

TP 5 – Trames ARP, ICMP et DNS

Sommaire

1. Capture de trames ARP et ICMP.....	2
2. Capture de trames ARP, DNS et ICMP.....	4
3. Commande Tracert et capture de trames ICMP.....	7

1. Capture de trames ARP et ICMP

- Capture de trame suite au ping sur le serveur roi (Trame ARP et ICMP)

No.	Time	Source	Destination	Protocol	Length	Info
53	17.382762	Dell_12:da:64	Broadcast	ARP	60	Who has 172.17.1.215? Tell 172.17.1.201
56	18.202211	VMware_fc:23:2b	Broadcast	ARP	60	Who has 172.17.245.250? Tell 172.17.246.250
60	19.226297	VMware_fc:23:2b	Broadcast	ARP	60	Who has 172.17.245.250? Tell 172.17.246.250
72	20.250202	VMware_fc:23:2b	Broadcast	ARP	60	Who has 172.17.245.250? Tell 172.17.246.250
73	23.458690	Dell_12:d6:1d	Broadcast	ARP	42	Who has 172.17.254.1? Tell 172.17.1.202
74	23.458908	Dell_7d:0e:2b	Dell_12:d6:1d	ARP	60	172.17.254.1 is at d4:ae:52:7d:0e:2b
75	23.458918	172.17.1.202	172.17.254.1	ICMP	74	Echo (ping) request id=0x0001, seq=13/3328, ttl=128 (reply in 76)
76	23.459136	172.17.254.1	172.17.1.202	ICMP	74	Echo (ping) reply id=0x0001, seq=13/3328, ttl=128 (request in 75)
77	24.462528	172.17.1.202	172.17.254.1	ICMP	74	Echo (ping) request id=0x0001, seq=14/3584, ttl=128 (reply in 78)

> Frame 73: 42 bytes on wire (336 bits), 42 bytes captured	0000	ff ff ff ff ff ff d8 9e f3 12 d6 1d 08 06 00 01
> Ethernet II, Src: Dell_12:d6:1d (d8:9e:f3:12:d6:1d), Dst	0010	08 00 06 04 00 01 d8 9e f3 12 d6 1d ac 11 01 ca
Address Resolution Protocol (request)	0020	00 00 00 00 00 00 ac 11 fe 01

```

Hardware type: Ethernet (1)
Protocol type: IPv4 (0x0800)
Hardware size: 6
Protocol size: 4
Opcode: request (1)
Sender MAC address: Dell_12:d6:1d (d8:9e:f3:12:d6:1d)
Sender IP address: 172.17.1.202
Target MAC address: 00:00:00_00:00:00 (00:00:00:00:00)
Target IP address: 172.17.254.1
  
```

- Vérification du cache ARP pour vérifier la présence de ROI

```

C:\Windows\System32>arp -a

Interface : 172.17.1.202 --- 0x8
  Adresse Internet      Adresse physique      Type
  172.17.0.1            d8-9e-f3-11-14-5f    dynamique
  172.17.244.1          00-0c-29-76-e3-f7    dynamique
  172.17.250.2          00-1f-ca-97-2c-56    dynamique
  172.17.254.1          d4-ae-52-7d-0e-2b    dynamique
  224.0.0.2             01-00-5e-00-00-02    statique
  224.0.0.22            01-00-5e-00-00-16    statique
  239.255.102.18        01-00-5e-7f-66-12    statique
  239.255.255.250       01-00-5e-7f-ff-fa    statique

Interface : 192.168.56.1 --- 0x11
  Adresse Internet      Adresse physique      Type
  224.0.0.22            01-00-5e-00-00-16    statique
  239.255.102.18        01-00-5e-7f-66-12    statique
  239.255.255.250       01-00-5e-7f-ff-fa    statique

Interface : 172.31.48.1 --- 0x12
  Adresse Internet      Adresse physique      Type
  224.0.0.22            01-00-5e-00-00-16    statique
  239.255.102.18        01-00-5e-7f-66-12    statique
  239.255.255.250       01-00-5e-7f-ff-fa    statique
  
