EECS 489 - WN 22

Discussion 7

Announcements

Assignment 2

Due date: **02/24 2023, 11:59 PM**

Midterm

02/22, 9:00 am

No discussion next week.
OH in regular discussion period.

Q1 IP True or False

IPv6 packet headers have fixed size and thus are more efficient to process. However, because an IPv6 header uses 128-bit source and destination addresses instead of 32-bit ones, it is larger than any IPv4 header.

Q1 IP True or False

IPv6 packet headers have fixed size and thus are more efficient to process. However, because an IPv6 header uses 128-bit source and destination addresses instead of 32-bit ones, it is larger than any IPv4 header.

False. IPv6 headers are always 40 B and IPv4 headers can be 20 - 60 B.

Q2 IP MCQ

Which is **NOT** the four basic processes used in the IP to accomplish end-to-end transport?

1. Addressing packets with an IP address
2. Encapsulation
3. Guaranteed delivery
4. Routing
5. Decapsulation

Q2 IP MCQ

Which is **NOT** the four basic processes used in the IP to accomplish end-to-end transport?

1. Addressing packets with an IP address
2. Encapsulation
3. Guaranteed delivery
4. Routing
5. Decapsulation

IP only provides best-effort delivery.
Guaranteed delivery is provided by Transport Layer (e.g.TCP).

Q3 IP Fragmentation

Suppose a TCP message containing 2048 bytes of data and 20 bytes of TCP header is passed to IP for delivery across two networks of the Internet. The first network has an MTU of 1024 bytes; the second has an MTU of 512 bytes.

Give the sizes and offsets of the fragments delivered to the network layer at the destination host.

Assume all IP headers are 20 bytes. Assume we send out the largest fragments whenever we can.

Q3 IP Fragmentation

20B	2068B
IP Header	IP Payload

IP Datagram: (2048+20+20) Bytes

IP Payload: (2048+20) Bytes

Network 1 **MTU: 1024B**

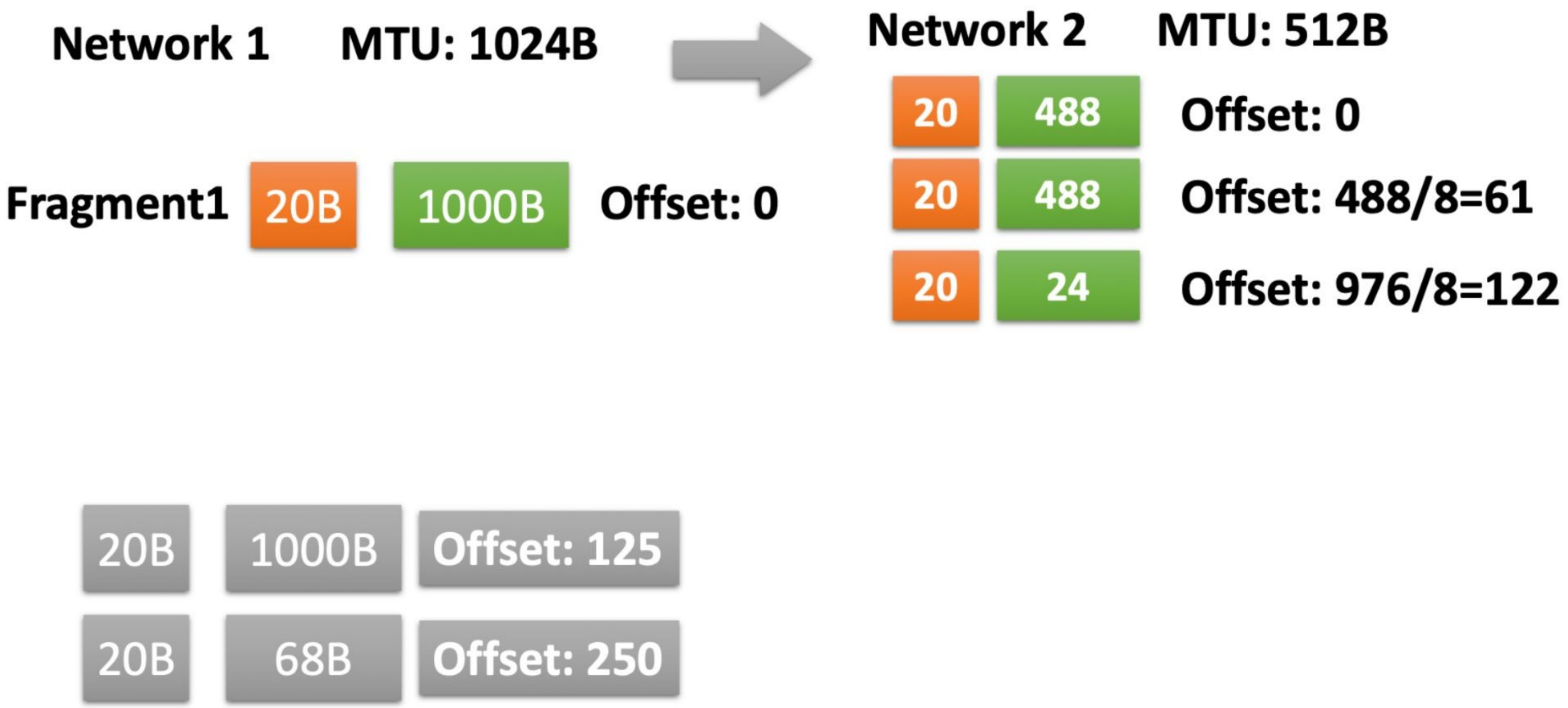
Fragmented payload:

$8n < 1024 - 20, \qquad n \in N$

Payload: $8n = 1000$

	Header	Payload	Offset
Fragment1	20B	1000B	**Offset: 0**
Fragment2	20B	1000B	**Offset: 1000/8=125**
Fragment3	20B	68B	**Offset: 2000/8=250**

Q3 IP Fragmentation



Q3 IP Fragmentation

Network 1 MTU: 1024B

Fragment2 20B 1000B Offset: 125

Network 2 MTU: 512B

20 488 Offset: 125

20 488 Offset: 125+61=186

20 24 Offset: 125+122=247

20B 68B Offset: 250

Q3 IP Fragmentation

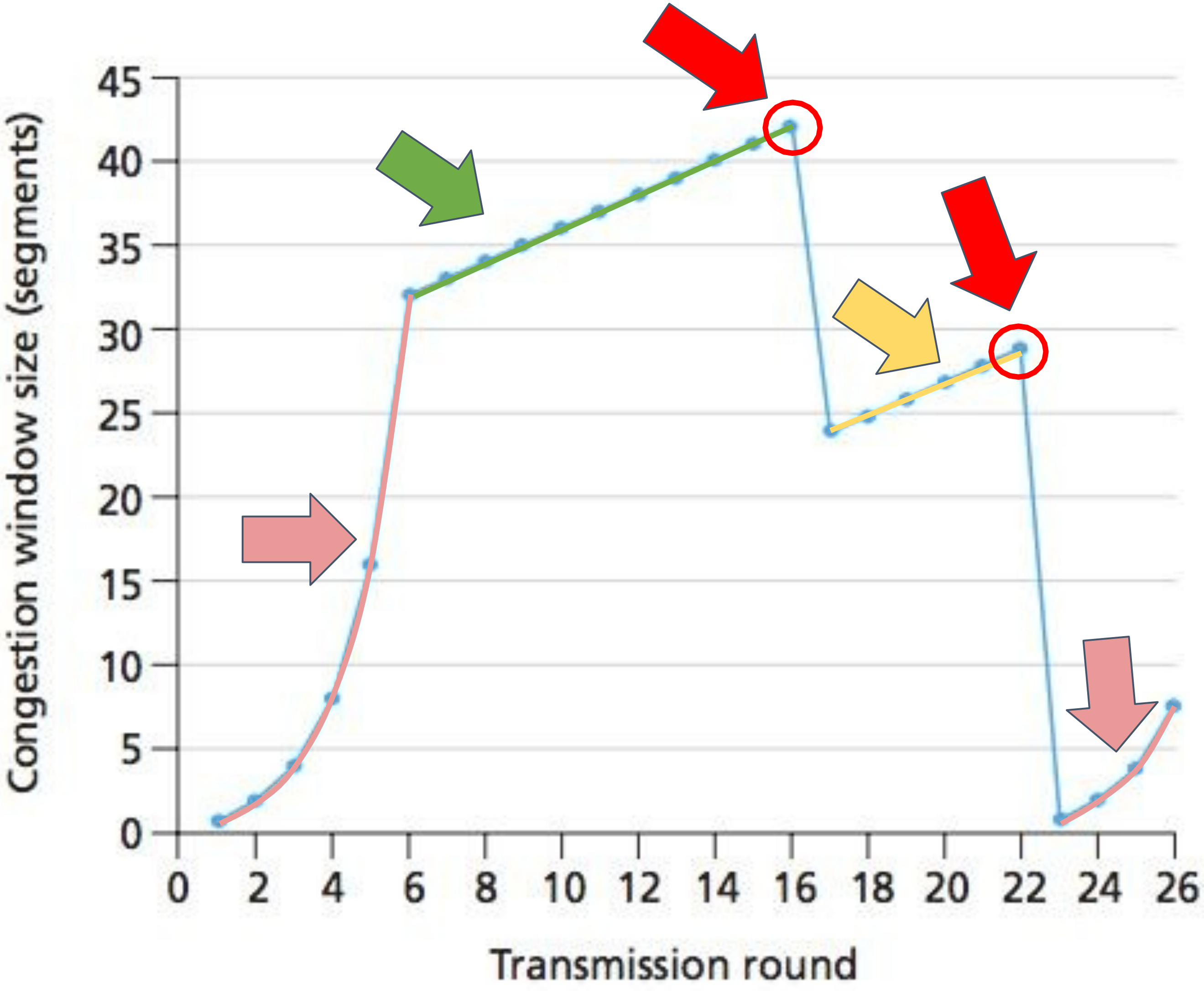
Network 1 **MTU: 1024B** → **Network 2** **MTU: 512B**

