

COMPUTER NETWORKS LAB (CS315)

Assignment-7

Internet Protocol

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Internet Protocol (IP)

- What is Internet Protocol?

Internet Protocol is a set of technical rules that defines how computers communicate over a network.

- Currently, There are two versions of IP
 - IP version 4 (IPv4)
 - IP version 6 (IPv6)



Internet Protocol (IP)

- What is IPv4?
 - IPv4 was the first version of Internet Protocol to be widely used, and accounts for most of today's Internet traffic.
 - There are just over 4 billion IPv4 addresses. While that is a lot of IP addresses, it is not enough to last forever
- What is IPv6?
 - IPv6 is a newer numbering system that provides a much larger address pool than IPv4. It was deployed in 1999 and should meet the world's IP addressing needs well into the future.



Internet Protocol (IP)

- What is the major difference?
 - The major difference between IPv4 and IPv6 is the number of IP addresses.
 - There are 4,294,967,296 IPv4 addresses.
 - while, there are 40,282,366,920,938,463,463,374,607,431, 768,211,456 IPv6 addresses.



IPv4 companion protocols

- ARP: Address Resolution Protocol
 - Mapping from IP address to MAC address
- ICMP: Internet Control Message Protocol
 - Error reporting & Query
- IGMP: Internet Group Management Protocol
 - Multicast member join/leave
- Unicast Routing Protocols (Intra-AS)
 - Maintaining Unicast Routing Table
 - E.g. RIP, OSPF (Open Shortest Path First)
- Multicast Routing Protocols
 - Maintaining Multicast Routing Table
 - E.g. DVMRP, MOSPF, CBT, PIM Exterior Routing Protocols (Inter-AS)
 - E.g. BGP (Border Gateway Protocol)
- Quality-of-Service Frameworks
 - Integrated Service (ISA, IntServ) ○ Differentiated Service (DiffServ)



Why IPv6?

- Deficiency of IPv4
- Address space exhaustion
- New types of service Integration
 - Multicast
 - Quality of Service
 - Security
 - Mobility (MIPv6)
- Header and format limitations