```

- Les octets 0x0C et 0x0D, respectivement 08 06 signifient que dans Ethernet est encapsulé ARP.
- La trame ARP Request va demander en **broadcast** à toute les machines, laquelle possède une **IP précise** afin qu'elle lui renvoie son **Adresse MAC**.
- Les octets 0x04 et 0x05 ligne 0010 sont l'opcode, ici 00 01 (1) donc une request.
Dans la reply, l'opcode est 00 02 (2)
- La longueur du message ARP dans la trame ARP request est de 28 bytes
- La longueur de la trame ARP Request est de 42 bytes
- La longueur de la tram ARP Reply est de 60 bytes
- 18 Octets sont utilisés pour le padding sur la Reply, 0 sont utilisés pour la Request
- TRAME ARP REQUEST :

MAC Destination : FF:FF:FF:FF:FF:FF

MAC Source : d8:9e:f3:12:d6:1d

Ethernet Type : 08 06

Opcode : 00 01

MAC Cible : FF:FF:FF:FF:FF:FF

IP Cible : 172.17.254.1

> Frame 75: 74 bytes on wire (592 bits), 74 bytes captur	0000	d4 ae 52 7d 0e 2b d8 9e f3 12 d6 1d 08 00 45 00	..R}+... ..E.
> Ethernet II, Src: Dell_12:d6:1d (d8:9e:f3:12:d6:1d), [0010	00 3c 67 b6 00 00 80 01 00 00 ac 11 01 ca ac 11	<g.....
> Internet Protocol Version 4, Src: 172.17.1.202, Dst: 1	0020	fe 01 08 00 4d 4e 00 01 00 0d 61 62 63 64 65 66	...MN... ..abcdef
▼ Internet Control Message Protocol	0030	67 68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76	ghijklmn opqrstuv
Type: 8 (Echo (ping) request)	0040	77 61 62 63 64 65 66 67 68 69	wabcdefg hi
Code: 0			
Checksum: 0x4d4e [correct]			
[Checksum Status: Good]			
Identifiant (BE): 1 (0x0001)			
Identifiant (LE): 256 (0x0100)			
Sequence Number (BE): 13 (0x000d)			
Sequence Number (LE): 3328 (0x0d00)			
[Response frame: 76]			
> Data (32 bytes)			

- Les octets 0x0C et 0x0D couche 0000, respectivement 08 00, signifie que dans la trame est encapsulé IPv4.
- L'octet 0x07 ligne 0010 a pour valeur 01, soit le protocole ICMP.
- Longueur de la trame : 74
- Longueur du paquet IP : 20
- Longueur du message ICMP : 40
- L'octet de position 0x02 ligne 0020 a pour valeur 08, qui est le type de message ICMP (request)
- 0x02 ligne 0020 de la trame ICMP Echo Reply est le champ Type, qui a pour valeur 00, soit une Reply.

