CS3200: Computer Networks

Lecture 16

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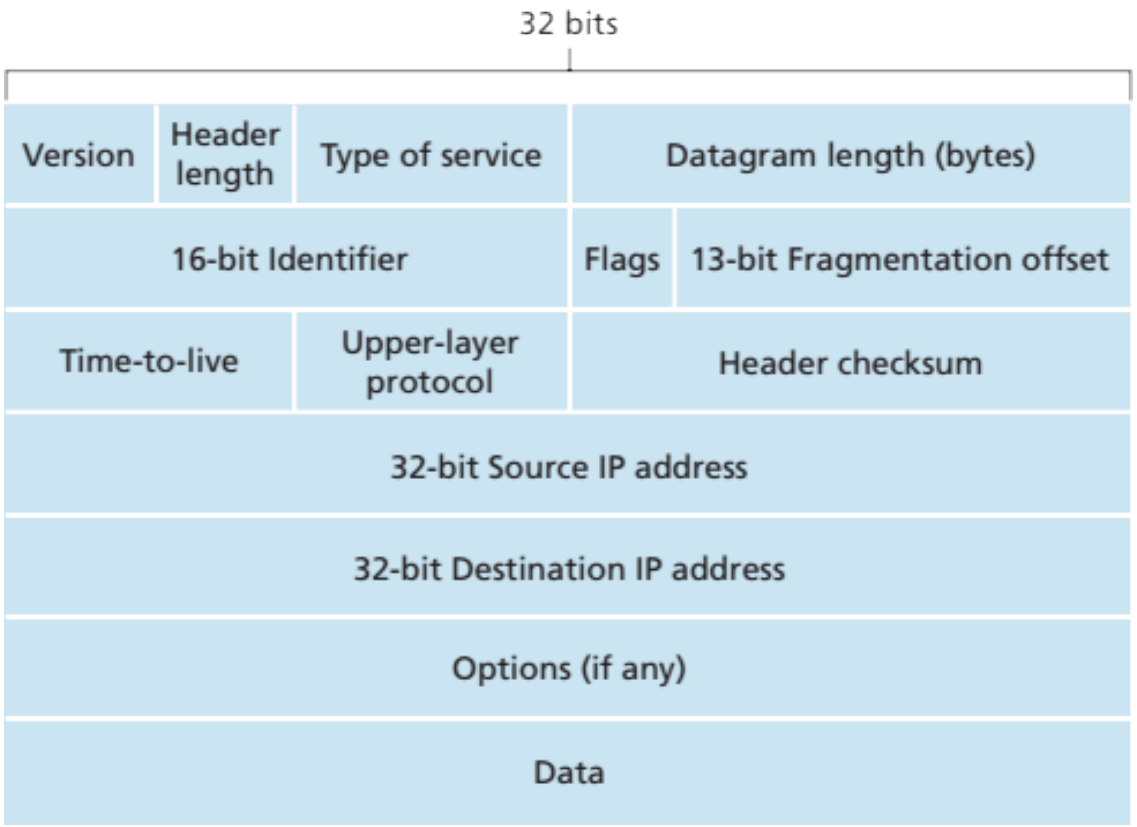
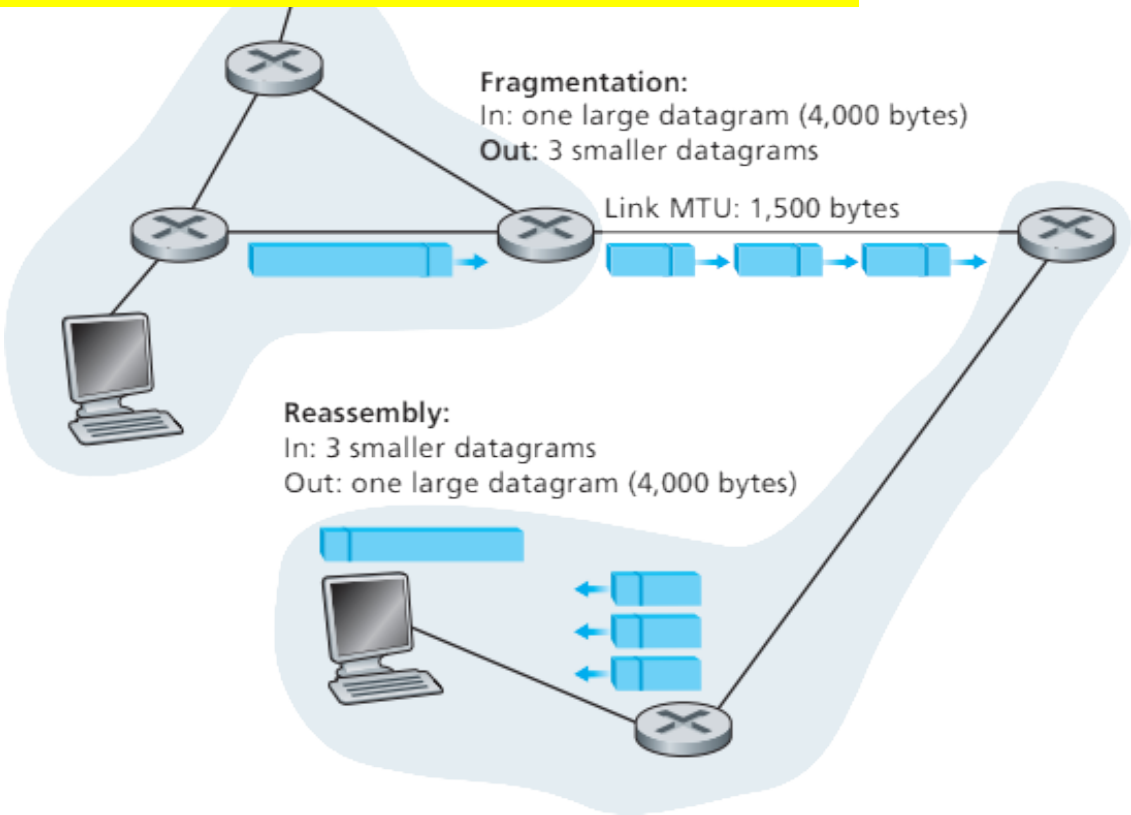
IPv4 Datagram Format

