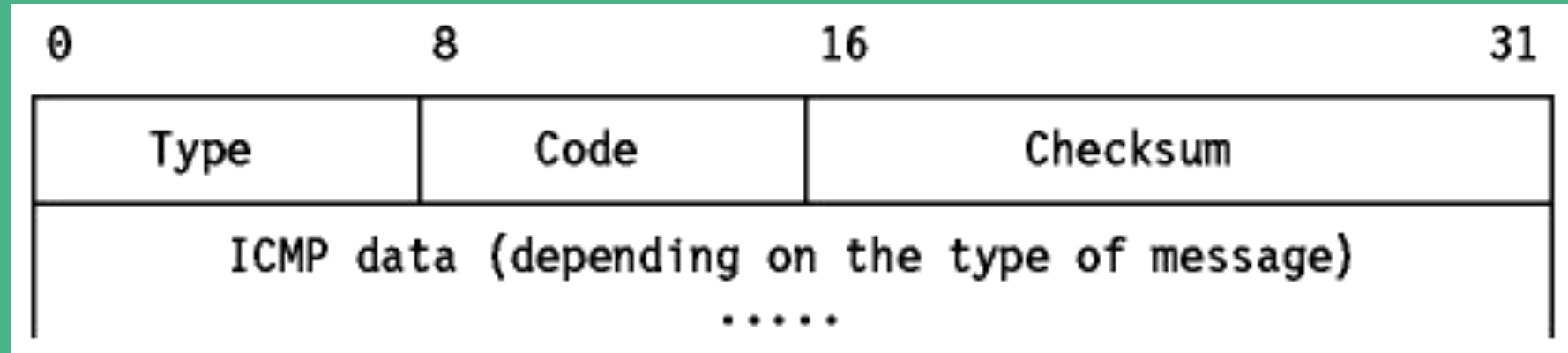
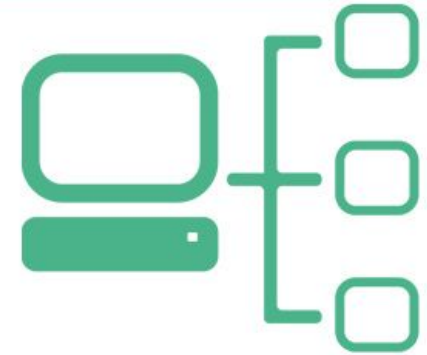
# REDES I: Internet Control Message Protocol

# Internet Control Message Protocol

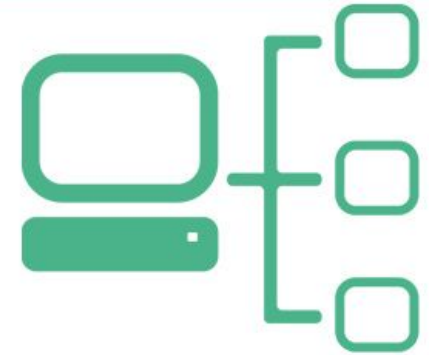


- Definido en el RFC 792 (1981).
- Sub-protocolo de control y notificación de errores de IP.
- Se utiliza con fines de diagnóstico o control

# Formato

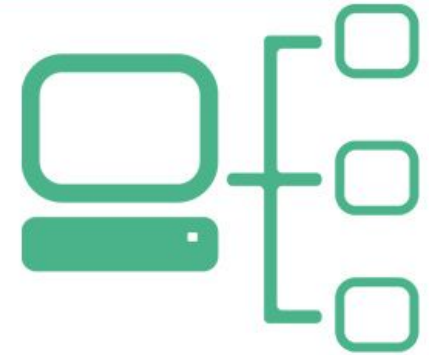


# Ejemplos de uso



- Cada router que reenvía un datagrama IP tiene que disminuir el campo de tiempo de vida (TTL) de la cabecera IP en una unidad; si el TTL llega a 0, se envía un mensaje ICMP "tiempo de vida excedido " a la fuente del datagrama.

