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ENGINEERING REPORT

Time Code Summit – User Survey and Requirements for a New Time Label

SMPTE ER-2:2017

THE NEXT CENTURY

SMPTE ER 2:2017

Engineering Report

Time Code Summit – User Survey and Requirements for a New Time Label

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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 and Engineering Reports are drafted in accordance with the rules given in its Standards Operations Manual. This SMPTE Engineering Report was prepared by Technology Committee 32NF.

Introduction

In 1975 one of the most prolific SMPTE Standards, then called ANSI C98.12.1975 now called ST 12-1 Time and Control Code, was published which allowed the industry to consolidate around what became known as SMPTE Time Code. These 32 Binary Coded Decimal (BCD) bits would be used in ways that no one had imagined at the time. Today Theatrical shows, Concerts, Music recording and of course Television, just to name a few, make use of this standard. ST 12-1 was voted the top Standard of the past 100 years in a poll taken recently of the Standards Community.

Since its publication two other additions have been published: ST 12-2 Transmission of Time Code in the Ancillary Data Space and ST 12-3 Time Code for High Frame Rate Signals and Formatting in the Ancillary Data Space. The first allows Time Code to be embedded into the Ancillary space in SDI, HDSDI, and UHSDI serial signals, and the second specifies time code formats with the frame counts 72, 96, 100 and 120 and the frame count 120 with drop-frame compensation. However, even with these updates Time Code has not kept up with the radical changes brought about by integration of Internet Protocol and the push to higher and variable frame rates. These are just a few areas that are testing the limits of the ST 12 family of standards.

It has been recognized for some time that a new standard is needed to address the issues brought about by new these new technologies. The 32NF Network/Facilities Technology Committee has been tasked to address these issues and create Standards, Recommended Practices and Engineering Guidelines. This new area of work is termed “Time Labels”. TC-32NF-80 WG Time Labelling and Synchronization is the Working Group that has been working on a new Time Label system for some time now. Out of this work two non-compatible Time Labels standard suites have been proposed, Time Related Label (TRL) and Generic Time Label (GTL). The latter of the two proposed standard suites has been balloted and received many comments.

During the quarterly SMPTE Standards meeting, that occurred at CBS on June 9th, 2016 in the 32NF TC, it was recognized by the committee chair, the SVP of Standards and the Director of Engineering and Standards (Standards Director) that moving forward with two competing Time Label standards was not going to add value to the industry. It was also noted that there was a lack of “User” presence at the Working Group level. The Standards Director (the author of this report) proposed that a Time Code Summit (TCS) should be held where SMPTE would reach out to the User Community and seek out the User Requirements for a new Time Label standard. The TC suspended both TRL and GTL until the proposed “Time Labels Summit” (per Howard Lukk) can convene and make recommendations. The motion was seconded. There was discussion. A member requested a transition plan be developed as well as the new label or labels. The motion was amended to read “32NF will not conduct further ballots on either TRL and GTL until the proposed ‘Time Labels Summit’ can convene and make recommendations”. The amended motion passed without opposition.

Once the Time Code Summits were completed an Engineering Report capturing the User Requirements was to be submitted to the TC at the December 2016 32NF TC meeting.

The following Report describes the process to collect the User Requirements, the results of surveys conducted and the comments captured at each of the three Time Code Summits that were held in Hollywood, London and New York City. It concludes with a Summary of the results from the author’s perspective.

1 Executive Summary

The 32NF Technology Committee instructed the Director of Engineering to seek out User Requirements for a new Time Label Standards. A small Super Users group was formed and a User Survey was created that would be given as a Live Poll survey at three Time Code Summits (TCS) in the major market places for entertainment production, post production and broadcast. Hollywood, London and New York City were selected for this purpose. There was also an Online survey posted for those who could not attend these Time Code Summits (TCS's). Approximately 254 Users attended the Summits with 85 users taking the online survey.

The summits were broken into three parts with the first part taking the Live Poll Survey, followed by a Time Label Tutorial and then a freeform discussion to collect missed requirements and comments. When these Summits were completed the data was collected and the results are provided here along with the report.

The main User requirements fell into four general areas; Frame Rate support, Compatibility and transition from ST 12 Time Code, Multiple Time Labels, Unique ID and Production Environments.

The biggest challenge now facing Users is the lack of support for frame rates above 120Hz. It is not just the high frame rates but also frame rates that are not multiples of 24, 25 or 30. Also support for variable frame rates and frame rates lower than 1 fps such as Time Lapse and the ability to Time Stamp frame rates that "ramp" up and down.

Most of the Users made a strong argument to have compatibility with ST 12. There are two general areas, one would be to support legacy content and the other to support a transition from Timecode equipment to Time Label support.

Over the course of the TCS's an idea of a minimum of two Time Labels seemed to stem from the discussions. One "creation" time label and one "user" or "modify" time label.

There was a lot of debate about including metadata into a Time Label. After much discussion users seemed to rally around the idea of a way to link creation metadata to a unique ID embedded into the Time Label.

There was a lot of discussion around the lack of GPS on stages and remote locations to sync Time of Day. The question was asked how do we provide for a PTP type system when we don't have the ability to access GPS? So, a method of implementation to provide a precision source in these environments is required.

This Report will provide more specific data about how the process was conducted and the results of the survey and User discussion.

2 Time Code Summit Process

With the instructions from the 32NF TC to collect User Requirements for a new Time Label standard, the Director of Standards began the process to conduct three Time Code Summits (TCS) in the major media production and Broadcast centers in the US and UK; Hollywood, New York City and London. The term "Time Code" was chosen since most of the User Community was unfamiliar with the term "Time Label".

The first part of the process was to set the dates for these Summits. Hollywood would be the first of the three Summits scheduled for October 10, 2016 at the Linnwood Dunn Theatre located in the Academy of Motion Picture Arts and Sciences, Pickford Center for Motion Picture Study. The next summit would be held on November 1, 2016 at the BT Tower in London. The last summit was conducted at ABC in New York City on November 16, 2016. It is important to note that these summits would not have been possible without the extensive help of the local SMPTE sections.

Once these dates and facilities were locked down then the next step was to create the program for each summit. To help with this task two decisions were made. The first decision was to select a small set of Super

Users (listed below) to help assist in creating the program and a User requirement survey. The second decision was to create a “firewall” between the creation of the program and the current proponents of the Time Label standardization that had been under way. The purpose of the second decision was to prevent any proponent bias to enter the program or the survey.

Once the Super Users Group was selected, two online meetings were conducted to help create the User Survey. (See section 3) The group also discussed whether to conduct a Live Poll of the survey during the first part of the meeting or ask folks to take the survey before the summit. It was concluded that since the first TCS was approaching so fast that there would be limited time to pre-stage the survey so the Live Poll option was selected. It was then concluded that each summit would be split into three basic sections.

The first section was to complete introductions, present the agenda and then conduct a Live Poll of the survey created in advance. This was accomplished by alerting members attending to bring a device capable of accessing the internet or mobile phones that could text their answers to the Live Poll. The Live Poll was then displayed onto the screen so the results could be displayed instantly. This allowed for; yes/no answers, multiple choice answers and text answers as well.

The next section of the meeting was an informal presentation given by the Director of Engineering to bring the audience up to speed on the progress and technology that led up to the Time Label work that has been taking place in the SMPTE Standards effort. This covered general media workflows and their transition from Analog distribution of Time Code to the current SDI distribution. (See Figure 1. Below, which represents only one type of workflow know as chase lock). The figure shows a configuration with Videotape Recorder and an Audiotape Recorder although these could be any type of master/slave chase lock devices. Then the presentation introduced the concepts of Universal Coordinated Time (UTC), Precision Time Protocol (PTP) and a look at the SMPTE ST 2059 standard including a small discussion surrounding Epochs. (You can find the presentation here Time Code Summit Presentation)

Following the presentation, a free form discussion took place at the Hollywood and NYC summits. This allowed for questions and answers. The audience was also tasked to speak up on any requirements or issues that were not touched on up to that point. The London TCS was a full day session, which gave the opportunity to have breakout sessions. The members attending were split into three groups; production, Post Production and distribution/broadcast. This allowed the users to discuss and write down their specific requirements. When these breakouts were finished the members then got together and reviewed all the breakout session’s requirements and allowed more discussion to see if there were common threads among the separate groups.

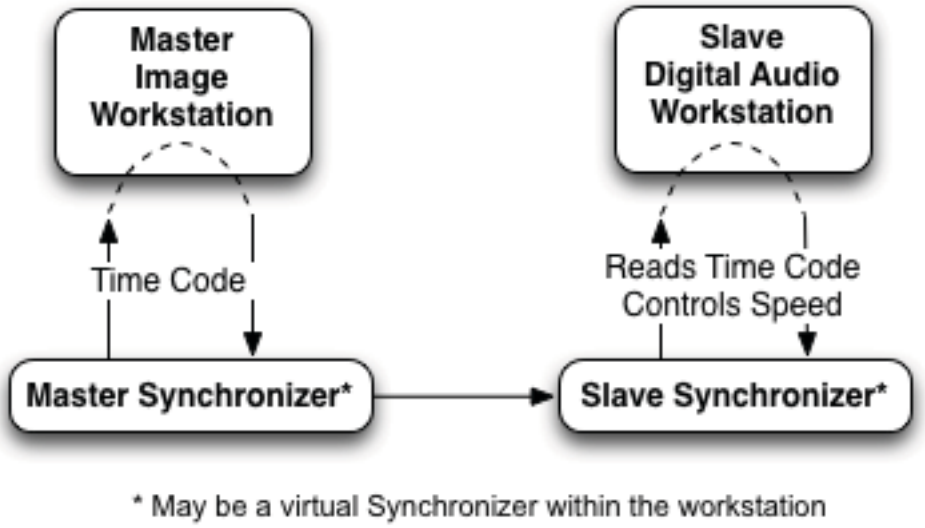


Figure 1 - Timecode Master/Slave chase workflow

It was also realized that not all users would be able to attend so it was decided to also provide the survey online so that we could reach out to the greater community. We also encouraged the Users that attended to go and take the online survey because they may have different opinions after completing the TCS.

The results of these TCS's and the online survey were then collected and the notes and surveys are a part of this report.

3 Survey

As mentioned in Section 2 it was decided to conduct a survey to get a representation of User Requirements for new Time Label. To accomplish this a group of Super Users was selected to create this survey.

3.1 Super Users Group

The selection process for this group was to have folks that were familiar with the SMPTE Standards process and have been or are currently involved with operations that involve the use of Time Code. The chairman of the 32NF-80 was also included since this would eventually return to his committee and since he has had extensive experience as an engineer supporting production environments.

Below you will find a list of those Super Users.

Howard Lukk
Bruce Devlin
Pat Waddell
Andy Quested
Jim Houston
Sieg Heep
Jim DeFlippis

3.2 The Live Poll and Online Survey

After a couple of meetings an agreed upon final survey was constructed which you will find below. The survey is broken into multiple parts. The first part being the General information, second Facility/System Usage, third Timecode in Files, fourth Editorial, fifth Granularity and Accuracy, sixth Time Labels and the final part Priorities.

The survey is a combination of; yes/no selection, multiple choice selection, rate the priority and fill in text questions. This allowed for a wide range of questions and answers. For the Live Poll, there were some constraints and so arrangement was made to duplicate the intention of the question that was asked in the online survey.

Due to the time constraints as the numbers were put together for the live poll survey had some logistics that only allowed shoe horning in some alphabetic extensions where questions were put in at the last minute. For example, in between 03 and 04 a 03a was created. When it came time to do the online survey after that first meeting that platform did not provide for a similar alphanumeric approach. Therefore, there is a different numbers scheme between the two. To notate that below you will see two numbers the Online number then in brackets the Live Poll number. (See example below) Also for the online survey it provided the ability for required questions that must be answered and optional questions that did not have to be answered. This was distinguished by an (*) on line for the required questions. Here for clarification I have identified the difference by following the question with an (R) for required and a (O) for optional. (See example below) For the Live Poll we instructed the audience to not respond to the question if it was not relevant to them.

4. [03a] Where does Time Code fall short? (O)

There was also one other difference between the Live Poll and the Online Poll. On the Live Poll, you were not allowed to “select all that apply”. In these cases, you had to “Rank the priority of all that apply”.

It was discovered during the first Live Poll that some questions were redundant and therefore were removed from the Online Survey. These are indicated by not having the first number notated. There were also some questions that were modified slightly for the online poll as they were found not to be clear when the first TCS was held.

3.2.1 Part 1 General

1. [01] What part of the industry do you work in? (R)
    a. Feature Film Production
    b. Episodic Production
    c. Live Television Production
    d. Post Production
    e. Visual Effects
    f. Broadcast Television
    g. Audio Production
    h. Live Events (Theatrical, Concert)
    i. Theme Parks
    j. Other

If other, please list:

2. [02] Does the use of Time Code impact your job? (R)
    a. Yes
    b. No

3. [03] If yes to the previous question, is the experience a positive one? (O)
    a. Yes
    b. No

4. [03a] Where does Time Code fall short? (O)

5. [04] Where do you create Time Code (Select all that apply)? (R)
    a. In the Camera
    b. In a DAW
    c. In Production
    d. In Post Production
    e. In Playout
    f. In File Distribution
    g. In OTT Distribution
    h. In second screen applications
    i. In captioning and Ancillary services

6. [05] Where do you use Time Code (Select all that apply)? (R)
    a. In the Camera
    b. In a DAW
    c. In Production
    d. In Post Production
    e. In Playout
    f. In File Distribution
    g. In OTT Distribution
    h. In second screen applications
    i. In captioning and Ancillary services

    [05a] What problem does Time Code solve in those applications?

7. [05b] Where does Time Code work well in those applications? (O)

8. [05c] Where does Time Code fall short in those applications? (O)

9. [06] Do you record the image of a Time Code slate/marker or Time Code display as a part of your production? (R)
    a. Yes
    b. No

3.2.2 Part 2 Facility/System Usage

10. [07] Do you use multiple Time Code frame rates in your facility or system? (Ex. 24, 25, 30 etc.) (R)
    a. Yes
    b. No

11. [07a] How well does Time Code work well in multi-rate applications? (O)

12. [08] Do you use Drop Frame? (R)
    c. Yes
    d. No

13. [09] Do you use “Jam Sync”? (A momentary synchronization from one Time Code source to another Time Code generator.) (R)
    a. Yes
    b. No

14. [10] Does your facility perform a “Daily Jam Sync”? (O)
    a. Yes
    b. No
    c. I don’t know

15. [11] What Time Base do you “Jam Sync” to? (O)
    a. Time of Day (ex. UTC, GPS, PTP)
    b. Master Clock (ex. Camera, Sound Recorder, Slate, Master Generator)
    c. Both

16. [12] How often do you “Jam Sync”? (O)
    a. Less than every week
    b. Once a week
    c. Once a day
    d. Twice a day
    e. More than Twice a day

17. [13] Do you use Hour per Reel Time Code? (R)
    a. Yes
    b. No

18. [14] Do you use Continuous Time Code? (R)
    a. Yes
    b. No

19. [15] Do you use Time Code to sync MIDI? (R)
    a. Yes
    b. No

20. [16] Do you use MIDI Time Code? (R)
    a. Yes
    b. No

21. [17] Do you sync Time Code to Word Clock? (R)
    a. Yes
    b. No

22. [18] What rate of Word Clock do you use the most? (Select all that apply) (O)
    a. 44.1 kHz
    b. 47.976 kHz (48/1.001)
    c. 48 kHz
    d. 48.048 kHz (48*1.001)
    e. 96 kHz

23. [18a] What other word clock rates do you use? (O)

24. [19 + 19a] How do you distribute Time Code in your facility or system? (Select all that apply) (R)
    a. Analog audio channel
    b. AES3
    c. SDI
    d. Ethernet
    e. Wireless / RF
    f. Other

25. [20] What is the farthest distance you have to distribute Time Code? (R)
    a. Under 10 feet (3 meters)
    b. 10 to 100 feet (3 to 30 meters)
    c. 100 to 1000 feet (30 to 300 meters)
    d. More than 1000 feet (>300 meters)

26. [21] What is your master sync generator? (R)
    a. Word Clock.
    b. Video (Black, Tri-sync etc.)
    c. NTP
    d. PTP
    e. GPS
    f. Camera

27. [22] Is your facility or system locked to a remote source? (Ex. GPS) (R)
    a. Yes
    b. No
    c. Not sure

28. [23] Do you use Time Code to have devices chase that code? (Time Code as position data) (R)
    a. Yes
    b. No

29. [24] What is the expected lock up time for Time Code slave chase devices? (O)
    a. Seconds
    b. Milliseconds (frames)
    c. Microseconds (sub-frames)

3.2.3 Part 3 Timecode in Files

30. [25] Do you encounter files with multiple Time Codes? (R)
    a. Yes
    b. No

31. [26] Do you make use of multiple Time Codes in a file? (R)
    a. Yes
    b. No

32. [27] Do you encounter “illegal” Time Code values in files? (Ex. 25DF) (R)
    a. Yes
    b. No

33. [28] Do you encounter non-continuous Time Code values in files? (R)
    a. Yes
    b. No

34. [29] Do you find Time Code sequences in files that (no longer) match the essence? (Ex. Frame count does not equal Time Code) (R)
    a. Yes
    b. No

35. [30] Do you find audio-only MXF files with essentially random Time Code sequences? (e.g. Two related audio only files such as language dubs with one having 24p Time Code and another language having 30DF Time Code?) (O)
    a. Yes
    b. No

36. [31] Do you understand how Time Code is used in AS-11 files? (R)
    a. Yes
    b. No
    c. I don’t know what AS-11 files are

37. [32] Do you understand how Time Code is used in IMF files? (R)
    a. Yes
    b. No
    c. I don’t know what IMF files are

3.2.4 Part 4 Editorial

38. [33] Do you process files with Time Code based EDL’s? (R)
    a. Yes
    b. No

39. [33a] How well does this work? (O)

40. [34] Do you use frame counts to establish position or offset on a timeline instead of Time Code? (O)
    a. Yes
    b. No

41. [35] Do you use frame counts to establish durations on a timeline? (R)
    a. Yes
    b. No

42. [36] When establishing an edit out point, do you use the label of the next frame? (Beginning of the next frame) (O)
    a. Yes
    b. No
    c. I don't know the application takes care of it for me

43. [37] When establishing an edit out point, do you use the label of the last frame of the element that is being used on the time line? (Film editing aka "Inclusive") (O)
    a. Yes
    b. No
    c. I don't know the application takes care of it for me

3.2.5 Part 5 Granularity and Accuracy

44. [38] What granularity of time stamping do you require? (R)
    a. Image frame rate
    b. Audio Block rate
    c. Audio sample rate

45. [39] Does a new time stamp need to be synchronized to real time? ("Time of Day") (R)
    a. Yes
    b. No

46. [40] What "Time of Day" granularity of sync is required? (O)
    a. Seconds
    b. Milliseconds (Frames)
    c. Microseconds (Sub-frames)
    d. Nanoseconds (Sub-pixels)

47. [41] Does the "Time of Day" Time Label need to support Daylight Saving Time (DST)? (O)
    a. Yes
    b. No

