

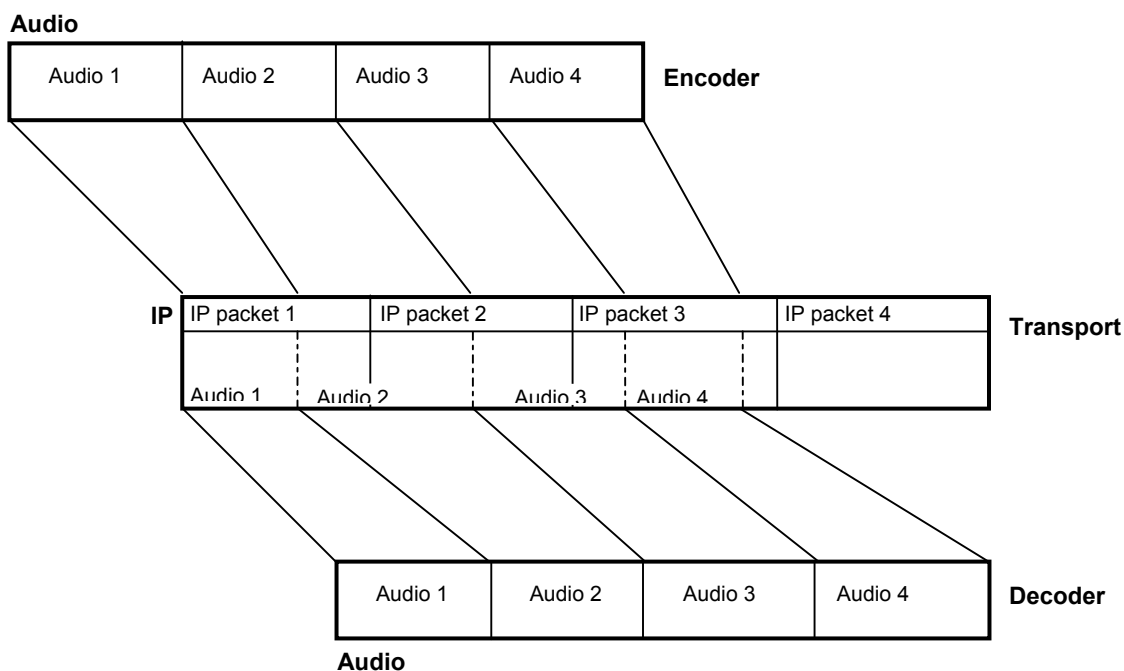
Audio over IP

1 Transport of audio via IP-packets

In the average case of audio data transport via IP, one IP-packet carries exactly one audio frame. Depending on frame length and packet size there is a specific overhead in each IP-packet. An exception can occur if the data transport isn't working correctly due to different possible reasons, e.g. network problems. In this situation, if the IP-packets are refused and have to be sent again, the audio frames are allocated to the IP packets in a different way.

1.1 One IP-packet carries more than one frame

This would be the normal way of audio transport in a situation described above. As you can see in the following figure, the first IP-packet carries not only the first audio frame but also parts of the second one. The second IP-packet carries the rest of Audio 2 and parts of Audio 3. IP-packet 3 carries the rest of Audio 3 and Audio 4 etc..



1.2 One frame is carried by more than one IP-packet

In specific situations, e.g. if the bit rate is high and the sample rate is low, the frame length can be larger than the packet size. In this case the first IP-packet would only carry parts of the first audio and IP-packet 2 the rest etc..

In both situations it is necessary to get access to the frame header to be able to read the information about frame length, bit rate, sample rate etc.. How to get this information is dealt with in the following chapter.

2 Header information

The structure of the headers for MPEG Layer2/3, AAC/CT-aacPlus and AAC Low Delay are described in the following chapters.

