SMPTE EG 2059-10:2016

SMPTE ENGINEERING GUIDELINE

Introduction to the New Synchronization System

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Approved
July 15, 2016

Foreword

SMPTE (the Society of Motion Picture and Television Engineers) is an internationally-recognized standards developing organization. Headquartered and incorporated in the United States of America, SMPTE has members in over 80 countries on six continents. SMPTE's Engineering Documents, including Standards, Recommended Practices, and Engineering Guidelines, are prepared by SMPTE's Technology Committees. Participation in these Committees is open to all with a bona fide interest in their work. SMPTE cooperates closely with other standards-developing organizations, including ISO, IEC and ITU.

SMPTE Engineering Documents are drafted in accordance with the rules given in its Standards Operations Manual.

SMPTE EG 2059-10 was prepared by Technology Committee 32NF.

Introduction

The current methods of synchronization for television, audio and other moving picture signals rely on standards that have been in place for over 30 years. These standards are becoming increasingly inappropriate for the digital age with, for example, networked content sharing and the higher frame rates appropriate to HDTV, UHDTV and other image formats.

In order to solve these problems, SMPTE has specified a new synchronization system based on alignment to reference time measured from the SMPTE Epoch. SMPTE ST 2059-1 specifies how signals are aligned with respect to the SMPTE Epoch. SMPTE ST 2059-2 specifies a Profile of IEEE Std 1588-2008 Precision Time Protocol for distribution of reference time and synchronization metadata in the professional broadcast environment.

This guideline describes basic ideas, concepts and Use Cases of the new synchronization system, including SMPTE ST 12-1 Time Code generation.

1 Scope

The objective of this document is to introduce the basic concepts behind the use of the new synchronization system and the IEEE-1588 Precision Time Protocol in Professional Broadcast Applications, and to give some use cases. Detailed explanation of the technology is out of scope of this document.

2 Conformance Notation

This Engineering Guideline is purely informative and meant to provide tutorial information to the industry. It does not impose Conformance Requirements and avoids the use of Conformance Notation.

Engineering Guidelines frequently provide tutorial information about a Standard or Recommended Practice and when this is the case, the user should rely on the Standards and Recommended Practices referenced for interoperability information.

3 Concept of the New Synchronization System

Periodic AV signals can be created deterministically if their phase at a particular time is known. In the case of a video synchronization signal, if the start point of the video frame (phase) and the video clock frequency are known, it can be created deterministically at any given point in time.

The new synchronization system takes advantage of this characteristic and shares time information across the system rather than transferring synchronization signals themselves. As time information consists of phase (offset from the certain point in time) and frequency, if the phase relationship between time and an A/V signal has been defined, any A/V synchronization signal can be created deterministically from time information. This concept is illustrated in Figure 1.

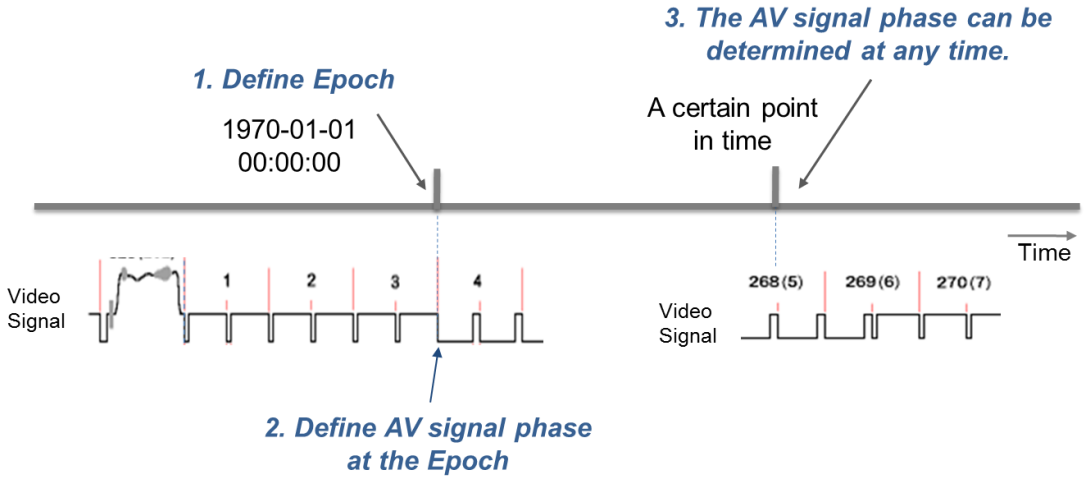

Figure 1 – Concept of the New Synchronization System