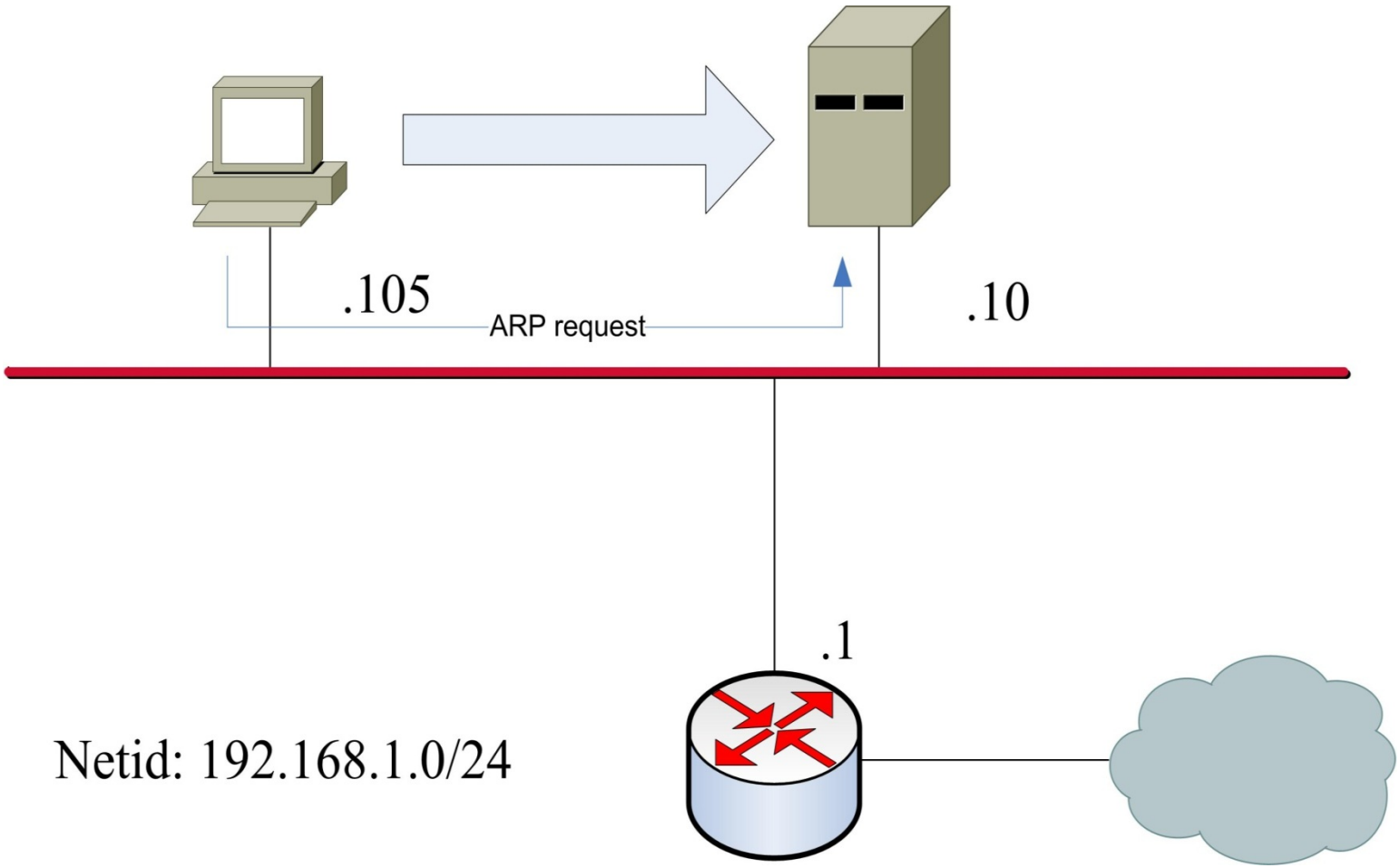
ARP, Fragmentation, Address aggregation

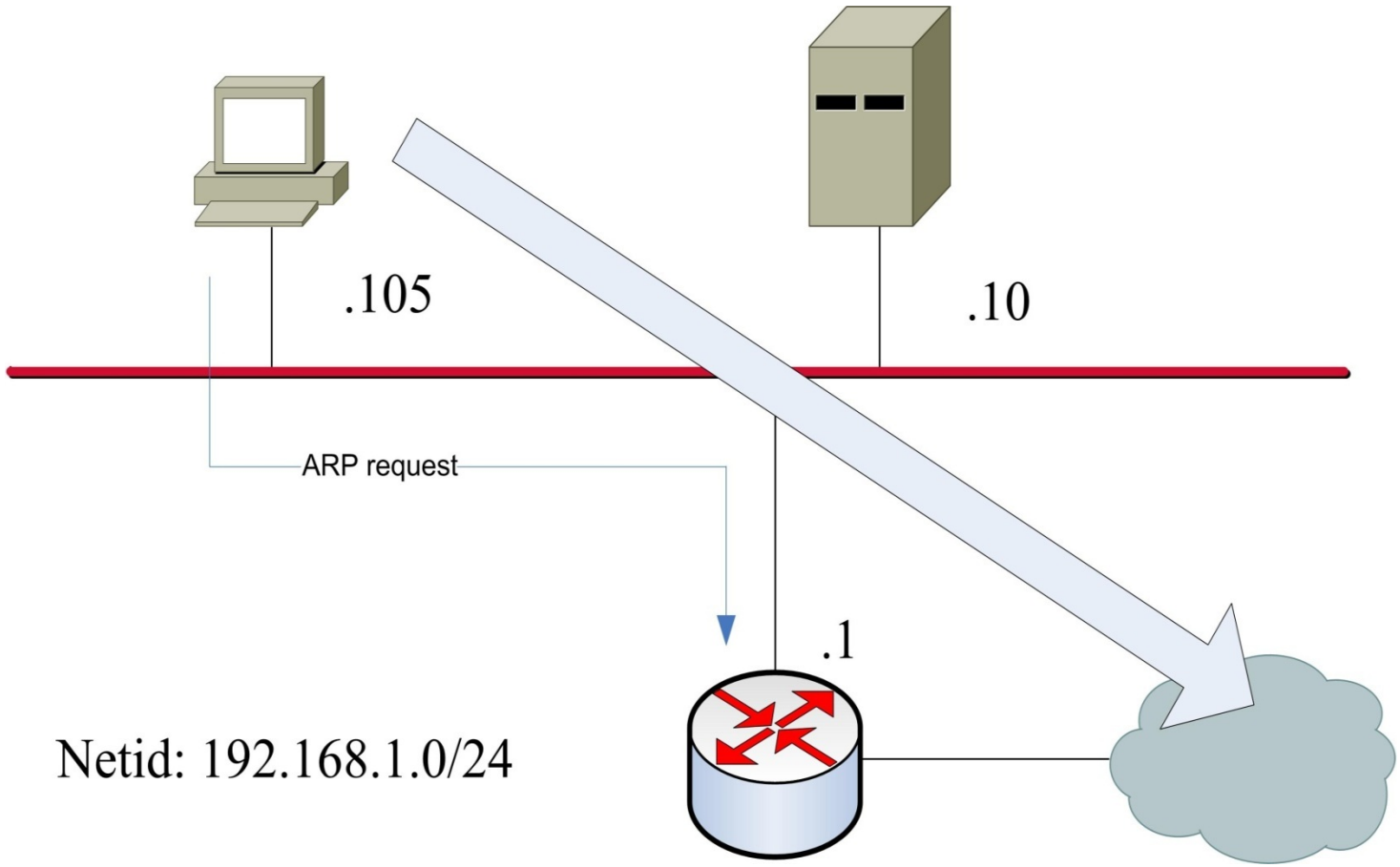
Why Address Resolution?

- For transport on a link we need to know the link layer addresses
- IP uses IP address
- Address Resolution:
  - Method for mapping a global network layer address to a local link layer address

ARP (1)



ARP (2)