# El programa `ping`



- Permite descubrir si una estación se encuentra activa en la red.
- Envía un mensaje ICMP de tipo 8 ("petición de eco").
- El receptor debe responder con mensaje ICMP de tipo 0 ("Respuesta de eco")

```

christian@laptop: ~ - Konsole
christian@laptop:~$ ping -c 3 www.ufro.cl
PING ramtun.ufro.cl (146.83.204.136) 56(84) bytes of data.
64 bytes from ramtun.ufro.cl (146.83.204.136): icmp_seq=1 ttl=51 time=36.2 ms
64 bytes from ramtun.ufro.cl (146.83.204.136): icmp_seq=2 ttl=51 time=95.6 ms
64 bytes from ramtun.ufro.cl (146.83.204.136): icmp_seq=3 ttl=51 time=457 ms

--- ramtun.ufro.cl ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2003ms
rtt min/avg/max/mdev = 36.239/196.391/457.327/186.095 ms
christian@laptop:~$ █

```

Capturing from wlan0 (icmp) [Wireshark 1.10.6 (v1.10.6 from master-1.10)]

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help

Filter:  Expression... Clear Apply Guardar

No.	Source	Destination	Protocol	Length	Info
1	192.168.100.128	146.83.204.136	ICMP	98	Echo (ping) request id=0x256a, seq=1/256, ttl=
2	192.168.100.128	200.30.192.15	ICMP	136	Destination unreachable (Port unreachable)
3	146.83.204.136	192.168.100.128	ICMP	98	Echo (ping) reply id=0x256a, seq=1/256, ttl=
4	192.168.100.128	146.83.204.136	ICMP	98	Echo (ping) request id=0x256a, seq=2/512, ttl=
5	146.83.204.136	192.168.100.128	ICMP	98	Echo (ping) reply id=0x256a, seq=2/512, ttl=
6	192.168.100.128	146.83.204.136	ICMP	98	Echo (ping) request id=0x256a, seq=3/768, ttl=
7	146.83.204.136	192.168.100.128	ICMP	98	Echo (ping) reply id=0x256a, seq=3/768, ttl=

▶ Frame 1: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface wlan0

▶ Ethernet II, Src: HonHaiPr\_18:15:9f (78:e4:00:18:15:9f), Dst: Cisco\_80:3a:29

▶ Internet Protocol Version 4, Src: 192.168.100.128 (192.168.100.128), Dst: 146.83.204.136

▶ Internet Control Message Protocol

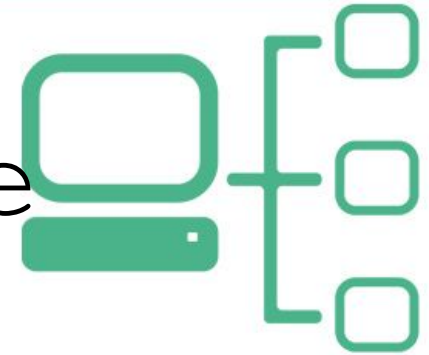
```

0000  00 23 5e 80 3a a0 78 e4 00 18
0010  00 54 d9 45 40 00 40 01 dd 5e
0020  cc 88 08 00 0c 63 25 6a 00 01
0030  00 00 35 39 0d 00 00 00 00 00
0040  16 17 18 19 1a 1b 1c 1d 1e 1f
0050  26 27 28 29 2a 2b 2c 2d 2e 2f
0060  36 37

```

wlan0: <live capture in progress> File... Packets: 7 · Displayed: 7 ... Profile: Default