2. Capture de trames ARP, DNS et ICMP

16	5.421775	Dell_12:d6:1d	Broadcast	ARP	42	Who has 172.17.254.1? Tell 172.17.1.202
17	5.422051	Dell_7d:0e:2b	Dell_12:d6:1d	ARP	60	172.17.254.1 is at d4:ae:52:7d:0e:2b
18	5.422061	172.17.1.202	172.17.254.1	DNS	74	Standard query 0x4771 A www.ac-nice.fr
19	5.466401	172.17.254.1	172.17.1.202	DNS	126	Standard query response 0x4771 A www.ac-nice.fr CNAME cs234.wpc.alphacdn.net A 93.184.221.161
20	5.472634	Dell_12:d6:1d	Broadcast	ARP	42	Who has 172.17.250.2? Tell 172.17.1.202
21	5.472834	Cisco_97:2c:56	Dell_12:d6:1d	ARP	60	172.17.250.2 is at 00:1f:ca:97:2c:56
22	5.472844	172.17.1.202	93.184.221.161	ICMP	74	Echo (ping) request id=0x0001, seq=41/10496, ttl=128 (reply in 23)
23	5.504669	93.184.221.161	172.17.1.202	ICMP	74	Echo (ping) reply id=0x0001, seq=41/10496, ttl=56 (request in 22)
25	6.267365	VMware_fc:23:2b	Broadcast	ARP	60	Who has 172.17.245.250? Tell 172.17.246.250
26	6.485053	172.17.1.202	93.184.221.161	ICMP	74	Echo (ping) request id=0x0001, seq=42/10752, ttl=128 (reply in 27)
27	6.517521	93.184.221.161	172.17.1.202	ICMP	74	Echo (ping) reply id=0x0001, seq=42/10752, ttl=56 (request in 26)
28	7.295290	VMware_fc:23:2b	Broadcast	ARP	60	Who has 172.17.245.250? Tell 172.17.246.250
29	7.500732	172.17.1.202	93.184.221.161	ICMP	74	Echo (ping) request id=0x0001, seq=43/11008, ttl=128 (reply in 30)
30	7.532779	93.184.221.161	172.17.1.202	ICMP	74	Echo (ping) reply id=0x0001, seq=43/11008, ttl=56 (request in 29)
31	8.319166	VMware_fc:23:2b	Broadcast	ARP	60	Who has 172.17.245.250? Tell 172.17.246.250
32	8.512891	172.17.1.202	93.184.221.161	ICMP	74	Echo (ping) request id=0x0001, seq=44/11264, ttl=128 (reply in 33)
33	8.548504	93.184.221.161	172.17.1.202	ICMP	74	Echo (ping) reply id=0x0001, seq=44/11264, ttl=56 (request in 32)

>	Frame 1: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface \Device\NPF_{6A115EF9-A10F-4453-956D-5C2DD42DCC70}, interface 0000	ff ff ff ff ff d8 9e f3 12
>	Ethernet II, Src: Dell_12:bd:b4 (d8:9e:f3:12:bd:b4), Dst: Broadcast (ff:ff:ff:ff:ff:ff)	0010 08 00 06 04 00 01 d8 9e f3 12
>	Address Resolution Protocol (request)	0020 00 00 00 00 00 00 ac 11 01 dd
		0030 00 00 00 00 00 00 00 00 00 00

- L'adresse MAC recherchée est celle de la passerelle (172.17.250.2)

Trame ARP request
MAC Destination : FF:FF:FF:FF:FF:FF
MAC Source : d8:e9:f3:12:d6

Ethernet Type:0806 (ARP)

Opcode = 00 01 (Request)

MAC Cible : 00:00:00:00:00:00

IP Cible:172.17.250.2

- Le ping via ICMP nécessite une adresse MAC. Pour obtenir l'adresse MAC, on doit passer par ARP à l'aide d'une IP. Pour obtenir l'ip, il faut convertir le nom de domaine en IP à l'aide de DNS.

```
Nom d'enregistrement. : roi.prince.local
Type d'enregistrement : 1
Durée de vie . . . . : 575
Longueur de données . : 4
Section . . . . . : Supplémentaire
Enregistrement (hôte) : 172.17.254.1

Nom d'enregistrement. : roi2.prince.local
Type d'enregistrement : 1
Durée de vie . . . . : 575
Longueur de données . : 4
Section . . . . . : Supplémentaire
Enregistrement (hôte) : 172.17.244.1

www.ac-nice.fr
-----
Nom d'enregistrement. : www.ac-nice.fr
Type d'enregistrement : 5
Durée de vie . . . . : 2127
Longueur de données . : 8
Section . . . . . : Réponse
Enregistrement CNAME : cs234.wpc.alphacdn.net

Nom d'enregistrement. : cs234.wpc.alphacdn.net
Type d'enregistrement : 1
Durée de vie . . . . : 2127
Longueur de données . : 4
Section . . . . . : Réponse
Enregistrement (hôte) : 93.184.221.161
```

