TD IPv6 - 6 Novembre 2012

Exercice 1

1. How do you correctly compress the following IPv6 address (Note that multiple correct answers are possible):
2001:0db8:0000:0000:0000:0000:0000:0c50
A) 2001:0db8:0:0:0:0:0:0c50
B) 2001:0db8::0c50
C) 2001:db8::c50
D) 2001:db8::c5

2. How do you correctly compress the following IPv6 address (Note that multiple correct answers are possible):

2001:0db8:0000:0000:b450:0000:0000:00b4
A) 2001:db8::b450::b4
B) 2001:db8::b450:0:0:b4
C) 2001:db8::b45:0000:0000:b4
D) 2001:db8:0:0:b450::b4

3. How do you correctly compress the following IPv6 address (Note that multiple correct answers are possible):

2001:0db8:00f0:0000:0000:03d0:0000:00ff
A) 2001:0db8:00f0::3d0:0:00ff
B) 2001:db8:f0:0:0:3d0:0:ff
C) 2001:db8:f0::3d0:0:ff
D) 2001:0db8:0f0:0:0:3d0:0:0ff

4. How do you correctly compress the following IPv6 address (Note that multiple correct answers are possible):

2001:0db8:0f3c:00d7:7dab:03d0:0000:00ff
A) 2001:db8:f3c:d7:7dab:3d:0:ff
B) 2001:db8:f3c:d7:7dab:3d0:0:ff
C) 2001:db8:f3c:d7:7dab:3d0::ff
D) 2001:0db8:0f3c:00d7:7dab:03d::00ff

Exercice 2

Write the Link-Local Unicast Address corresponding to the following MAC (Ethernet) interface address 00:0d:56:01:13:c9

Write the Solicited-Node Multicast Address corresponding to the same interface.

How many bits are used for the "group identifier" field in IPv6 multicast packets? Hence, how many groups can be defined in IPv6?
Compare this number with:
- the maximum number of groups that could be defined in the IPv4 network (class D addresses)
- the overall number of addresses that exist in IPv4, regardless of their type.

Solution

EUI-64 Address:
02:0d:56:ff:fe:01:13:c9
1111 1110 10 + 54 zeros + EUI-64 Address
fe80:0000:0000:0000:020d:56ff:fe01:13c9 -> fe80::020d:56ff:fe01:13c9

Solicited-Node Multicast Address
ff02::1:ff01:13c9

Exercice 3

a) Si les adresses IPv4 étaient est allouées chaque nanoseconde, combien de temps la réserve d'adresses durera-t-elle ?

b) Si un bloc d'un million d'adresses IPv6 est alloué chaque picoseconde, combien de temps la réserve d'adresses durera-t-elle ?

Solution

- IPv4 : (2^32)/(10^9) = 4.295 secondes (moins de 5 secondes !)
- IPv6: With 16 bytes there are 2^{128} or 3. 4* 10^{38} addresses. If we allocate them at a rate of 10^{18} per second, they will last for 10^{13} years. This number is 1000 times the age of the universe. Of course, the address space is not flat, so they are not allocated linearly, but this calculation shows that even with an allocation scheme with an efficiency of 1/1000 (0.1 percent), one will never run out.