Fragmentation and Re-assembly

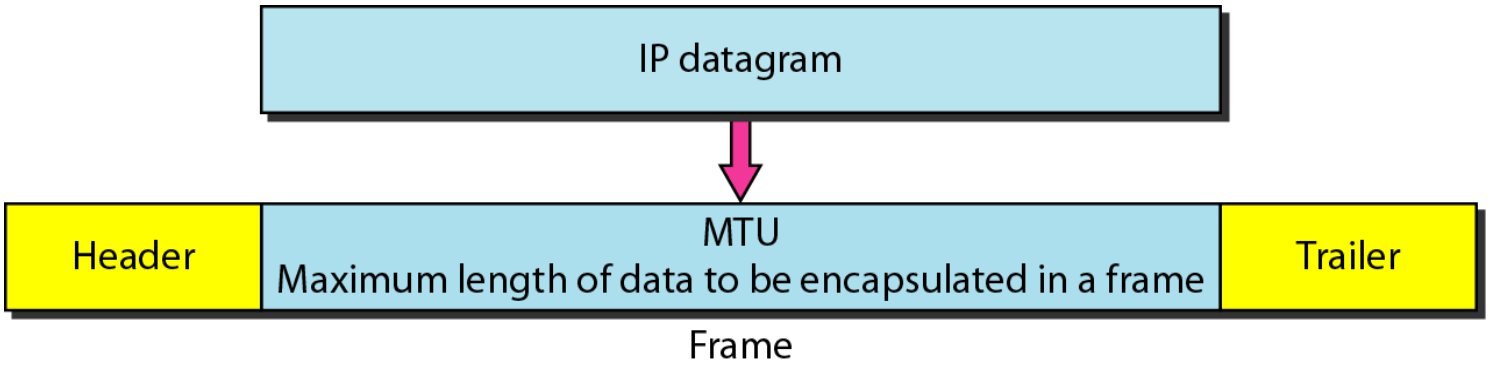
- Protocol exchanges data between two entities
- Lower-level protocols may need to break data up into smaller blocks, called fragmentation
- Reasons for fragmentation:
  - Network only accepts blocks of a certain size
  - Moreefficient error control and smallerretransmission units
  - Fairer access to shared facilities
  - Smaller buffers
- Disadvantages:
  - Smaller buffers
  - More interrupts and processing time

Fragmentation

- Needed when IP datagram size > MTU
- IPv4
  - Performed by the router meeting the problem
- IPv6
  - Performed by the source router only
- Defragmentation by destination host