No.	Time	Source	Destination	Protocol	Length	Info
54	7.457355	172.17.1.202	93.184.221.161	ICMP	74	Echo (ping) request id=0x0001, seq=45/11520, ttl=128 (reply in 55)
55	7.489729	93.184.221.161	172.17.1.202	ICMP	74	Echo (ping) reply id=0x0001, seq=45/11520, ttl=56 (request in 54)
74	8.464202	172.17.1.202	93.184.221.161	ICMP	74	Echo (ping) request id=0x0001, seq=46/11776, ttl=128 (reply in 75)
75	8.497258	93.184.221.161	172.17.1.202	ICMP	74	Echo (ping) reply id=0x0001, seq=46/11776, ttl=56 (request in 74)
77	9.477783	172.17.1.202	93.184.221.161	ICMP	74	Echo (ping) request id=0x0001, seq=47/12032, ttl=128 (reply in 78)
78	9.515282	93.184.221.161	172.17.1.202	ICMP	74	Echo (ping) reply id=0x0001, seq=47/12032, ttl=56 (request in 77)
89	10.494032	172.17.1.202	93.184.221.161	ICMP	74	Echo (ping) request id=0x0001, seq=48/12288, ttl=128 (reply in 90)
90	10.525413	93.184.221.161	172.17.1.202	ICMP	74	Echo (ping) reply id=0x0001, seq=48/12288, ttl=56 (request in 89)

Aucune requête DNS

On vide le cache DNS afin de ré-obtenir une requête DNS

No.	Time	Source	Destination	Protocol	Length	Info
7	2.668611	172.17.1.202	172.17.254.1	DNS	74	Standard query 0x6d57 A www.ac-nice.fr
8	2.669058	172.17.254.1	172.17.1.202	DNS	126	Standard query response 0x6d57 A www.ac-nice.fr CNAME cs234.wpc.alphacdn.net A 93.184.221.161
9	2.674877	172.17.1.202	93.184.221.161	ICMP	74	Echo (ping) request id=0x0001, seq=49/12544, ttl=128 (reply in 10)
10	2.706744	93.184.221.161	172.17.1.202	ICMP	74	Echo (ping) reply id=0x0001, seq=49/12544, ttl=56 (request in 9)
15	3.681010	172.17.1.202	93.184.221.161	ICMP	74	Echo (ping) request id=0x0001, seq=50/12800, ttl=128 (reply in 16)
16	3.713136	93.184.221.161	172.17.1.202	ICMP	74	Echo (ping) reply id=0x0001, seq=50/12800, ttl=56 (request in 15)
20	4.695314	172.17.1.202	93.184.221.161	ICMP	74	Echo (ping) request id=0x0001, seq=51/13056, ttl=128 (reply in 21)
21	4.726377	93.184.221.161	172.17.1.202	ICMP	74	Echo (ping) reply id=0x0001, seq=51/13056, ttl=56 (request in 20)
27	5.712676	172.17.1.202	93.184.221.161	ICMP	74	Echo (ping) request id=0x0001, seq=52/13312, ttl=128 (reply in 28)
28	5.743979	93.184.221.161	172.17.1.202	ICMP	74	Echo (ping) reply id=0x0001, seq=52/13312, ttl=56 (request in 27)