2.1 MPEG Layer 2 / Layer 3 frame header

```

          {+++++ +++++ +++++-----} Synchronisation
          ||||| ||||| ||||| +-----} Ident
          ||||| ||||| ||||| |++-----} Layer
          ||||| ||||| ||||| |||+-----} Protection
          ||||| ||||| ||||| ||||| +++++-----} Bitrate
          ||||| ||||| ||||| ||||| ||||| ++-----} Sampling Freq
          ||||| ||||| ||||| ||||| ||||| ||+-----} Padding
          ||||| ||||| ||||| ||||| ||||| |||+-----} Private
          ||||| ||||| ||||| ||||| ||||| ||||| ++-----} Mode
          ||||| ||||| ||||| ||||| ||||| ||||| ||++-----} Mode Extension
          ||||| ||||| ||||| ||||| ||||| ||||| ||||| +-----} Copyright
          ||||| ||||| ||||| ||||| ||||| ||||| ||||| |+-----} Original/Copy
          ||||| ||||| ||||| ||||| ||||| ||||| ||||| |||+-} Emphasis
          ||||| ||||| ||||| ||||| ||||| ||||| ||||| |||||}

HEADER_MASK      = $FFFE0000; {1111 1111 1111 1110 0000 0000 0000 0000}
HEADER_MPEG1     = $FFFC0000; {1111 1111 1111 1100 0000 0000 0000 0000}
HEADER_MPEG1_L3  = $FFFA0000; {1111 1111 1111 1010 0000 0000 0000 0000}
HEADER_MPEG2_L2  = $FFF40000; {1111 1111 1111 0100 0000 0000 0000 0000}
HEADER_MPEG2_L3  = $FFF20000; {1111 1111 1111 0010 0000 0000 0000 0000}
HEADER_MPEG25_L  = $FFE20000; {1111 1111 1110 0010 0000 0000 0000 0000}

SAMPLFREQ_MASK   = $00000C00; {0000 0000 0000 0000 0000 1100 0000 0000}
BITRATE_MASK     = $0000F000; {0000 0000 0000 0000 0000 1111 0000 0000}
PADDING_MASK     = $00000200; {0000 0000 0000 0000 0000 0000 0010 0000}
MODE_MASK        = $000000C0; {0000 0000 0000 0000 0000 0000 0000 1100}
MODE_EXT_MASK    = $00000030; {0000 0000 0000 0000 0000 0000 0000 0011}
PROTECTION_MASK  = $00010000; {0000 0000 0000 0001 0000 0000 0000 0000}
PRIVATEBIT_MASK  = $00000100; {0000 0000 0000 0000 0000 0000 0001 0000}

```

2.2 AAC/CT-aacPlus-Header

```

{++++ +++++----- Synch
| | | | | | | | | | +----- Ident
| | | | | | | | | | |++----- Layer
| | | | | | | | | | | | +----- Protect. absent
| | | | | | | | | | | | |++----- Profile
| | | | | | | | | | | | | |++ ++----- SamplFreq
| | | | | | | | | | | | | | |++----- Private
| | | | | | | | | | | | | | | |++----- Chan. Config.
| | | | | | | | | | | | | | | |++----- Original/Copy
| | | | | | | | | | | | | | | | |++----- Home
| | | | | | | | | | | | | | | | | | |}
HEADER_MPEG2_AAC = $FFF80000;{1111 1111 1111 1000 0000 0000 0000 0000}
PROTECTION_MASK_AAC = $00010000;{0000 0000 0000 0001 0000 0000 0000 0000}
PROFILE_MASK_AAC = $0000C000;{0000 0000 0000 0000 0000 1100 0000 0000}
SAMPLFREQ_MASK_AAC = $00003C00;{0000 0000 0000 0000 0000 0011 1100 0000}
PRIVATEBIT_MASK_AAC = $00000200;{0000 0000 0000 0000 0000 0010 0000 0000}
MODE_MASK_AAC = $000001C0;{0000 0000 0000 0000 0000 0001 1100 0000}
ORIGINAL_MASK_AAC = $00000020;{0000 0000 0000 0000 0000 0000 0010 0000}
HOME_MASK_AAC = $00000010;{0000 0000 0000 0000 0000 0000 0001 0000}

```

2.3 AAC Low Delay

```

{++++ +++++----- Synch
| | | | | | | | | | |++ +++++----- Length
| | | | | | | | | | | | | | | | +----- use same stream
| | | | | | | | | | | | | | | | |++----- audio mux vers.
| | | | | | | | | | | | | | | | | | |}
HEADER_MPEG4_AAC_LD = $56E00000;{0101 0110 1110 0000 0000 0000 0000 0000}
HEADER_MASK_AAC_LD = $FFE00000;{1111 1111 1110 0000 0000 0000 0000 0000}
LENGTH_MASK_AAC_LD = $001FFF00;{0000 0000 0001 1111 1111 1111 0000 0000}

```

3 3010 Signal

The signal of the 3010 has to be embedded into the MSC-channel by the multiplexer and the FAC- and SDC-channel has to be supplied with the multiplex parameters.

COFDM/QAM has to be used for the channel-coding and modulation along with time interleaving and forward error correction.