Header length has 4 bits, its



IPv4 Fragmentation

MTU = Maximum Transmission Unit



IPv4 Fragmentation

For example, a packet of 4,520 bytes, including the 20 bytes of the IP header (without options) is fragmented to two packets on a link with an MTU of 2,500 bytes:

2480 / 8 = 310

Fragment	Size (bytes)	Header size (bytes)	Data size (bytes)	Flag *More fragments*	Fragment offset (8-byte blocks)
1	2500	20	2480	1	0
2	2040	20	2020	0	310

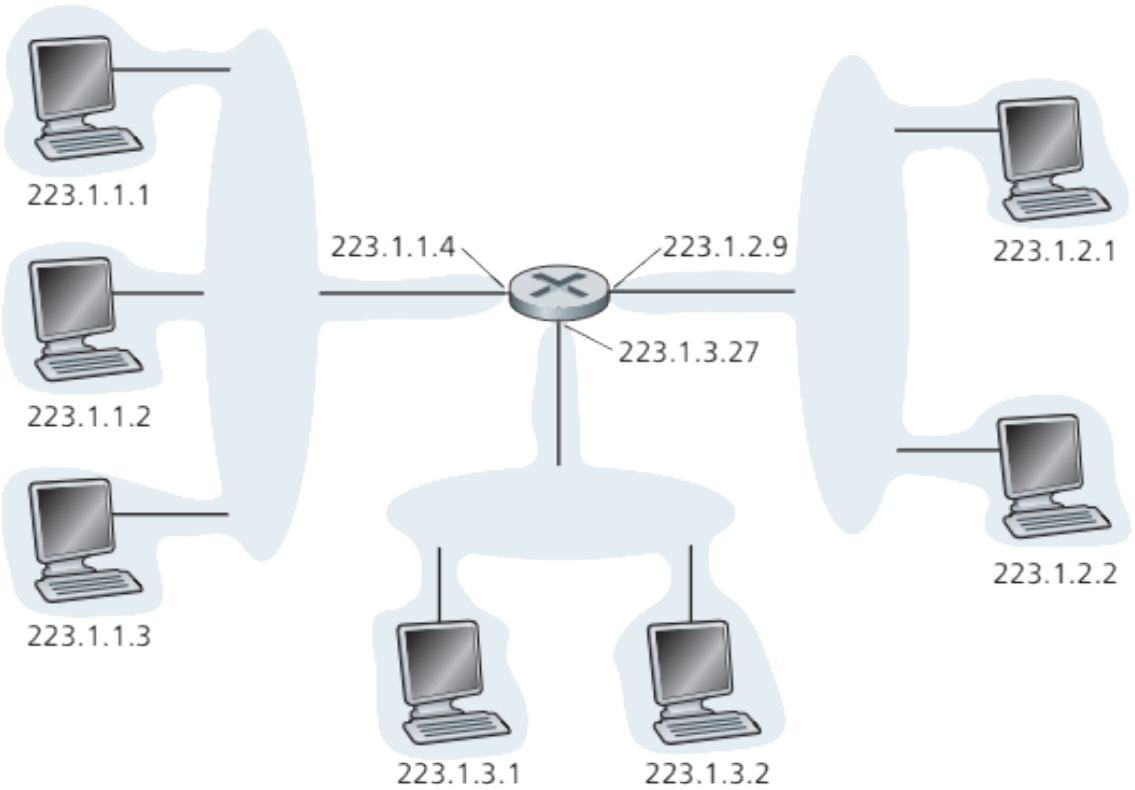
On a link with an MTU of 1,500 bytes, each fragment results in two fragments:

Fragment	Size (bytes)	Header size (bytes)	Data size (bytes)	Flag *More fragments*	Fragment offset (8-byte blocks)
1	1500	20	1480	1	0
2	1020	20	1000	1	185
3	1500	20	1480	1	310
4	560	20	540	0	495

IPv4 Addressing

- Each IP address is 32 bits long (equivalently, 4 bytes), and there are thus a total of 2^{32} (or approximately 4 billion) possible IP addresses.
- These addresses are typically written in so-called **dotted-decimal notation**.
- Each interface on every host and router in the global Internet must have an IP address that is globally unique.

IPv4 Addressing



IPv4 Addressing

- The Internet's address assignment strategy is known as **Classless Interdomain Routing**.
- CIDR generalizes the notion of subnet addressing.
- As with subnet addressing, the 32-bit IP address is divided into two parts and again has the dotted-decimal form $a.b.c.d/x$, where x indicates the number of bits in the first part of the address.
- The x most significant bits of an address of the form $a.b.c.d/x$ constitute the network portion of the IP address, and are often referred to as the prefix (or network prefix) of the address.
- The remaining $32 - x$ bits of an address can be thought of as distinguishing among the devices within the organization, all of which have the same network prefix.

IPv4 Addressing

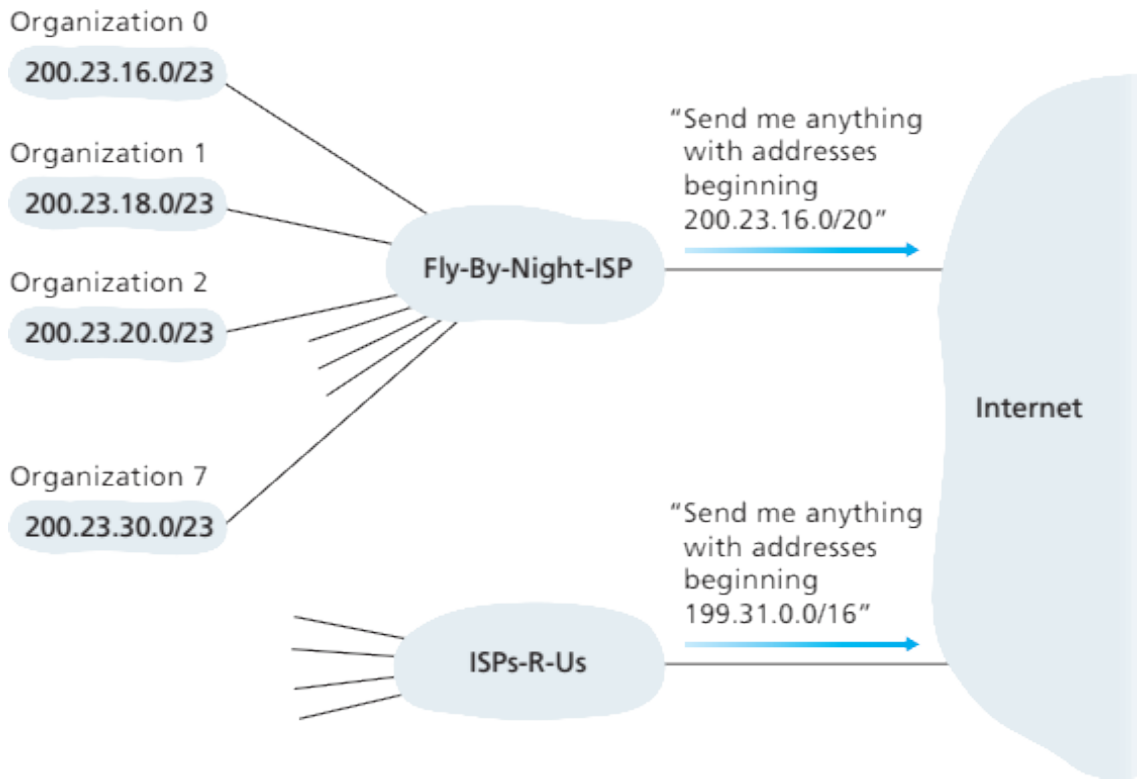
- Before CIDR was adopted, the network portions of an IP address were constrained to be 8, 16, or 24 bits in length, an addressing scheme known as **classful addressing**.

- What was the issue with this addressing scheme?

Issue is either it is too less or too high.

Hierarchical Addressing

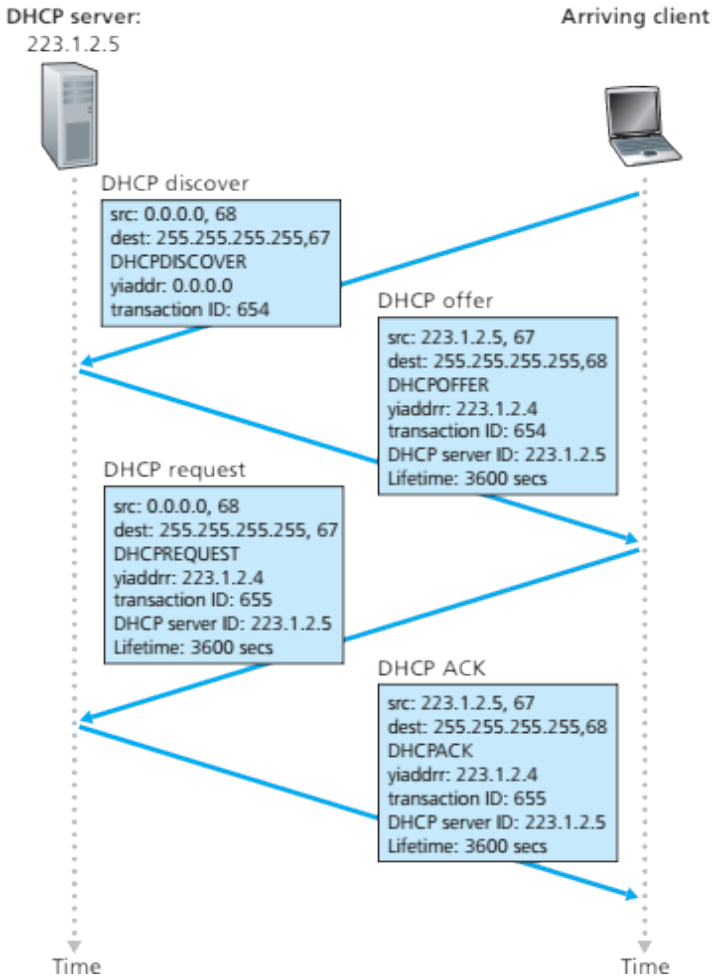
IP addresses are managed under the authority of the Internet Corporation for Assigned Names and Numbers (ICANN)



Dynamic Host Configuration Protocol (DHCP)

A means to assign IP address to hosts within an organization.

yiaddrr is the offered IP.



Network Address Translation (NAT)