12	4.303334	VMware_22:87:6d	Broadcast	ARP	60	Who has 172.17.244.15? Tell 172.17.243.11
16	5.421775	Dell_12:d6:1d	Broadcast	ARP	42	Who has 172.17.254.1? Tell 172.17.1.202
17	5.422051	Dell_7d:0e:2b	Dell_12:d6:1d	ARP	60	172.17.254.1 is at d4:ae:52:7d:0e:2b
18	5.422061	172.17.1.202	172.17.254.1	DNS	74	Standard query 0x4771 A www.ac-nice.fr
19	5.466401	172.17.254.1	172.17.1.202	DNS	126	Standard query response 0x4771 A www.ac-nice.fr C...
20	5.472634	Dell_12:d6:1d	Broadcast	ARP	42	Who has 172.17.250.2? Tell 172.17.1.202
21	5.472834	Cisco_97:2c:56	Dell_12:d6:1d	ARP	60	172.17.250.2 is at 00:1f:ca:97:2c:56
22	5.472844	172.17.1.202	93.184.221.161	ICMP	74	Echo (ping) request id=0x0001, seq=41/10496, ttl=...
23	5.504669	93.184.221.161	172.17.1.202	ICMP	74	Echo (ping) reply id=0x0001, seq=41/10496, ttl=...
25	6.267365	VMware_fc:23:2b	Broadcast	ARP	60	Who has 172.17.245.250? Tell 172.17.246.250

```

> Frame 18: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface 0
> Ethernet II, Src: Dell_12:d6:1d (d8:9e:f3:12:d6:1d), Dst: Dell_7d:0e:2b (08:00:0e:1c:7d:0e:2b)
> Internet Protocol Version 4, Src: 172.17.1.202, Dst: 172.17.254.1
> User Datagram Protocol, Src Port: 59019, Dst Port: 53
  > Domain Name System (query)
    Transaction ID: 0x4771
    > Flags: 0x0100 Standard query
    Questions: 1
    Answer RRs: 0
    Authority RRs: 0
    Additional RRs: 0
    > Queries
      [Response In: 19]
    0000 d4 ae 52 7d 0e 2b d8 9e f3 12 d6 1d 08 00 45 00  ..R]
    0010 00 3c 68 8f 00 00 80 11 00 00 ac 11 01 ca ac 11  <h
    0020 fe 01 e6 8b 00 35 00 28 58 28 47 71 01 00 00 01  ....
    0030 00 00 00 00 00 00 03 77 77 77 07 61 63 2d 6e 69  ....
    0040 63 65 02 66 72 00 00 01 00 01                                     ce:f
  
```

- Les différents protocoles utilisés dans une Trame DNS sont : Ethernet, IPv4, UDP, DNS
- La machine destinataire de la requête DNS est le routeur Cisco (172.17.250.2)
- L'ip du routeur est : 172.17.250.2
- Les octets de position 0x0C et 0x0D ligne 0000, respectivement 08 00 signifie que ce qui est encapsulé dans Ethernet est IP. 0x07 ligne 0010 (11) est UDP.
- Les octets 0x04 et 0x05 ligne 0020, respectivement 00 35 (53) signifie que ce qui est encapsulé dans UDP est DNS.

18	5.422061	172.17.1.202	172.17.254.1	DNS	74 Standard query 0x4771 A www.ac-nice.fr
19	5.466401	172.17.254.1	172.17.1.202	DNS	126 Standard query response 0x4771 A www.ac-nice.fr
20	5.472634	Dell_12:d6:1d	Broadcast	ARP	42 Who has 172.17.250.2? Tell 172.17.1.202
21	5.472834	Cisco_97:2c:56	Dell_12:d6:1d	ARP	60 172.17.250.2 is at 00:1f:ca:97:2c:56
22	5.472844	172.17.1.202	93.184.221.161	ICMP	74 Echo (ping) request id=0x0001, seq=41/10496, t
23	5.504669	93.184.221.161	172.17.1.202	ICMP	74 Echo (ping) reply id=0x0001, seq=41/10496, t
25	6.267365	VMware_fc:23:2b	Broadcast	ARP	60 Who has 172.17.245.250? Tell 172.17.246.250


```

Class: IN (0x0001)
  Answers
  www.ac-nice.fr: type CNAME, class IN, cname cs234.wpc.alp
    Name: www.ac-nice.fr
    Type: CNAME (Canonical NAME for an alias) (5)
    Class: IN (0x0001)
    Time to live: 5527 (1 hour, 32 minutes, 7 seconds)
    Data length: 24
    CNAME: cs234.wpc.alphacdn.net
  cs234.wpc.alphacdn.net: type A, class IN, addr 93.184.221.161
    Name: cs234.wpc.alphacdn.net
    Type: A (Host Address) (1)
    Class: IN (0x0001)
    Time to live: 3599 (59 minutes, 59 seconds)
    Data length: 4
    Address: 93.184.221.161
  [Request In: 18]
  [Time: 0.044340000 seconds]
0000 d8 9e f3 12 d6 1d d4 ae 52 7d 0e 2b 08 00 45 00
0010 00 70 e9 fb 00 00 80 11 f8 92 ac 11 fe 01 ac 11
0020 01 ca 00 35 e6 8b 00 5c 3b db 47 71 81 80 00 01
0030 00 02 00 00 00 00 03 77 77 77 07 61 63 2d 6e 69
0040 63 65 02 66 72 00 00 01 00 01 c0 0c 00 05 00 01
0050 00 00 15 97 00 18 05 63 73 32 33 34 03 77 70 63
0060 08 61 6c 70 68 61 63 64 6e 03 6e 65 74 00 c0 2c
0070 00 01 00 01 00 00 0e 0f 00 04 5d b8 dd a1

