

# **COMP 3721**

# **Introduction to Data Communications**

**12c - Week 12 - Extras**

# IPv6 CIDR Notation

- IPv6 uses hierarchical addressing (a prefix and a suffix)
- IPv6 allows **slash** or **CIDR notation**
  - FDEC::BBFF:0:FFFF/**60** → Defines a **prefix** of **60 bits** using CIDR.

# Address Space Allocation

Block prefix	CIDR	Block assignment	Fraction
0000 0000	0000::/8	Special addresses	1/256
001	2000::/3	Global unicast	1/8
1111 110	FC00::/7	Unique local unicast	1/128
1111 1110 10	FE80::/10	Link local addresses	1/1024
1111 1111	FF00::/8	Multicast addresses	1/256

# IPv6 Global Unicast Address

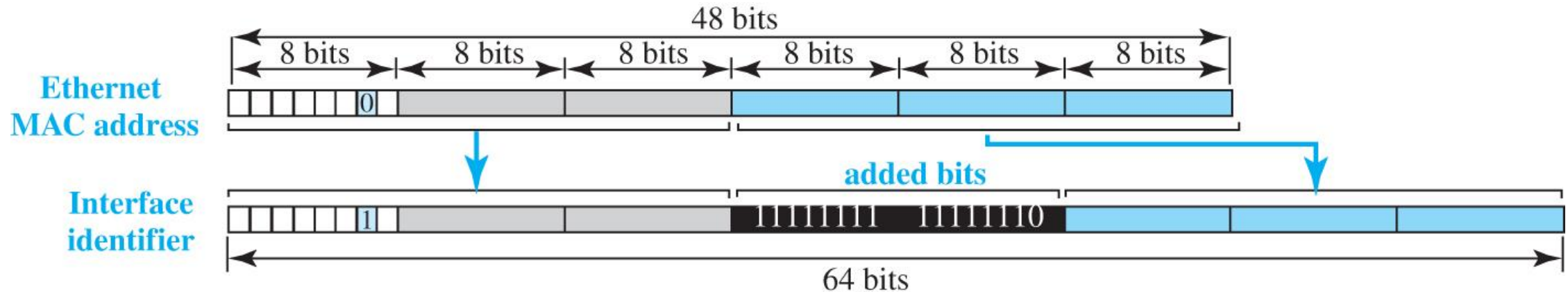
- A block of address space that is used for unicast (one-to-one) communication.
- The **global routing prefix** is used to route the packet through the Internet to the **organization site**, such as the ISP, that owns the block.
- An address in this block is divided into three parts:
  1. **Global routing prefix** ( $n$  bits)
  2. **Subnet identifier** ( $m$  bits)
  3. **Interface identifier** ( $q$  bits)
- CIDR notation: **2000::/3**
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  - 3 leftmost bits are the same for all addresses in this block (001)
  - Size of this block?  **$2^{125}$**

# Interface Identifier and Link-layer Addresses

- **Ethernet protocol**: defines a 48-bit link-layer address.
- The **local/global bit** is changed to **1** and an additional **16 bits are inserted** (15 ones followed by one zero, or **FFFE<sub>16</sub>**).



# Example

- An organization is assigned the block **2000:1456:2474/48**. What is the IPv6 address of an interface in the **third subnet** if the IEEE physical address of the computer is **(F5-A9-23-14-7A-D2)<sub>16</sub>**?
- First, the subnet identifier is appended to the block address:  
**2000:1456:2474:0003**

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- First, the subnet identifier is appended to the block address:  
**2000:1456:2474:0003**
- Second, we calculate the interface identifier as follows:  
We only need to change the **seventh bit** of the **first octet** (i.e., F5) of the physical address from 0 to 1, then, we insert two octet **FFFE<sub>16</sub>**, and change the format to colon hex notation. The result is **F7A9:23FF:FE14:7AD2**.



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- Then, we add the interface identifier (colored in blue) to the global prefix (colored in green) and the subnet identifier (colored in purple), we get:
- **2000:1456:2474:0003:F7A9:23FF:FE14:7AD2/128**