CHAPTER 28

Real-Time Traffic over the Internet

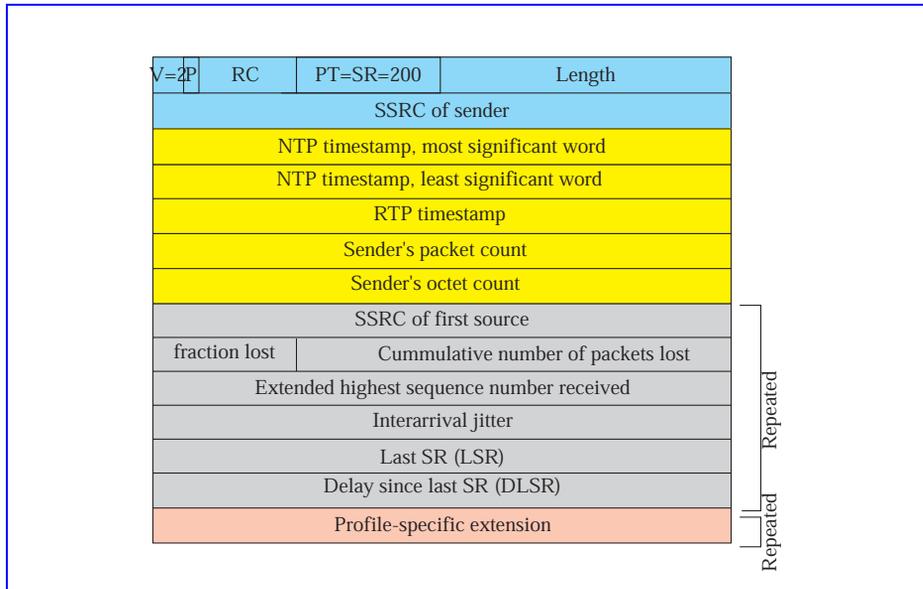## 28.1   MULTIPLE-CHOICE QUESTIONS

1. b	3. b	5. a	7. b	9. d
11. d	13. c	15. a	17. b	

28.2   EXERCISES

19.
- a. 9 seconds played; 11 left
- b. 12 seconds played; 8 left
- c. 17 seconds played; 3 left
- d. 22 seconds played; 8 left

21. 28 bytes

23. See Figure 28.1 (sender report)

Fields:

V: RTP version

P: padding, if set

RC: number of reception report blocks

PT: packet type; for SR the value is 200

length: length of the packet in 32-bit words minus 1; this includes header and padding

SSRC: synchronization source identifier

NTP timestamp: time the report was sent

RTP timestamp: same time as NTP timestamp but in the same units and same offset as RTP timestamps in data packets

sender's packet count: number of RTP data packets from sender

Figure 28.1   *Exercise 23*

sender's octet count: number of payload octets transmitted

SSRC_1: source identifier for block 1

fraction lost: fraction of RTP data packets lost since previous SR or RR packet sent

cumulative number of packets lost: total number of RTP packets lost since beginning of reception

extended highest sequence number received: low 16 bits contain the highest ssequence number; high 16 bits extend that number

interarrival jitter: variance of the RTP data packet interarrival time

LSR: last SR timestamp

DLSR: delay since last SR

SSRC_2: source identifier for block 2

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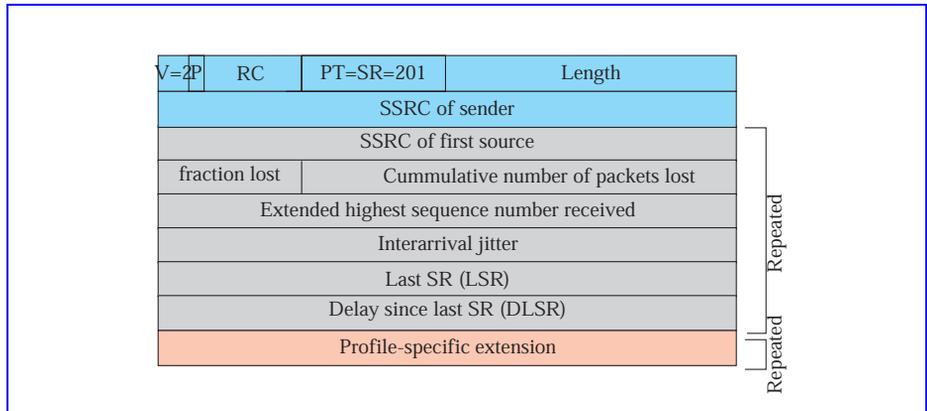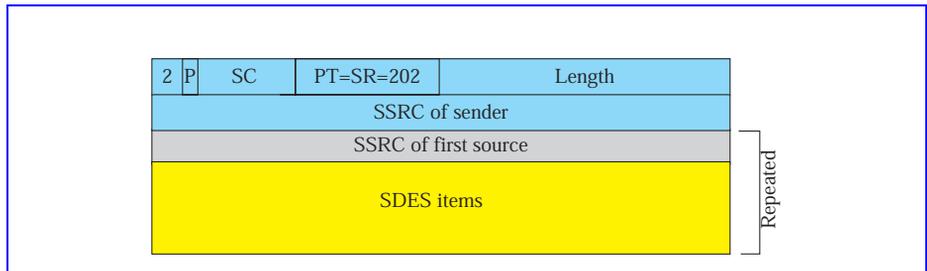**SSRC_n**: source identifier for block n

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profile-specific extensions

25. The RTCP receiver report has similar fields as the RTCP sender report. The packet type field (PT) has a value of 201. There are no 20 bytes of sender information. See Figure 28.2 (receiver report).

27. See Figure 28.3(source description)

   V: RTP version

Figure 28.2   *Exercise 25*

V=2	P	RC	PT=SR=201	Length
SSRC of sender
SSRC of first source
fraction lost	Cummulative number of packets lost
Extended highest sequence number received
Interarrival jitter
Last SR (LSR)
Delay since last SR (DLSR)
Profile-specific extension

Repeated
Repeated

Figure 28.3   *Exercise 27*

2	P	SC	PT=SR=202	Length
SSRC of sender
SSRC of first source
SDES items

Repeated

P: padding, if set

SC: source count; the number of SSRC/CSRC chunks in this packet

PT: packet type; for SDES the value is 202

length: length of the packet in 32-bit words minus 1; this includes header and padding

SSRC/SCRC_1: identifier for first source

SDES items: information about the SSRC/SCRC

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SSRC/SCRC_2: identifier for second source

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SSRC/CSRC_n: identifier for nth source

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29. **CNAME**: canonical end-point identifier

   NAME: user name

   EMAIL: electronic mail address

> **PHONE**: telephone number
> **LOC**: geographic user location
> **TOOL**: application or tool name
> **NOTE**: notice/status
> **PRIV**: private extensions

31. If 5 sources are leaving, the minimum total length is 24 bytes. Since the reasons for leaving field are optional for each source, the packet length is variable.