Fragment2 20B 68B **Offset: 250** → 20 68 **Offset: 250**

Q4 TCP Congestion Control

Identify:

- Slow Start (SS)
- Congestion Avoidance (CA)
- Fast Recovery (FR)
- Retransmission (RTX)



Q4 TCP Congestion Control

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- Slow Start (SS)
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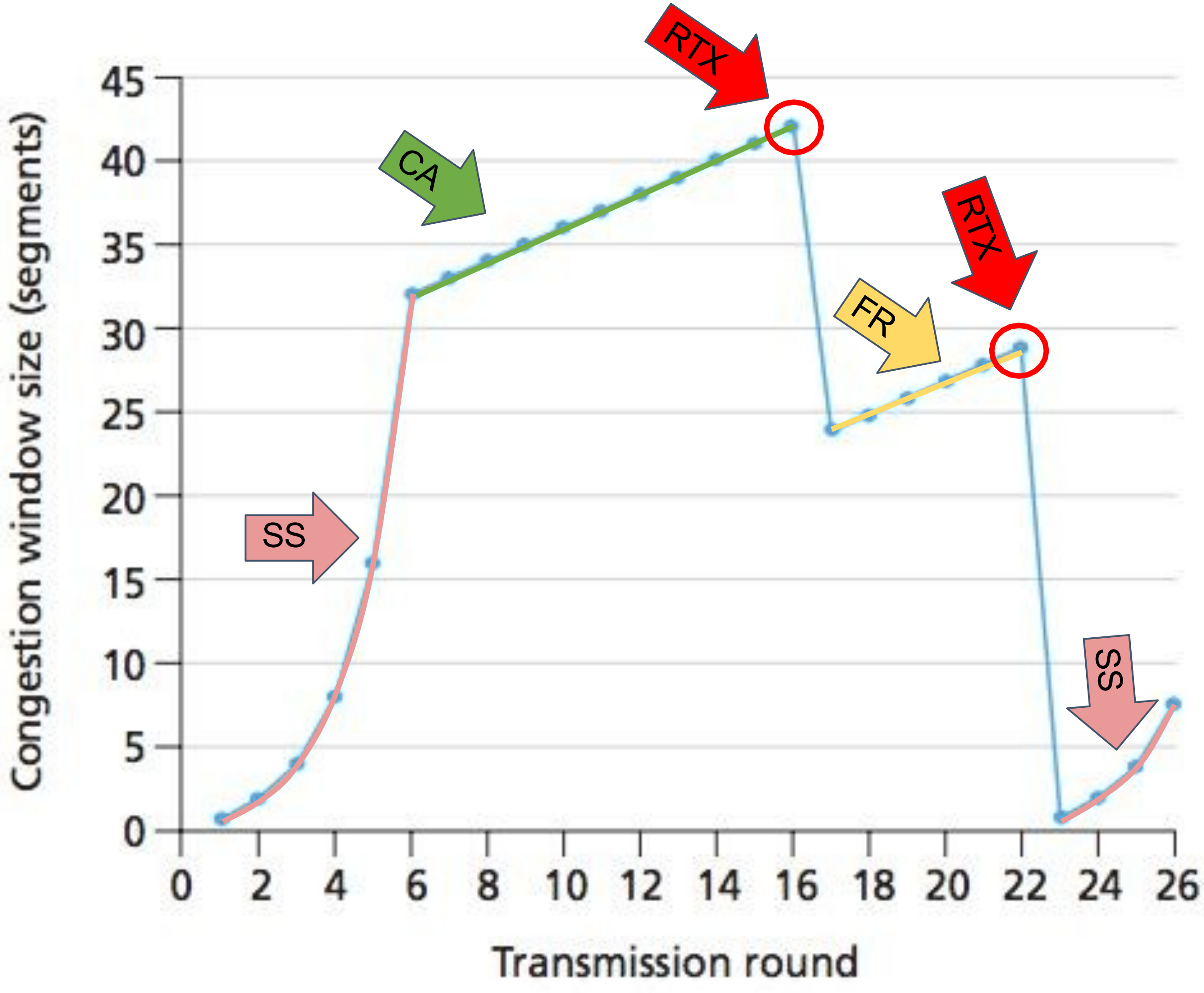
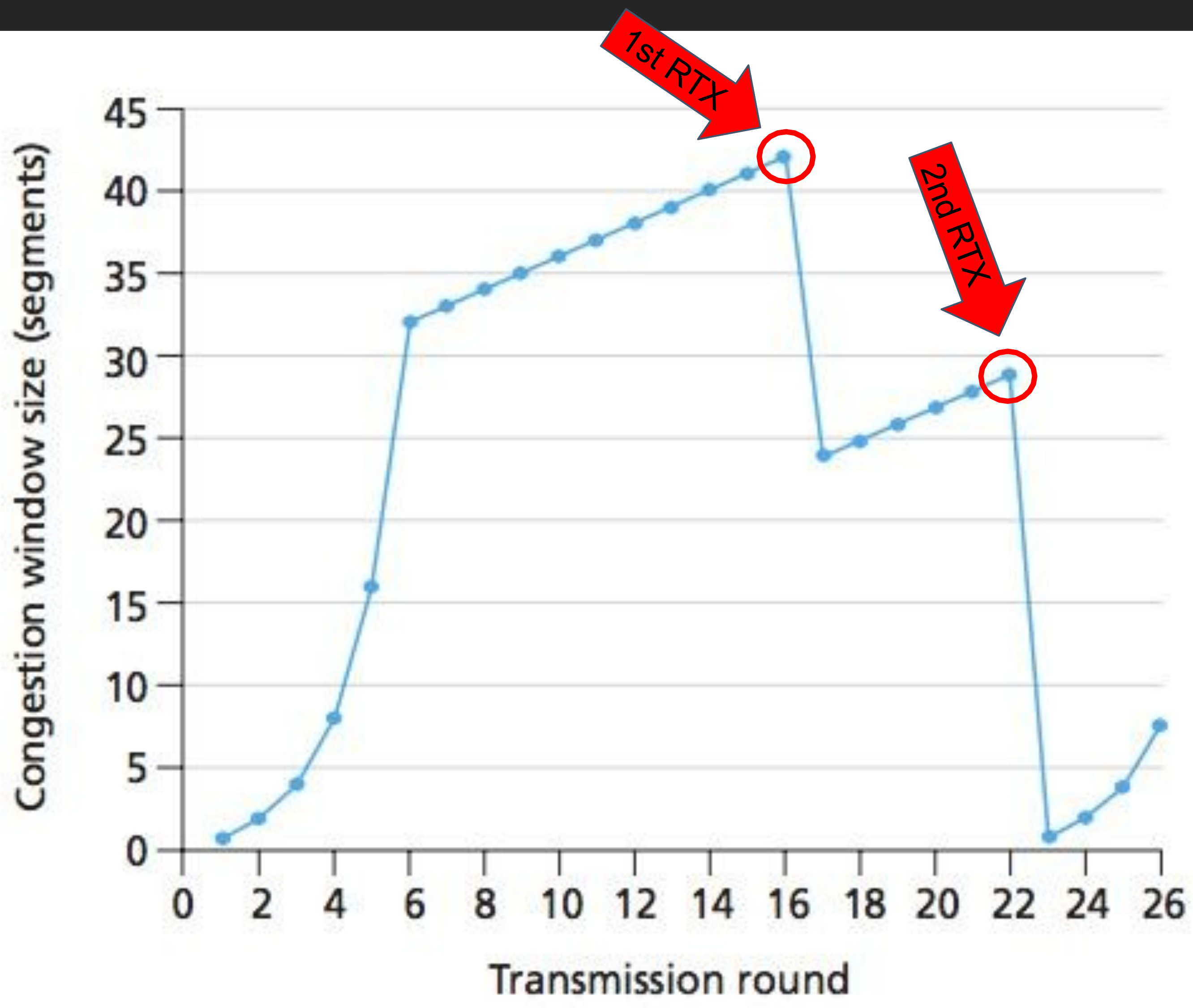


