New DVSI AMBE+™ Vocoder: Toll-Quality Speech at 4 kbps

The latest independent test results show Digital Voice Systems, Inc.'s (DVSI's) new AMBE+™ Vocoder, running at 4.8 kbps and 4.0 kbps out performs both the ITU G.726A vocoder at 32 kbps and the ITU G.729 vocoder at 8 kbps. This new voice coder builds upon the strengths of DVSI's previous IMBE™ and AMBE® Technology to provide toll quality speech with unsurpassed robustness to both acoustic noise and channel errors [1,2,3,4]. DVSI's new AMBE+™ Vocoder is targeted at applications requiring the very highest speech quality at rates as low as 3.0 kbps. Its unmatched performance brings toll-quality speech to a new level of bandwidth efficiency.

The latest Mean Opinion Score (MOS) test results were prepared independently by Comsat Laboratories and are shown in Figure 1. These results show the relative clean speech quality of DVSI's AMBE+™ and AMBE® Vocoders operating at rates between 2.0 kbps and 4.8 kbps. In addition, various references including 8 kbps G.729 (CS-ACELP), GSM-FR, G.726A (ADPCM), FS-1016 (CELP) and FS-1015 (LPC), are shown for comparative purposes. All test conditions in Figure 1 used flat-weighted speech where all input/output was conducted using 16-bit-linear samples at 8 kHz.

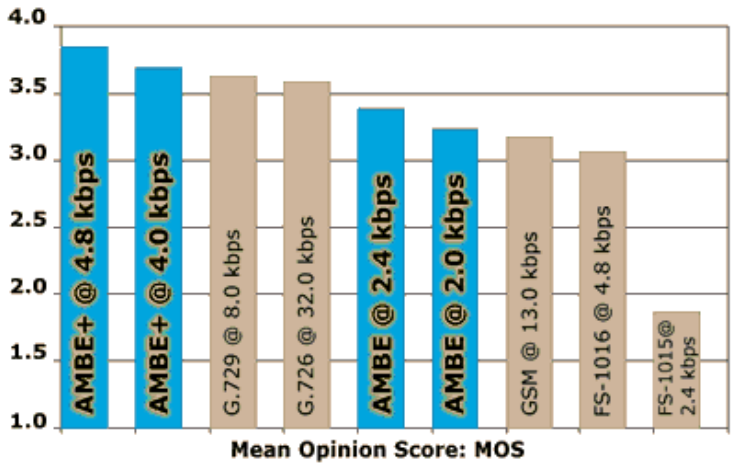

Figure 1: MOS Results on DVSI's AMBE+™ and AMBE® Vocoders

These results show that DVSI's 4.8 kbps and 4.0 kbps AMBE+™ Vocoders out perform and match the quality of both the 8 kbps and 32 kbps ITU standards, respectively. This performance combined with the 2-8 times

reduction in bit rate makes DVSI's AMBE+™ Vocoder the logical choice for applications requiring toll quality with bandwidth efficiency. Furthermore, Figure 1 shows that DVSI's low-rate 2.4 kbps and 2.0 kbps AMBE® Vocoders out perform the GSM-FR vocoder operating at 13 kbps. The net result is that DVSI's AMBE® Vocoder can provide performance equal to today's digital cellular systems with a 5-6 fold improvement in bandwidth efficiency.

Further evidence of the DVSI advantage is shown in Figure 2, which compares the performance of DVSI's 4.0 kbps AMBE+™ Vocoder against the 8 kbps ITU G.729 voice codec under several conditions: flat and IRS weighted speech, ulaw input/output and 3% random frame erasures. The data shows that the 4.0 kbps AMBE+™ Vocoder is equivalent to G.729 over a range of conditions, with the only substantial deviation being the 3% frame erasures where the AMBE+™ Vocoder has a clear advantage.

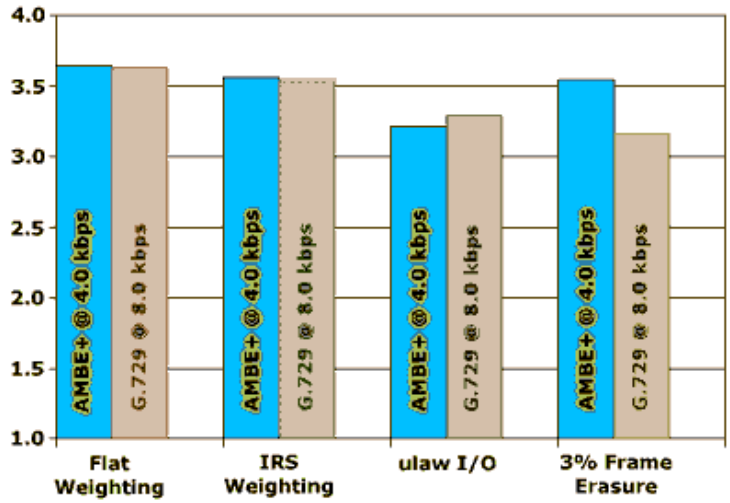

Figure 2: DVSI's 4.0 kbps AMBE+™ Vocoder vs. 8.0 kbps ITU G.729

These new results provide further confirmation of the DVSI performance advantage [2,3,4]. Throughout our 10-year history, DVSI has been a leading worldwide provider of speech compression technology. Key applications include mobile satellite, digital telephony, mobile radio, consumer devices and others. DVSI's speech coders have been standardized by TIA for APCO Project 25 and current customers include Motorola (IRIDIUM), Inmarsat, ICO Global Communications, NEC, Lockheed Martin, GTE (Airfone) and others. DVSI specializes in speech compression solutions including software, hardware, channel coding, echo cancellers, test sets and custom engineering. DVSI's dedicated staff has the necessary expertise to meet the voice communication needs of tomorrow, today.

[1] J. C. Hardwick and J. S. Lim, "The Application of the IMBE Speech Coder to Mobile Communications", Proceedings ICASSP 91, Toronto Canada, May 14-17, 1991, pp. 249-252.

[2] S. W. Wong, "An Evaluation of 6.4 kbps Speech Codecs for Inmarsat-M System", Proceedings ICASSP 91, Toronto Canada, May 14-17, 1991, pp. 629-632.

[3] S. Dimolitsas et. al., "Evaluation of Voice Codec Performance for the Inmarsat Mini-M System", 10'th Intl. Conf. on Digital Satellite Comm., 15-19

May 1995, pp. 101-105.

[4] S. F. C. Neto et. al., "Performance Assessment of 4.8 kbps AMBE Coding under Aeronautical Environmental Conditions", IEEE 1996, pp. 499-501.

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