```

- Trame DNS query : Valeur hexadécimales des octets correspondant au nom de domaine internet www.ac-nice.fr : 03 77 77 77 07 61 63 2d 6e 69 63 65 02 66 72 00
- Trame DNS response : Valeurs hexadécimales et décimales de l'adresse IP du serveur web hébergeant le site de l'académie de Nice : 5d b8 dd a1 (93.184.221.161)

3. Commande Tracert et capture de trames ICMP.

No.	icmp icmpv6	Source	Destination	Protocol	Length	Info
14026	15.522382	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2945/33035, ttl=2 (no response found!)
18426	15.522386	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2946/33291, ttl=2 (no response found!)
22999	19.534206	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2947/33547, ttl=3 (no response found!)
27436	23.533369	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2948/33803, ttl=3 (no response found!)
28178	24.198281	194.199.224.233	192.168.1.4	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
31870	27.533024	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2949/34059, ttl=3 (no response found!)
36518	31.525185	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2950/34315, ttl=4 (no response found!)
41161	35.533055	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2951/34571, ttl=4 (no response found!)
45806	39.536000	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2952/34827, ttl=4 (no response found!)
50153	43.529783	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2953/35083, ttl=5 (no response found!)
50186	43.546124	212.194.170.74	192.168.1.4	ICMP	182	Time-to-live exceeded (Time to live exceeded in transit)
50187	43.546590	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2954/35339, ttl=5 (no response found!)
50219	43.565698	212.194.170.74	192.168.1.4	ICMP	182	Time-to-live exceeded (Time to live exceeded in transit)
50220	43.568172	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2955/35595, ttl=5 (no response found!)
50233	43.584744	212.194.170.74	192.168.1.4	ICMP	182	Time-to-live exceeded (Time to live exceeded in transit)
51169	44.587165	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2956/35851, ttl=6 (no response found!)
51191	44.603269	212.194.171.9	192.168.1.4	ICMP	182	Time-to-live exceeded (Time to live exceeded in transit)
51192	44.604131	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2957/36107, ttl=6 (no response found!)
51209	44.621001	212.194.171.9	192.168.1.4	ICMP	182	Time-to-live exceeded (Time to live exceeded in transit)
51212	44.622066	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2958/36363, ttl=6 (no response found!)
51231	44.638281	212.194.171.9	192.168.1.4	ICMP	182	Time-to-live exceeded (Time to live exceeded in transit)
56845	50.185115	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2959/36619, ttl=7 (no response found!)
56863	50.201992	212.194.171.141	192.168.1.4	ICMP	182	Time-to-live exceeded (Time to live exceeded in transit)
56864	50.203143	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2960/36875, ttl=7 (no response found!)
56882	50.219514	212.194.171.141	192.168.1.4	ICMP	182	Time-to-live exceeded (Time to live exceeded in transit)
56883	50.220388	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2961/37131, ttl=7 (no response found!)
56900	50.236062	212.194.171.141	192.168.1.4	ICMP	182	Time-to-live exceeded (Time to live exceeded in transit)
57948	51.227848	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2962/37387, ttl=8 (no response found!)