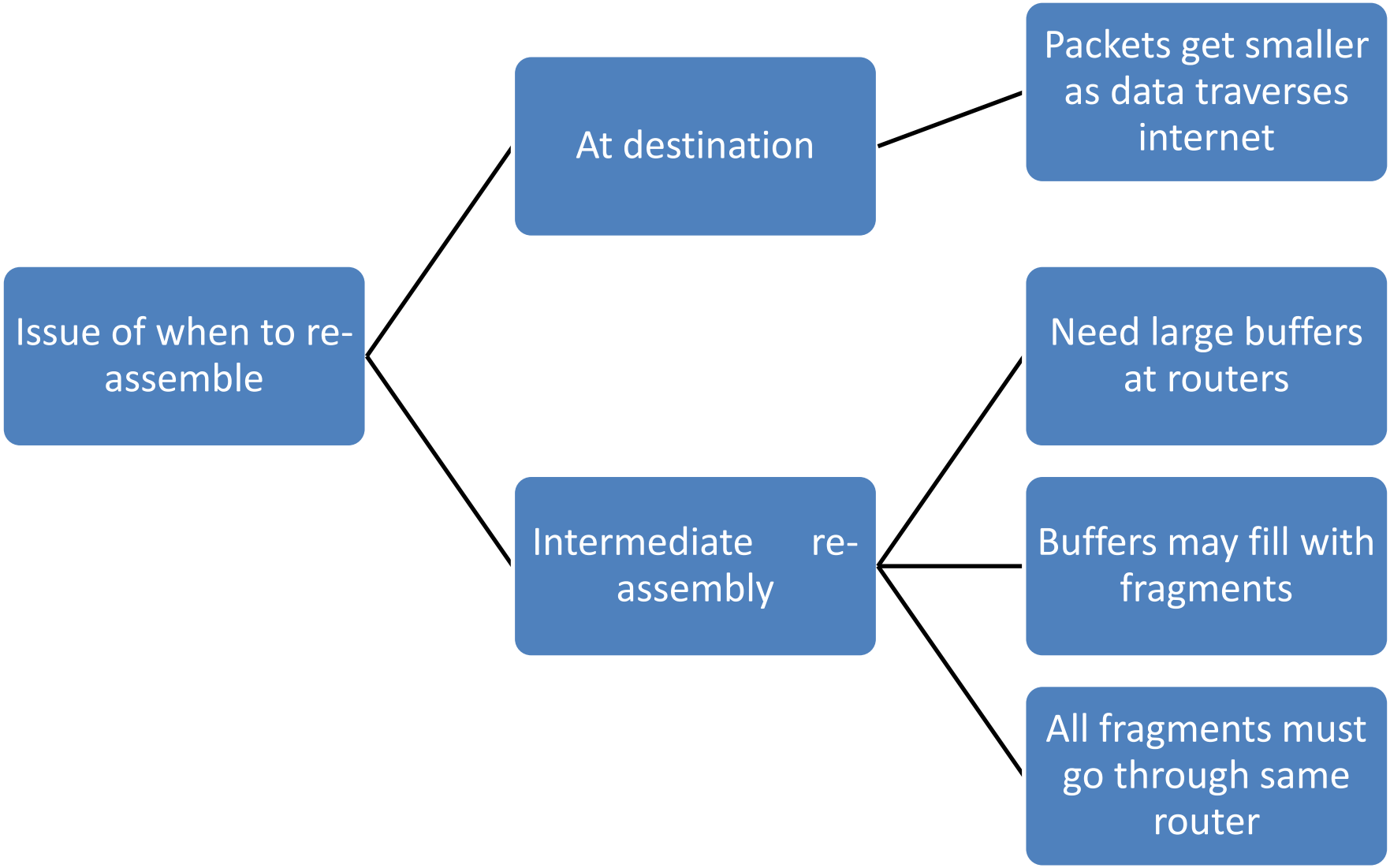
D: Do not fragment
M: More fragments

Maximum datagram size

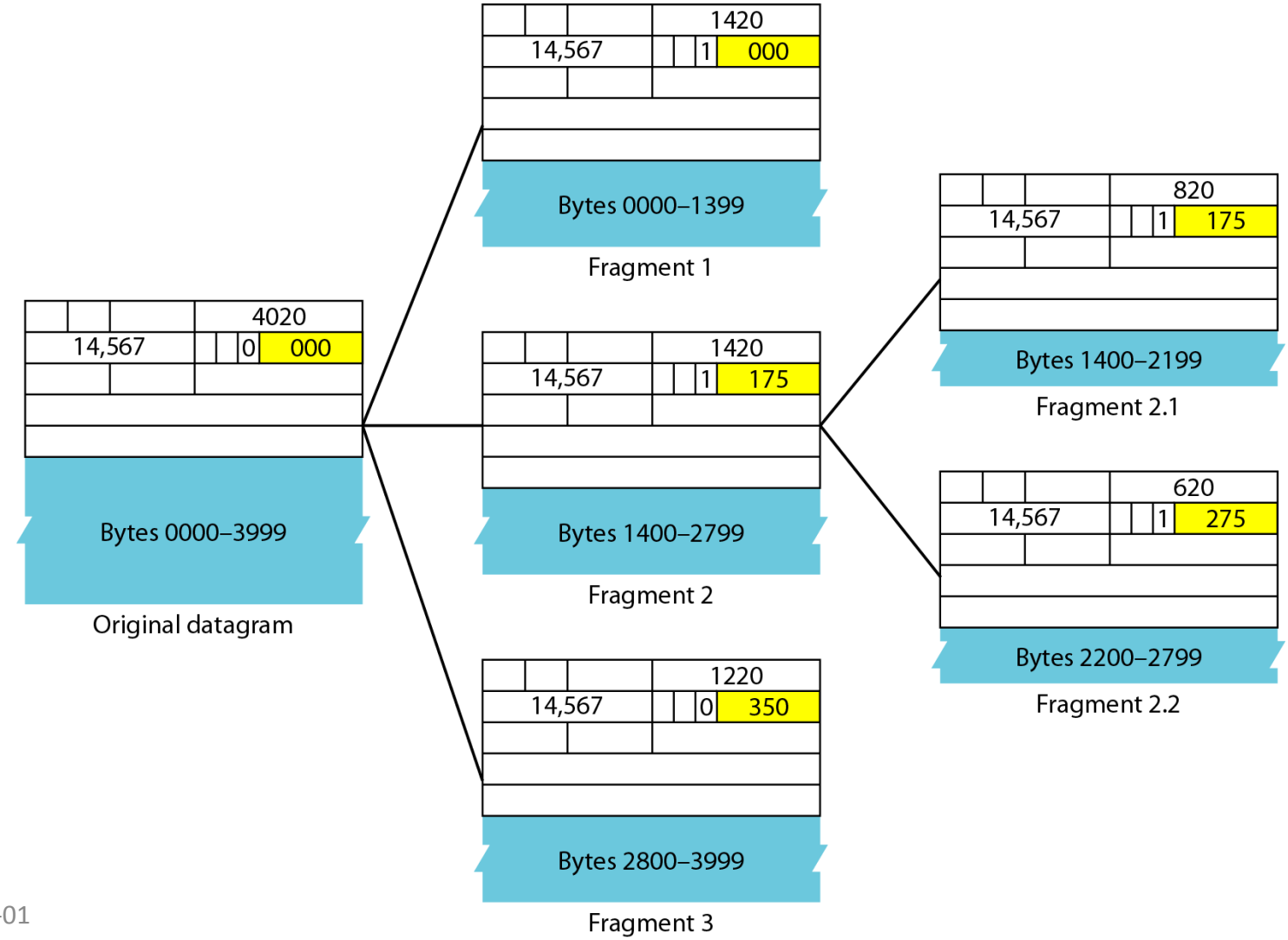


Protocol	*MTU*
Hyperchannel	65,535
Token Ring (16 Mbps)	17,914
Token Ring (4 Mbps)	4,464
FDDI	4,352
Ethernet	1,500
X.25	576
PPP	296

Fragmentation Re-assembly



Fragmentation example



What with TCP/UDP header?

- Where is a TCP or UDP header in fragments?
- Problem?