# El programa `traceroute`



- Permite encontrar las rutas entre un origen y un destino.
- Utiliza un mecanismo basado en mensajes genéricos ICMP:
  - Se envían paquetes al destino con TTL secuencialmente ascendentes.
  - El paquete con  $TTL = 1$  será rechazado por el primer direccionador, el que tenga  $TTL = 2$  por el segundo, etc.
  - Cada uno de los direccionadores devolverá un mensaje ICMP “tiempo de vida agotado”.
  - Cuando el mensaje llega al destino, debe devolver algún mensaje para saber que la secuencia ha finalizado.



```

christian@laptop: ~ -- Konsole
christian@laptop:~$ traceroute www.ufro.cl
traceroute to www.ufro.cl (146.83.204.136), 30 hops max, 60 byte packets
 1  192.168.100.1 (192.168.100.1)  5.371 ms  5.326 ms  5.295 ms
 2  * * *
 3  192.168.243.50 (192.168.243.50)  42.042 ms  42.046 ms  42.032 ms
 4  192.168.22.89 (192.168.22.89)  42.016 ms  42.000 ms  43.056 ms
 5  200.10.224.157 (200.10.224.157)  51.067 ms  51.069 ms  51.065 ms
 6  * * *
 7  * * *
 8  * * *
 9  gw2-reuna.cust.movistar.cl (200.91.0.214)  43.709 ms  49.249 ms  51.942 ms
10  ra-ufro-icn.reuna.cl (146.83.247.126)  72.221 ms  35.686 ms  38.790 ms
11  ramtun.ufro.cl (146.83.204.136)  48.088 ms  43.908 ms  47.783 ms
12  ramtun.ufro.cl (146.83.204.136)  43.820 ms !X  41.241 ms !X  40.125 ms !X
christian@laptop:~$ 

```

\*wlan0 (icmp) [Wireshark 1.10.6 (v1.10.6 from master-1.10)]

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help

Filter:  Expression... Clear Apply Guardar

No.	Source	Destination	Protocol	Length	Info
14	200.91.0.214	192.168.100.128	ICMP	70	Time-to-live exceeded (Time to live exceeded)
15	200.91.0.214	192.168.100.128	ICMP	70	Time-to-live exceeded (Time to live exceeded)
16	200.91.0.214	192.168.100.128	ICMP	70	Time-to-live exceeded (Time to live exceeded)
17	146.83.247.126	192.168.100.128	ICMP	70	Time-to-live exceeded (Time to live exceeded)
18	146.83.247.126	192.168.100.128	ICMP	70	Time-to-live exceeded (Time to live exceeded)
19	146.83.247.126	192.168.100.128	ICMP	70	Time-to-live exceeded (Time to live exceeded)
20	146.83.204.136	192.168.100.128	ICMP	70	Time-to-live exceeded (Time to live exceeded)
21	146.83.204.136	192.168.100.128	ICMP	70	Time-to-live exceeded (Time to live exceeded)
22	146.83.204.136	192.168.100.128	ICMP	70	Time-to-live exceeded (Time to live exceeded)
23	146.83.204.136	192.168.100.128	ICMP	102	Destination unreachable (Host administrative)
24	146.83.204.136	192.168.100.128	ICMP	102	Destination unreachable (Host administrative)
25	146.83.204.136	192.168.100.128	ICMP	102	Destination unreachable (Host administrative)
26	146.83.204.136	192.168.100.128	ICMP	102	Destination unreachable (Host administrative)

▶ Frame 1: 136 bytes on wire (1088 bits), 136 bytes captured (1088 bits) on wlan0

▶ Ethernet II, Src: HonHaiPr 18:15:9f (78:e4:00:18:15:9f), Dst: Cisco 80:3a:ae:00:00:00

▶ Internet Protocol Version 4, Src: 192.168.100.128 (192.168.100.128), Dst: 146.83.204.136

▶ Internet Control Message Protocol

```

0000  00 23 5e 80 3a a0 78 e4 00 18
0010  00 7a 98 3e 00 00 40 01 34 2e
0020  c0 0f 03 03 aa af 00 00 00 00
0030  40 00 3a 11 93 38 c8 1e c0 0f
0040  45 19 00 4a ea 09 96 ae 81 80
0050  00 00 03 77 77 77 04 75 66 72
0060  01 00 01 c0 0c 00 05 00 01 00
0070  72 61 6d 74 75 6e c0 10 c0 29
0080  00 0d 00 04 92 53 cc 88

```

File: "/tmp/wireshark\_pcapng\_wlan0\_..." Packets: 26 · Displayed: ... Profile: Default