61881	55.036061	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2963/37643, ttl=8 (no response found!)
61889	55.053323	62.34.2.88	192.168.1.4	ICMP	134	Time-to-live exceeded (Time to live exceeded in transit)
61890	55.054433	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2964/37899, ttl=8 (no response found!)
61912	55.071257	62.34.2.88	192.168.1.4	ICMP	134	Time-to-live exceeded (Time to live exceeded in transit)
68424	60.604787	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2965/38155, ttl=9 (no response found!)
68433	60.620988	152.195.108.200	192.168.1.4	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
68437	60.622197	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2966/38411, ttl=9 (no response found!)
68453	60.640109	152.195.108.200	192.168.1.4	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
68454	60.641395	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2967/38667, ttl=9 (no response found!)
68484	60.658845	152.195.108.200	192.168.1.4	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
69595	61.644982	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2968/38923, ttl=10 (no response found!)
69617	61.662496	152.195.108.129	192.168.1.4	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
69622	61.664016	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2969/39179, ttl=10 (no response found!)
69659	61.686070	152.195.108.129	192.168.1.4	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
69660	61.687050	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2970/39435, ttl=10 (no response found!)
69678	61.704083	152.195.108.129	192.168.1.4	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
70684	62.700495	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2971/39691, ttl=11 (reply in 70705)
70705	62.718735	93.184.221.161	192.168.1.4	ICMP	106	Echo (ping) reply id=0x0001, seq=2971/39691, ttl=54 (request in 70684)
70710	62.720045	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2972/39947, ttl=11 (reply in 70723)
70723	62.739199	93.184.221.161	192.168.1.4	ICMP	106	Echo (ping) reply id=0x0001, seq=2972/39947, ttl=54 (request in 70710)
70727	62.740664	192.168.1.4	93.184.221.161	ICMP	106	Echo (ping) request id=0x0001, seq=2973/40203, ttl=11 (reply in 70745)
70745	62.757650	93.184.221.161	192.168.1.4	ICMP	106	Echo (ping) reply id=0x0001, seq=2973/40203, ttl=54 (request in 70727)
78088	69.201265	194.199.224.233	192.168.1.4	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)

```
C:\Users\dupui>tracert www.ac-nice.fr
```

```
Détermination de l'itinéraire vers cs234.wpc.alphacd.net [93.184.221.161]
avec un maximum de 30 sauts :
```

```
 1    1 ms    1 ms    1 ms    bouygues [192.168.1.254]
 2    *      *      *      Délai d'attente de la demande dépassé.
 3    *      *      *      Délai d'attente de la demande dépassé.
 4    *      *      *      Délai d'attente de la demande dépassé.
 5   16 ms   19 ms   16 ms   be21.cbr01-poi.net.bbox.fr [212.194.170.74]
 6   16 ms   16 ms   16 ms   212.194.171.9
 7   16 ms   16 ms   15 ms   be5.cbr01-cro.net.bbox.fr [212.194.171.141]
 8    *      17 ms   16 ms   62.34.2.88
 9   16 ms   17 ms   17 ms   ae-130.border1.pam.edgecastcdn.net [152.195.108.200]
10   17 ms   22 ms   17 ms   ae-65.core1.paa.edgecastcdn.net [152.195.108.129]
11   18 ms   19 ms   17 ms   93.184.221.161
```

```
Itinéraire déterminé.
```

- Première trame ICMP Echo Request :
IP Destination : 5d b8 dd a1 soit 93.184.221.161
Champ TTL : 01 soit 1
Valeur du champ Type : 08 soit 8
- Valeur du champ Type de la trame d'erreur TTL : 11 soit 0b