48. [42] Does the "Time of Day" Time Label need to adjust for Leap Seconds? (UTC) (O)
    a. Yes
    b. No

49. [43] How long should a Time of Day Time Label maintain its synchronization to (UTC)? (O)
    a. Days
    b. Months
    c. Years

50. [44] Do you use variable frame rates? (“Over crank” or “Under crank”) (R)
    a. Yes
    b. No

51. [45] Should a new Time Label support off speed rates? (Ex. 22 fps, 70 fps etc.) (R)
    a. Yes
    b. No

3.2.6 Part 6 Time Labels

52. [46] Do you make use of User Bits? (R)
    a. Yes
    b. No
    c. Don’t know

53. [47] What do you put into User Bits? (Select all that apply) (O)
    a. Audio Time Code
    b. Date
    c. Film Foot and Frame
    d. Nothing
    e. Other

54. [48] What does the term “Time Label” mean to you? (O)

55. [49] Should a new Time Label contain the frame rate? (R)
    a. Yes
    b. No
    c. Not sure

56. [50] What should be the minimum frame rate for a new Time Label? (R)
    a. 1 fps
    b. 1 to 12 fps
    c. 12 to 23.976 fps (24/1.001)
    d. 23.976 fps (24/1.001)
    e. Other

57. [51] What should be the maximum frame rate for a new Time Label? (R)
    a. 120 fps
    b. 300 fps
    c. 1000 fps
    d. Greater than 1000 fps

58. [52] Do you work with Film? (R)
    a. Yes
    b. No

59. [53] Do you need a new Time Labels to keep track of a Film 3:2 or 2:2 sequence? (O)
    a. Yes
    b. No

60. [54] Do you need a new Time Label to support feet and frames counts? (O)
    a. Yes
    b. No

61. [54a] Do you need a new Time Label to support Keycode? (O)
    a. Yes
    b. No

62. [55] Do you need a new Time Label to keep track of legacy Color Framing (CF)? (R)
    a. Yes
    b. No

63. [56] Do you want a new Time Label to be human readable? (R)
    a. Yes
    b. No

64. [57] Does a new Time Label system need to be compatible with Legacy Time Code Systems? (R)
    a. Yes
    b. No

65. [58] Does a new Time Label need to be able to embed ST-12 Time Code? (R)
    a. Yes
    b. No

66. [59] Does a new Time Label need to embed the User Bits from ST-12 Time Code? (R)
    a. Yes
    b. No

67. [60] Does a new Time Label need the ability to generate ST-12 Time Code? (R)
    a. Yes
    b. No

68. [61] Do you need your new Time Label to be a frame counter? (R)
    a. Yes
    b. No

69. [62] How far should a new Time Label be able to count up to? (R)
    a. Hours
    b. Days
    c. Months
    d. Years

70. [63] Would you like an acquisition equipment ID in a new Time Label? (R)
    a. Yes
    b. No

71. [64] Do you want a new time label to support Camera Roll, Scene and Take numbers? (O)
    a. Yes
    b. No

72. [65] Do you want a new time label to carry the source time label through post-production and into a final master? (R)
    a. Yes
    b. No

3.2.7 Part 7 Priorities

73. [66] What are your Top Ten Priorities for a future Time Label system? (Rank in Order) (R)

Feature	1	2	3	4	5	6	7	8	9	10
Time of day locked to known std (GPS, UTC, NTP, PTP)										
Support for variable frame rate (over/under crank)										
Explicit frame rate (Embedded into the Time Label)										
Frame rates below 23.98Hz (24/1.001)										
Frame rates above 120Hz										
Compatible with legacy ST 12 TC										
Counts other than frames (audio samples, uSec, etc.)										
ID of source device (camera)										
Support for roll, take, scene numbers										
Multiple Time Labels (file)										

4 Hollywood Summit

About 134 individuals attended the Hollywood TCS hosted by the SMPTE Hollywood section at the Academy of Motion Picture Arts and Sciences Linn Dunn Theatre in Hollywood on October 10, 2016. The meeting started with the Live Poll and then the tutorial followed by the freeform discussion. Since this was the first TCS held it was noticed that some of the questions in the Live Poll were not well understood. This allowed us to adjust some of those questions before the Online Survey was posted.

Most those attending were from the Post Production community, with a number of folks from the Broadcast and Other category. The Live Poll was a great icebreaker, and the audience was encouraged after the meeting ended to go back and take the Online Survey as they may have changed their minds after the tutorial and the free form discussion.

The results of the Live Poll survey can be found here. Hollywood TCS Survey.pdf A summary of the results can be found later on in this report.

4.1 Hollywood Freeform Discussion Notes

The following notes were recorded from the Discussion session.

1. Must be able to communicate time labels to existing asset management systems.
2. Use GPS to synchronize multiple devices in different locations.
3. Be careful of “feature creep”. Let’s not add metadata into a time label. (lens info, script notes etc.) We need a linkage mechanism, but don’t put stuff into a Time Label that is not “time” related.
4. Would like to have a unique equipment ID when content is created and use as linkage to metadata. Does not have to be human readable.
5. Don’t need explicit frame rate embedded, if precision “time of day” stamp allows downstream devices to calculate frame rate and frame rate “ramping”.
6. Will a time label include a time stamp on every frame or will it stamp the head of the file and then file count from there? How does a new Time Label work with Broadcast Wave Files?
7. What is the container for this new Time Label?
8. When will this be implemented?
9. Where is this new time label embedded? How does it get into files, streams? Specifically, ProRes /QuickTime and DNxHD.

5 London Summit

About 60 individuals attended the London TCS hosted by the local SMPTE section at the British Telecom Tower on November 1, 2016. This meeting was an all-day affair. It started with the Live Poll and then the tutorial. There was a break for lunch and when the audience returned they were broken into three groups; Production, Post Production and a Distribution/Broadcast group. Each group was led by a leader that walked their group through a discussion to capture the requirements and comments. These were written down and then brought into the final section of the meeting to share with the complete group. During this last part, each group leader explained their findings and then a freeform group discussion occurred.

Most of those attending were from the Broadcast community, followed by Other and the Post Production category. The Live Poll worked well, and the audience was encouraged after the meeting ended to go back and take the Online Survey as they may have changed their minds after the tutorial and the free form discussion.

The results of the Live Poll survey can be found here. London TCS Survey.pdf A summary of the results can be found later in this report.

5.1 Breakout Sessions

As mentioned above the time allowed for three groups were assembled for a breakout session for more detailed discussion of requirements and comments. The notes were then captured and reviewed when all the groups came back together for the last portion of the meeting.

5.1.1 Production Notes

The following notes were recorded from the production breakout session.

1. The most important requirement was that there be an ability to have a transition from Time Code to Time Labels.
    a. The ability to embed ST 12 into a new Time Label.
    b. The ability to create ST 12 Time Code from Time Labels.
2. The next requirement was support for High Frame Rate. This means more than just fixed frame rates.
3. The next requirement was to have support for the date to be included in the Time Label. Right now, a lot of users capture the date in the User Bits.
4. The next priority was that there be at a minimum of two Time Labels.
    a. Creation Time Label. The Time of Day (Date) at the creation of the media. This label should be persistent and not able to be edited later.
    b. A user Time Label such as Hour per Reel
5. There was a lot of discussion surrounding how much metadata should be included with a Time Label. Of this the following were desired from the Production group however after much discussion this group would be satisfied if there was a way to calculate this or a way to link to the Time Label.
    a. Frame Rate (Especially in the case of variable frame rates)
    b. Scene, Roll, Take
    c. Physical Location (Time Zone)
6. There was a strong desire to include a unique Source ID in the Time Label. This could be used to link to another associated metadata mentioned above.
7. Time of Day (including the date) was required and there was concern on how you would capture the local time if using GPS or PTP. Is there a way to notate the offset to GMT?
8. There was a lot of concern about Time Labels being based on PTP. This concern was since on a lot of locations in production there is no way to access GPS or PTP to get an accurate Time of Day source.
9. The new Time Label should support Time Lapse capture.

5.1.2 Post Production Notes

The following notes were recorded from the post production breakout session.

1. Rollover of 00:00:00:00 is a pain.
    a. Inconsistent behavior of devices is a problem
    b. News and Sport suffer the most
2. There is a need to sync a Time Label to Time of Day for Global logging.
3. Need for Time Label to be continuous and referenced to Time of Day
4. The Time Label needs a Unique ID
    a. To link to associated Metadata
    b. Trying to come up with a single metadata scheme within a Time Label will be impossible.
5. There is a need to rethink EDL's.
    a. MUST be able to use Time Labels in an EDL (e.g. CMX or XML style)
    b. AAF is way too bulky
6. Must be easy for Humans to read
    a. Understandable for Interns and Senior Management
    b. Keep it simple. The ability to check A vs. B
7. Must provide an ability to use a Local Epoch. (i.e. relative to start of the file. 10:00:00:00 for start of file)
8. Minimum of 2 Time Labels (maybe more)
    a. Creation Time Label
    b. Program Time Label (Modification Time Label)
9. Carry the frame rate in the Time Label
10. There is concern about temperature drift especially when dealing with High Frame rates.
11. Ban Drop Frame (European perspective)

5.1.3 Distribution and Broadcast Notes

The following notes were recorded from the distribution and broadcast breakout session.

The following are noted as Must Haves:

1. Time of Day Code
2. Variable and High Frame Rate support
3. Multiple Labels
    a. Time of Day
    b. Preset Start time (00:00:00:00) start time
4. Translate across all media formats

Other notes:

5. Do not want explicit frame rate embedded into Time Label this should be able to be calculated
6. Do not need direct compatibility with ST 12 but need a way to convert back and forth
7. Do not need Source ID but need some way to link with external metadata.
8. Solve issues with 00:00:00:00 roll over
9. Provide use of Time Labels for consumer tracking/forensic (may not be a SMPTE issue)
10. Time Label needs to support other Time Labels other than Time of Day
11. Files and Streams should use Time Labels in the same way (MXF allows to many variables for Time Labels)
12. Time Labels should support dates earlier than the PTP Epoch or have an Archive Time Label that can come from ST 12.
13. Have a description of each Time Label in a multiple Time Label system.
14. Provide the ability to set flags in a Time Label Stream. Start, Stop, In, Out.
15. Provide documentation of how to get from and to ST 12 including User Bits and how to interface Time Labels with ST 2059 PTP Time
16. Provide the ability to locate to any frame or field of media using Time Label
17. Need a mechanism to “clean up”, delete or “re-stripe” Time Labels (Except creation Time Label)
18. “Rules based Standard” (pure XML standard such as AS-11)

6 New York City

About 60 individuals attended the New York City TCS hosted by the local SMPTE section at the ABC Broadcast Center in New York City on November 16, 2016. The meeting started with the Live Poll and then the tutorial followed by the freeform discussion.

Most of those attending were from the Post Production and the Broadcast community. The Live Poll was a great icebreaker, and the audience was encouraged after the meeting ended to go back and take the Online Survey as they may have changed their minds after the tutorial and the free form discussion.

The results of the Live Poll survey can be found here. NYC TCS Survey.pdf A summary of the results can be found later in this report.

6.1 Freeform Discussion Notes

The following notes were recorded from the Discussion session.

1. Agreed we need to sync word clock to Time Labels - what about the converse?
2. Take note of usage of existing on-set tools for time code operations. Smart Slates, Lock-it Boxes, Wireless transmission systems and Audio Recorders. SMPTE should reach out to these manufactures. (Ambient, Time Code Systems, Denecke, Sound Designs, etc.)
3. Beware use of terms such as "beginning of frame" -- irrespective of coding or transmission a Time Label is a set of values that applies to a captured image "all of which" is assumed to have been captured at a single instant (any modification to this view would need to be captured as metadata)
4. Don't forget time lapse operations
5. Represent multiple time stamps. What about Time Label overwrite? (But general acceptance that good to retain acquisition values so need minimum two labels). Probably best kept separate as content owner may not want acquisition data to be visible to content consumers)
6. Time stamp + Source ID is likely good key into metadata database
7. *Peter's Symes comment*: We do need to think of metadata as a database structure, not a stream. Metadata will include static data, data that changes occasionally, and data that changes continually. Streaming will create excessive and unpredictable bandwidth requirements, and more difficult to consume than database.

7 Online Survey

The Online Survey was posted on October 12, 2016. As was mentioned before all the folks that participated in the TCS's were encouraged to re-take the survey online as they may have changed their minds after completing the TCS. The members were also encouraged to "tell their friends and neighbors" to take part in the Online Survey. At the date of this report there have been 85 responses. The Online Survey was to be closed before this report to the 32NF-80WG, however there has been a lot of interest generated by the TCS's that were held. So, the Online Survey is open now to give folks a chance if they have not responded yet.

The results up until this time can be found here. Time Code Summit Survey Online.pdf

8 Summary

Engineering reports should be completed without bias. In this case, it might be hard to separate the author's bias from this section of the report. The Survey results speak for themselves and the reader of this report is encouraged to wade through all the data collected to reinforce the results that are collected here. In the zip folder that was created there are the following documents to look at listed below in the following sections.

As with any data collected the reader is also encouraged to look at these as one piece of the User Requirements and not base all their decisions solely on the data collected. As was mentioned before a lot of the folks attending would have changed their answers especially in later sections of the survey after they were better informed after the tutorial and free form discussions. The reader also needs to be aware that the online survey respondents that have not been a part of the discussion may have the same experience. So, use this data carefully and I would not want to base major decisions from just the survey data.

Along with all the data collected this section will also try to note the common responses that were heard throughout each of the three TCS's. Of course, it would be better if one attended these TCS's, however the author will do his best to summarize these commonalities with as little filtering as possible.

8.1 Online Survey Results

There are two documents created from the Online Survey that should be found accompanying this report.

Time Code Summit Survey Online.pdf

8.2 Live Poll Survey Results

There are three documents created from each separate TCS from the Live Survey results that should be found accompanying this report.

Hollywood TCS Survey.pdf
London TCS Survey.pdf
New York TCS Survey.pdf

8.3 Combined Survey Results

Most of the workflows were represented here with the majority from Post Production and Broadcast ecosystem. Everyone touched Time Code in some way or another with a lot of them not having a positive experience with it.

8.3.1 Time Code Falls Short

On top of the list was High Frame Rate. This included lower frame rates as well including Time Lapse.

This was followed by the problem of the 00:00:00:00 roll over at midnight and the fact that Time Code only support 24 hours.

8.3.2 Time Code Slates or Displays

About half the users made use of these in their workflow.

8.3.3 Multi Time Code Rates

Most users used many different time code rates and most all were not satisfied how it worked.

8.3.4 Drop Frame

Almost all users used Drop Frame but hate it.

8.3.5 Jam Sync

Most users made use of Jam Sync

8.3.6 Daily Jam Sync

The slight majority does not do a Daily Jam Sync

8.3.7 Jam Sync Source

It was split between a UTC, GPS, and PTP vs. a Master Sync Generator

8.3.8 Jam Sync Period

This was all over the map from less than every week, through to more than twice a day depending on their workflow.

8.3.9 Hour per Reel Code

About 50% of the users made use of this technique.

8.3.10 Continuous Code

Most the users made use of this technique.

8.3.11 Sync MIDI to Time Code

A small segment of users make use of Time Code to sync Midi, and about the same use Midi Time Code.

8.3.12 Sync Time Code to Word Clock

There is a slight majority that syncs time code to word clock where the majority use 48kHz and some use 96kHz and 192kHz.

8.3.13 Time Code Distribution

This was all over the map with grouping around Analog and SDI and the length was just as wide from 10 feet (3m) up to more than 1000ft (300m)

8.3.14 Master Sync

A lot of users used video black for their master sync generator however there were many more different Master sync generator.

8.3.15 Remote Sync

Most facilities were not locked to a remote facility. (This is either locked to GPS or another facility for sync)

8.3.16 Time Code Chase

About half of the users use Time Code chase to have a slave device or show chase a preset time code track with most these users requiring millisecond lock up time.

8.3.17 Multiple Time Codes in a file

A large percentage of users experienced multiple time codes in a file and it is split if they make use in this.

8.3.18 Time Code Faults

A lot of users find issues with Time Code in files

8.3.19 EDL's

Most users work with Edit Decision Lists.

8.3.20 Frame Counters

A lot of users use time code as frame counters for timeline and duration and offsets.

8.3.21 Time Stamp Granularity

Most users want to stamp at the Image Frame Rate with a minority that would like audio sample granularity.

8.3.22 Time Stamp sync to Time of Day

About half of the users needed to reflect the Time of Day in their Time Stamp. If they did need Time of Day time stamp a majority needed image frame granularity with the ability to adjust for DST and Leap Seconds. The majority also wanted the sync to maintain over years

8.3.23 Variable Frame Rate

There was a slight majority that use variable frame rates. Most of the users believe that a new Time Label needs to support variable frame rates.

8.3.24 User Bits

A large portion of the Users make use of User Bits, where the majority use them for capturing the date. Audio time code and foot and frames were the other uses.

8.3.25 Explicit Embedded Frame Rate

Most the Users wanted the explicit frame rate embedded into the Time Label. However, as this was discussed most users would have this requirement satisfied if the implementation could calculate the frame rate. This leads to the question of what is the requirement for Time Stamps vs. metadata. (See the free form discussion below)

8.3.26 Frame Rate Support

Most of the users went to the two extremes for minimum and maximum frame rate support. (One frame per second to greater than 1000 frames per second) It should be noted that in the discussion the need for Time Lapse support was brought up. (Less than one frame per second).

8.3.27 Physical Film Support

About 50% of the users worked with film and of those about half required the use of Foot and Frame, 3:2 or 2:2 sequences and KeyKode labeling.

8.3.28 Legacy Color Framing Support

Most the users were not interested in having Color Framing support.

8.3.29 Human Readable Time Label

The majority would like a new Time Label to be Human Readable.

8.3.30 ST 12 Compatibility

Most users need a new Time Label to be compatible with ST 12 equipment and workflows. Of this group the majority have the requirement to embed ST 12 into a new Time Label to support archive work and to generate ST 12 to support existing equipment and workflows. Of this majority about slightly more than half want to also embed the User Bits.

8.3.31 Time Label as a Frame Counter

Most users require the Time Label to support Frame counts (durations in frames) with the majority wanting this to be able to durations up to years.

8.3.32 Equipment Creation Unique ID

Most users would like the Equipment that is creating the content to include a unique ID in the Time Label. It was suggested that this could be used to link other metadata to the Time Label. (See discussion below)

8.3.33 Scene, Roll, Take Metadata

This requirement fell to the workflows that folks were doing. There was a slight majority that would like to see this embedded into a new Time Label however in the following discussions most of the Users stated if there was a unique ID then the Metadata would not have to be included in the Time Label, it could be embedded into a linked side car file.

8.3.34 Persistent Time Label

There were most Users that would like the original Time of Day time label to be persistent with the file so that it could stay with the content through post production and into the final delivery master. (See discussion below)

8.3.35 Time Label Top Priorities

After reviewing the last question on the survey to see if there was a clear ranking of the priorities it turns out that there was no clear ranking order. It seems that Users workflows determined their ranking of the priorities. Listed below is the ranking from the Online survey, which seems to reflect the broader industry requirements. I do caution you to not put too much emphasis on this ranking as you will see in the freeform discussion section below.

