

## Cross Layer Protocol Design

### Radio Communication III



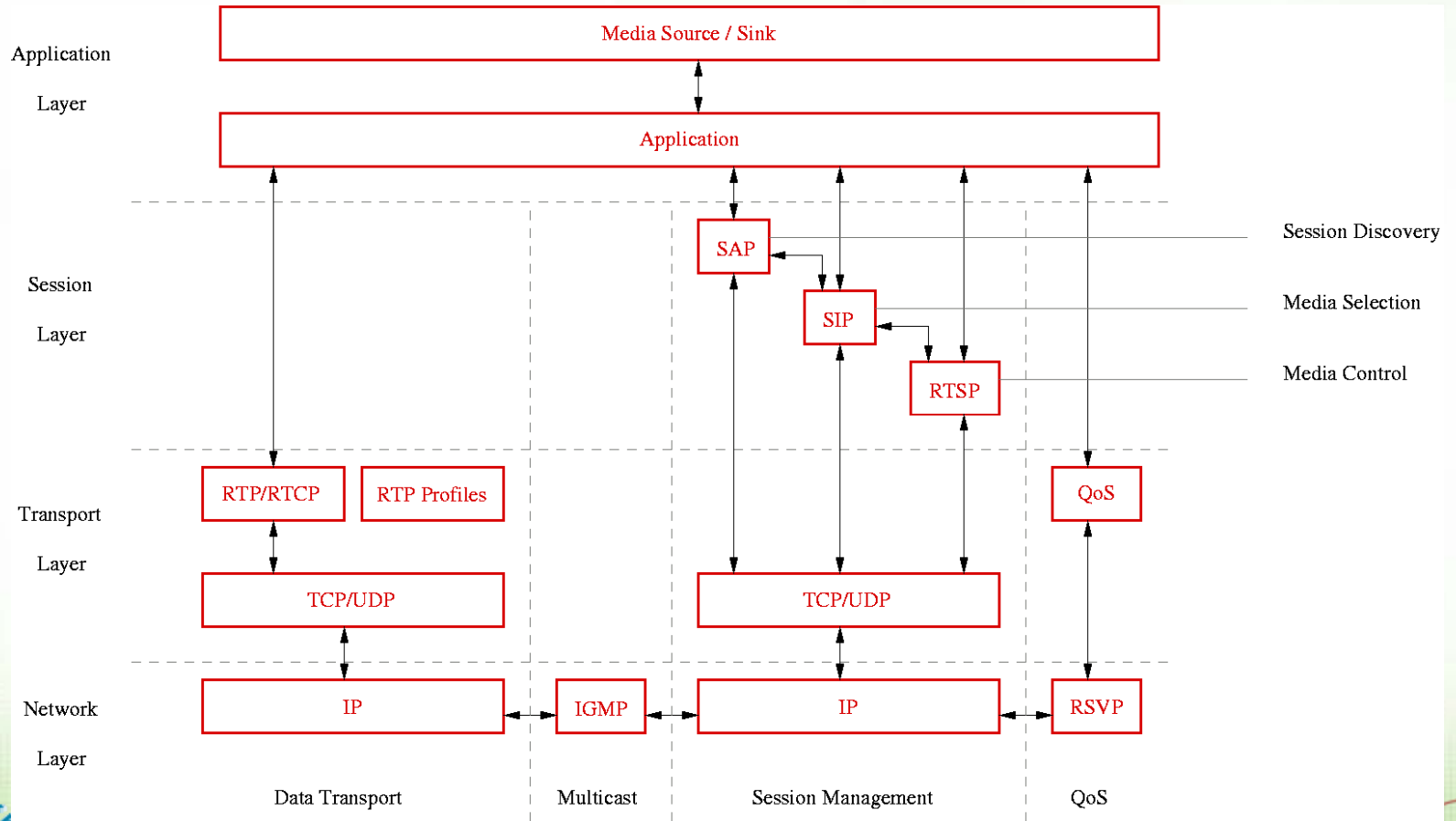
# »»» mobile phones

## The layered world of protocols

### The IP protocol stack



## Overview of the IP Protocol Suite



## Application Layer

- » Interface for Interconnection with the terminal
- » Media Source/Sink
  - Video Camera/Monitor
  - Microphone/Speaker
  - Encoder/Decoder
- » Application supports multiplexing
- » Later more about video and voice

