13. IPv6

13.1 IPv6 formats and address types

Read the attached copies, do the activities and solve the following additional exercises.

Exercise 1:

Convert the following hexadecimal numbers to binary numbers:

a) $3af8_{(16)}$ _____

b) $f09b_{(16)}$ _____

Exercise 2:

Convert the following binary numbers to hexadecimal numbers:

a) $111000100010_{(2)}$ _____

b) $11000011010110_{(2)}$ _____

c) $100101100000100_{(2)}$ _____

d) $1100011110101001 1_{(2)}$ _____

Exercise 3:

Convert the following IPv6 addresses to compressed format:

a) `2001:0002:0000:0000:ad01:00cd:0000:0000`

_____

b) `fd01:00df:1234:ad01:ad01:0000:0000:0000`

_____

c) `FE80:3456:1234:1af5:000f:0000:0000:a001`

_____

d) `FF01:0:0:0:0:0:0:0101`

_____

e) `8000:0000:0000:0000:0123:4567:89ab:cdef`

_____

f) `2001:0db8:0000:0001:0000:0000:0010:01ff`

_____

Exercise 4:

Convert the following IPv6 addresses to preferred format. Indicate if the compressed format is wrong.

a) fd::1

_____

b) 2001::23:1::

_____

c) 2003::

_____

d) da:3455::2:1:fe:1

_____

e) ab::2:1

_____

Exercise 5:

Indicate the IPv6 address type.

a) fd03::1 _____

b) fe80::7645:6de2:ff:1 _____

c) :: _____

d) 2001:0db8:85a3::7347 _____

e) ::1 _____

f) fcff:65c3:998a:7890:: _____

g) 2001:628:0:0:0:0:0:1 _____

13.2 Some differences and similarities between IPv4 and IPv6

Subnetting works the same way in IPv6 than in IPv4 except that the subnet mask is called prefix and that only the CIDR notation is used, i.e. 2001:DB8::/32.

Similar to APIPA under IPv4 the link local address in IPv6 is an automatically created IP address but unlike IPv4 every interface keeps its link local address even if it gets an additional unique local or global unicast address. As the link local address is generated out of the MAC address every host in a network can be addressed without any dedicated IP configuration. This is particularly interesting to address devices that have no displays, as for example Wifi access points.

Subnets are by convention not made smaller than /64 even if only two hosts are connected together. This increases security as is it very time intensive to scan such networks.

13.3 Some IPv6 address ranges

- 2000::/3 IANA (World)
- 2001:600::/23 RIPE (Europe, Middle East and Central Asia)
- 2001:7F8::/32 Post Luxembourg
- FF00::/8 Multicast
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