1. Unique ID of source device
2. Multiple Time Labels
3. Time of Day locked to known Standard source (PTP)
4. Compatible with legacy ST 12
5. Support counts other than image frames
6. Support Scene, Roll and Take Metadata
7. Explicit Frame Rate embedded into the Time Label
8. Support Frame Rates above 120Hz
9. Support for frame rates below 23.98Hz
10. Support for Variable Frame Rate

8.4 Combined Freeform Discussion Notes

The following section is a consolidation of the notes that were taken from the Freeform discussions from each of the TCS's. Again, I will alert the reader that this reflects the author's memory of the sessions combined with the notes that were taken and listed in the sections above. There is an attempt here to prioritize the requirements collected from the discussion.

8.4.1 Frame Rate

The biggest challenge now facing Users is the lack of support for frame rates above 120Hz. It is not just the high frame rates but also frame rates that are not multiples of 24, 25 or 30. Also support for variable frame rates and frame rates lower than 1 fps such as Time Lapse and the ability to Time Stamp frame rates that "ramp" up and down.

Along with this topic there was much discussion without a clear consensus that the frame rate should be explicitly embedded into the time label. There were pros and cons as to the usage and viability of this. If the frame rate could be correctly calculated from the Time Label and content, then that would probably solve the requirement for the users.

8.4.2 Compatibility and Transition from ST 12 Time Code

Most the Users made a strong argument to have compatibility with ST 12 and there was general agreement not to modify ST 12 going forward. There are two general areas, one would be to support legacy content and the other to support a transition from Timecode equipment to Time Label support.

The first requirement would be to be able to embed the legacy ST 12 including User Bits into a new File that uses Time Labels. It was discussed that this would most likely be embedded into the persistent "creation" Time Label with the ability to translate the date from the User Bits if it was in the legacy file/stream. (See multiple Time Labels below.)

The second requirement would be that there be a transition plan to allow users to move slowly from their existing Time Code equipment to the new Equipment that would provide Time Labels. This was especially evident in the Show Control and Production workflows to support on set gear and to allow Show Control folks to continue to use their slave Chase Lock workflows.

8.4.3 Multiple Time Labels

Over the course of the TCS's an idea of a minimum of two Time Labels seemed to stem from the discussions. One "creation" time label and one "user" or "modify" time label. There was discussion surrounding more time labels but one user pointed out that in MXF we have this capability and it causes a lot of pain due to the fact a user downstream may not know which is the relevant Time Label. So, he cautioned that indicating a "primary" Time Label could help with this issue.

The first one mentioned would be a precision "Time of Day" stamp that would remain persistent in the file and not be allowed to be modified in any way. This then could live with the file and be trusted as the original source Time Label. This Time Label should also provide a mechanism to link to User Metadata and this is where the idea of having a Unique Equipment (Source) ID could help.

The second-time label would be a User generated Time Label. This could provide for the requirement for Hour per Reel Time Labels, Chase lock Time Labels or a Modify "Time of Day" stamp. It was recognized that one might make use of more than two Time Labels so that is why the requirement is for a minimum of two Time Labels.

8.4.4 Unique ID

There was a lot of debate about including metadata into a Time Label. After much discussion users seemed to rally around the idea of a way to link creation metadata to a unique ID embedded into the Time Label. There was a lot of concern that with the frame rates we are looking to support that any metadata scheme that tries to embed Lens or shot information into the Time Label would severely hamper the Time Label.

8.4.5 Production Environments

There was a lot of discussion around the lack of GPS on stages and remote locations to sync Time of Day. The question was asked how do we provide for a PTP type system when we don't have the ability to access GPS? So, a method of implementation to provide a precision source in these environments is required.

There was also a lot of questions on how this gets new Time Label gets embedded into all the existing file formats that are now in use. Specifically, the camera recording formats.

Bibliography

Joint EBU – SMPTE Task Force on Time Labeling and Synchronization 2008

Meeting Minutes for the Technology Committee on Network/Facilities Infrastructure (32NF) Thursday, 9 June 2016, 9:00 am to 11:00 am EDT

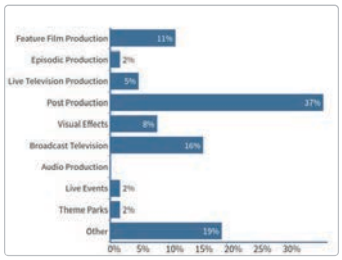
SMPTE ER-1:2017 MXF Timecode Study Group Report: Review of the current practice of the use and encoding of ST 12 Timecode in existing MXF standards

Time Code Summit Survey

Current run (last updated Oct 10, 2016 11:08pm)

75	88	60	67%
Polls	**Participants**	**Average responses**	**Average engagement**

01. What part of the industry do you work in?

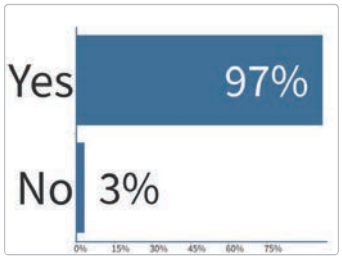


Response options	Count	Percentage
Feature Film Production	7	11%
Episodic Production	1	2%
Live Television Production	3	5%
Post Production	**23**	**37%**
Visual Effects	5	8%
Broadcast Television	10	16%
Audio Production	0	0%
Live Events	1	2%
Theme Parks	1	2%
Other	12	19%

72%
Engagement

63
Responses

02. Does the use of Timecode impact your job?

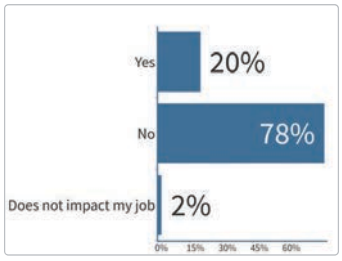


Response options	Count	Percentage
Yes	**65**	**97%**
No	2	3%

76%
Engagement

67
Responses

03. If yes to the previous question, is the experience always positive?



Response options	Count	Percentage
Yes	13	20%
No	**51**	**78%**
Does not impact my job	1	2%

74%
Engagement

65
Responses

03a. Where does timecode fall short?

Responses

multiple framerates

Distribution to other systems

Drop frame and mismatch between DF and NDF between different software in the workflow and Codecs

Doesn't work with non-industry (IRIG, etc) formats.

Frame rate / want ANY frame rate!

Variable frame rate

Interconnect between devs

Drop frame cadence

Feild Acquisitions

Subframes

Slow motion

Media not encoded in sync.

People who don't get it

Drift from mediatime can lead to confusion

Matching systems that use actual time.

Ndf to df

High Speed Photography

More user data

Jitter issues

Does not go more than 24hrs

Frame rate

Too subject to human error

In frames

24 hour limit

Measuring difference between 2.97 and 30, etc

I don't know where to begin...so many issues!!!

Subframes

not consistent

Drop frame inaccuracy & lack of HFR

hfr

Frame Rate

Drop frame, high frame rate, variable frame rate

No high frame rate

No high frame rate

VR

user error

Frame Rate is limited.

HFR;

Resolution

Notging

Frame rates

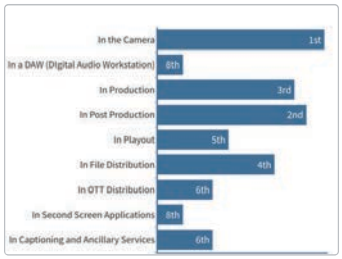
Engagement

43
Responses

Frame rates higher than 60fps

Frame rate

04. Where do you create Time Code? (Rank the priority of all that apply)

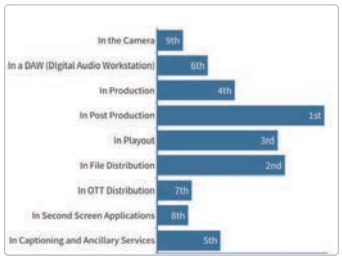


Response options	Rank
In the Camera	1st
In Post Production	2nd
In Production	3rd
In File Distribution	4th
In Playout	5th
In OTT Distribution	6th
In Captioning and Ancillary Services	6th
In a DAW (DIgital Audio Workstation)	8th
In Second Screen Applications	8th

28%
Engagement

25
Responses

05. Where do you use Time Code? (Rank the priority of all that apply)



Response options	Rank
In Post Production	1st
In File Distribution	2nd
In Playout	3rd
In Production	4th
In Captioning and Ancillary Services	5th
In a DAW (DIgital Audio Workstation)	6th
In OTT Distribution	7th
In Second Screen Applications	8th
In the Camera	9th

26%
Engagement

23
Responses

05a. What problem does Timecode solve in those applications?

Responses

Sync captions

sync multiple media components

Can use in multi-camera applications

Sync , edl

Sync and making sure there isn't jitter.

Syncing

Triggers

Edit. Sync. Locator for bad frames

Common frame of reference

Syncing video to audio software and tape decks

Allows for sync for production and broadcast

Sync shots, timely playout

Caption

57%
Engagement

53
Responses

Sync

Sync

Synchronizstion

Sync non AV systems

sorting data

EDL

Locating of specific shots. EDLS. Conform.

Sync Multiple Sources

Sync sound

it's the glue that binds it all together!

Track audio files from getting lost

Glue together a sequence

Relating different media

Search, sync,

QC

Decide election

Sync

Sync

Sync

Synchronize recordings

Synchronize

See errors

Sync

Sync

Sync sound

Ad insertion

Sync audio

Sync cameras

Helps to synchronize elements

Unique identifier for every frame

Syncing audio

Synchronization of multiple sources

Suncronization

Sync of multiple media clips

EDL

Everything

QC

Sync

Sync

Syncing

05b. Where does Timecode work well in those applications?

Responses

IMF

Editorial

Syncing different views.

I got nothing....

Sync camera and sound

Audio visual playback - automation.

Spotting sessions

having a (hopefully) unique address for all media keeps things working...

EDL

Motionbuilder

When it happens automatically

Editorial

it doesn't

Mastering

Closed captioning

Editing

Clapper board

On the control track

Edit lists

File id

Edl

Pro tools

XML

Captioning

Tarely

Is that a serious question!!!

Avid

Editorial / Digital Review / Identification of specific events in Time.

Burn in

DaVinci Resolve

AVID

In the timecode column

34%

Engagement

32

Responses

05c. Where does Timecode fall short in those applications?

Responses

If it ain't a multiple, you are hosed.

Mostly ok

Files

MPEG PTR time references clocks compatible with Smpte to but is not directly related.

vr

43%

Engagement

46

Responses

mixing drop drop and non drop content

Frame rate convert

Fractional timebases

HFR

Calculating offsets, etc. (doing math in three different bases)

sync drift

Non integer frame rates

Audio Sync

Differing rates

Bad Jam sync

Subframes

The dummy who forgot to setup the t/c

Bad cables

Pick one!

No hfr

DF

Proprietary codecs

Hfr

When ingesting digital video, pro tools won't lock to ndf

Mixed rate source

Conversions

Logging over long periods

In the wrong column

In HFR projects

Phantom footage for Scientific research

Drop outs

High Speed Cameras (Phantom)

Media incorrectly stamped.

linking metadata to video audio

Compat with other stands

Splicing

Drift from mediatime

HFR

59.94

Differing Frame Rates in the same project.

24 hour limit

Hfr

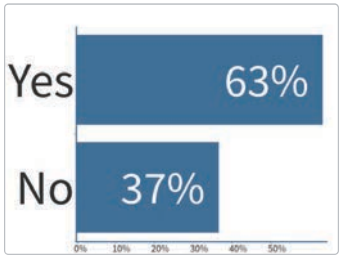
Human error

In the timecode column

Video

Playout

06. Do you use a Timecode slate/marker or Time Code display?

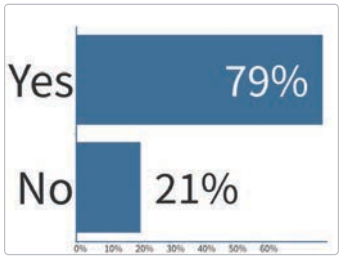


Response options	Count	Percentage
Yes	**45**	**63%**
No	26	37%

81%
Engagement

71
Responses

07. Do you use multiple Timecode rates in your facility or system?



Response options	Count	Percentage
Yes	**54**	**79%**
No	14	21%

77%
Engagement

68
Responses

07a. How well does Timecode work well in multi-rate applications?

Responses

depends on how smart you are...

Next question please!

Not

Not Well

really?

nightmare

Hmm

Rhetorical question

Nafa

not good

What is time code?

Not

Premiere does ok

Cross jam sync only

Not

Poorly

It doesn't

Got together

Doesn't

Dodgy

Not so good

poorly

Ugh

Not so good

Not well.

Badly, subframes

Not well

Nope

Not very

Fail

It doesnt

No...

Not

Poorly

Not at all.

Not well

It doesn't

Lol

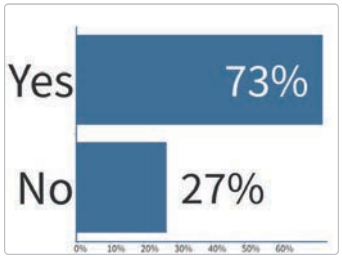
42%

Engagement

39

Responses

08. Do you use Drop Frame?

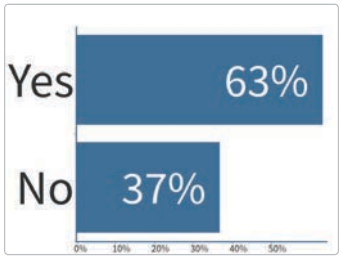


Response options	Count	Percentage
Yes	**52**	**73%**
No	19	27%

81%
Engagement

71
Responses

09. Do you use "Jam Sync"?

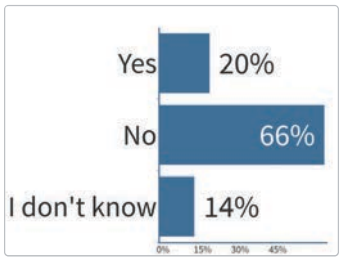


Response options	Count	Percentage
Yes	**43**	**63%**
No	25	37%

77%
Engagement

68
Responses

10. Does your facility perform a "Daily Jam Sync"?

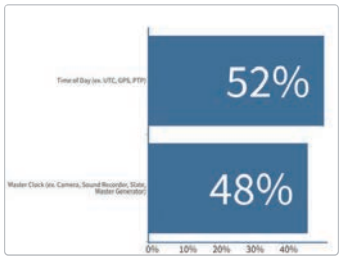


Response options	Count	Percentage
Yes	13	20%
No	**43**	**66%**
I don't know	9	14%

74%
Engagement

65
Responses

11. What Time Base do you "Jam Sync" to?

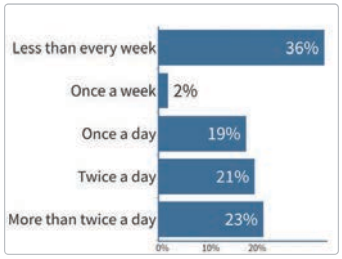


Response options	Count	Percentage
Time of Day (ex. UTC, GPS, PTP)	**32**	**52%**
Master Clock (ex. Camera, Sound Recorder, Slate, Master Generator)	29	48%

69%
Engagement

61
Responses

12. How often do you "Jam Sync"?

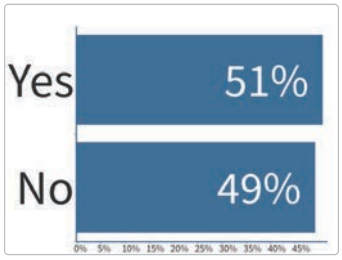


Response options	Count	Percentage
Less than every week	**19**	**36%**
Once a week	1	2%
Once a day	10	19%
Twice a day	11	21%
More than twice a day	12	23%

60%
Engagement

53
Responses

13. Do you use Hour per Reel Time Code?

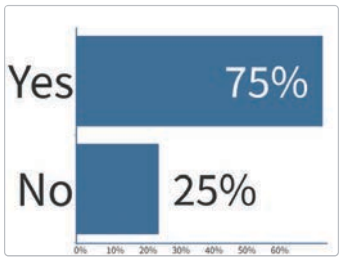


Response options	Count	Percentage
Yes	**33**	**51%**
No	32	49%

74%
Engagement

65
Responses

14. Do you use continuous Time Code?

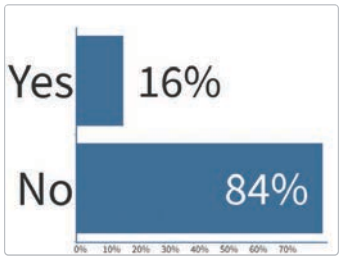


Response options	Count	Percentage
Yes	**48**	**75%**
No	16	25%

73%
Engagement

64
Responses

15. Do you use Time Code to sync Midi?

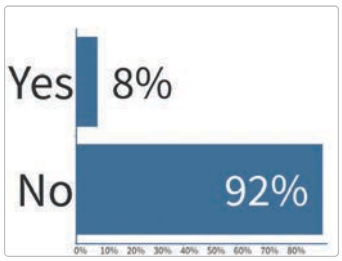


Response options	Count	Percentage
Yes	10	16%
No	**53**	**84%**

72%
Engagement

63
Responses

16. Do you use Midi Time Code?

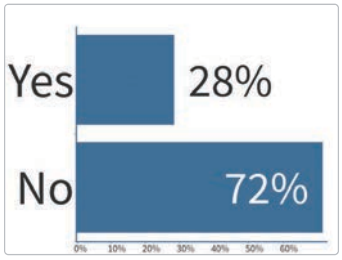


Response options	Count	Percentage
Yes	5	8%
No	**60**	**92%**

74%
Engagement

65
Responses

17. Do you sync Time Code to Word Clock?

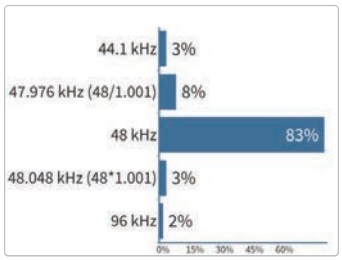


Response options	Count	Percentage
Yes	17	28%
No	**43**	**72%**

68%
Engagement

60
Responses

18. What rate of Word Clock do you use the most? (Rank in order of usage)



Response options	Count	Percentage
44.1 kHz	2	3%
47.976 kHz (48/1.001)	5	8%
48 kHz	**50**	**83%**
48.048 kHz (48*1.001)	2	3%
96 kHz	1	2%

68%
Engagement

60
Responses

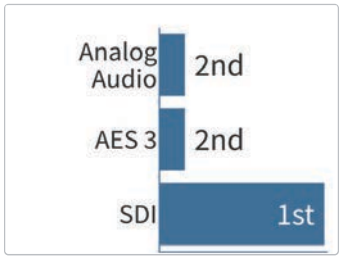
18a. What other word clock rates do you use?