Q4 TCP Congestion Control

What triggers the first retransmission? How about the second?



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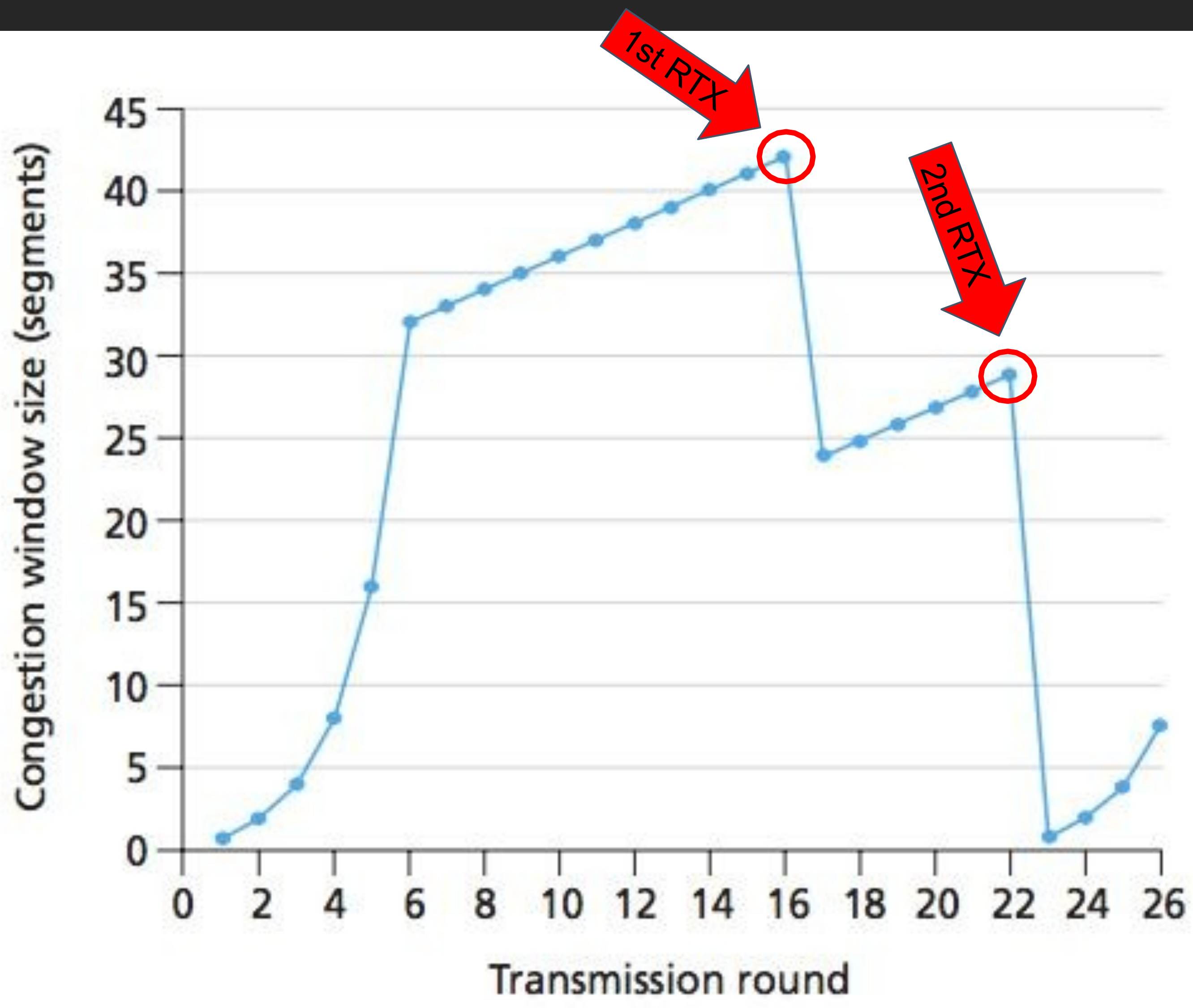
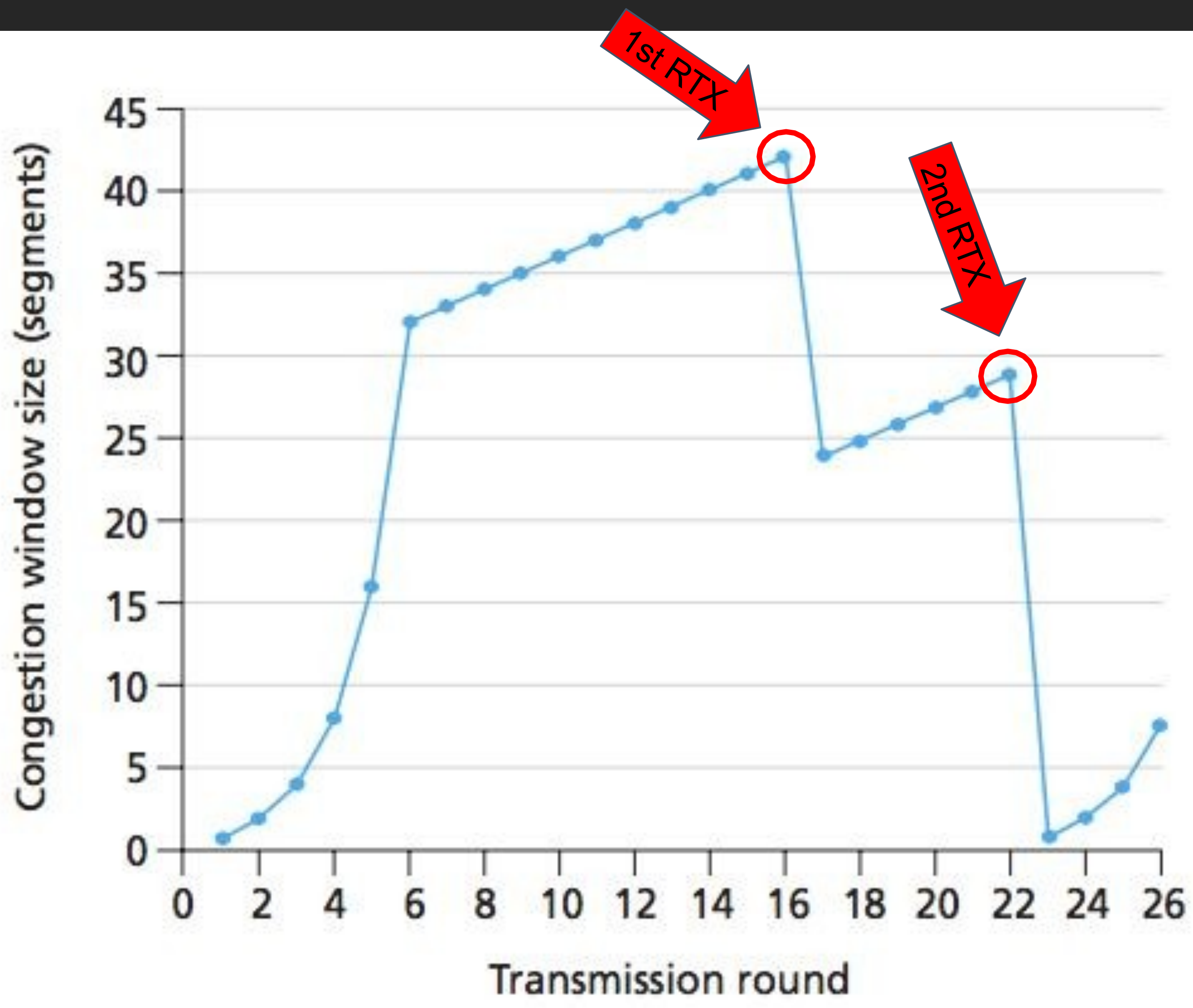


