



# Standards Report: Timing and Synchronization

By Peter Symes

## Old Standards and a New Task Force!

**SMPTE standards address many aspects of motion imaging and the supporting infrastructures.** Some areas, like 35mm film, are characterized by long-lasting stable standards. Television, on the other hand, has a standards environment that is much more volatile. However, even in the field of television, a few standards enjoy unusual longevity—and an enormous installed base. That results in a challenging task to update or replace them when the need arises.

One example is SMPTE 12M timecode. Dating from the 1970s, SMPTE timecode is probably the most-used standard in motion imaging and related fields. In essence it is simple; timecode is just a label that may be associated with a frame of video, or with many other types of timed sequence. This very simplicity has been one of the reasons for its widespread adoption. It is the basis of most editing, and of many other operations requiring time labeling.

But the existing timecode standard has its limitations. First, it was designed for recording on a linear audio track on a video or audio-tape machine, and this physical relationship implied aspects such as transport binding that would be defined explicitly in a modern standard. The time representation was BCD coding of tens and units for hours, minutes, seconds, and frames—very easy for human interface display, but not an efficient code. The “drop frame” mechanism to cope with the unfortunate timing specifications of NTSC is inconvenient at best. Perhaps most significantly, 12M timecode could not support any frame rate greater than 30 frames/sec.

The 12M standard itself, and a number of documents relating to use and transport, have all evolved over the last 30 years. Functionality has been improved, but perhaps at the expense of clarity! A long and complex debate considered many options, but eventually it was decided that SMPTE should address a number of specific issues for a new version of 12M, but then move on to consideration of a new form of time label, more suited to the needs of the digital age and the future.

The revision process was long and quite contentious. Everyone was well-meaning, but it was difficult to resolve some philosophical differences! Some participants wanted to rewrite the document completely; others preferred the minimum possible set of changes so as to reduce the risk of introducing unintended incompatibilities with existing implementations. In the end, there was extensive restructuring, but with unprecedented attention to detail and wording. We believe the new standard is much more readable, and precise; more importantly, it now provides support for 50 Hz and 60 Hz progressive television systems.

The new version has just completed the approval process and will be published in early 2008. The new version of SMPTE 12M will be published in two parts. Part 1 (SMPTE 12M-1-2008) covers code definition and both linear and vertical interval transports. This document incorporates the information from two earlier SMPTE Recommended Practices, RP 164-1996 (Location of Vertical Interval Time Code) and RP 159-1995 (Vertical Interval Time Code and Longitudinal Time Code Relationship). Part 2 (SMPTE 12M-2-2008) replaces RP188 and defines how timecode is carried in ancillary data packets in digital television systems.

So, one part of the work is done. This is a very important step, because SMPTE 12M timecode will be an essential element of old and new systems for some time to come. But now we can look

[continued on page 10](#)

**Fujifilm  
Printer drop-in**

ahead and focus on the requirements for a labeling system for the digital world of the future.

In late 2007 a Joint Task Force was formed by the European Broadcasting Union (EBU) and SMPTE to study needs for synchronization and timing for the future. This Task Force was established to investigate two areas. One is the requirements for the future for synchronizing of television and media systems; the other is the time labeling system discussed above.

Synchronization is another area where an old standard has proven unexpectedly robust but presents challenges for the future. Today, almost all television equipment is synchronized by the distribution of a color black signal, as defined (most recently) in SMPTE 318M. As with timecode, color black provides a robust solution that will continue to be viable for many years. However, also like timecode, there are probably better solutions available.

Color black does have its limitations. There is no convenient way to generate signals of different frame rates from a single reference signal, and there is no unambiguous way of locking audio to NTSC video. Outside of the historical context it is a rather strange signal; it is relatively difficult to achieve really good stability, and both the NTSC and PAL versions rely on color subcarrier frequencies—frequencies that have no relevance in a digital world.

So, the Task Force on Timing and Synchronization will examine both of these issues. There have already been meetings in New

York and Burbank; the next meeting will be in Geneva at the end of January 2008. The Task Force will produce a set of user requirements for a synchronization system and for time-related labeling, and incorporate these into a Request for Technology (RFT) that will be publicized widely. Responses to the RFT will be evaluated, and the Task Force will then create a “Request for Standardization” that will be sent to the appropriate SMPTE committees for drafting of the necessary documents.

The greatest challenge of this work is not to find “better solutions;” that in itself is probably fairly easy, but is not sufficient. The greater difficulty will be in finding solutions that offer enough added value, and sufficiently simple transition scenarios, to create a momentum for change.

But this is an exciting task; it is not often that there is an opportunity to create standards this fundamental “from scratch.” It’s looking good—there has been enthusiastic participation from both users and vendors, and from experts from the IT and Telecommunication industries. If you have something to contribute to this work, please join us. Participation at the physical meetings is not a requirement; we welcome comments, suggestions, and proposals by e-mail, or on the Wiki established by EBU. Details of Task Force participation are on the SMPTE website at [www.smpte.org/](http://www.smpte.org/) under “Standards” or directly at [www.smpte.org/standards/tf\\_home/](http://www.smpte.org/standards/tf_home/).

## BKSTS Joint Membership Ceases

Due to exchange rate issues, the BKSTS and SMPTE discontinued the joint membership offering. The program end date is effective January 1, 2008. Both Societies continue to work together on programs and offerings periodically—and the Societies collectively are offering the HD Masters Program again in London with TVB Europe. Joint members will continue to keep their membership in each respective Society until the member’s renewal date—at that time, the member can renew with each Society individually. Contact the SMPTE Membership Department to renew your SMPTE membership or go online at [www.smpte.org](http://www.smpte.org).