

IPv4 Compatible Addresses

- ◊ ::a.b.c.d
 - 96 bits of all 0
 - followed by an IPv4 address (32 bits)
- ◊ ::FFFF:a.b.c.d
 - 80 bits of all 0
 - followed by FFFF (16 bits)
 - then IPv4 address (32 bits)
- ◊ First form
 - used to number any node that has IPv6
 - and also has an IPv4 address
 - IPv4 compatibility mode
- ◊ Second form
 - used to number all IPv4 nodes that have no IPv6

IPv4 Compatible Addresses

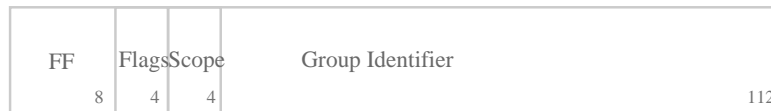
- ◊ ::a.b.c.d
- ◊ ::FFFF:a.b.c.d
- ◊ Packet translation is possible
 - These addresses generate the same
 - transport protocol checksums
 - as the IPv4 addresses they represent
- ◊ Used for API purposes only
 - Not routed on IPv6 network

IPv4 Mapped Addresses

- ◊ 2002:a.b.c.d:SLA:EUI-64
 - Cannot be written this way
 - Must use
 - 2001:AABB:CCDD:SLA:EUI-64
 - a.b.c.d must be a global IPv4 address
- ◊ Any site with an IPv4 address
 - can use this as an IPv6 prefix
 - IPv4 internet is the IPv6 backbone

Multicast Addresses

- ◊ FF00::/8
 - NB: this is not FF::/8
 - That would be 00FF::/8 or 00::/8



- ◊ Flags: 4 bits, only 1 assigned
 - T: T==0 ==> Well Known Multicast Address
 - T==1 ==> Transient Multicast Address
- ◊ Scope: 4 bit numeric field
 - 1 Node Local
 - 2 Link Local
 - 5 Site Local
 - 8 Organisation Local
 - E Global

FF02::1- All

Rest unassigned or

Node

rese

IP Fragmentation & Reassembly

- ◊ Link Layer provides protocol that has a Maximum Transmission Unit (MTU)
 - MTU
 - defined to be the biggest data packet
 - that can be carried by link layer
 - the link layer headers are not included in this value
 - MTU is
 - max link layer packet size - link layer header size
- ◊ IP layer packets -- up to 65535 bytes long
- ◊ Link Layer MTU is generally much smaller than 65535

IP Fragmentation & Reassembly

- ◊ Must divide large IP packet into smaller parts to transmit
 - Fragmentation
- ◊ Must re-join fragments into original large IP packet to deliver
 - Reassembly
- ◊ Can also have link layer fragmentation & reassembly
 - Used when link layer max packet size
 - is too small for IP
 - IP minimum MTU is 68
 - ATM cell is 48 data bytes
 - Link layer sends multiple cells
 - builds a packet from those
 - and offers a larger MTU

IP Fragmentation

- ◊ Ethernet MTU == 1500
 - (At < Gbps speeds)
- ◊ To send a packet with 4096 (4K) data bytes
 - plus header (20)
 - the packet must be divided
 - into at least 3 fragments

IP Header

Vers	H.L.	TOS	Total Length	
Packet Identifier			Flags	Fragment Offset
TTL	Protocol		Header Checksum	
Source Address				
Destination Address				
Options				
Data				

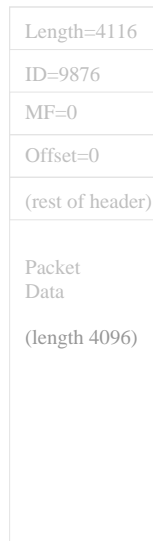
IP Header - Fragmentation

Vers	H.L.	TOS	Total Length	
Packet Identifier			RDM FFF	Fragment Offset
TTL	Protocol		Header Checksum	
Source Address				
Destination Address				
Options				
Data				

IP Header - Fields Used



Fragmentation Example



Fragmentation Eg (2)



Fragmentation Eg (3)

Length=4116
ID=9876
MF=0
Offset=0
(rest of header)

Packet
Data
(length 1480)

Packet
Data
(length 1480)

Packet
Data
(length 1136)

(total length 4096)

Fragmentation Eg (4)

Length=1500
ID=9876
MF=1
Offset=0
(rest of header)

Packet
Data
(length 1480)

Length=1500
ID=9876
MF=1
Offset=185
(rest of header)

Packet
Data
(length 1480)

Length=1156
ID=9876
MF=0
Offset=370
(rest of header)

Packet
Data
(length 1136)

Fragmentation Eg (5)

Length=1500
ID=9876
MF=1
Offset=0
(rest of header)
Packet Data

Length=1500
ID=9876
MF=1
Offset=185
(rest of header)
Packet Data

Length=1156
ID=9876
MF=0
Offset=370
(rest of header)
Packet Data