## Session Layer

- » Announcement
- » Invitation
- » Control

## Session Layer - SDP

```
v=0 // Version number
o=mjh 2890844526 2890842807 IN IP4 192.16.6.202 // Originator
s=Wireless Internet Demonstrator // session title
i=A seminar on Internet multimedia //session information
u=http://www.acticom.de //URL for more information
e=fitzek@acticom.de (Frank Fitzek) // Email address to contact
c=IN IP4 224.2.17.12/127 // connection information
a=recvonly // attribute, this telling session is receive only
m=audio 1789 RTP/AVP 0 // PCM audio using RTP on port 1789
m=application 1990 udp wb // "wb" application on port 1990
a=orient:portrait // "wb" in portrait mode
m=video 2003 RTP/AVP 31 // H.261 video using RTP on port 2003
```

## Session Layer - SAP

- » Announcement of session
- » Hard to recover information from the web
- » Twister Example

## Session Layer - SIP

- » ITU H.323 – IETF SIP RFC 3261
- » client server protocol
- » creates, modifies, and terminates sessions
- » multi-party conferencing is enabled through IP multicast or a mesh of unicast channels
- » set of requests are used : INVITE, BYE, ACK, REGISTER, CANCEL, etc



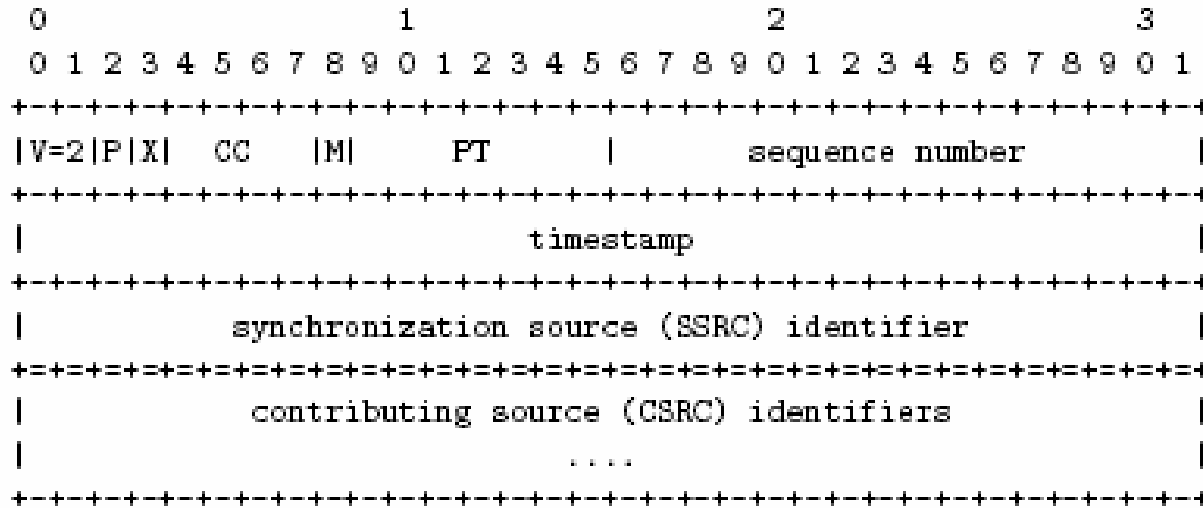
## Session Layer - RTSP

- » act like a remote control
  - Pause
  - Play
  - Stop
  - FFW
  - RWD
- » only for unicast sessions
- » ASCII text based
- » TCP/UDP

