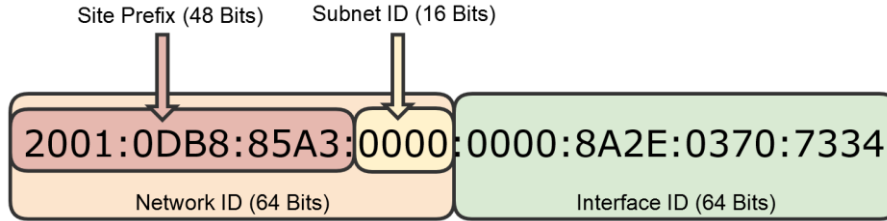


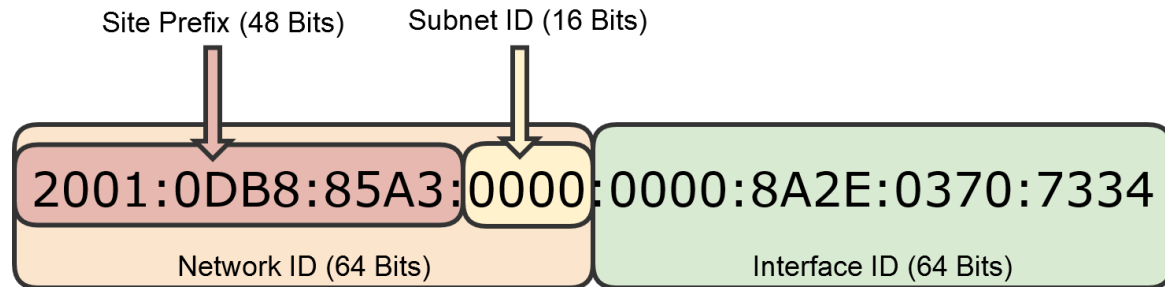
IPv6 Addressing



- 128-bit address composed of eight 16-bit hexadecimal blocks, separated by colons
- Each number or letter is 4 binary bits.
- They are shown in hexadecimal to simplify the address:
 - 128 digits in binary format
 - Up to 64 digits in decimal format.
- Example:
 - **Hexadecimal:** 85A3
 - **Binary:** 1000 0101 1010 0011
 - **Decimal:** 8 5 10 3

Decimal (Base 10)	Binary (Base 2)	Hexadecimal (Base 16)
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

The Network and Interface IDs



- 128-bit address composed of eight 16-bit hexadecimal blocks, separated by colons
- **Network ID**
 - Site Prefix: Used for routing over the Internet.
 - Subnet ID: Used for subnets on internal networks.
- **Interface ID**
 - The host portion of the address, that's automatically configured from the MAC address or manually configured in EUI-64 format.

IPv6 Address Simplification

We can simplify by omitting leading 0's

- 0DB8 → DB8
- 0000 → 0

Can also compress contiguous blocks of 0's into double colon "::" once per address.

- :0000:0000: → ::

2001:0DB8:85A3:0000:0000:8A2E:0370:7334

Leading Zero's Can Be Omitted

2001:DB8:85A3:0:0:8A2E:370:7334

All-Zero Groups Can Be Omitted (Once) to ::

2001:DB8:85A3::8A2E:370:7334

IPv6 CIDR

- We can use CIDR notation with IPv6 addresses, similar to IPv4
 - FE80::8A:0:8398:85A3/64
- This tells us:
 - **Network ID (64-bits):** FE80:0000:0000:0000
 - **Interface ID (64-bits):** 008A:0000:8398:85A3
- A standard IPv6 subnet can have 2^{64} IPv6 addresses:
 - 18,446,744,073,709,551,616 IPv6 Addresses