First: Duplicate ACK
Second:Timeout

Q4 TCP Congestion Control

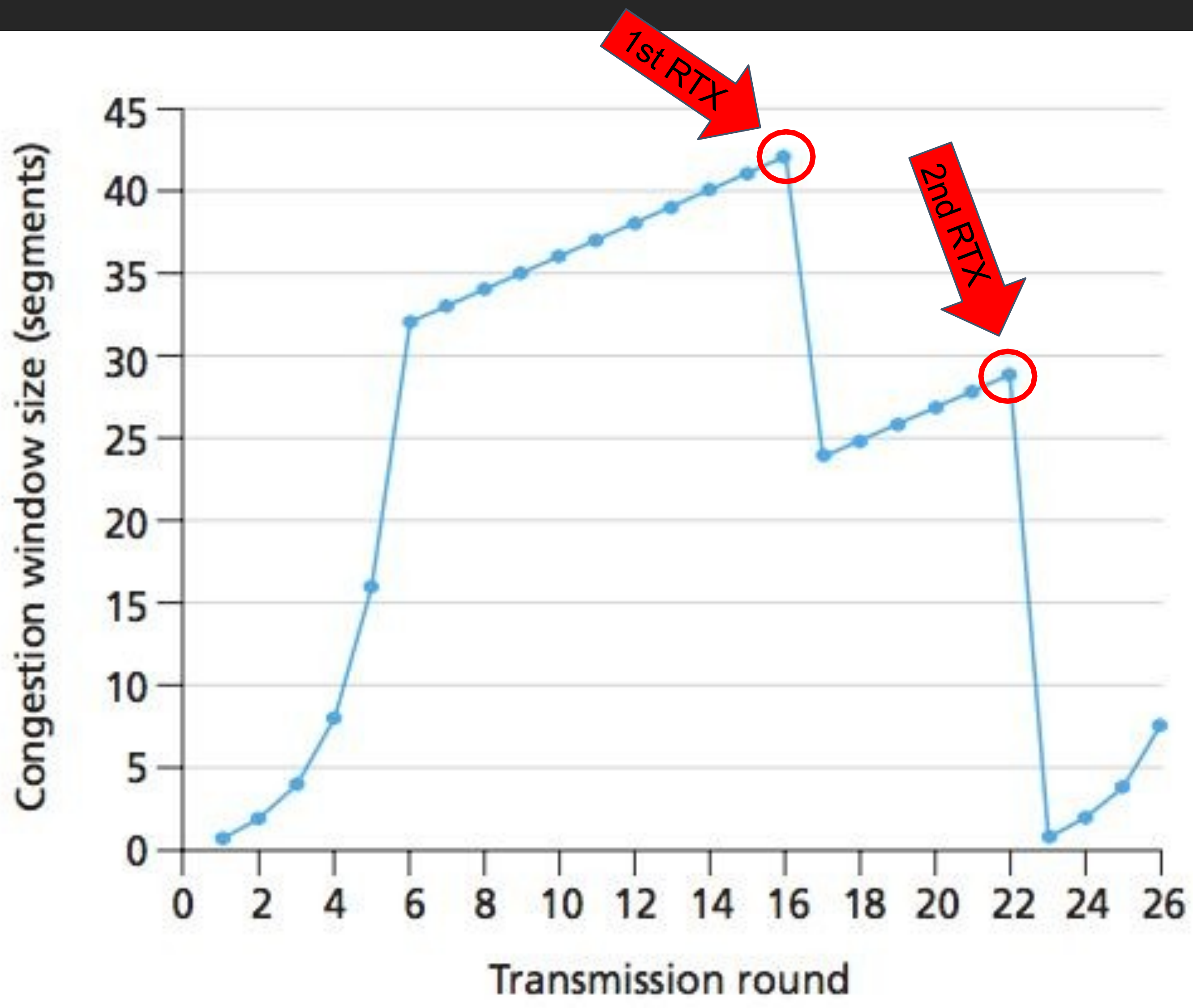
What is the size of CWND at 17th round?



