

Real Time Protocol

- Transmisja w czasie rzeczywistym
- Najważniejsze informacje w nagłówku: numer ramki, typ danych, znacznik czasu
- Używana m.in. do wideokonferencji
- Brak gwarancji obsługi!
- Struktura nagłówka protokołu RTP:

bit offset	0-1	2	3	4-7	8	9-15	16-31
0	Version	P	X	CC	M	PT	Sequence Number
32	Timestamp						
64	SSRC identifier						
96	CSRC identifiers ...						
96+32×CC	Profile-specific extension header ID					Extension header length	
128+32×CC	Extension header ...						

Nagłówek RTP

bit offset	0-1	2	3	4-7	8	9-15	16-31
0	Version	P	X	CC	M	PT	Sequence Number
32	Timestamp						
64	SSRC identifier						
96	CSRC identifiers ...						
96+32×CC	Profile-specific extension header ID						Extension header length
128+32×CC	Extension header ...						

- Version
- Padding, Extension, CSRC Count, Marker, Payload Type
- Timestamp
- SSRC Identifier
- Contributing Source

Przykładowa ramka RTP

Wireshark packet capture showing an RTP stream. The selected packet is a Real-Time Transport Protocol (RTP) packet. The packet details pane shows the following structure:

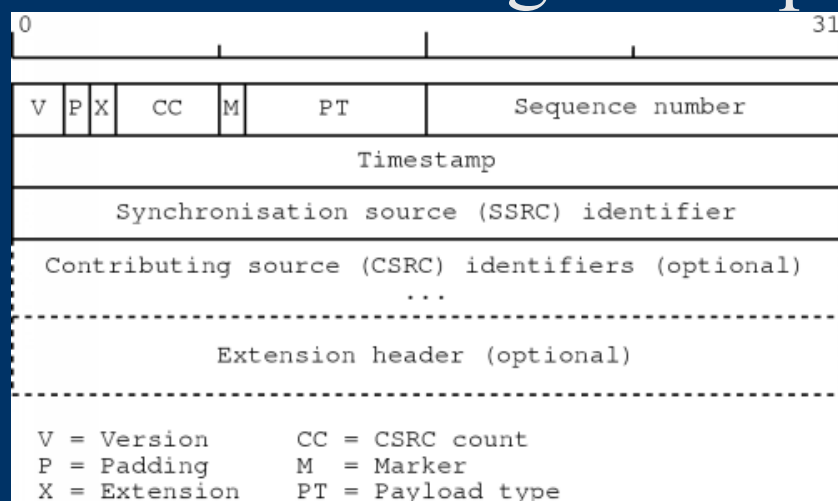
- Ethernet II, Src: AskeyCom_5a:65:8c (00:26:b6:5a:65:8c), Dst: Giga-Byt_8b:18:f7 (00:1f:d0:8b:18:f7)
 - Destination: Giga-Byt_8b:18:f7 (00:1f:d0:8b:18:f7)
 - Source: AskeyCom_5a:65:8c (00:26:b6:5a:65:8c)
 - Type: IP (0x0800)
- Internet Protocol Version 4, Src: 10.10.10.100 (10.10.10.100), Dst: 10.10.10.101 (10.10.10.101)
 - Version: 4
 - Header length: 20 bytes
 - Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00: Not-ECT (Not ECN-Congestion))
 - Total Length: 1137
 - Identification: 0x7ba6 (31654)
 - Flags: 0x00
 - Fragment offset: 0
 - Time to live: 128
 - Protocol: UDP (17)
 - Header checksum: 0x91f9 [correct]
 - Source: 10.10.10.100 (10.10.10.100)
 - Destination: 10.10.10.101 (10.10.10.101)
- User Datagram Protocol, Src Port: centerline (3987), Dst Port: 61204 (61204)
- Real-Time Transport Protocol
 - 10.. = Version: RFC 1889 Version (2)
 - ..0. = Padding: False
 - ..0. = Extension: False
 - 0000 = Contributing source identifiers count: 0
 - 0... = Marker: False
 - Payload type: DynamicRTP-Type-101 (101)
 - Sequence number: 46997
 - Timestamp: 617027260
 - Synchronization Source identifier: 0xe9490e6d (3913879149)
- RFC 2833 RTP Event
 - Event ID: Acceptance tone (96)
 - 1... = End of Event: True
 - ..0.. = Reserved: False
 - ..01 1111 = Volume: 31
 - Event Duration: 19584

The packet is captured on interface 0a:65:0f:93:ef:14. The packet bytes pane shows the raw data of the packet, including the Ethernet II header, IP header, UDP header, and RTP payload.

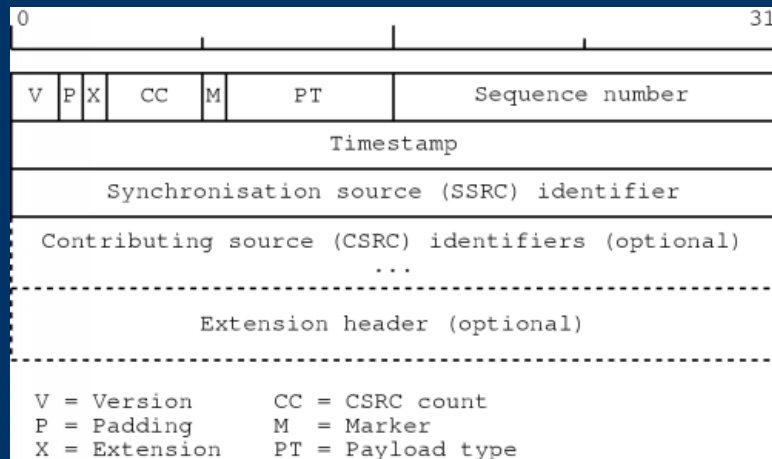
bit offset	0-1	2	3	4-7	8	9-15	16-31
0	Version	P	X	CC	M	PT	Sequence Number
32	Timestamp						
64	SSRC identifier						
96	CSRC identifiers						
	...						
96+32×CC	Profile-specific extension header ID			Extension header length			
128+32×CC	Extension header						
	...						

