RSC
Part II: Network Layer
5. IPv6

Redes y Servicios de Comunicaciones
Universidad Carlos III de Madrid

These slides are, mainly, part of the companion slides to the book “Computer Networking: A Top Down Approach” generously made available by their authors (see copyright below). The slides have been adapted, where required, to the teaching needs of the subject above.

All material copyright 1996-2009
J.F Kurose and K.W. Ross, All Rights Reserved

- II.1 Basic Network layer concepts
- II.2 Introduction to IPv4
- II.3 IPv4 addressing
- II.4 IPv4 in operation
  - ARP
- II.5 IPv6
- II.6 Network routing
  - Link state
  - Distance Vector
- II.7 Routing in the Internet
  - Hierarchical routing
  - RIP
**IPv6: motivation**

- *initial motivation:* 32-bit address space soon to be completely allocated.
- additional motivation:
  - header format helps speed processing/forwarding
  - header changes to facilitate QoS

**IPv6 datagram format:**

- fixed-length 40 byte header
- no fragmentation allowed

---

**IPv6 datagram format**

*priority:* identify priority among datagrams in flow

*flow Label:* identify datagrams in same “flow.”

(concept of “flow” not well defined).

*next header:* identify upper layer protocol for data

<table>
<thead>
<tr>
<th>ver</th>
<th>pri</th>
<th>flow label</th>
</tr>
</thead>
<tbody>
<tr>
<td>payload len</td>
<td>next hdr</td>
<td>hop limit</td>
</tr>
</tbody>
</table>

- source address (128 bits)
- destination address (128 bits)

-data-

32 bits
Other changes from IPv4

- **checksum**: removed entirely to reduce processing time at each hop
- **options**: allowed, but outside of header, indicated by “Next Header” field
- **ICMPv6**: new version of ICMP
  - additional message types, e.g. “Packet Too Big”
  - multicast group management functions