

Convert Computer MAC Addresses to IPv6 EUI-64 Addresses

Juan J. Moreno Santos

December 7 2023

1 Using the six (fake) MAC addresses below, convert each from a 48-bit MAC address to a 64-bit (EUI-64) address.

1. C9:2C:BF:7A:D5:DD

In detail, the steps implemented in each exercise are the following:

- i. Split the MAC address into two 3-byte (24-bit) halves:

$$\text{C9:2C:BF:7A:D5:DD} = \text{C9:2C:BF} \text{ and } \text{7A:D5:DD} \quad (1)$$

- ii. Add FFFE, the missing 16 bits, in the middle:

$$\text{C9:2C:BF:FF:FE:7A:D5:DD} \quad (2)$$

- iii. Format in IPv6 notation, dividing the address into four hexadecimal bits:

$$\text{C92C:BFFF:FE7A:D5DD} \quad (3)$$

- iv. Convert the first octet (C9 in this case) from hexadecimal to binary:

$$\text{C9} = 1100 \text{ and } 1001 = 11001001 \quad (4)$$

- v. Invert the seventh bit:

$$11001001 \Rightarrow 11001011 \quad (5)$$

- vi. Convert the octet from binary back into hexadecimal:

$$11001011 = CB \quad (6)$$

- vii. Replace the first octet with the converted one:

$$\text{C92C:BFFF:FE7A:D5DD} \Rightarrow \text{CB2C:BFFF:FE7A:D5DD} \quad (7)$$

- viii. Add fe80:: to the beginning of the address, and write it in lowercase:

$$\text{fe80::cb2c:bfff:fe7a:d5dd} \quad (8)$$

2. 08:9C:FD:C3:39:ED

- 08:9C:FD:C3:39:ED = 08:9C:FD and C3:39:ED (1)
- 08:9C:FD:FF:FE:C3:39:ED (2)
- 089C:FDFE:FEC3:39ED (3)
- 08 = 00001000 (4)
- 00001000 \Rightarrow 00001010 (5)
- 00001010 = 0A (6)
- 089C:FDFE:FEC3:39ED \Rightarrow 0A9C:FDFE:FEC3:39ED (7)
- fe80::0a9c:fdff:fec3:39ed (8)

3. 5E:9D:8F:CF:3A:FE

- 5E:9D:8F:CF:3A:FE = 5E:9D:8F and CF:3A:FE (1)
- 5E:9D:8F:FF:FE:CF:3A:FE (2)
- 5E9D:8FFF:FECE:3AFE (3)
- 5E = 01011110 (4)
- 01011110 \Rightarrow 1011100 (5)
- 1011100 = 5C (6)
- 5E9D:8FFF:FECE:3AFE \Rightarrow 5C9D:8FFF:FECE:3AFE (7)
- fe80::5c9d:8fff:fece:3afe (8)

4. BB:65:FD:22:FB:68

- BB:65:FD:22:FB:68 = BB:65:FD and 22:FB:68 (1)
- BB:65:FD:FF:FE22:FB:68 (2)
- BB65:FDFE:FE22:FB68 (3)
- BB = 10111011 (4)
- 10111011 \Rightarrow 10111001 (5)
- 10111001 = B9 (6)
- BB65:FDFE:FE22:FB68 \Rightarrow B965:FDFE:FE22:FB68 (7)
- fe80::b965:fdff:fe22:fb68 (8)

5. 96:41:FD:C3:C1:C5

- 96:41:FD:C3:C1:C5 = 96:41:FD and C3:C1:C5 (1)
- 96:41:FD:FF:FE:C3:C1:C5 (2)
- 9641:FDFE:FEC3:C1C5 (3)
- 96 = 10010110 (4)
- 10010110 \Rightarrow 10010100 (5)
- 10010100 = 94 (6)
- 9641:FDFE:FEC3:C1C5 \Rightarrow 9441:FDFE:FEC3:C1C5 (7)
- fe80::9441:fdff:fec3:c1c5 (8)

6. AB:79:B0:CA:F7:BF

$$\text{AB:79:B0:CA:F7:BF} = \text{AB:79:B0} \text{ and } \text{CA:F7:BF} \quad (1)$$

$$\text{AB:79:B0:FF:FE:CA:F7:BF} \quad (2)$$

$$\text{AB79:B0FF:FECA:F7BF} \quad (3)$$

$$\text{AB} = 10101011 \quad (4)$$

$$10101011 \Rightarrow 10101001 \quad (5)$$

$$10101001 = \text{A9} \quad (6)$$

$$\text{AB79:B0FF:FECA:F7BF} \Rightarrow \text{A979:B0FF:FECA:F7BF} \quad (7)$$

$$\text{fe80::a979:b0ff:feca:f7bf} \quad (8)$$