Real Time Control Protocol

- Protokół współpracujący z RTP
- Monitorowanie przesyłu danych
- Podtrzymywanie sesji
- Zbieranie statystyk na temat odbiorców
- Liczba – mniej niż 5% wszystkich pakietów
- Struktura nagłówka protokołu RTCP:



Nagłówek RTCP

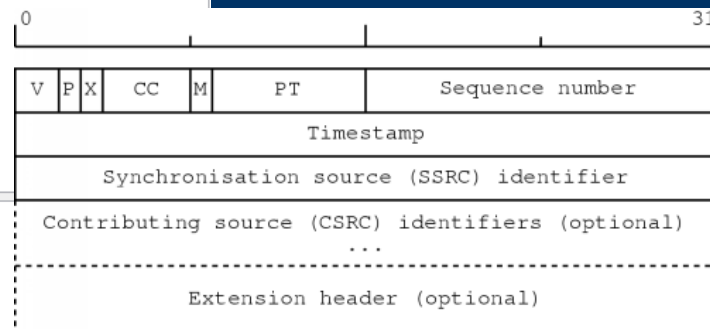


- Version, Padding, Extension, CSRC Count, Marker
- Payload Type, Sequence Number, Timestamp
- SSRC Identifier
- CSRC Identifier

Przykładowa ramka RTCP

```
+ Frame 2371: 112 bytes on wire (896 bits), 112 bytes captured (896 bits)
- Ethernet II, Src: AskeyCom_5a:65:8c (00:26:b6:5a:65:8c), Dst: Giga-Byt_8b:18:f7 (00:1f:d0:8b:18:f7)
  + Destination: Giga-Byt_8b:18:f7 (00:1f:d0:8b:18:f7)
  + Source: AskeyCom_5a:65:8c (00:26:b6:5a:65:8c)
    Type: IP (0x0800)
- Internet Protocol Version 4, Src: 10.10.10.100 (10.10.10.100), Dst: 10.10.10.101 (10.10.10.101)
  Version: 4
  Header length: 20 bytes
  + Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00: Not-ECT (Not ECN-Capable Transport))
  Total Length: 98
  Identification: 0x7c9d (31901)
  + Flags: 0x00
  Fragment offset: 0
  Time to live: 128
  Protocol: UDP (17)
  + Header checksum: 0x9511 [correct]
  Source: 10.10.10.100 (10.10.10.100)
  Destination: 10.10.10.101 (10.10.10.101)
+ User Datagram Protocol, Src Port: centerline (3987), Dst Port: 61204 (61204)
- Real-time Transport Control Protocol (Sender Report)
  10.. .... = Version: RFC 1889 Version (2)
  ..0. .... = Padding: False
  ...0 0000 = Reception report count: 0
  Packet type: Sender Report (200)
  Length: 6 (28 bytes)
  Sender SSRC: 0xe9490e6d (3913879149)
  Timestamp, MSW: 2409737052 (0x8fa1ab5c)
  Timestamp, LSW: 1623266532 (0x60c114e4)
  [MSW and LSW as NTP timestamp: May 12, 1976 11:24:12.377946000 UTC]
  RTP timestamp: 3098536809
  Sender's packet count: 3502944051
  Sender's octet count: 948917150
[RTCP frame length check: OK - 28 bytes]
```

```
0000 00 1f d0 8b 18 f7 00 26 b6 5a 65 8c 08 00 45 00 .....& .Ze...E.
0010 00 62 7c 9d 00 00 80 11 95 11 0a 0a 0a 64 0a 0a .b].....d..
0020 0a 65 0f 93 ef 14 00 4e 61 81 80 c8 00 06 e9 49 .e....N a.....I
0030 0e 6d 8f a1 ab 5c 60 c1 14 e4 b8 af eb 69 d0 ca .m... ..i..
0040 af 33 38 8f 53 9e e0 d0 e3 4a dc 3d 73 18 10 39 .38.S... .J.=s..9
0050 b6 98 2d f5 58 f5 fd 7d 91 72 fb a8 2f 06 ea b8 ..-X..} .r./...
0060 09 2c 80 00 02 80 dc 1d 2a f5 8e 2f c6 11 b0 55 .....*./...U
```



V = Version CC = CSRC count
P = Padding M = Marker
X = Extension PT = Payload type

Typy pakietów RTCP

- Raport nadawcy (*SR, Sender Report*)
- Raport odbiorcy (*RR, Receiver Report*)
- Identyfikacja źródła (*SDES, Source Description*)
- Zakończenie sesji (*BYE*)
- Funkcje specjalne (*APP*)

Dodatkowe informacje

- Podczas transmisji osobno przesyłane są wideo i dźwięk
- Przy słabej jakości połączenia występują problemy z dekodowaniem ramek