Q4 TCP Congestion Control

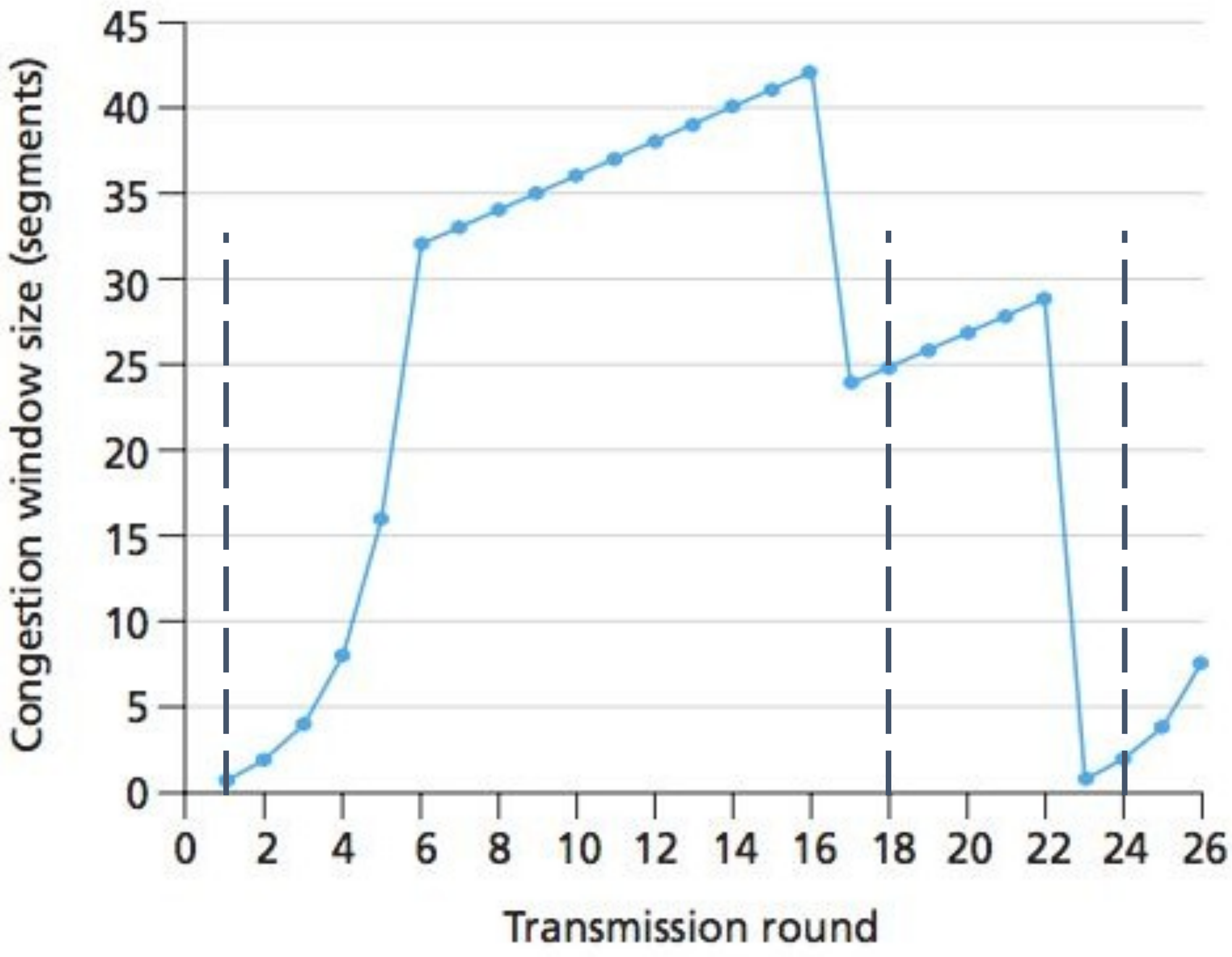
What is the size of CWND at 17th round?

