

Motorola comments on T3-596

Motorola opposes the technology proposed in T3-596 (optional extension to the 8-VSB standard).

We are concerned by the potential severe degradation of the bit rate caused by the use of this 'optional enhancement'. While other standards bodies are working on extending the bit-rate achievable through the use of better modulation techniques (such as DVB-S2), the ATSC transmission system seems to be going in the reverse direction. We do not see the clear benefits that compensate for the loss of bandwidth, other than in a restricted application environment that uses less than 1 Mbps for services to non-fixed-receiver devices.

The test data reviewed by T3/S9 indicates an average of 6-dB improvement in E-VSB reception compared to 8-VSB reception. This is significant, but not an outstanding improvement compared to the loss of more than 6-dB in video quality that will occur due to the reduction in bit rate when significant portions of the spectrum are used for E-VSB. Some unknown percentage of viewers with fixed receivers would benefit from this additional margin, but the broadcasters' stated requirement for ease of reception with simple indoor set-top antennas is not completely met by this technology.

Even though the data claims minimal complexity to implement the modulation and FEC, support for perceived applications such as 'fallback services' involves significant complexities that burden equipment manufacturers who provide transmission (encoding) and receiver systems. Following lists a few specific areas of complexity:

1. In order to compensate for the severe degradation in bit rate, more efficient coding schemes for both video and audio must be specified by ATSC. These newer compression schemes are more complex compared to MPEG-2, involve additional memory and require faster processing capabilities. In addition, both the transmission and receiver systems must also implement dual-compression capability (to continue support for the current video and audio coding schemes), which significantly increases the equipment costs.
2. In order to implement the compelling 'fallback services' application, the transport buffer management and multiplexing in the encoder becomes significantly more complex compared to the current design, as the delays between the 2 different video and audio streams need to be managed accurately. In addition, the packetization difference between the 2 different coding schemes needs to be comprehended in the encoding and receiver systems.
3. To continue support for the FCC requirements on captions and v-chip data, the transmission and receiver systems must implement the carriage and display of these features in 2 different compression schemes adding further burden to these systems.

DVB and other standards bodies are extending their standards to effectively utilize the emerging ISO JVT standard that can enable transmission of HDTV in place of SDTV services using the same bandwidth (HDTV using JVT at 6 Mbps with comparable quality to current HDTV at 12-15 Mbps using MPEG-2). Adoption of this VSB-extension limits opportunities for ATSC in use of emerging technologies for Terrestrial transmission as the quality of video that is achievable after complete migration to E-VSB and new compression schemes (that are 2x better than MPEG-2 and use 9 Mbps full rate) will be the same as today's video quality using MPEG-2 (at 19.2 Mbps).

Motorola believes that the marginal improvement in receivability offered by E-VSB does not justify the potential loss of HDTV video quality and the additional cost burdens on transmission and reception equipment manufacturers.

If this is the only solution to enable 8-VSB compatible 'robust' services, then we recommend the use of E-VSB based applications in an ATSC framework be constrained as follows:

1. The bandwidth used in 'robust' mode be limited to less than 1 Mbps. This will marginally lower the bit rate used for deployed HDTV services.
2. Robust mode applications use existing tools specified in A/90, A/92 and A/53B. This will reduce the dual-mode implementation burden on equipment.
3. Extensions to ATSC standards (video, audio, modulation or transport) based on emerging technologies should not be explicitly tailored for this modulation scheme only.