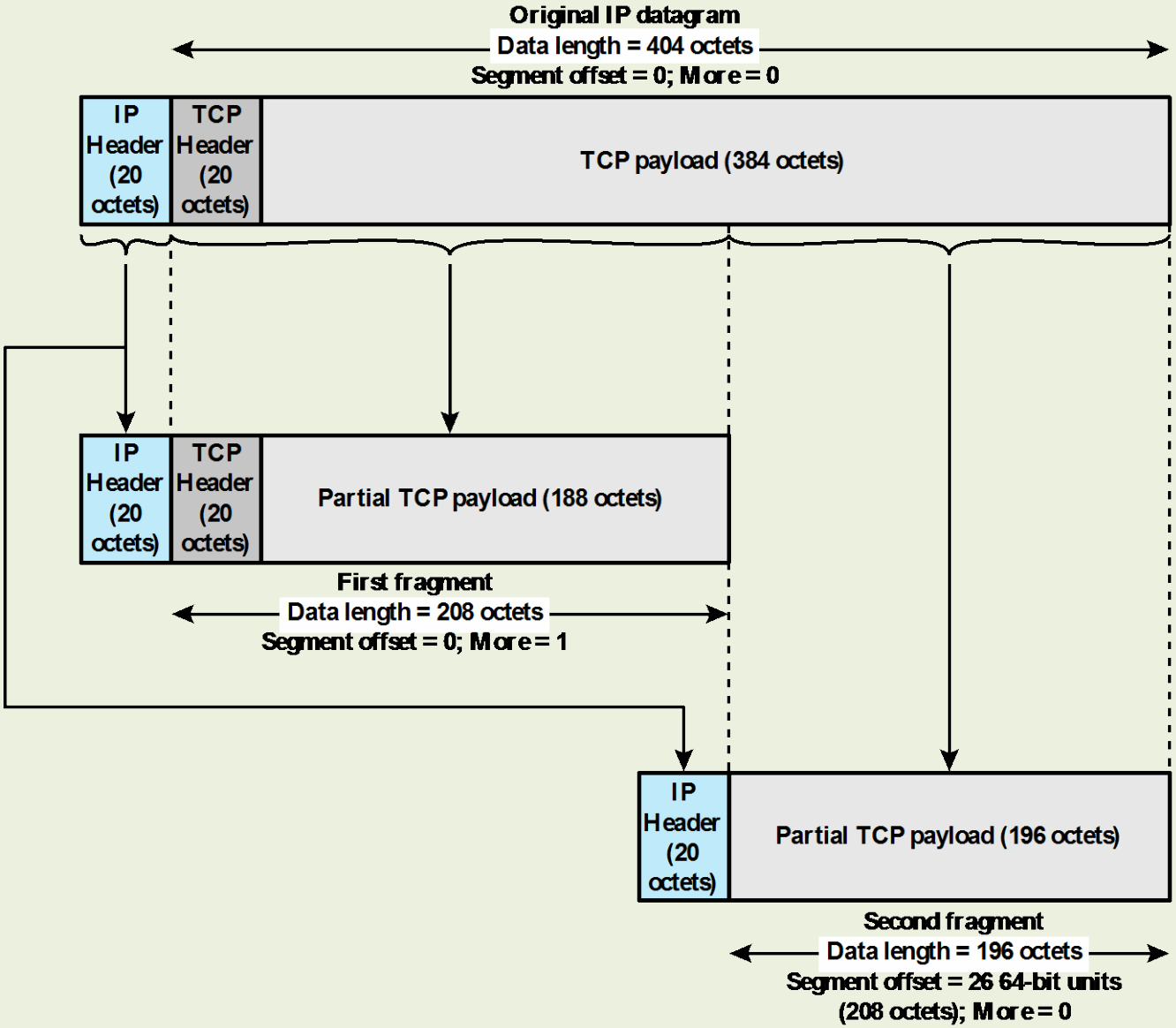
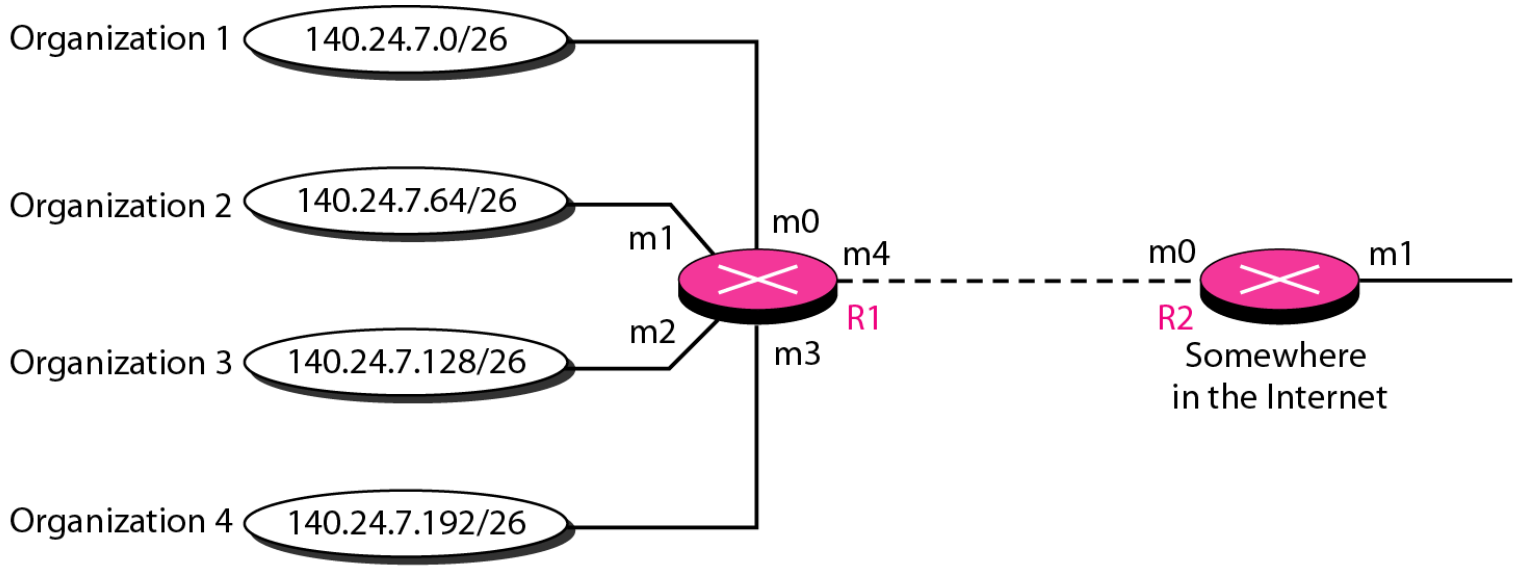