Responses
None
NA
1/0
None
No
None
X
1
48.048, etc.
193/1.002
NA
None
none

15%
Engagement

13
Responses

19. How do you distribute Time Code in your facility or system? (Rank in order of usage)

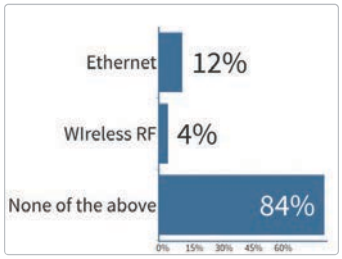


Response options	Rank
SDI	1st
Analog Audio	2nd
AES 3	2nd

47%
Engagement

41
Responses

19a. Do you distribute Time Code in your facility or system via?

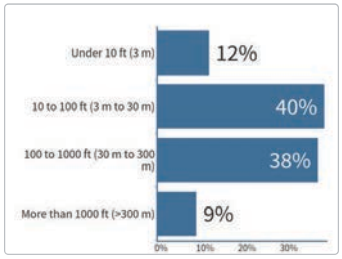


Response options	Count	Percentage
Ethernet	8	12%
WIreless RF	3	4%
None of the above	**58**	**84%**

78%
Engagement

69
Responses

20. How far do you have to distribute Time Code?

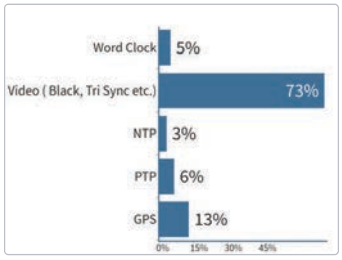


Response options	Count	Percentage
Under 10 ft (3 m)	8	12%
10 to 100 ft (3 m to 30 m)	**26**	**40%**
100 to 1000 ft (30 m to 300 m)	25	38%
More than 1000 ft (>300 m)	6	9%

74%
Engagement

65
Responses

21. What is your master sync generator?

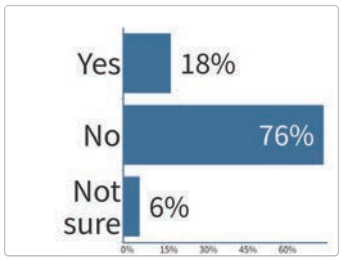


Response options	Count	Percentage
Word Clock	3	5%
Video (Black, Tri Sync etc.)	**45**	**73%**
NTP	2	3%
PTP	4	6%
GPS	8	13%

70%
Engagement

62
Responses

22. Is your facility or system locked to a remote source?

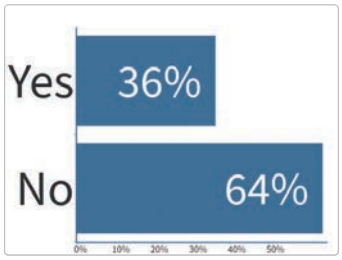


Response options	Count	Percentage
Yes	12	18%
No	**51**	**76%**
Not sure	4	6%

76%
Engagement

67
Responses

23. Do you use time code to have devices chase that code? (Time code as position data)

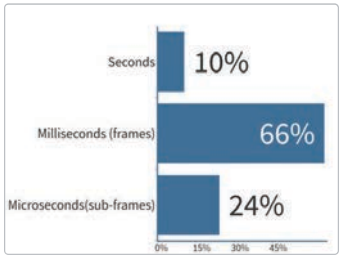


Response options	Count	Percentage
Yes	22	36%
No	**39**	**64%**

69%
Engagement

61
Responses

24. What is the expected lock up time for time code slave chase devices?

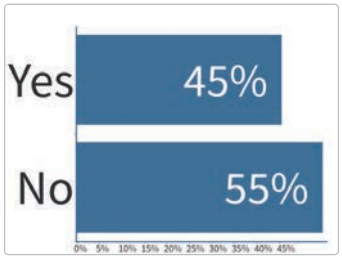


Response options	Count	Percentage
Seconds	6	10%
Milliseconds (frames)	**38**	**66%**
Microseconds(sub-frames)	14	24%

66%
Engagement

58
Responses

25. Do you encounter files with multiple time codes?

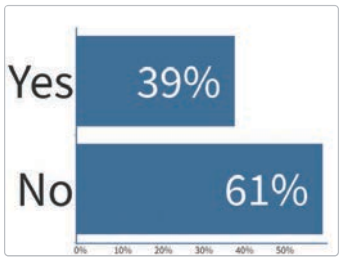


Response options	Count	Percentage
Yes	30	45%
No	**36**	**55%**

75%
Engagement

66
Responses

26. Is there a use for allowing multiple Time Codes in a file?

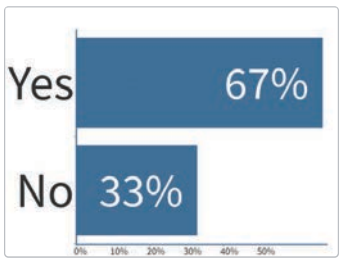


Response options	Count	Percentage
Yes	27	39%
No	**42**	**61%**

78%
Engagement

69
Responses

27. Do you encounter "illegal" Time Code values in files?

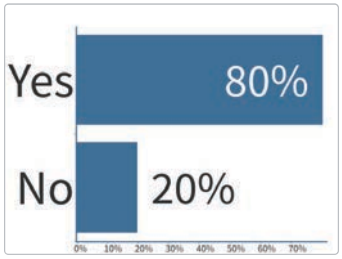


Response options	Count	Percentage
Yes	**47**	**67%**
No	23	33%

80%
Engagement

70
Responses

28. Do you encounter non-contiguous Time Code values in files?

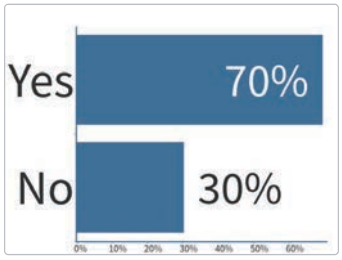


Response options	Count	Percentage
Yes	**57**	**80%**
No	14	20%

81% Engagement

71 Responses

29. Do you find Time Code sequences in files that (no longer) match the essence?

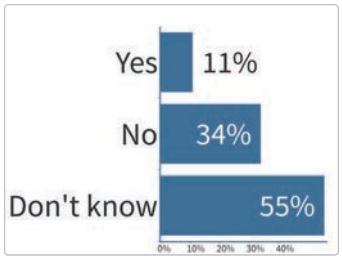


Response options	Count	Percentage
Yes	**46**	**70%**
No	20	30%

75% Engagement

66 Responses

30. Do you find audio-only MXF files with essentially random Time Code sequences? (e.g. Two related audio only files such as language dubs with one having 24p Time Code and another language having 30DF Time Code)

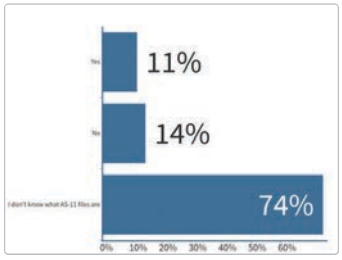


Response options	Count	Percentage
Yes	7	11%
No	22	34%
Don't know	**36**	**55%**

74% Engagement

65 Responses

31. Do you understand how Time Code is used in AS-11 files?

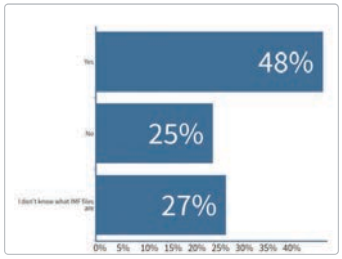


Response options	Count	Percentage
Yes	8	11%
No	10	14%
I don't know what AS-11 files are	**52**	**74%**

80% Engagement

70 Responses

32. Do you understand how Time Code is used in IMF files?

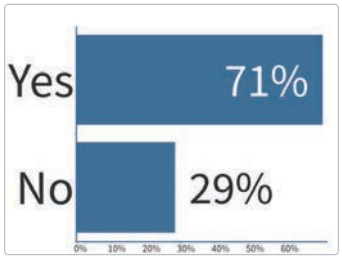


Response options	Count	Percentage
Yes	**35**	**48%**
No	18	25%
I don't know what IMF files are	20	27%

83%
Engagement

73
Responses

33. Do you process files with external Time Code based EDL formats?



Response options	Count	Percentage
Yes	**45**	**71%**
No	18	29%

72%
Engagement

63
Responses

33a. How well does this work?

Responses

Can we go back to pencil and paper?

Surprisingly meh

As well as my assistant, not often.

When it works, it works great. When it doesn't....

It depends on the workflow and NLE vs encoder

Meh

Depend

mediocre

Neat.

as long as you can tame the metadata beast, it's a joy!

Clean

Ubetcha

Great!

It's getting better and I'm optimistic

Most of the time

Works well if you don't mess it up

Well

sometimes

Huh?

Wicked good

Bene

reasonably – has issues

Not well

Depends.

OK

Like buttah

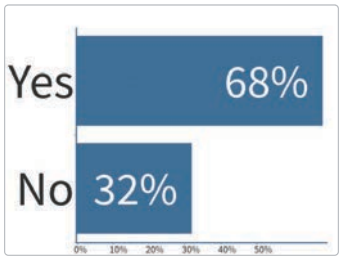
Yowsa

b

32%
Engagement

29
Responses

34. Do you use frame counts to establish position of offset on a timeline in place of Time Code?

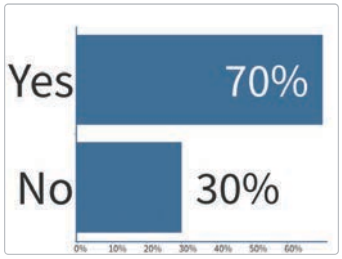


Response options	Count	Percentage
Yes	**45**	**68%**
No	21	32%

75%
Engagement

66
Responses

35. Do you use frame counts to establish durations?

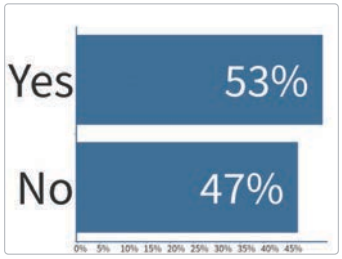


Response options	Count	Percentage
Yes	**47**	**70%**
No	20	30%

76% Engagement

67 Responses

36. When establishing an edit Out point, do you use the label of the next frame? (Beginning of the next frame)

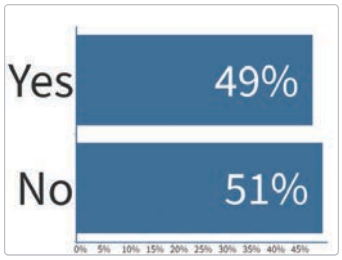


Response options	Count	Percentage
Yes	**30**	**53%**
No	27	47%

65% Engagement

57 Responses

37. When establishing an edit Out point, do you use the label of the last frame of the element that is being used on the timeline? (Film editing aka "Inclusive")

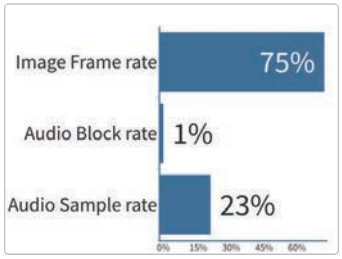


Response options	Count	Percentage
Yes	24	49%
No	**25**	**51%**

56% Engagement

49 Responses

38. What granularity of Time Stamping do you require?

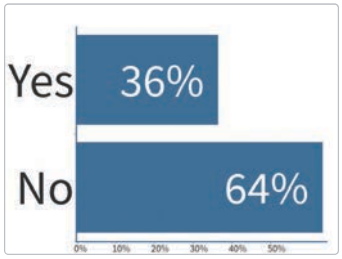


Response options	Count	Percentage
Image Frame rate	**52**	**75%**
Audio Block rate	1	1%
Audio Sample rate	16	23%

78% Engagement

69 Responses

39. Does your Time Stamp need to be synchronized to real time? ("Time of Day")

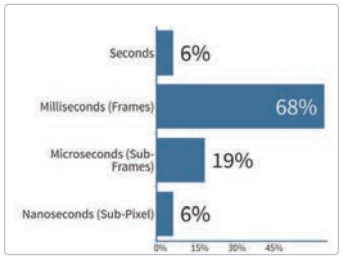


Response options	Count	Percentage
Yes	27	36%
No	**47**	**64%**

81%
Engagement

74
Responses

40. What "Time of Day" granularity of sync is required?

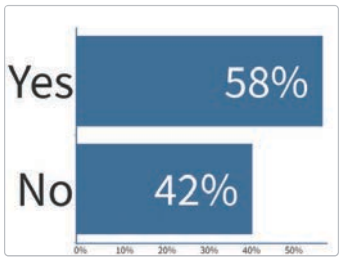


Response options	Count	Percentage
Seconds	4	6%
Milliseconds (Frames)	**42**	**68%**
Microseconds (Sub-Frames)	12	19%
Nanoseconds (Sub-Pixel)	4	6%

70%
Engagement

62
Responses

41. Does the "Time of Day" Time Label need to support Daylight Savings Time (DST)?

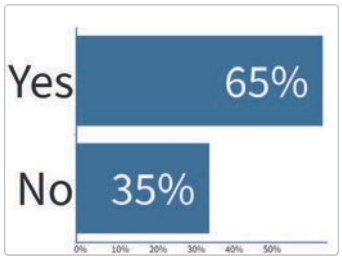


Response options	Count	Percentage
Yes	**35**	**58%**
No	25	42%

68%
Engagement

60
Responses

42. Does the "Time of Day" Time Label need to adjust for Leap Seconds? (UTC)

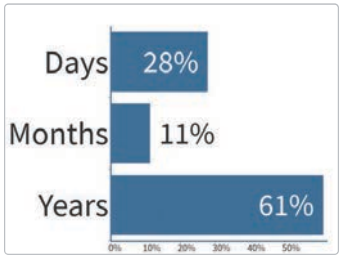


Response options	Count	Percentage
Yes	**39**	**65%**
No	21	35%

68%
Engagement

60
Responses

43. How long should a "Time of Day" Time Label maintain its synchronization to UTC?

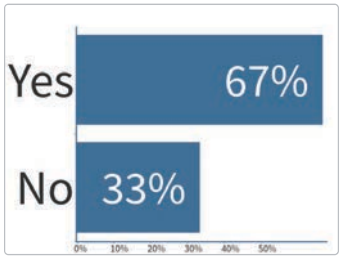


Response options	Count	Percentage
Days	15	28%
Months	6	11%
Years	**33**	**61%**

61%
Engagement

54
Responses

44. Do you use variable frame rates? (Over crank or Under crank)

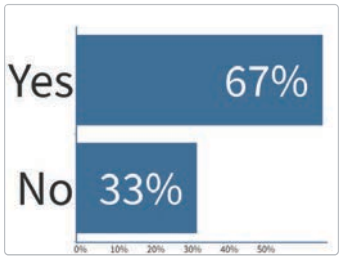


Response options	Count	Percentage
Yes	**48**	**67%**
No	24	33%

72%
Engagement

72
Responses

45. Does your Time Label need to support off speed rates?

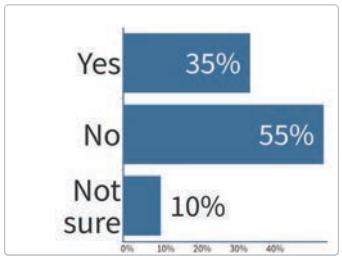


Response options	Count	Percentage
Yes	**45**	**67%**
No	22	33%

72%
Engagement

67
Responses

46. Do you make use of User Bits?

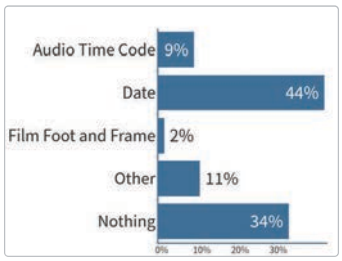


Response options	Count	Percentage
Yes	24	35%
No	**38**	**55%**
Not sure	7	10%

73%
Engagement

69
Responses

47. What do you put into User Bits?



Response options	Count	Percentage
Audio Time Code	6	9%
Date	**28**	**44%**
Film Foot and Frame	1	2%
Other	7	11%
Nothing	22	34%

63%
Engagement

64
Responses

48. What does the term "Time Label" mean to you?

Responses

timestamp of start

Warp

A unique definition of sampling time that is meaningful to humans yet axcurate

When the milk expires

Huh

Marker

Not sure.

Time code

a marker for a specific place in time

Everything I need to know about a moment in time

Numbers

?

Time code ptouch

A place in a media

a description of your timecode

What doctor who actor you like

time sync to what source

Unique and precise

Nothing

Huh?

Doctor Who thing

?

New age time code

It's complicated

Time traveler

Good times.

What?

Timecode number

B

That we're not sure

E

B

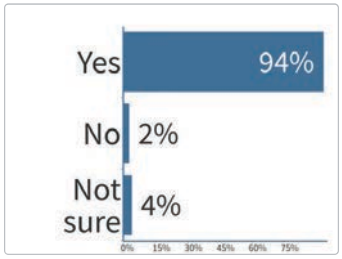
35%

Engagement

32

Responses

49. Should a Time Label contain the frame rate?

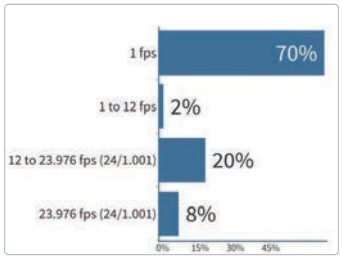


Response options	Count	Percentage
Yes	**76**	**94%**
No	2	2%
Not sure	3	4%

78%
Engagement

81
Responses

50. What would be the minimum frame rate for a Time Label?

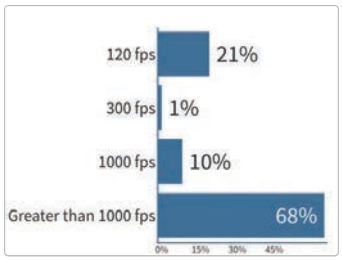


Response options	Count	Percentage
1 fps	**43**	**70%**
1 to 12 fps	1	2%
12 to 23.976 fps (24/1.001)	12	20%
23.976 fps (24/1.001)	5	8%

67%
Engagement

61
Responses

51. What would be the maximum frame rate for a Time Label?

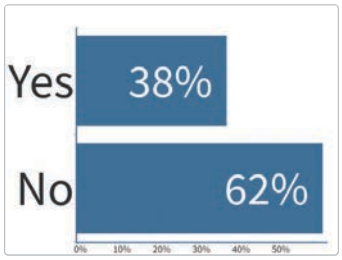


Response options	Count	Percentage
120 fps	15	21%
300 fps	1	1%
1000 fps	7	10%
Greater than 1000 fps	**49**	**68%**

73%
Engagement

72
Responses

52. Do you work with Film?

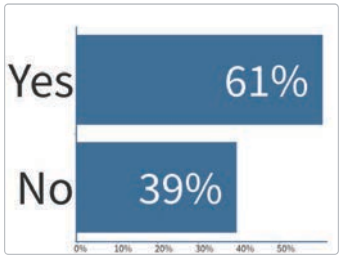


Response options	Count	Percentage
Yes	28	38%
No	**46**	**62%**

81%
Engagement

74
Responses

53. Do you need Time Labels to keep track of a Film 3:2 or 2:2 sequence?

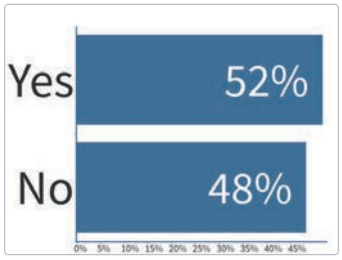


Response options	Count	Percentage
Yes	**40**	**61%**
No	26	39%

73% Engagement

66 Responses

54. Do you need a Time Label to support Feet and Frame counts?

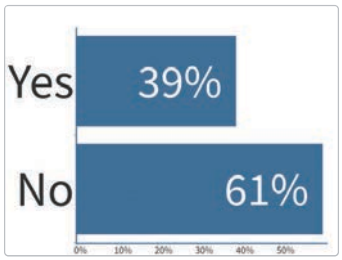


Response options	Count	Percentage
Yes	**30**	**52%**
No	28	48%

66% Engagement

58 Responses

54a. Do you need a Time Label to support Keycode?

