IT 4505 Section 3.5

IP Version 6





3.5.1 IPv6 - IP Version 6

☐ IP Version 6

- Is the successor to the currently used IPv4
- Specification completed in 1994
- Makes improvements to IPv4 (no revolutionary changes)
- □ One (not the only!) feature of IPv6 is a significant increase in of the IP address to 128 bits (16 bytes)
 - IPv6 will solve for the foreseeable future the problems with IP addressing
 - 10²⁴ addresses per square inch on the surface of the Earth.





IPv6 Header

32 bits-----

versio			Flow Label (24 bits)	
	Payload Lengt	th (16 bits)	Next Header (8 bits)	Hop Limits (8 bits)
	Source IP address (128 bits) Destination IP address (128 bits)			
Ethernet Header	IPv6 Header	TCP Header	Application data	Ethernet Trailer



-Ethernet frame-

Notation of IPv6 addresses

□ Convention: The 128-bit IPv6 address is written as eight 16-bit integers (using hexadecimal digits for each integer)

CEDF:BP76:3245:4464:FACE:2E50:3025:DF12

- Short notation:
- Abbreviations of leading zeroes:

CEDF:BP76:0000:0000:009E:0000:3025:DF12

→ CEDF:BP76:0:0:9E :0:3025:DF12

":0000:0000:0000" can be written as "::"

CEDF:BP76:0:0:FACE:0:3025:DF12

→ CEDF:BP76::FACE:0:3025:DF12

☐ IPv6 addresses derived from IPv4 addresses have 96 leading zero bits. Convention allows to use IPv4 notation for the last 32 bits.

::80:8F:89:90 → ::128.143.137.144



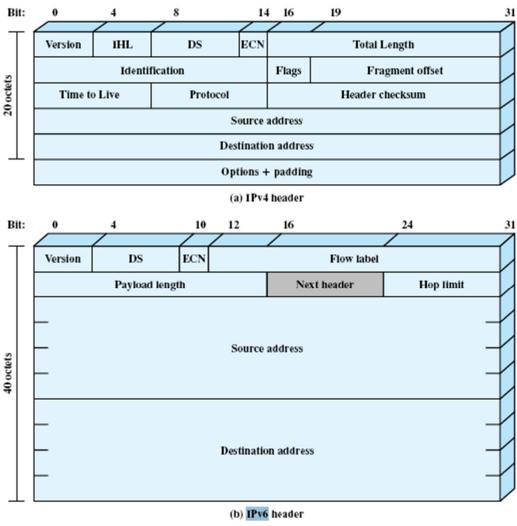
3.5.2 IPv6 vs. IPv4: Address Comparison

- □ IPv4 has a maximum of
 - 2³² ≈ 4 billion addresses
- □ **IPv6** has a maximum of
 - $2^{128} = (2^{32})^4 \approx 4$ billion x 4 billion x 4 billion x 4 billion addresses





IPv6 vs. IPv4 cont.



DS = Differentiated services field ECN = Explicit congestion notification field Note: The 8-bit DS/ECN fields were formerly known as the Type of Service field in the IPv4 header and the Traffic Class field in the IPv6 header.



