Speech Coding Enhancement for Opus: Development Update

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IETF 119
draft-buethe-opus-speech-coding-enhancement
Opus (SILK) Speech Coding Enhancement

Algorithm Development

• Develop SOTA low-complexity speech coding enhancement methods
• First without side info, later with side info via extension mechanism
• Full optimization and integration into libopus

Standardization

• Desirable to keep method open for improvement
• To achieve this: standardize requirements instead of methods regarding
  • Quality
  • Integration
  • Interoperability
State as of IETF-119

Algorithm Development
• LACE: very low complexity (100 MFLOPS) with significant quality improvement
• NoLACE: higher complexity (400 MFLOPS) higher quality gain
• Integration into libopus (1.5. release)

Standardization
• First evaluation of quality metrics
• Identified modified opus compare metric as promising candidate for formulating requirements
Opus 1.5 Integration

• Further size / complexity reduction of LACE/NoLACE
• compatible with all modes (silk/hybrid/celt/mono/stereo)
• compatible with neural PLC
• Resource requirements:

<table>
<thead>
<tr>
<th>Method</th>
<th>Binary size (MB)</th>
<th>MFLOPS</th>
<th>MCPS on Cortex A-53</th>
<th>MCPS on Cortex A-72</th>
<th>MCPS on Cortex A-76</th>
</tr>
</thead>
<tbody>
<tr>
<td>LACE</td>
<td>0.5</td>
<td>100</td>
<td>37.7</td>
<td>16.5</td>
<td>5.3</td>
</tr>
<tr>
<td>NoLACE</td>
<td>1.1</td>
<td>393</td>
<td>189.8</td>
<td>77.0</td>
<td>23.1</td>
</tr>
</tbody>
</table>

=> first complete implementation, prerequisite for continuing ID
Questions regarding versioning and updates

• Since we don’t standardize individual enhancement methods there might eventually be decoders with different enhancement methods deployed.

• Do we need a scheme for naming and versioning enhancement methods?

• Should the decoder disclose what method it will use?

• Should the encoder be given the capability to disable decoder enhancement or reject individual methods?
Next steps

Algorithm Development
• Improvements for bandwidths higher than wideband

Standardization
• Formulate first proposal for quality requirements based on Opus 1.5
Thank you!