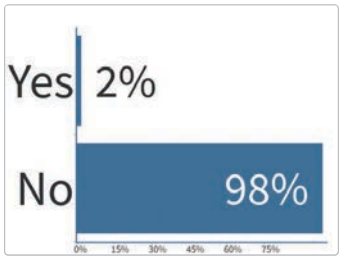


Response options	Count	Percentage
Yes	22	39%
No	**34**	**61%**

64% Engagement

56 Responses

55. Do you need Time Labels to keep track of legacy Color Framing (CF)?

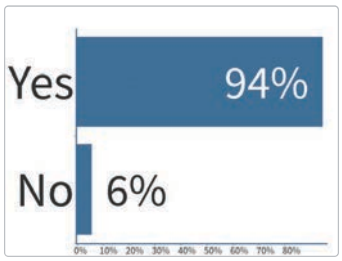


Response options	Count	Percentage
Yes	1	2%
No	**60**	**98%**

69% Engagement

61 Responses

56. Do you need your Time Label to be human readable?

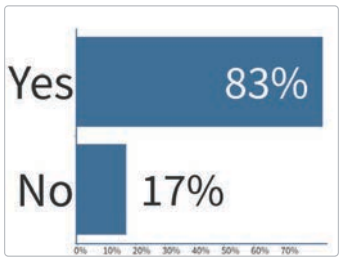


Response options	Count	Percentage
Yes	**67**	**94%**
No	4	6%

81% Engagement

71 Responses

57. Does a new Time Label system need to be compatible with Legacy Time Code systems? (ST 12-1, ST 12-2, ST 12-3)

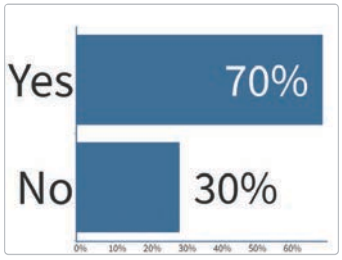


Response options	Count	Percentage
Yes	**55**	**83%**
No	11	17%

75% Engagement

66 Responses

58. Does a new Time Label need to be able to embed ST-12 Time Code?

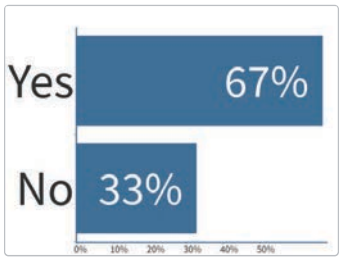


Response options	Count	Percentage
Yes	**43**	**70%**
No	18	30%

69% Engagement

61 Responses

59. Does a new Time Label need to embed User Bits for ST-12 Time Code?

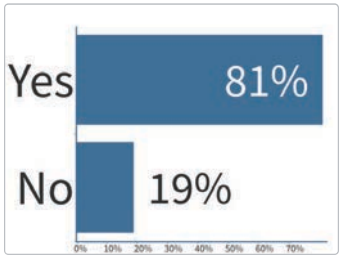


Response options	Count	Percentage
Yes	**39**	**67%**
No	19	33%

66% Engagement

58 Responses

60. Does a new Time Label need the ability to generate ST-12 Time Code?

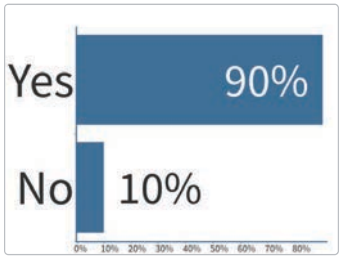


Response options	Count	Percentage
Yes	**52**	**81%**
No	12	19%

73% Engagement

64 Responses

61. Do you need your Time Label to be a frame counter?

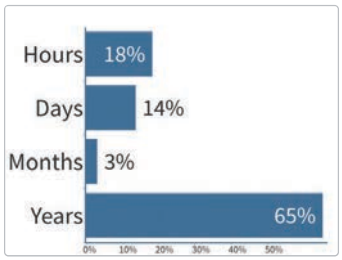


Response options	Count	Percentage
Yes	**64**	**90%**
No	7	10%

81% Engagement

71 Responses

62. How far should a Time Label be able to count up to?

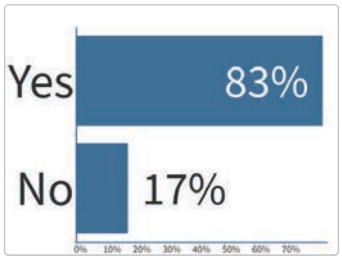


Response options	Count	Percentage
Hours	12	18%
Days	9	14%
Months	2	3%
Years	**43**	**65%**

75% Engagement

66 Responses

63. Would you like an acquisition equipment ID in a Time Label?

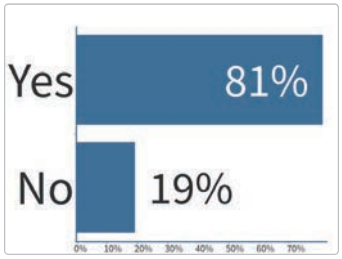


Response options	Count	Percentage
Yes	**58**	**83%**
No	12	17%

80% Engagement

70 Responses

64. Do you want your Time Label to support Camera Roll, Scene and Take numbers?

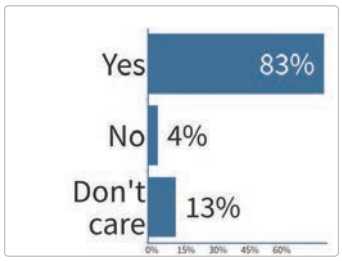


Response options	Count	Percentage
Yes	**55**	**81%**
No	13	19%

77%
Engagement

68
Responses

65. Do you want a new Time Label to carry the Source Time Label through to post-production and into a final master?

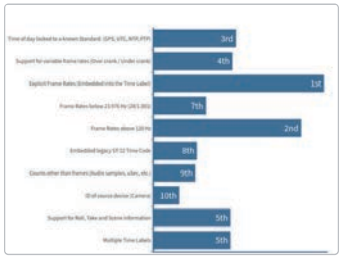


Response options	Count	Percentage
Yes	**58**	**83%**
No	3	4%
Don't care	9	13%

80%
Engagement

70
Responses

66. What are your Top Ten Priorities for a future Time Label System? (Rank in order)



Response options	Rank
Explicit Frame Rates (Embedded into the Time Label)	1st
Frame Rates above 120 Hz	2nd
Time of day locked to a known Standard. (GPS, UTC, NTP, PTP)	3rd
Support for variable frame rates (Over crank / Under crank)	4th
Support for Roll, Take and Scene information	5th
Multiple Time Labels	5th
Frame Rates below 23.976 Hz (24/1.001)	7th
Embedded legacy ST-12 Time Code	8th
Counts other than frames (Audio samples, uSec, etc.)	9th
ID of source device (Camera)	10th

47%
Engagement

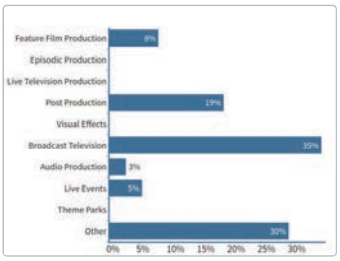
41
Responses

Time Code Summit Survey

Current run (last updated Nov 7, 2016 12:32pm)

75	41	29	71%
Polls	**Participants**	**Average responses**	**Average engagement**

01. What part of the industry do you work in?

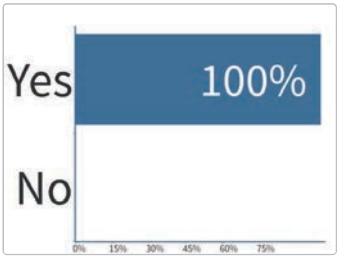


Response options	Count	Percentage
Feature Film Production	3	8%
Episodic Production	0	0%
Live Television Production	0	0%
Post Production	7	19%
Visual Effects	0	0%
Broadcast Television	**13**	**35%**
Audio Production	1	3%
Live Events	2	5%
Theme Parks	0	0%
Other	11	30%

90%
Engagement

37
Responses

02. Does the use of Timecode impact your job?

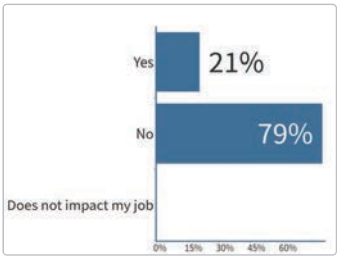


Response options	Count	Percentage
Yes	**35**	**100%**
No	0	0%

85%
Engagement

35
Responses

03. If yes to the previous question, is the experience always positive?



Response options	Count	Percentage
Yes	7	21%
No	**27**	**79%**
Does not impact my job	0	0%

83%
Engagement

34
Responses

03a. Where does timecode fall short?

Responses

High Frame Rates

HFR

Drop frame

Not consistent

1.001

At the boundaries where there is a frame rate or sample rate change

Changing frame rate

High frame rate

Conversions

Standards conversion

working with multiple frame rates and high frame rates

When production don't want to pay for lockits

Frame rates> 60

high and variable frame rates

Slow, frame rate limitation,

HFR

date

More than hours

Drop frame

Mixed frame rates / drop frame legacy

doesn't uniquely specify a point in absolute time

High frame rate.

One timecodee is not enough. HFR. Drop frame.

HFR

Tc in File

Drop frame

Higher rates, drop frame, crossing midnight

High frame rates, durations beyond 24 hr, tcout beyond midnight

Vendor calculations for software development

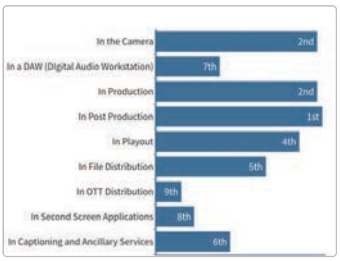
61%

Engagement

29

Responses

04. Where do you create Time Code? (Rank the priority of all that apply)

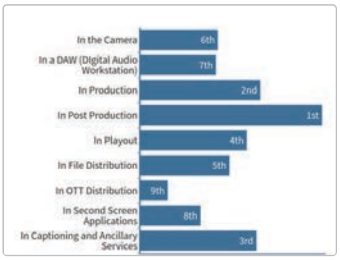


Response options	Rank
In Post Production	1st
In the Camera	2nd
In Production	2nd
In Playout	4th
In File Distribution	5th
In Captioning and Ancillary Services	6th
In a DAW (DIgital Audio Workstation)	7th
In Second Screen Applications	8th
In OTT Distribution	9th

39%
Engagement

16
Responses

05. Where do you use Time Code? (Rank the priority of all that apply)



Response options	Rank
In Post Production	1st
In Production	2nd
In Captioning and Ancillary Services	3rd
In Playout	4th
In File Distribution	5th
In the Camera	6th
In a DAW (DIgital Audio Workstation)	7th
In Second Screen Applications	8th
In OTT Distribution	9th

44%
Engagement

18
Responses

05a. What problem does Timecode solve in those applications?

Responses

Sync

synchronisation (sometimes)

Finding an exact frame

Binding the assorted essences

Image location

synchronising, reslience

Conform

A V sync

ID Frame order

Belt and braces

Universal start point for programme line – up (do we need this any more though?)

Multi camera and audio edits

Synchronisation

Multi camera sync

Synchronisation

Sync. Control. Reference to real world events.

Identification and sync

how to get white lines a the top of frame

Sync

Keeping my developers busy

Logging reference

Multi camera sync

Synchronization

Referring to exact point in asset across multiple applications

Identifying frames accurately in an edit

Sync among cameras, accuracy

Apportion of blame for lack of lipsync

Accuracy, sync of cameras

time and date of event

61%
Engagement

29
Responses

05b. Where does Timecode work well in those applications?

Responses

sound equipment

outside America

Nle

When everything can be locked toghter

Simple standard frame rates

Digital archive

integer frame rate sync with single audio sequences

syncing if sources well timed

Logging software

older equipment.

Editing

When single frame rate in pipeline is used

29%

Engagement

12

Responses

05c. Where does Timecode fall short in those applications?

Responses

Drop frame

GoPro

Mixed framerate

Sync

Conversion

HFR

AV sync.

NTSC TO PAL

Conversion ;)

Mixed standards

Cameras which don't say Arri Alexa on

Mixed and non standard timecodes

mixed frame rate and amercia

Camera sync

drop frame conversion

Drop frame, non real time

when DF or NDF has to be divined by reading tea leaves

Midnight

Jy

IP layer

Conversion

daily jam syncing

high frame rate, file based system

Multiple formats

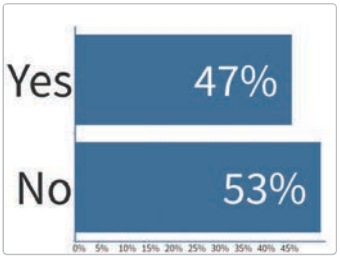
Varying vendor unit stores (transcoding)

Past midnight

51%
Engagement

26
Responses

06. Do you use a Timecode slate/marker or Time Code display?

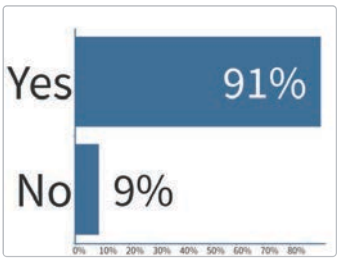


Response options	Count	Percentage
Yes	15	47%
No	**17**	**53%**

78%
Engagement

32
Responses

07. Do you use multiple Timecode rates in your facility or system?

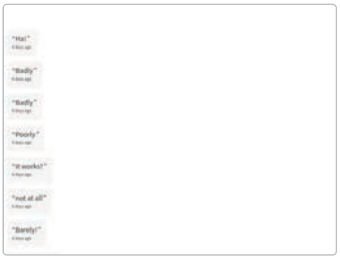


Response options	Count	Percentage
Yes	**32**	**91%**
No	3	9%

85%
Engagement

35
Responses

07a. How well does Timecode work well in multi-rate applications?



Responses

Ha!

Badly

Badly

Poorly

It works?

not at all

Barely!

Fairly poor!

Complicated

Not

doesn't

Kind of..

it has kept me employed for 30 years by failing

Poorly

like a dream but not good one

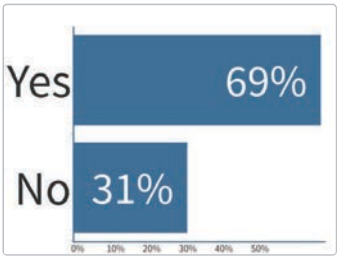
As well as a Chocolate fireguard

Not as bad as the picture interpolation

41%
Engagement

17
Responses

08. Do you use Drop Frame?

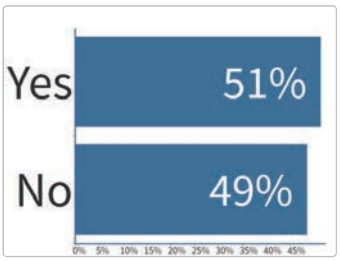


Response options	Count	Percentage
Yes	**24**	**69%**
No	11	31%

85%
Engagement

35
Responses

09. Do you use "Jam Sync"?

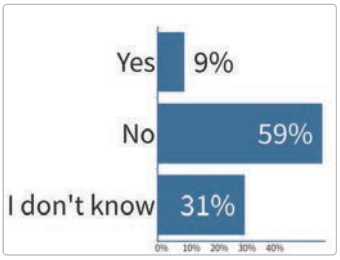


Response options	Count	Percentage
Yes	**18**	**51%**
No	17	49%

85%
Engagement

35
Responses

10. Does your facility perform a "Daily Jam Sync"?

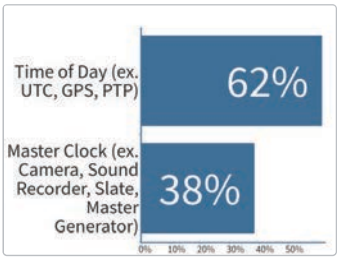


Response options	Count	Percentage
Yes	3	9%
No	**19**	**59%**
I don't know	10	31%

78%
Engagement

32
Responses

11. What Time Base do you "Jam Sync" to?

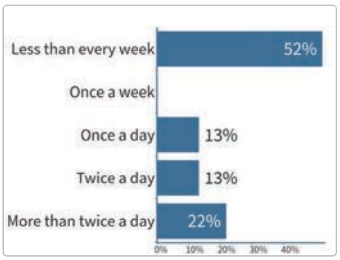


Response options	Count	Percentage
Time of Day (ex. UTC, GPS, PTP)	**16**	**62%**
Master Clock (ex. Camera, Sound Recorder, Slate, Master Generator)	10	38%

63%
Engagement

26
Responses

12. How often do you "Jam Sync"?

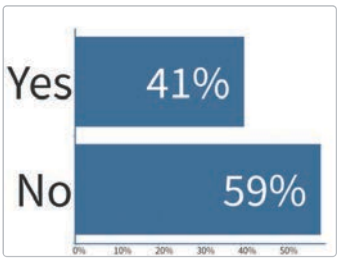


Response options	Count	Percentage
Less than every week	**12**	**52%**
Once a week	0	0%
Once a day	3	13%
Twice a day	3	13%
More than twice a day	5	22%

56%
Engagement

23
Responses

13. Do you use Hour per Reel Time Code?

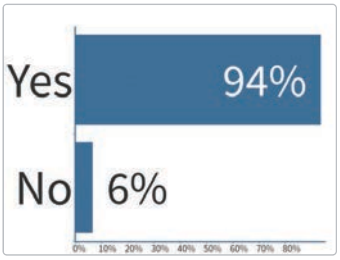


Response options	Count	Percentage
Yes	11	41%
No	**16**	**59%**

66%
Engagement

27
Responses

14. Do you use continuous Time Code?

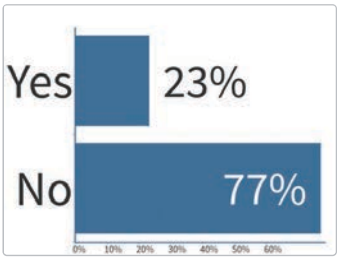


Response options	Count	Percentage
Yes	**29**	**94%**
No	2	6%

76%
Engagement

31
Responses

15. Do you use Time Code to sync Midi?

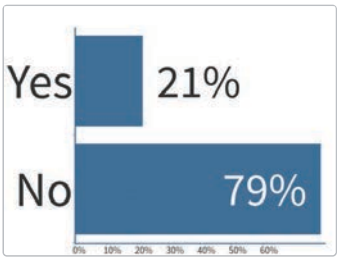


Response options	Count	Percentage
Yes	6	23%
No	**20**	**77%**

63%
Engagement

26
Responses

16. Do you use Midi Time Code?

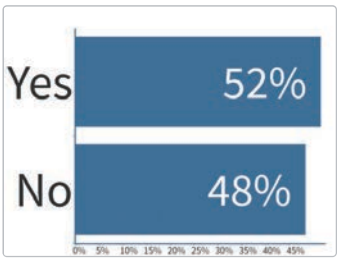


Response options	Count	Percentage
Yes	6	21%
No	**22**	**79%**

68%
Engagement

28
Responses

17. Do you sync Time Code to Word Clock?

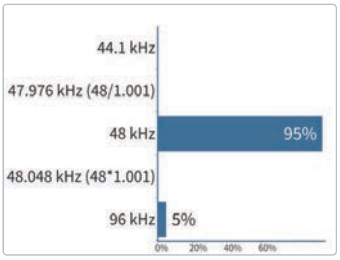


Response options	Count	Percentage
Yes	**16**	**52%**
No	15	48%

76%
Engagement

31
Responses

18. What rate of Word Clock do you use the most? (Rank in order of usage)



Response options	Count	Percentage
44.1 kHz	0	0%
47.976 kHz (48/1.001)	0	0%
48 kHz	**21**	**95%**
48.048 kHz (48*1.001)	0	0%
96 kHz	1	5%

54%
Engagement

22
Responses

18a. What other word clock rates do you use?

