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)

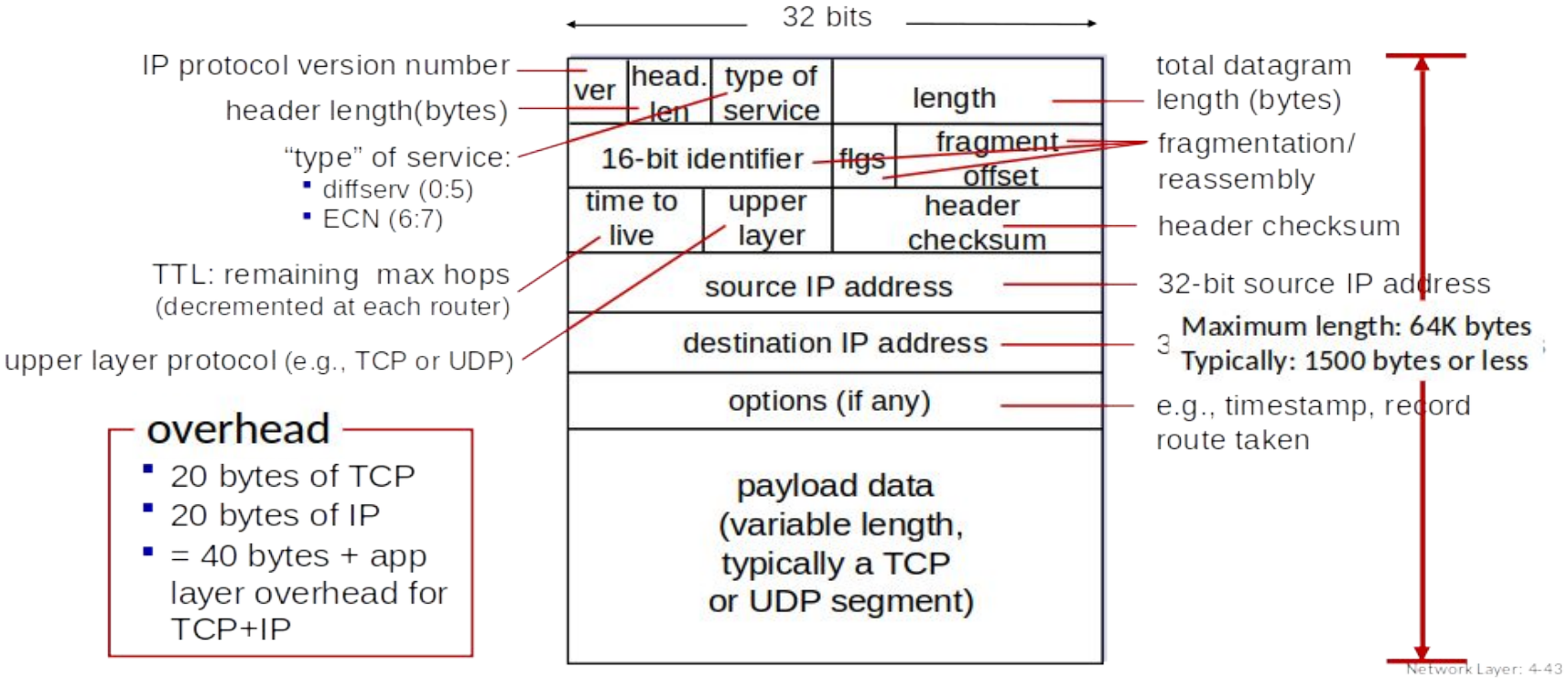
Why IPv6?

- 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



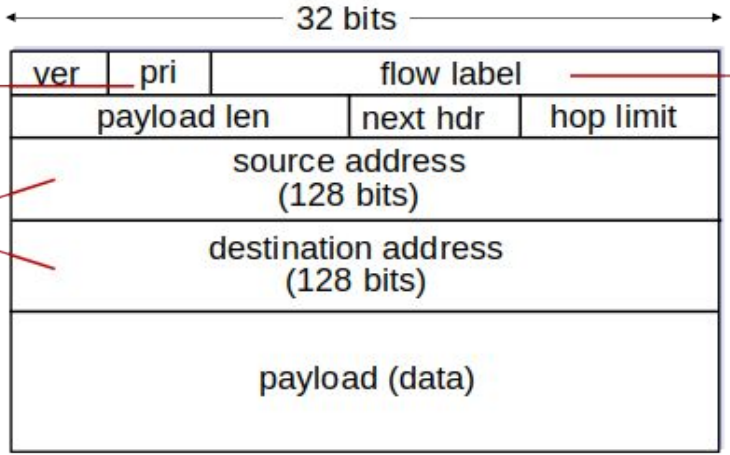
overhead

- 20 bytes of TCP
- 20 bytes of IP
- = 40 bytes + app layer overhead for TCP+IP

IPv6 datagram format

priority: identify priority among datagrams in flow

128-bit IPv6 addresses



flow label: identify datagrams in same "flow." (concept of "flow" not well defined).

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