Figure 14.4 Fragmentation Example

Forwarding: Address aggregation



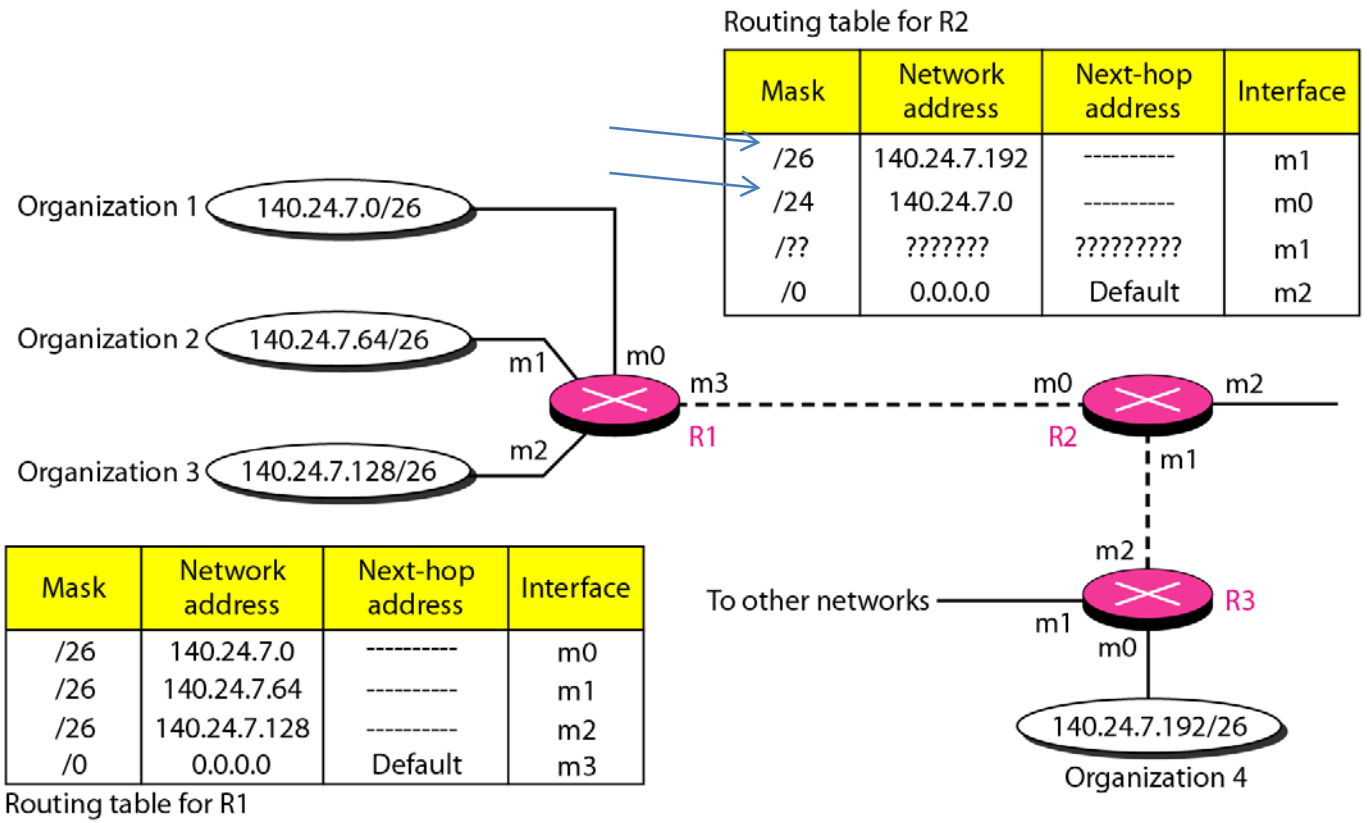
Mask	Network address	Next-hop address	Interface
/26	140.24.7.0	----------	m0
/26	140.24.7.64	----------	m1
/26	140.24.7.128	----------	m2
/26	140.24.7.192	----------	m3
/0	0.0.0.0	Default	m4

Routing table for R1

Mask	Network address	Next-hop address	Interface
/24	140.24.7.0	----------	m0
/0	0.0.0.0	Default	m1

Routing table for R2

Forwarding: Longest mask matching



Forwarding: Hierarchical routing