Responses

192

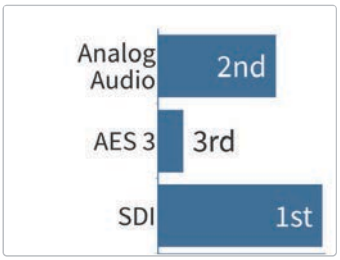
96khz, 192khz

192

7%
Engagement

3
Responses

19. How do you distribute Time Code in your facility or system? (Rank in order of usage)

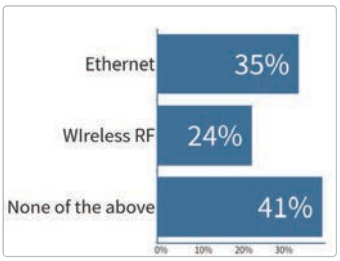


Response options	Rank
SDI	1st
Analog Audio	2nd
AES 3	3rd

63%
Engagement

26
Responses

19a. Do you distribute Time Code in your facility or system via?

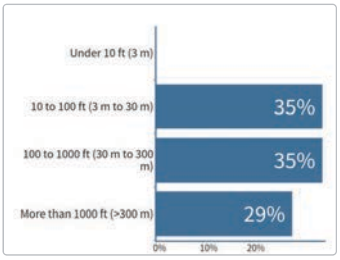


Response options	Count	Percentage
Ethernet	12	35%
WIreless RF	8	24%
None of the above	**14**	**41%**

83%
Engagement

34
Responses

20. How far do you have to distribute Time Code?

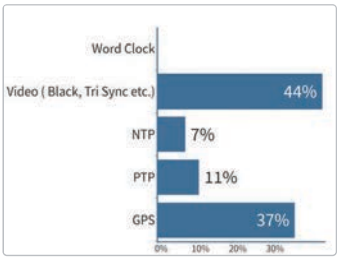


Response options	Count	Percentage
Under 10 ft (3 m)	0	0%
10 to 100 ft (3 m to 30 m)	**11**	**35%**
100 to 1000 ft (30 m to 300 m)	**11**	**35%**
More than 1000 ft (>300 m)	9	29%

76%
Engagement

31
Responses

21. What is your master sync generator?

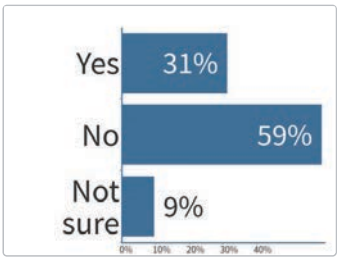


Response options	Count	Percentage
Word Clock	0	0%
Video (Black, Tri Sync etc.)	**12**	**44%**
NTP	2	7%
PTP	3	11%
GPS	10	37%

66%
Engagement

27
Responses

22. Is your facility or system locked to a remote source?

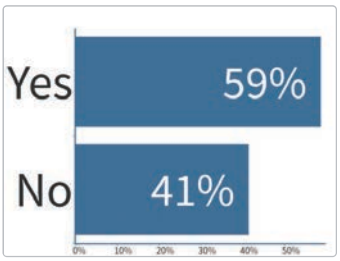


Response options	Count	Percentage
Yes	10	31%
No	**19**	**59%**
Not sure	3	9%

78%
Engagement

32
Responses

23. Do you use time code to have devices chase that code? (Time code as position data)

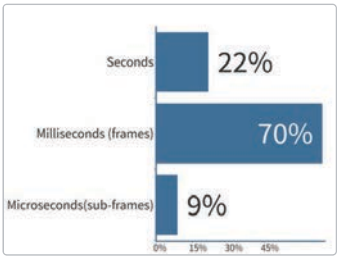


Response options	Count	Percentage
Yes	**17**	**59%**
No	12	41%

71%
Engagement

29
Responses

24. What is the expected lock up time for time code slave chase devices?

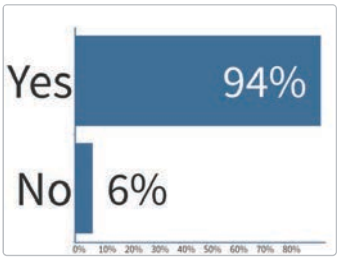


Response options	Count	Percentage
Seconds	5	22%
Milliseconds (frames)	**16**	**70%**
Microseconds(sub-frames)	2	9%

56%
Engagement

23
Responses

25. Do you encounter files with multiple time codes?

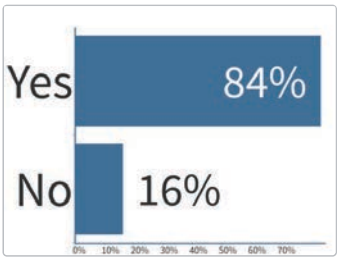


Response options	Count	Percentage
Yes	**29**	**94%**
No	2	6%

76%
Engagement

31
Responses

26. Is there a use for allowing multiple Time Codes in a file?

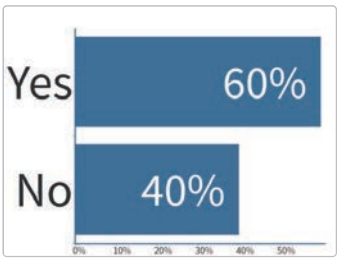


Response options	Count	Percentage
Yes	**26**	**84%**
No	5	16%

76%
Engagement

31
Responses

27. Do you encounter "illegal" Time Code values in files?

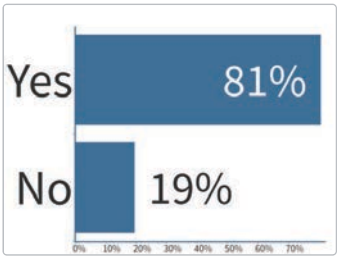


Response options	Count	Percentage
Yes	**18**	**60%**
No	12	40%

73%
Engagement

30
Responses

28. Do you encounter non-contiguous Time Code values in files?



Response options	Count	Percentage
Yes	**25**	**81%**
No	6	19%

76%
Engagement

31
Responses

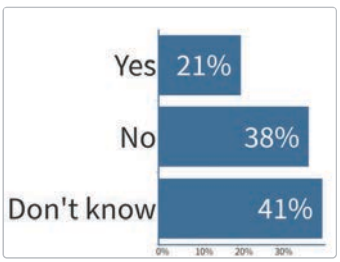
29. Do you find Time Code sequences in files that (no longer) match the essence?

Response options	Count	Percentage
Yes	**24**	**83%**
No	5	17%

71%
Engagement

29
Responses

30. Do you find audio-only MXF files with essentially random Time Code sequences? (e.g. Two related audio only files such as language dubs with one having 24p Time Code and another language having 30DF Time Code)

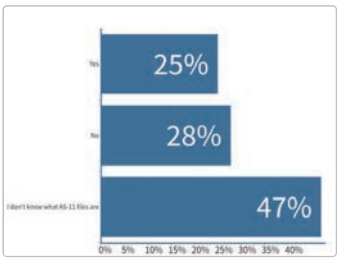


Response options	Count	Percentage
Yes	6	21%
No	11	38%
Don't know	**12**	**41%**

71%
Engagement

29
Responses

31. Do you understand how Time Code is used in AS-11 files?

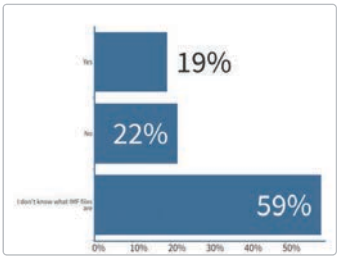


Response options	Count	Percentage
Yes	9	25%
No	10	28%
I don't know what AS-11 files are	**17**	**47%**

88%
Engagement

36
Responses

32. Do you understand how Time Code is used in IMF files?

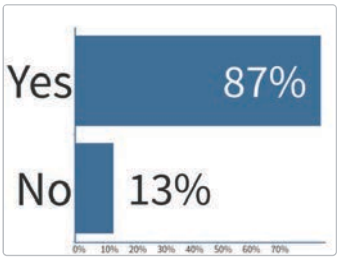


Response options	Count	Percentage
Yes	7	19%
No	8	22%
I don't know what IMF files are	**22**	**59%**

90%
Engagement

37
Responses

33. Do you process files with external Time Code based EDL formats?



Response options	Count	Percentage
Yes	**26**	**87%**
No	4	13%

73%
Engagement

30
Responses

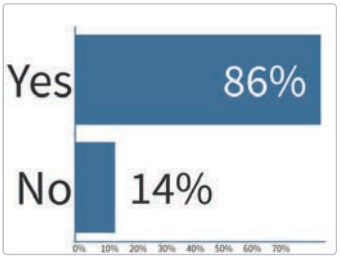
33a. How well does this work?

Responses
randomly
Sometimes
fine
Variably
Works well
Poorly
ok
Generally good
Gives me a job :)
User dependant
Depends on the vendor systems
Does the job
Only with simple standard constant frame rate
Mostly good
User dependant
Well, when an assistant editor isn't involved

37%
Engagement

16
Responses

34. Do you use frame counts to establish position of offset on a timeline in place of Time Code?

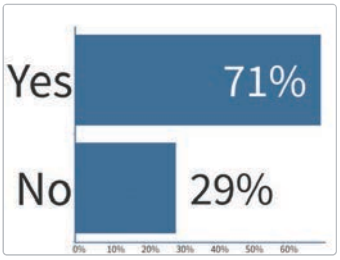


Response options	Count	Percentage
Yes	**25**	**86%**
No	4	14%

71%
Engagement

29
Responses

35. Do you use frame counts to establish durations?

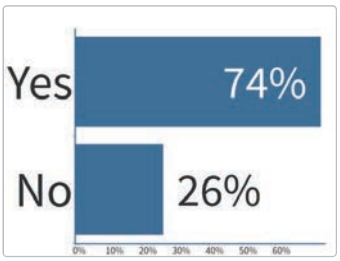


Response options	Count	Percentage
Yes	**22**	**71%**
No	9	29%

76%
Engagement

31
Responses

36. When establishing an edit Out point, do you use the label of the next frame? (Beginning of the next frame)

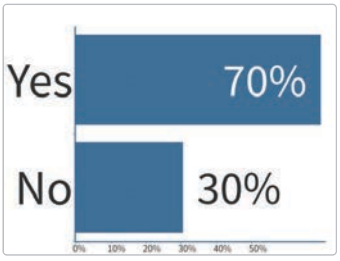


Response options	Count	Percentage
Yes	**14**	**74%**
No	5	26%

46%
Engagement

19
Responses

37. When establishing an edit Out point, do you use the label of the last frame of the element that is being used on the timeline? (Film editing aka "Inclusive")

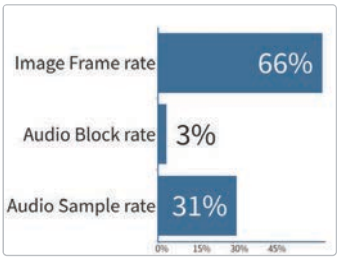


Response options	Count	Percentage
Yes	**16**	**70%**
No	7	30%

56%
Engagement

23
Responses

38. What granularity of Time Stamping do you require?

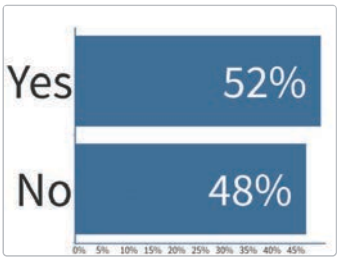


Response options	Count	Percentage
Image Frame rate	**21**	**66%**
Audio Block rate	1	3%
Audio Sample rate	10	31%

78%
Engagement

32
Responses

39. Does your Time Stamp need to be synchronized to real time? ("Time of Day")

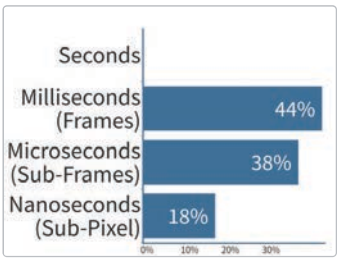


Response options	Count	Percentage
Yes	**17**	**52%**
No	16	48%

80%
Engagement

33
Responses

40. What "Time of Day" granularity of sync is required?

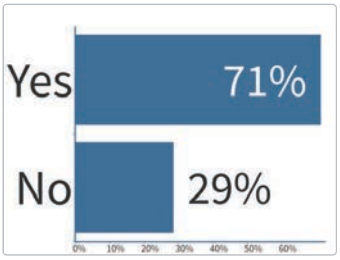


Response options	Count	Percentage
Seconds	0	0%
Milliseconds (Frames)	**15**	**44%**
Microseconds (Sub-Frames)	13	38%
Nanoseconds (Sub-Pixel)	6	18%

83%
Engagement

34
Responses

41. Does the "Time of Day" Time Label need to support Daylight Savings Time (DST)?

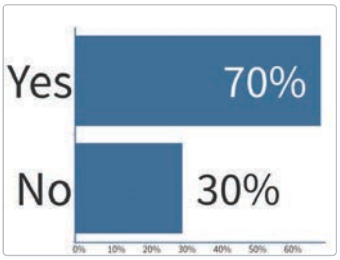


Response options	Count	Percentage
Yes	**25**	**71%**
No	10	29%

85%
Engagement

35
Responses

42. Does the "Time of Day" Time Label need to adjust for Leap Seconds? (UTC)

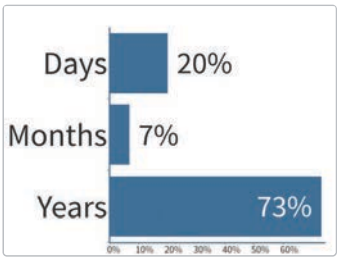


Response options	Count	Percentage
Yes	**23**	**70%**
No	10	30%

80%
Engagement

33
Responses

43. How long should a "Time of Day" Time Label maintain its synchronization to UTC?

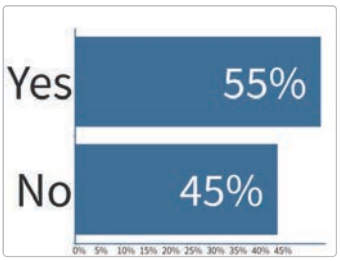


Response options	Count	Percentage
Days	6	20%
Months	2	7%
Years	**22**	**73%**

73%
Engagement

30
Responses

44. Do you use variable frame rates? (Over crank or Under crank)

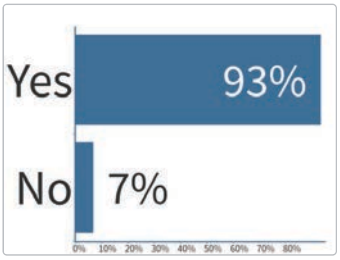


Response options	Count	Percentage
Yes	**17**	**55%**
No	14	45%

76%
Engagement

31
Responses

45. Does your Time Label need to support off speed rates?

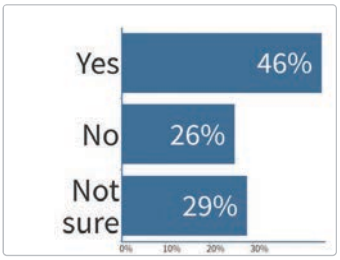


Response options	Count	Percentage
Yes	**28**	**93%**
No	2	7%

73%
Engagement

30
Responses

46. Do you make use of User Bits?

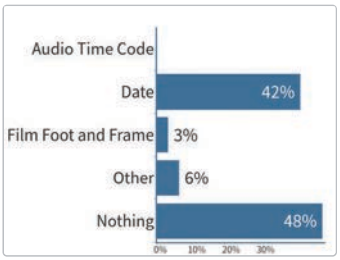


Response options	Count	Percentage
Yes	**16**	**46%**
No	9	26%
Not sure	10	29%

85%
Engagement

35
Responses

47. What do you put into User Bits?



Response options	Count	Percentage
Audio Time Code	0	0%
Date	13	42%
Film Foot and Frame	1	3%
Other	2	6%
Nothing	**15**	**48%**

76%
Engagement

31
Responses

48. What does the term "Time Label" mean to you?

Responses

pain and fear

Unique ID

Confusion

Unique I'd for each frame

Change

your late

Frame id

I'm watching Dr Who

Different for every camera

A short time stamp to unique Id

Coffee?