## Transport Layer

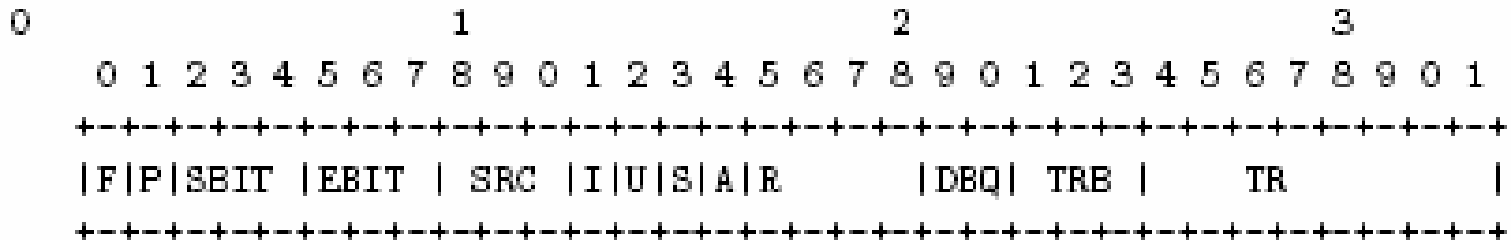
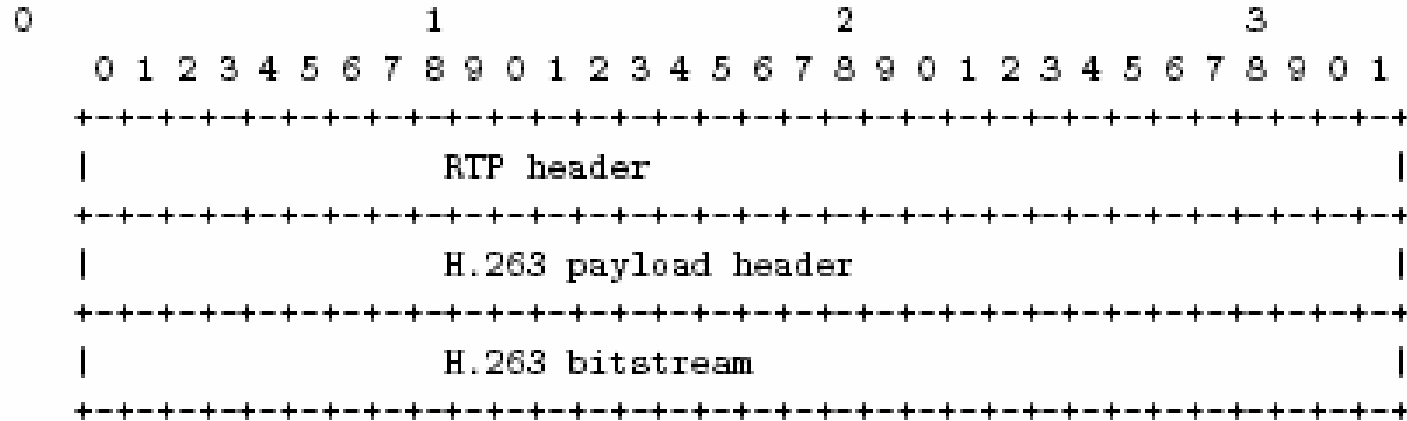
- » Reliable Transmission with TCP
  - Data
  - Signaling
- » Unreliable with UDP
  - in conjunction with RTP for real time

## Transport Layer - RTP



- » Time stamps
- » Sequence Number
- » Enhanced Header Fields
- » Payload Type

## Transport Layer - RTP



## Transport Layer - RTCP

- » Controls the RTP flow by means of reports
- » feedback channel needed
- » Sender Reports (SR)
- » Receiver Reports (RR)
- » Source Descriptions (SDES)
- » Application Specific Information (APP)
- » Session Termination Packets (BYE)
- » Rate adaptation for multicast

»»» mobile phones

**Introduction**

**Conclusion**



[http://mobiledevices.kom.aau.dk/teaching/radio\\_communication\\_iii/cross\\_layer\\_design/](http://mobiledevices.kom.aau.dk/teaching/radio_communication_iii/cross_layer_design/)

