

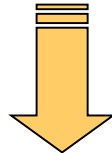
IPv6 Addressing (1/5)

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Thanks to the address length of 128 bits, 2^{128} addresses are possible

- Corresponds to 10^{23} IP addresses per m^2 of the earth's surface (in comparison: age of our solar system: $< 10^{10}$ years)
- 16 bit groups are written in hexadecimal notations with a colon as a separator
- Zero compression:
 - Suppression leading 0's
 - Summary of one (!) 0 sequence

Example: 000E:0C64:0000:0000:0000:1342:0E3E:00FE



E:C64::1342:E3E:FE

IPv6 Addressing (2/5)

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IPv6 address components

- IPv6 address architecture provides 3 components for addresses

2001:08db:3c4d:0015:0000:0000:1a2f:1a2b



Prefix Subnet ID Interface ID

- **Prefix** or **site ID** describes **type of** IPv6 address or designates the **location** (e.g. ISP or company)
- **Subnet ID** describes a **private topology**, e.g., within a private network
- **Interface ID** stands for network interface and can, e.g., be calculated from its MAC address

IPv6 Addressing (3/5)

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IPv6 address types and prefixes (1/3)

■ Unicast addresses

- Designate individual network interfaces – suitable for point-to-point connections

■ Multicast addresses

- Identify groups of interrelated network interfaces – the message is sent to all the members of the group

■ Anycast addresses

- Identifies group of functionally interrelated interfaces (usually with the same interface ID), message is sent to ONE group member

IPv6 Addressing (4/5)

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IPv6 address types and prefixes (2/3)

Different IPv6 address types are distinguished based on their prefix, e.g:

- | | |
|-------------|---|
| ::1/128 | Loopback address ("local host"),
corresponds to 127.0.0.1 |
| fe80::/10 | Link local unicast address , only delivery within the
local network ("private IP addresses," corresponds to,
e.g., 192.168.0.0/24) |
| ff00::/8 | Multicast address , groups of associated network
interfaces that can be addressed collectively |
| ff01::1/128 | All nodes address , corresponds to a broadcast |
| ff01::2/128 | All routers address , all routers in one area |

IPv6 Addressing (5/5)

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IPv6 address types and prefixes (3/3)

- **Backward compatibility** with IPv4 addresses, e.g., with IPv4 mapped 0:0:0:0:0:ffff::/96, last 32 bits containing IPv4 address
- Almost all other IPv6 addresses are **global unicast addresses**
- Previously assigned by IANA to the Regional Internet Registries (e.g. RIPE for Europe): **2000:... to 3fff:...**
 - RIRs give the network areas to the provider
 - Providers give the subnets(→ subnet ID) to the customer
- Several special addresses in this area are used in
 - automatic → 6to4 tunneling (2002:...)
 - documentation and literature: 2001:db8::/32