Timing Calculations for Distributed Transmission Systems per ATSC A/110

The ATSC Synchronization Standard for Distributed Transmission A/110 has several sections concerned with the specification, adjustment, and measurement of the relative emission times of the signals from the several transmitters in a Distributed Transmission Network (DTxN). A/110 defines a set of parameters that are used to control the timing of emissions from the transmitters in a network and describes a group of calculations that use those parameters to cause transmitter emission timing to adopt desired values. It has become apparent from questions raised by recent implementers of the standard that misunderstanding of the techniques used is possible and could lead to different interpretations by different implementers, despite the fact that those implementers participated in the development of the standard. The proposed Corrigendum 1 to A/110 is written so as to remove the potential inconsistency of interpretation by different implementers of the standard.

In particular, Section 6.4 Transmitter Timing Control Data and Section 11 Transmitter Timing Adjustment define a number of values that are sent in the Distributed Transmission Packet (DTxP) from the Distributed Transmission Adapter (DTxA) to the Distributed Transmitters (DTxTs) and explain how those values are to be used to calculate the emission times of the signals from the transmitters in a DTxN. The values sent in the DTxP include a Synchronization Time Stamp (STS), Maximum Delay (MD) value, and Offset Delay (OD) value. Also described is a value for Transmitter and Antenna Delay (TAD) that is calculated for each transmitter. This assortment of values is unchanged in the draft Corrigendum, although some of their definitions and reference points are modified to improve clarity and consistency of interpretation. In addition, certain new terms, such as DTxP Modulation Time, are added to clarify the reference points in the signals at which timing measurements are to be made.

Within Section 6.4, Figure 6.5 is replaced, a few words are added to subsection 6.4.1, and major revisions or additions are made in subsections 6.4.3 Offset Delay, 6.4.4, renamed DTxP Modulation and Reference Emission Times, and 6.4.5, renamed Determining Transmitter Delay. In Section 11, a word is added, a major addition is made to subsection 11.1, renamed Time References and Emission Time Calculations, and relatively minor revisions and additions are made to most of the remainder of the section, including renaming subsection 11.2 to DTxP Modulation Time Alignment. The changes have been vetted with those individuals who originally asked the questions that pointed to the inconsistency of interpretation, and all those participating are now believed to have the same interpretation of the methods used for setting transmitter timing.