CWND = 42 / 2 + 3 = 24



Q4 TCP Congestion Control

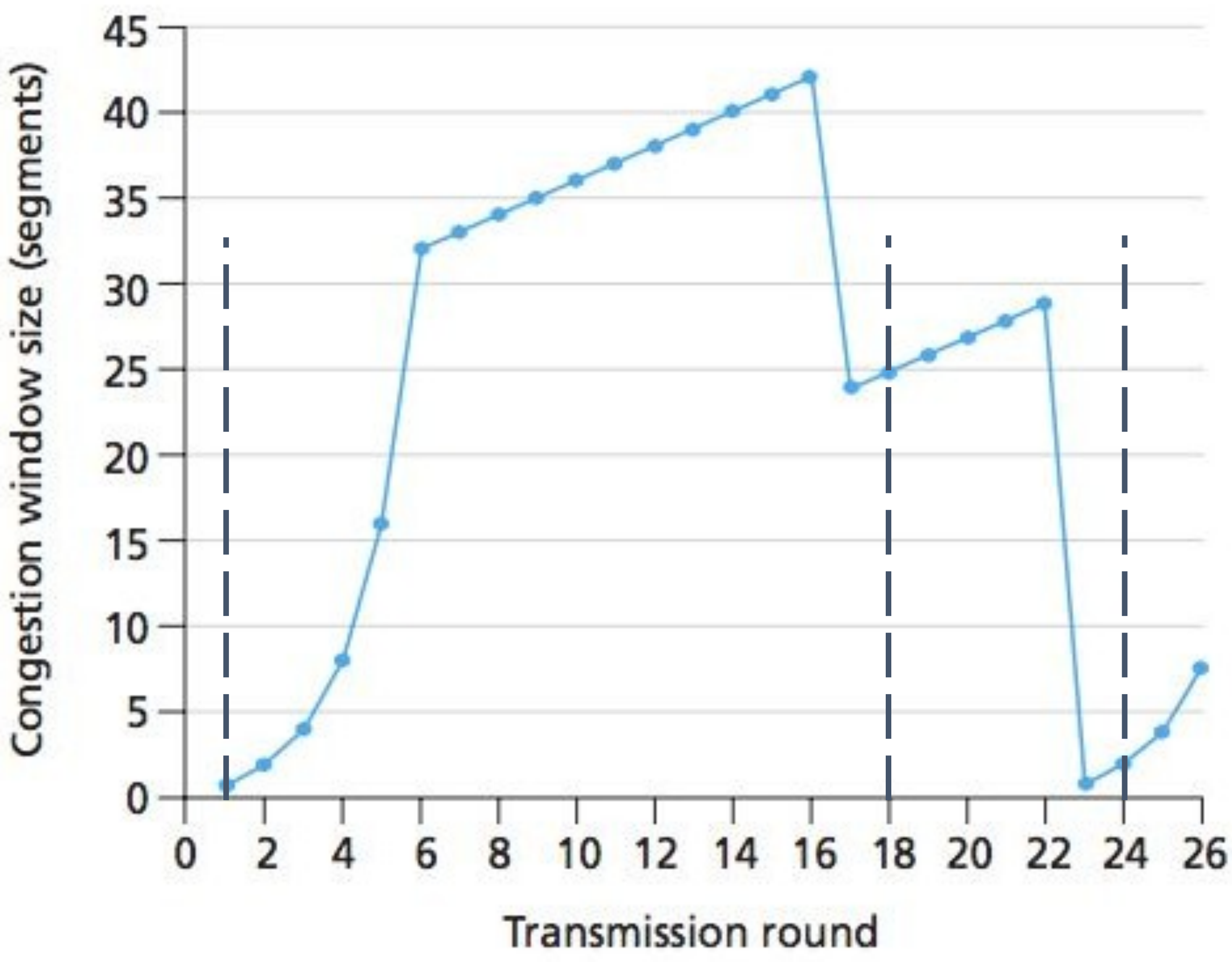
What is the ssthresh at the 1st round, 18th round, 24th round?



Q4 TCP Congestion Control

What is the ssthresh at the 1st round, 18th round, 24th round?

1st: 32
18th: 42 / 2 = 21
24th: 29 / 2 = 14



Q5 Forwarding Table

Consider a datagram network using 32-bit addressing. Suppose a router has 4 links, and packets are to be forwarded as follows:

Destination Address Range	Interface
11100000 00000000 00000000 00000000 11100000 00111111 11111111 11111111	**0**
11100000 01000000 00000000 00000000 11100000 01000000 11111111 11111111	**1**
11100000 01000001 00000000 00000000 11100001 01111111 11111111 11111111	**2**
otherwise	**3**

Provide a forwarding table using longest prefix matching.

Q5 Forwarding Table

Range for interface 2 cannot be described with a single prefix! Need to split.

Destination Address Range	Interface
11100000 00000000 00000000 00000000 11100000 00111111 11111111 11111111	**0**
11100000 01000000 00000000 00000000 11100000 01000000 11111111 11111111	**1**
11100000 01000001 00000000 00000000 11100001 01111111 11111111 11111111	**2**
otherwise	**3**

11100000 01000001 00000000 00000000
11100000 11111111 11111111 11111111

11100001 00000000 00000000 00000000
11100001 01111111 11111111 11111111

Q5 Forwarding Table

Destination Address Range	Interface
11100000 00(/10)	0
11100000 01000000(/16)	1
11100000 (/8)	2
11100001 0(/9)	2
otherwise	3

Thanks

Good Luck on your Midterm!