**Source: Dolby Laboratories Inc., Nokia Corporation**

**Title: On IVAS codec bit rate constraints**

**Document for: Discussion & Agreement**

**Agenda Item: 7.5**

# Introduction

Pdoc IVAS-4 [1] will specify IVAS codec design constraints. One fundamental constraint is the set of bit rates that the IVAS codec shall support. Currently, a list of bit rates is already agreed, while others are still under discussion.

The present contribution is a proposal to progress the bit rate design constraints as one fundamental design constraint. Settling on the bit rates to be supported will give IVAS codec contenders the necessary planning security they need in their codec developments.

# Discussion

The present version of the IVAS codec design constraints specifies the following requirements for bit rate support and for DTX support:

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| --- | --- |
| **Bit Rates** | When EVS bit-exact operation is used (see Backward interoperability), the IVAS codec shall operate at bit rates of EVS (including all EVS Primary and AMR-WB IO modes)Note: As implemented in EVS, the bit rates up to 24.4 kb/s are gross bit rates and they are net bit rates above 24.4 kb/s.In other cases than EVS bit-exact operation: the IVAS codec shall operate at bit rates of [5.9VBR, 7.2, 8, 9.6, 13.2, 16.4], 24.4, 32, 48, 64, 96, 128, 160, 192, 256, [384, 512] kb/s [min and max TBD].Note: The gross bit rate supported in the DTX/CNG/SID operation is [TBD]. |

The source is of the opinion that the bit rate requirements should be updated as follows:

* Minimum bit rates
The minimum bit rate to be supported is presently undecided. While it would be desirable to have IVAS codec bit rate support down to e.g. 5.9 kbps, it is also clear that there are practical limits for the audio quality that could be offered at such bit rates. Accordingly, the source believes that the minimum bit rate to be supported, e.g., for stereo operation should be 13.2 kbps. Furthermore, it can be useful to consider the existing EVS deployments as a baseline, since some future IVAS deployments can be direct extensions from those. Thus, 13.2 kbps can be a particularly interesting bit rate for both stereo and spatial operation.
* Maximum bit rates

In line with the EVS codec supporting bit rates that offer virtually a transparent quality level for SWB and FB input audio bandwidth, the source believes that IVAS should provide similar support of bit rates at which virtually transparent quality can be achieved for the various supported input audio formats. For more advanced audio formats than stereo with a larger number of component channels, this requires a maximum bit rate higher than 256 kbps. It is proposed to set this maximum to 512 kbps.

* Bit rate spacing

The source believes that bit rate support of 80 kbps should be added for better spacing of the different bit rates and corresponding audio quality levels.

Accordingly, the following update to the bit rate requirements are suggested:

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| --- | --- |
| **Bit Rates** | When EVS bit-exact operation is used (see Backward interoperability), the IVAS codec shall operate at bit rates of EVS (including all EVS Primary and AMR-WB IO modes)In other cases than EVS bit-exact operation: the IVAS codec shall operate at least at bit rates of 13.2, 16.4, 24.4, 32, 48, 64, 80, 96, 128, 160, 192, 256, 384, 512 kb/s.Note: The bit rates specified above for IVAS operation are net bit rates meaning the payload bit rates excluding the rate for RTP payload header.Note: The bit rate supported in the DTX/CNG/SID operation is [TBD]. |

# Conclusion and proposal

The present contribution provides a proposal for bit rates to be supported. It is suggested to update the design constraints table rows on Bit Rates with the corresponding table above.

# References

[1] Pdoc IVAS-4: IVAS Design Constraints, v0.2.0