Frame UID

Capture insa

A highly accurate time stamp for every single frame

A unique id for each frame

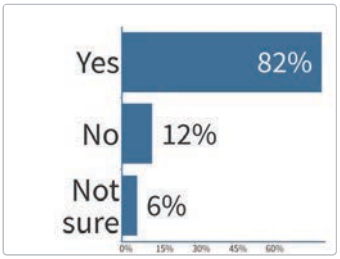
a machine or human friendly representation of a unique point in time

Frame UID

37%
Engagement

17
Responses

49. Should a Time Label contain the frame rate?

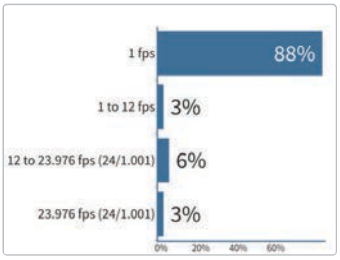


Response options	Count	Percentage
Yes	**27**	**82%**
No	4	12%
Not sure	2	6%

80%
Engagement

33
Responses

50. What would be the minimum frame rate for a Time Label?

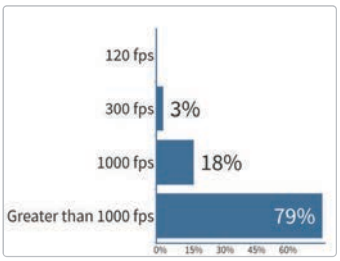


Response options	Count	Percentage
1 fps	**30**	**88%**
1 to 12 fps	1	3%
12 to 23.976 fps (24/1.001)	2	6%
23.976 fps (24/1.001)	1	3%

83%
Engagement

34
Responses

51. What would be the maximum frame rate for a Time Label?

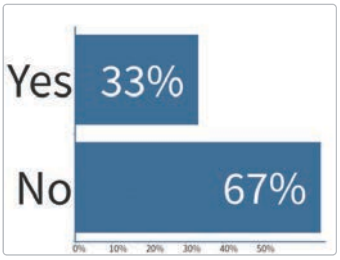


Response options	Count	Percentage
120 fps	0	0%
300 fps	1	3%
1000 fps	6	18%
Greater than 1000 fps	**27**	**79%**

83%
Engagement

34
Responses

52. Do you work with Film?

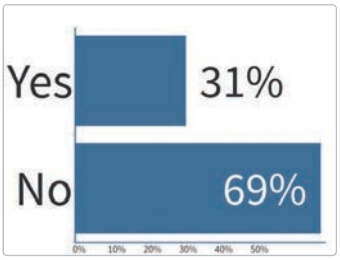


Response options	Count	Percentage
Yes	12	33%
No	**24**	**67%**

88%
Engagement

36
Responses

53. Do you need Time Labels to keep track of a Film 3:2 or 2:2 sequence?

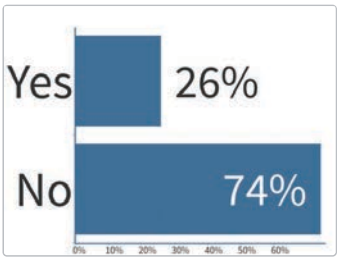


Response options	Count	Percentage
Yes	9	31%
No	**20**	**69%**

71%
Engagement

29
Responses

54. Do you need a Time Label to support Feet and Frame counts?

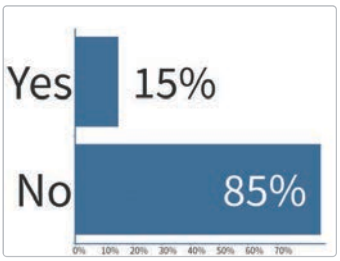


Response options	Count	Percentage
Yes	8	26%
No	**23**	**74%**

76%
Engagement

31
Responses

54a. Do you need a Time Label to support Keycode?

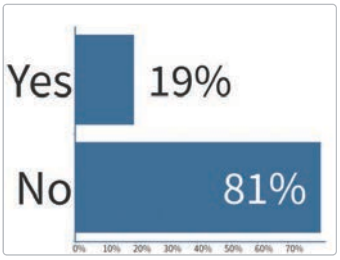


Response options	Count	Percentage
Yes	4	15%
No	**23**	**85%**

66% Engagement

27 Responses

55. Do you need Time Labels to keep track of legacy Color Framing (CF)?

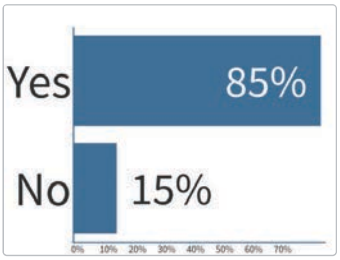


Response options	Count	Percentage
Yes	5	19%
No	**21**	**81%**

63% Engagement

26 Responses

56. Do you need your Time Label to be human readable?

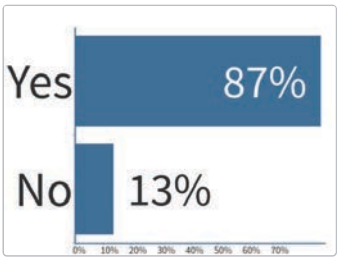


Response options	Count	Percentage
Yes	**29**	**85%**
No	5	15%

83% Engagement

34 Responses

57. Does a new Time Label system need to be compatible with Legacy Time Code systems? (ST 12-1, ST 12-2, ST 12-3)

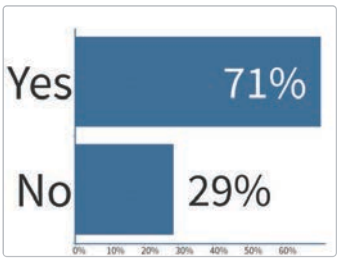


Response options	Count	Percentage
Yes	**26**	**87%**
No	4	13%

73% Engagement

30 Responses

58. Does a new Time Label need to be able to embed ST-12 Time Code?

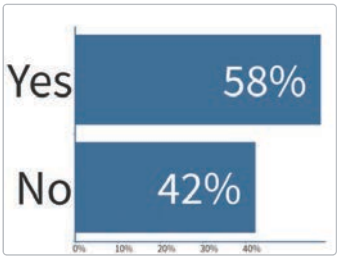


Response options	Count	Percentage
Yes	**20**	**71%**
No	8	29%

68%
Engagement

28
Responses

59. Does a new Time Label need to embed User Bits for ST-12 Time Code?

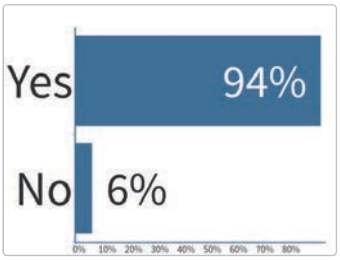


Response options	Count	Percentage
Yes	**15**	**58%**
No	11	42%

63%
Engagement

26
Responses

60. Does a new Time Label need the ability to generate ST-12 Time Code?

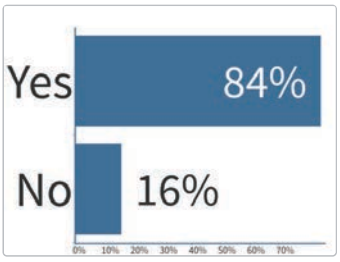


Response options	Count	Percentage
Yes	**30**	**94%**
No	2	6%

78%
Engagement

32
Responses

61. Do you need your Time Label to be a frame counter?

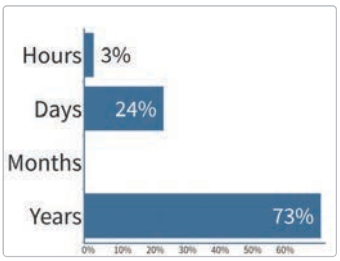


Response options	Count	Percentage
Yes	**27**	**84%**
No	5	16%

78%
Engagement

32
Responses

62. How far should a Time Label be able to count up to?

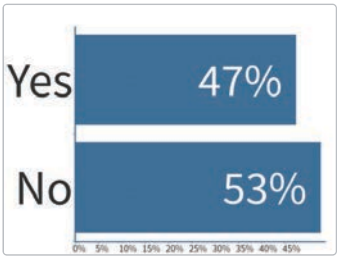


Response options	Count	Percentage
Hours	1	3%
Days	9	24%
Months	0	0%
Years	**27**	**73%**

90%
Engagement

37
Responses

63. Would you like an acquisition equipment ID in a Time Label?

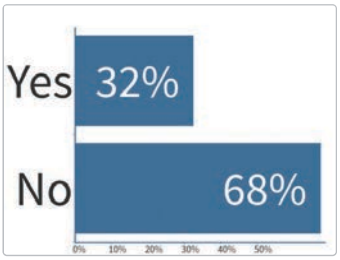


Response options	Count	Percentage
Yes	18	47%
No	**20**	**53%**

93%
Engagement

38
Responses

64. Do you want your Time Label to support Camera Roll, Scene and Take numbers?

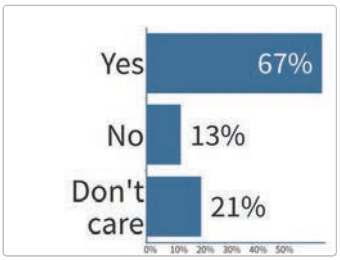


Response options	Count	Percentage
Yes	12	32%
No	**25**	**68%**

90%
Engagement

37
Responses

65. Do you want a new Time Label to carry the Source Time Label through to post-production and into a final master?

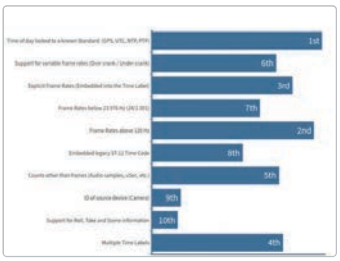


Response options	Count	Percentage
Yes	**26**	**67%**
No	5	13%
Don't care	8	21%

95%
Engagement

39
Responses

66. What are your Top Ten Priorities for a future Time Label System? (Rank in order)



Response options	Rank
Time of day locked to a known Standard. (GPS, UTC, NTP, PTP)	1st
Frame Rates above 120 Hz	2nd
Explicit Frame Rates (Embedded into the Time Label)	3rd
Multiple Time Labels	4th
Counts other than frames (Audio samples, uSec, etc.)	5th
Support for variable frame rates (Over crank / Under crank)	6th
Frame Rates below 23.976 Hz (24/1.001)	7th
Embedded legacy ST-12 Time Code	8th
ID of source device (Camera)	9th
Support for Roll, Take and Scene information	10th

63%
Engagement

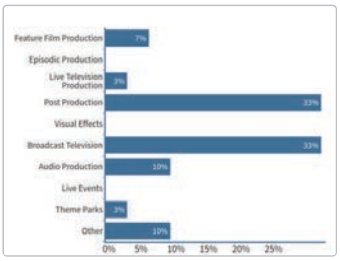
26
Responses

NYC Poll

Current run (last updated Nov 19, 2016 11:26am)

75	35	26	74%
Polls	**Participants**	**Average responses**	**Average engagement**

01. What part of the industry do you work in?

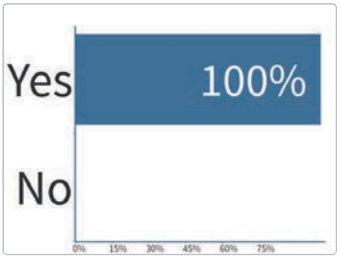


Response options	Count	Percentage
Feature Film Production	2	7%
Episodic Production	0	0%
Live Television Production	1	3%
Post Production	**10**	**33%**
Visual Effects	0	0%
Broadcast Television	**10**	**33%**
Audio Production	3	10%
Live Events	0	0%
Theme Parks	1	3%
Other	3	10%

86%
Engagement

30
Responses

02. Does the use of Timecode impact your job?

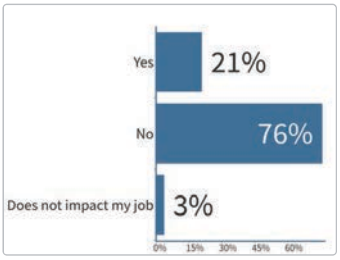


Response options	Count	Percentage
Yes	**28**	**100%**
No	0	0%

80%
Engagement

28
Responses

03. If yes to the previous question, is the experience always positive?



Response options	Count	Percentage
Yes	6	21%
No	**22**	**76%**
Does not impact my job	1	3%

83%
Engagement

29
Responses

03a. Where does timecode fall short?

Responses

Multiple time codes in files, frame rate conversion, drop frame, HFR

No dates

Transcoding rate

Only 24hr, no metadata transfer,

Low frame rate, high frame rate. Drop/non-drop conversion

Not above 30fps

Higher frame rates

No support for audio

High frame rates film

Ethernet

Frame accuracy on progressive and higher frame rates

HFR

Post nle

Across days

no descriptor for frame rate

High frame rate

Time values not absolute

Used with pc

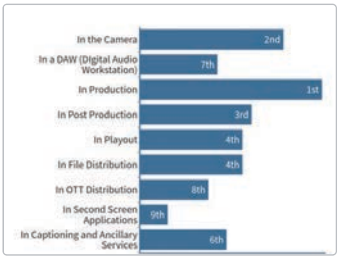
Only 24 hours

High speed imaging

51%
Engagement

20
Responses

04. Where do you create Time Code? (Rank the priority of all that apply)

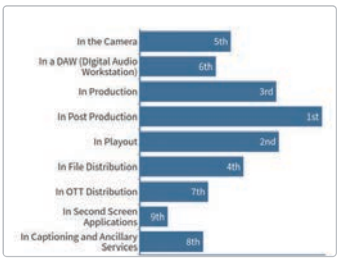


Response options	Rank
In Production	1st
In the Camera	2nd
In Post Production	3rd
In Playout	4th
In File Distribution	4th
In Captioning and Ancillary Services	6th
In a DAW (DIgital Audio Workstation)	7th
In OTT Distribution	8th
In Second Screen Applications	9th

34%
Engagement

12
Responses

05. Where do you use Time Code? (Rank the priority of all that apply)



Response options	Rank
In Post Production	1st
In Playout	2nd
In Production	3rd
In File Distribution	4th
In the Camera	5th
In a DAW (DIgital Audio Workstation)	6th
In OTT Distribution	7th
In Captioning and Ancillary Services	8th
In Second Screen Applications	9th

37%
Engagement

13
Responses

05a. What problem does Timecode solve in those applications?

Responses
Accurately transition
order archival ftg
Sync and annotation
Field frame tracking and sync system
Sync multiple devices. Multiple cameras, and audio
Sync
Edit replace
synchronize multiple cameras
time stamp as source code
Match frames, keep schedule, timing
Audio sync
Camera Sync in gro
Allow for preroll
Keep it in sync
Sync audio & video
Identify exact frame when communicating
Conforming
Synchronize a v cc
Time of day reference
Sync
Marries sound and picture
Match footage
Sync
Synchronize picture and sound
Synchronize multiple sources

66%
Engagement

25
Responses

05b. Where does Timecode work well in those applications?

Responses

editing

Tape layout

Time of day DF. Non-stop

On tape, in post

Synchronizing sources

Syncing real time events

Cameras and sound recorders

Communication

Rarely

Tape machines

Automation

31%
Engagement

11
Responses

05c. Where does Timecode fall short in those applications?

Responses

Not always there on audio : files

Video frame rates in audio only sources

Jam slave devices from master clock. Also HFR, mis-matched TC settings on devices

Drift if not synchronous

In files

Film

multiple sources not synched b roll

Too many places for timecodes in file formats that get out of sync

High frame rate

Off speed

Low bit rates

film

Non sync sound compatible frame rates

Real-time needs, high/low frame rate

Drop frame

In progressive and HFR

Variable frame rate

At midnight

Frame rate conversion

HFR

Camera operator error

Human error

On timeline

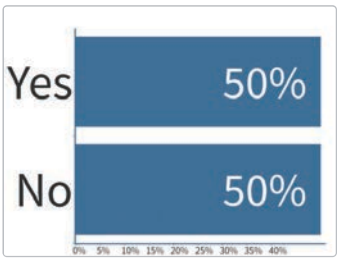
High frame rates

Jamming cameras and SOUND Devices

57%
Engagement

25
Responses

06. Do you use a Timecode slate/marker or Time Code display?

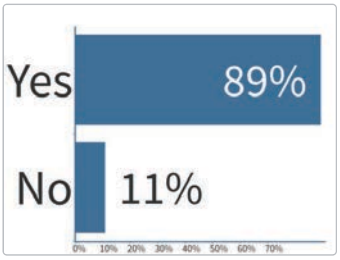


Response options	Count	Percentage
Yes	**14**	**50%**
No	**14**	**50%**

80%
Engagement

28
Responses

07. Do you use multiple Timecode rates in your facility or system?



Response options	Count	Percentage
Yes	**25**	**89%**
No	3	11%

80%
Engagement

28
Responses

07a. How well does Timecode work well in multi-rate applications?

Responses

Xxx

:(

Itza mess

Meh

Causes more confusion than clarity

Depends on the user

Incompatible for jamming.

Not well

It doesn't

Could be better

Horiably

Good luck

Not

Doesnt

Nightmare

Very poorly.

Not so well

Hahah

Poorly

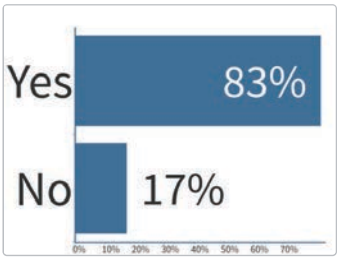
Poorly

Hahahaha

57%
Engagement

21
Responses

08. Do you use Drop Frame?

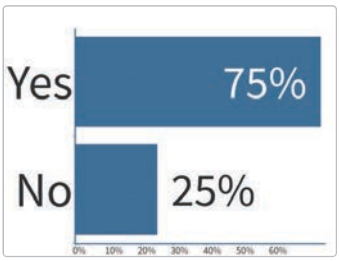


Response options	Count	Percentage
Yes	**24**	**83%**
No	5	17%

83%
Engagement

29
Responses

09. Do you use "Jam Sync"?

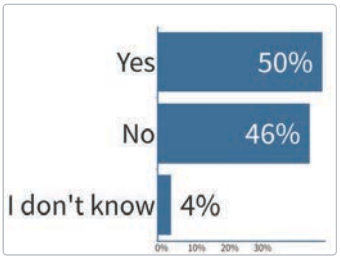


Response options	Count	Percentage
Yes	**21**	**75%**
No	7	25%

80%
Engagement

28
Responses

10. Does your facility perform a "Daily Jam Sync"?

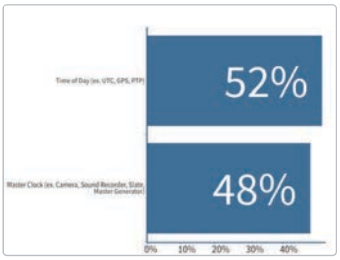


Response options	Count	Percentage
Yes	**13**	**50%**
No	12	46%
I don't know	1	4%

74%
Engagement

26
Responses

11. What Time Base do you "Jam Sync" to?

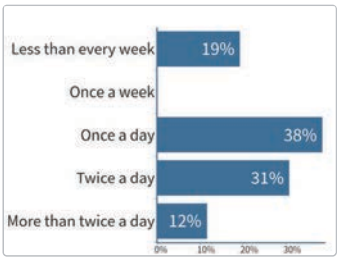


Response options	Count	Percentage
Time of Day (ex. UTC, GPS, PTP)	**15**	**52%**
Master Clock (ex. Camera, Sound Recorder, Slate, Master Generator)	14	48%

83%
Engagement

29
Responses

12. How often do you "Jam Sync"?

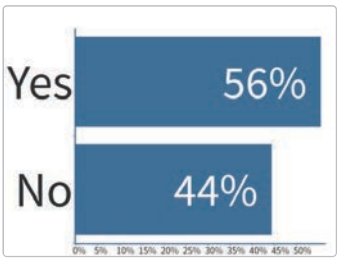


Response options	Count	Percentage
Less than every week	5	19%
Once a week	0	0%
Once a day	**10**	**38%**
Twice a day	8	31%
More than twice a day	3	12%

