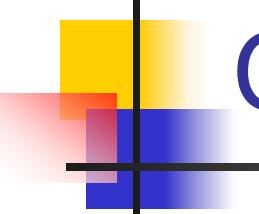


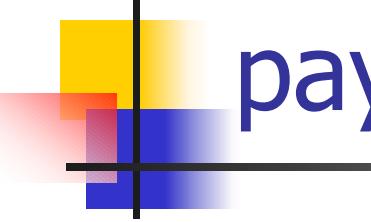
# Codecs and RTP payload formats in SDPng

Anders Klemets <[anderskl@microsoft.com](mailto:anderskl@microsoft.com)>  
Jim Alkove <[jalkove@microsoft.com](mailto:jalkove@microsoft.com)>



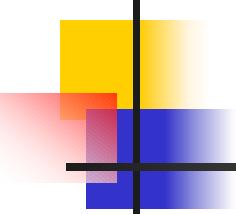
# Codecs and RTP payload formats

- **There may be more than one RTP payload format for any given codec.**
  - MP3 has two: MPA and MPA-ROBUST
  - MPEG-4 has three or more...
- **Proposal: Don't tie the codec to a specific RTP payload format**
  - New "format" attribute in "rtp:pt" tag.



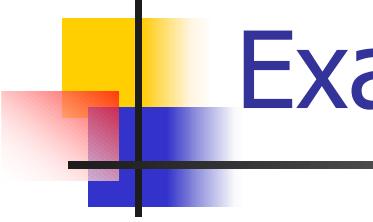
# Example: Two different RTP payload formats for MP3

```
<cfg>
<component name="mp3-audio" media="audio">
  <alt name="old-MP3-payload-format">
    <rtp:session>
      <rtp:pt name="rtp-avp-14" format="mpa" pt="14">
        <audio:codec ref="mpeg-audio-level-3" channels="2" />
      </rtp:pt>
      <rtp:udp ref="A-rcv"/>
    </rtp:session>
  </alt>
  <alt name="RFC-3119-robust-MP3-payload-format">
    <rtp:session>
      <rtp:pt name="mpa-robust-96" format="mpa-robust" pt="96">
        <audio:codec ref="mpeg-audio-level-3" channels="2" />
      </rtp:pt>
      <rtp:udp ref="A-rcv"/>
    </rtp:session>
  </alt>
</component>
</cfg>
```



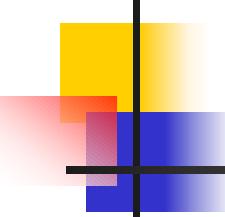
# Bit rates of codec and RTP payload format may differ

- **Bit rate of codec cannot always be deduced by “sampling” attribute**
  - **Example: Variable bit rate MP3**
- **RTP payload format may add extra overhead, increasing the bit rate**
  - **Examples: FEC, RED (redundant audio), Comfort Noise**
- **Proposal: New “bitrate” attributes in “audio:codec” and “rtp:pt” tags.**



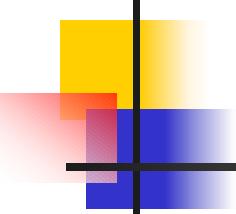
# Example: Variable bit rate MP3

```
<cfg>
  <component name="mp3-audio" media="audio">
    <rtp:session>
      <rtp:pt name="rtp-avp-14" format="mpa" bitrate="197kbps" pt="14">
        <audio:codec ref="mpeg-audio-level-3" channels="2" bitrate="196kbps" />
      </rtp:pt>
      <rtp:udp ref="A-rcv"/>
    </rtp:session>
  </component>
</cfg>
```



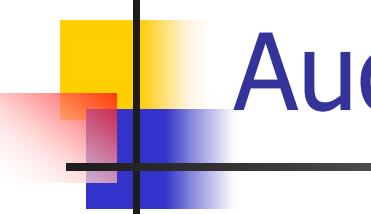
# RTP sessions that use multiple payload formats

- **The total bit rate of an RTP session cannot be determined**
  - **Bit rates of individual payload formats cannot be added.**
  - **Examples: Audio+FEC and Audio+RED**
- **Proposal: Add “bitrate” attribute to “rtp:sesison” tag.**
  - **Orthogonal to any SDPng QoS parameters**



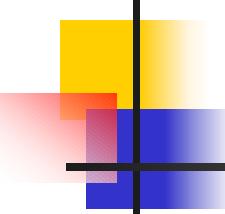
# RTP payload formats without codecs

- Some RTP payload formats don't use a "codec" because they encapsulate other payload formats.
  - Example: ParityFEC, RED, Interleaving
- For such payload formats, some codec attributes need to be specified on "rtp:pt" tag.
  - "sampling" – RTP clock frequency
  - "formatdata" – equivalent to "fmtp" in SDP