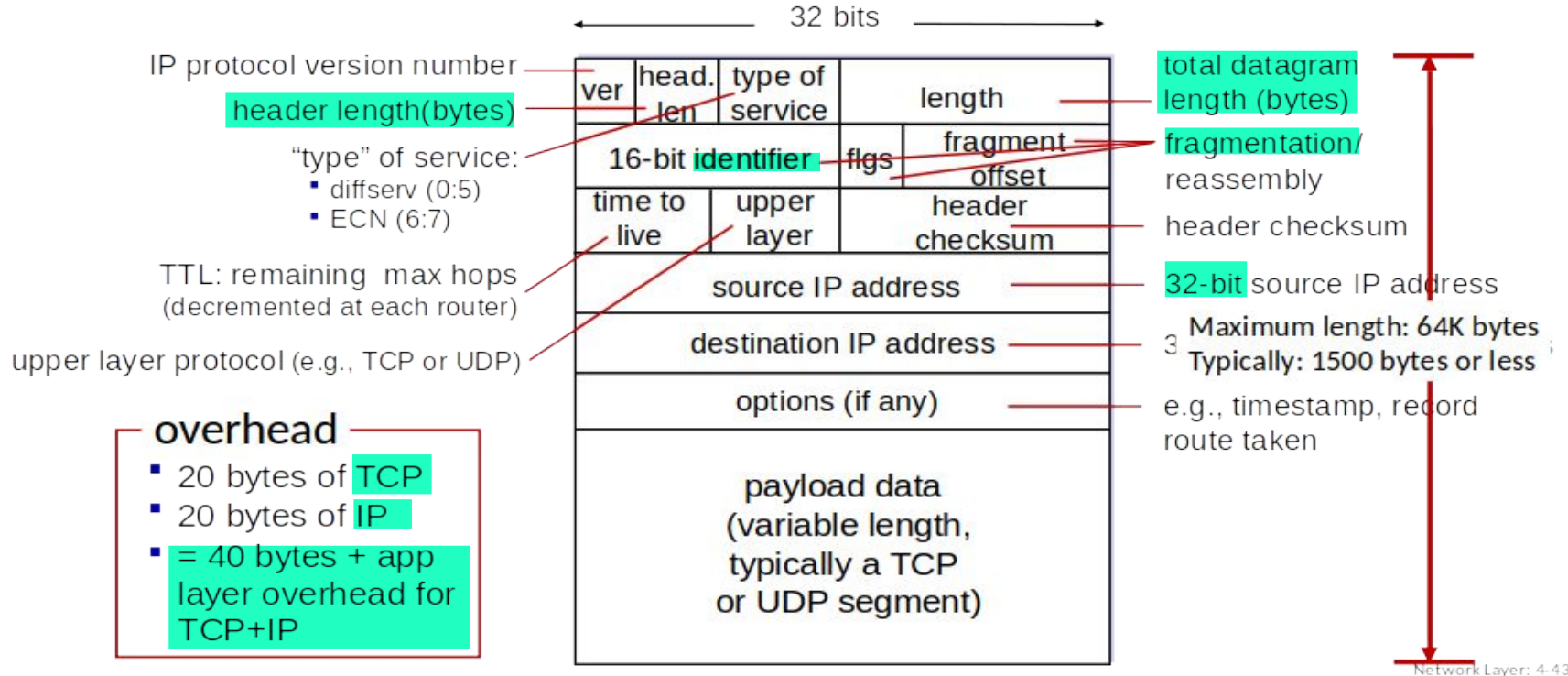


Advantages of IPv6 over IPv4

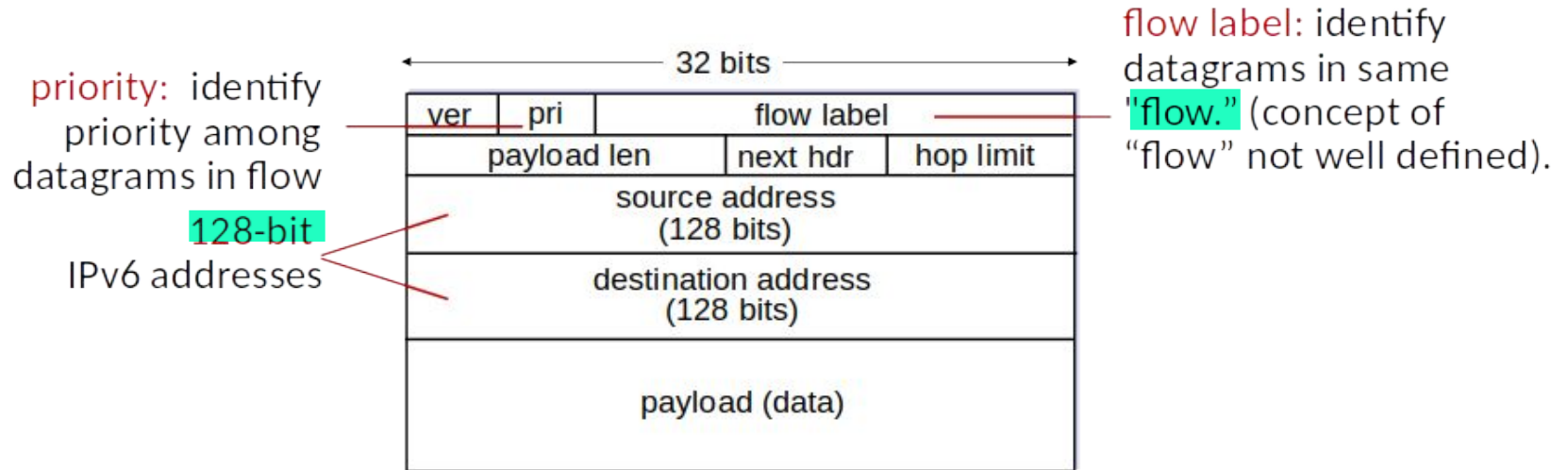
- Larger address space
- Better header format
- New options
- Allowance for extension
- Support for resource allocation
- Support for more security
- Support for mobility



IP Datagram format



IPv6 datagram format



What's missing (compared with IPv4):

- **no checksum** (to speed processing at routers)
- **no fragmentation/reassembly**
- **no options** (available as **upper-layer, next-header protocol at router**)

Thank you