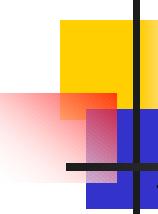
# Putting it all together: Audio+FEC+RED

```
<cfg>
  <component name="PCM-with-parity-FEC" media="audio">
    <rtp:session bitrate="80kbps" >
      <rtp:pt name="rtp-avp-0" format="PCMU" pt="0">
        <audio:codec ref="PCMU" />
      </rtp:pt>
      <rtp:pt name="rtp-avp-parityfec" format="parityfec" sampling="8000"
          pt="96" />
      <rtp:pt name="red-PCMU-and-ParityFEC" format="RED" sampling="8000"
          formatdata="0/96" pt="97" />
        <rtp:udp ref="A-rcv"/>
    </rtp:session>
  </component>
</cfg>
```



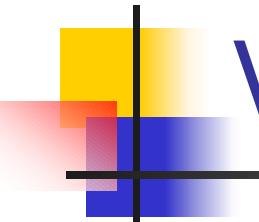
# Other audio codec parameters

- “**Bitspersample**” attribute
  - Need to specify only if bits per sample is allowed to vary (not needed for L8 & L16, for example.)
- “**language**” tag for international content
  - “constraints” section can specify how to choose among streams based on a language preference.
  - Could also be specified as meta-data inside “conf” tag.
    - But meta-data in “conf” section is specific to MBone conferences (e-mail, phone, etc.) – “language” does not seem to belong here.



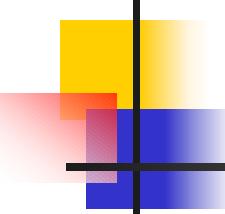
# Example: Multiple languages

```
<cfg>
<component name="mp3-audio" media="audio">
  <alt name="RFC-3119-robust-MP3-in-English">
    <rtp:session>
      <rtp:pt name="mpa-robust-96" format="mpa-robust" pt="96">
        <audio:codec ref="mpeg-audio-level-3" language="en-us" />
      </rtp:pt>
      <rtp:udp ref="A-rcv"/>
    </rtp:session>
  </alt>
  <alt name="RFC-3119-robust-MP3-in-Swedish">
    <rtp:session>
      <rtp:pt name="mpa-robust-96" format="mpa-robust" pt="96">
        <audio:codec ref="mpeg-audio-level-3" language="se" />
      </rtp:pt>
      <rtp:udp ref="A-rcv"/>
    </rtp:session>
  </alt>
</component>
</cfg>
```



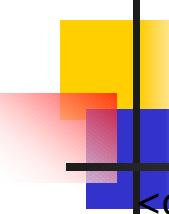
# Video codec parameters

- A “**video:codec**” tag could have these attributes:
  - **name**
  - **encoding**
    - E.g., “**H263**”
  - **Version**
    - To distinguish between different codec revisions
  - **bitrate**
  - **imagewidth & imageheight**
    - Sorely missing from SDP
  - **language**
    - May be useful for video of slide presentations



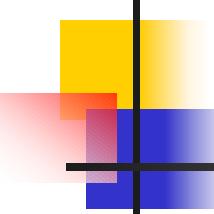
# SDPng usage with RTSP

- **New “rtsp” tag at “component” tag level**
  - No “rtp:rtsp” tag needed, since transport is negotiated in RTSP SETUP command.
- **New “rtsp” tag in “conference” section, to specify RTSP Presentation URL.**



# Example: SDPng and RTSP

```
<cfg>
  <component name="mp3-audio" media="audio">
    <alt name="old-MP3-payload-format">
      <rtp:session>
        <rtp:pt ref="rtp-avp-14" />
      </rtp:session>
      <b><rtsp control="rtsp://server/music.mp3/stream_1/alt_1" /></b>
    </alt>
    <alt name="RFC-3119-robust-MP3-payload-format">
      <rtp:session>
        <rtp:pt ref="mpa-robust" pt="96" />
      </rtp:session>
      <b><rtsp control="rtsp://server/music.mp3/stream_1/alt_2" /></b>
    </alt>
  </component>
</cfg>
<b><conf>
  <rtsp control="rtsp://server/music.mp3" />
</conf></b>
```



# Summary / Open Issues

- **Codec definitions should be separated from RTP payload format definitions.**
- **How to specify codecs for non-A/V media?**
  1. **Require separate SDPng profile for each non-A/V media type.**
  2. **Define a “catch-all” tag, such as “application/codec”**
    - **Will make it easier to deploy SDPng in new applications.**
    - **“Encoding” attribute would be MIME type of codec.**