74%
Engagement

26
Responses

13. Do you use Hour per Reel Time Code?

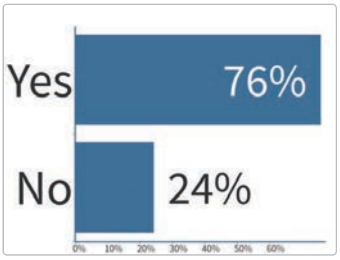


Response options	Count	Percentage
Yes	**15**	**56%**
No	12	44%

77%
Engagement

27
Responses

14. Do you use continuous Time Code?

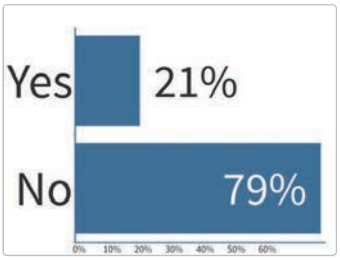


Response options	Count	Percentage
Yes	**22**	**76%**
No	7	24%

83%
Engagement

29
Responses

15. Do you use Time Code to sync Midi?

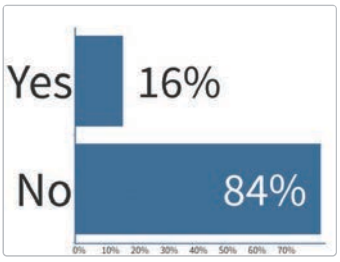


Response options	Count	Percentage
Yes	6	21%
No	**23**	**79%**

83%
Engagement

29
Responses

16. Do you use Midi Time Code?

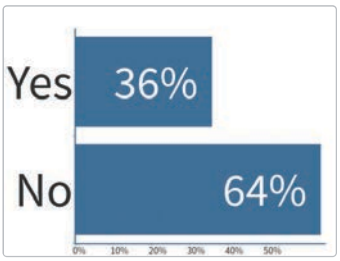


Response options	Count	Percentage
Yes	5	16%
No	**26**	**84%**

89%
Engagement

31
Responses

17. Do you sync Time Code to Word Clock?

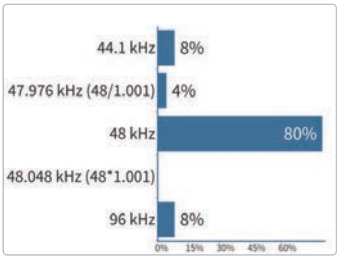


Response options	Count	Percentage
Yes	10	36%
No	**18**	**64%**

80%
Engagement

28
Responses

18. What rate of Word Clock do you use the most? (Rank in order of usage)



Response options	Count	Percentage
44.1 kHz	2	8%
47.976 kHz (48/1.001)	1	4%
48 kHz	**20**	**80%**
48.048 kHz (48*1.001)	0	0%
96 kHz	2	8%

71%
Engagement

25
Responses

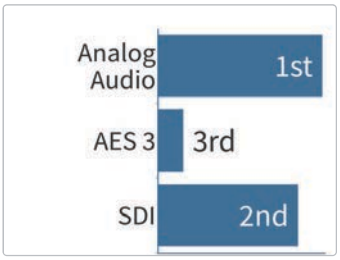
18a. What other word clock rates do you use?

Responses
192000
192
192
96000
192
192
192
47.9
384k
192k
48.08
48KHz, 32KHz
None
All of them
96k
48, 96
47952
All
None
All
44.1
48048
Naaaa
All

43%
Engagement

24
Responses

19. How do you distribute Time Code in your facility or system? (Rank in order of usage)

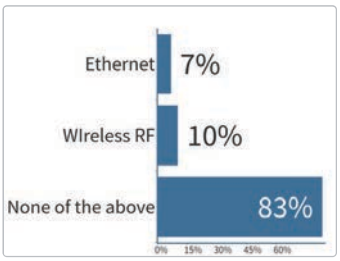


Response options	Rank
Analog Audio	1st
SDI	2nd
AES 3	3rd

51%
Engagement

18
Responses

19a. Do you distribute Time Code in your facility or system via?

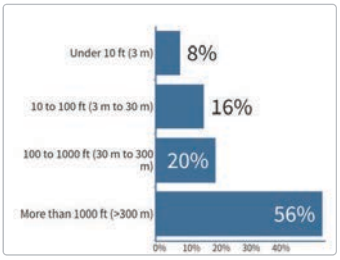


Response options	Count	Percentage
Ethernet	2	7%
WIreless RF	3	10%
None of the above	**25**	**83%**

86%
Engagement

30
Responses

20. How far do you have to distribute Time Code?

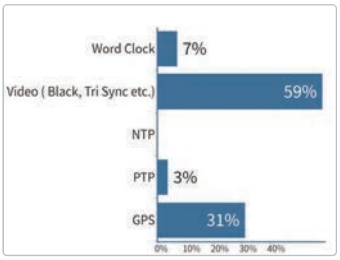


Response options	Count	Percentage
Under 10 ft (3 m)	2	8%
10 to 100 ft (3 m to 30 m)	4	16%
100 to 1000 ft (30 m to 300 m)	5	20%
More than 1000 ft (>300 m)	**14**	**56%**

71%
Engagement

25
Responses

21. What is your master sync generator?

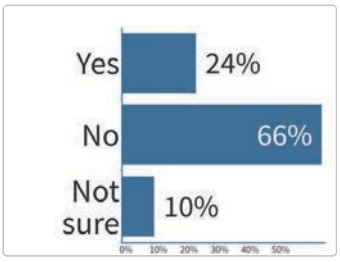


Response options	Count	Percentage
Word Clock	2	7%
Video (Black, Tri Sync etc.)	**17**	**59%**
NTP	0	0%
PTP	1	3%
GPS	9	31%

83%
Engagement

29
Responses

22. Is your facility or system locked to a remote source?

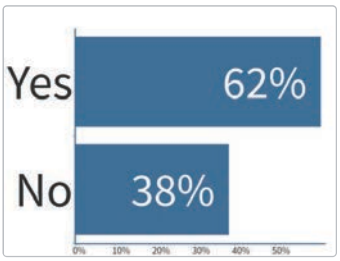


Response options	Count	Percentage
Yes	7	24%
No	**19**	**66%**
Not sure	3	10%

83%
Engagement

29
Responses

23. Do you use time code to have devices chase that code? (Time code as position data)

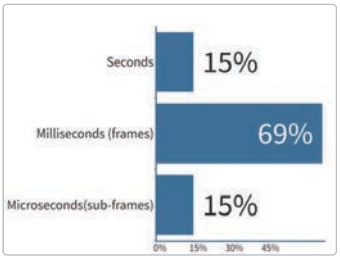


Response options	Count	Percentage
Yes	**16**	**62%**
No	10	38%

74%
Engagement

26
Responses

24. What is the expected lock up time for time code slave chase devices?

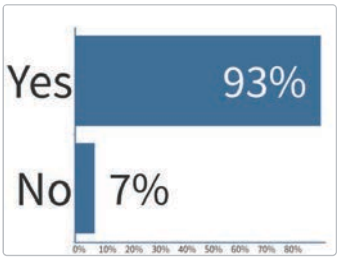


Response options	Count	Percentage
Seconds	4	15%
Milliseconds (frames)	**18**	**69%**
Microseconds(sub-frames)	4	15%

74%
Engagement

26
Responses

25. Do you encounter files with multiple time codes?

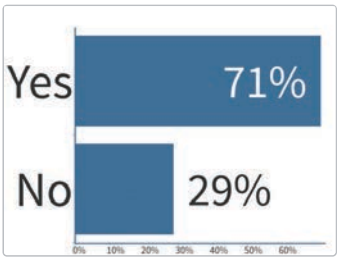


Response options	Count	Percentage
Yes	**26**	**93%**
No	2	7%

80%
Engagement

28
Responses

26. Is there a use for allowing multiple Time Codes in a file?

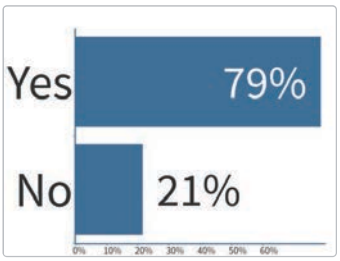


Response options	Count	Percentage
Yes	**20**	**71%**
No	8	29%

80%
Engagement

28
Responses

27. Do you encounter "illegal" Time Code values in files?

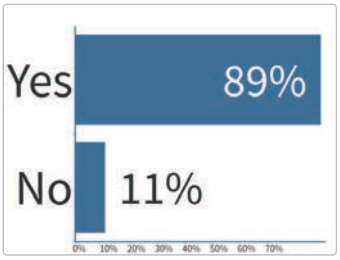


Response options	Count	Percentage
Yes	**22**	**79%**
No	6	21%

80%
Engagement

28
Responses

28. Do you encounter non-contiguous Time Code values in files?

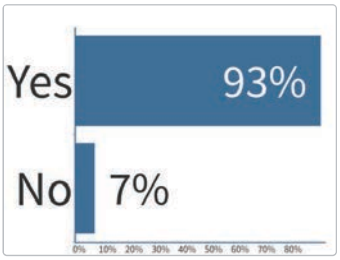


Response options	Count	Percentage
Yes	**25**	**89%**
No	3	11%

80%
Engagement

28
Responses

29. Do you find Time Code sequences in files that (no longer) match the essence?

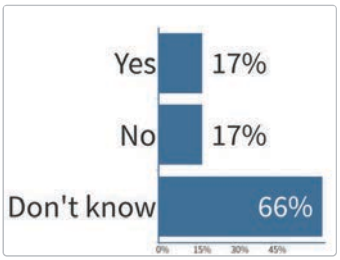


Response options	Count	Percentage
Yes	**26**	**93%**
No	2	7%

80%
Engagement

28
Responses

30. Do you find audio-only MXF files with essentially random Time Code sequences? (e.g. Two related audio only files such as language dubs with one having 24p Time Code and another language having 30DF Time Code)

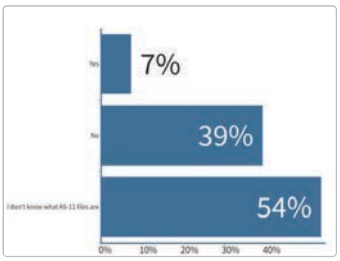


Response options	Count	Percentage
Yes	5	17%
No	5	17%
Don't know	**19**	**66%**

83%
Engagement

29
Responses

31. Do you understand how Time Code is used in AS-11 files?

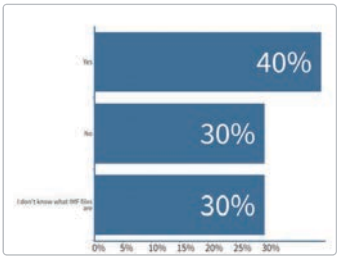


Response options	Count	Percentage
Yes	2	7%
No	11	39%
I don't know what AS-11 files are	**15**	**54%**

80%
Engagement

28
Responses

32. Do you understand how Time Code is used in IMF files?

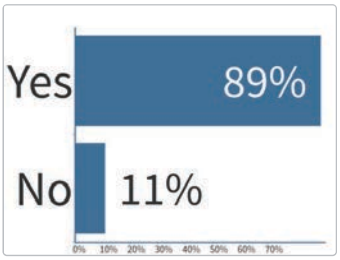


Response options	Count	Percentage
Yes	**12**	**40%**
No	9	30%
I don't know what IMF files are	9	30%

86%
Engagement

30
Responses

33. Do you process files with external Time Code based EDL formats?



Response options	Count	Percentage
Yes	**25**	**89%**
No	3	11%

80%
Engagement

28
Responses

33a. How well does this work?

Responses

Within the Tiny window of acceptable conditions, yes

Depends on whether we created the content or it came out of house.

Dependent on user

Slightly more often than not

Depends on the operator

Mostly. Issues with drop/non-drop

Just like it has forever

Feeling the pain

I rather have a XML

Works well with same time base

Usually ok

50/50

Not

Awdul

50/50

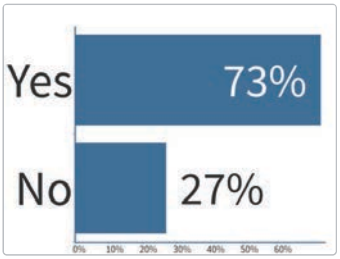
So so

Meh

49%
Engagement

17
Responses

34. Do you use frame counts to establish position of offset on a timeline in place of Time Code?

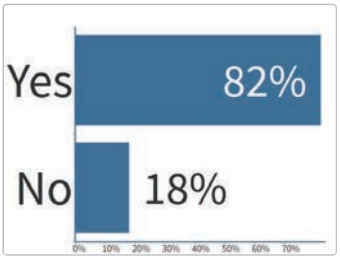


Response options	Count	Percentage
Yes	**19**	**73%**
No	7	27%

74%
Engagement

26
Responses

35. Do you use frame counts to establish durations?

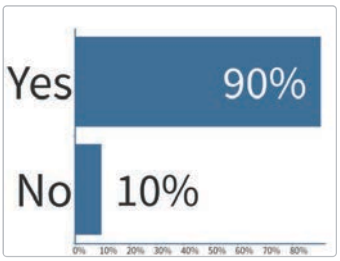


Response options	Count	Percentage
Yes	**23**	**82%**
No	5	18%

80%
Engagement

28
Responses

36. When establishing an edit Out point, do you use the label of the next frame? (Beginning of the next frame)

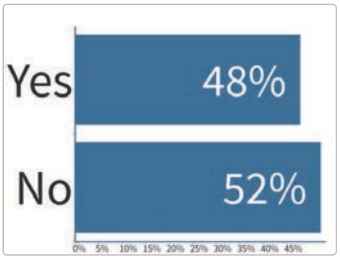


Response options	Count	Percentage
Yes	**19**	**90%**
No	2	10%

60%
Engagement

21
Responses

37. When establishing an edit Out point, do you use the label of the last frame of the element that is being used on the timeline? (Film editing aka "Inclusive")

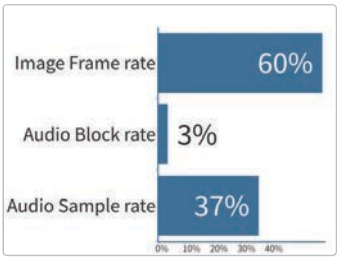


Response options	Count	Percentage
Yes	11	48%
No	**12**	**52%**

66%
Engagement

23
Responses

38. What granularity of Time Stamping do you require?

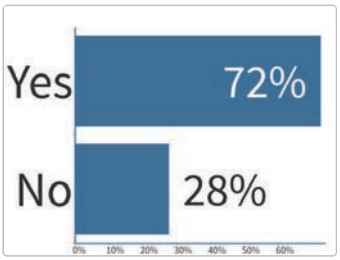


Response options	Count	Percentage
Image Frame rate	**18**	**60%**
Audio Block rate	1	3%
Audio Sample rate	11	37%

86%
Engagement

30
Responses

39. Does your Time Stamp need to be synchronized to real time? ("Time of Day")

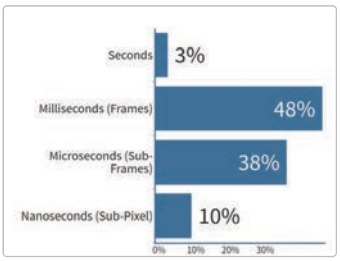


Response options	Count	Percentage
Yes	**21**	**72%**
No	8	28%

83%
Engagement

29
Responses

40. What "Time of Day" granularity of sync is required?

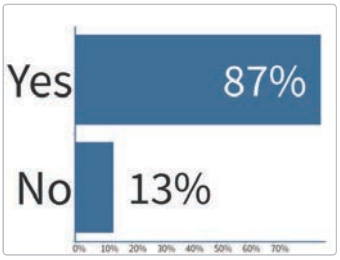


Response options	Count	Percentage
Seconds	1	3%
Milliseconds (Frames)	**14**	**48%**
Microseconds (Sub-Frames)	11	38%
Nanoseconds (Sub-Pixel)	3	10%

83%
Engagement

29
Responses

41. Does the "Time of Day" Time Label need to support Daylight Savings Time (DST)?

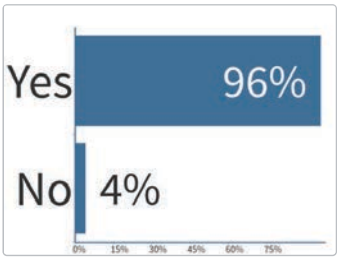


Response options	Count	Percentage
Yes	**26**	**87%**
No	4	13%

86%
Engagement

30
Responses

42. Does the "Time of Day" Time Label need to adjust for Leap Seconds? (UTC)

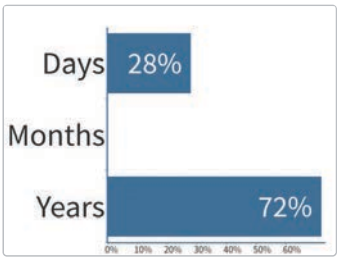


Response options	Count	Percentage
Yes	**25**	**96%**
No	1	4%

74%
Engagement

26
Responses

43. How long should a "Time of Day" Time Label maintain its synchronization to UTC?

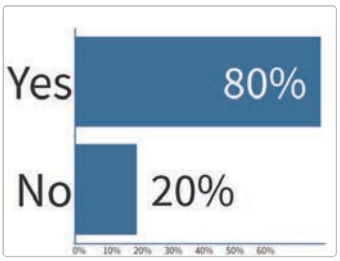


Response options	Count	Percentage
Days	7	28%
Months	0	0%
Years	**18**	**72%**

71%
Engagement

25
Responses

44. Do you use variable frame rates? (Over crank or Under crank)

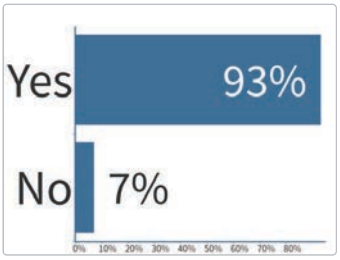


Response options	Count	Percentage
Yes	**24**	**80%**
No	6	20%

86%
Engagement

30
Responses

45. Does your Time Label need to support off speed rates?

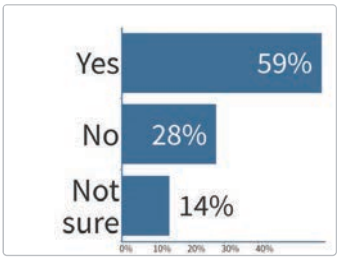


Response options	Count	Percentage
Yes	**27**	**93%**
No	2	7%

83%
Engagement

29
Responses

46. Do you make use of User Bits?

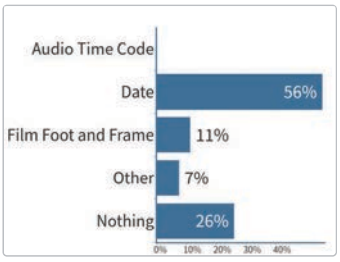


Response options	Count	Percentage
Yes	**17**	**59%**
No	8	28%
Not sure	4	14%

83%
Engagement

29
Responses

47. What do you put into User Bits?



Response options	Count	Percentage
Audio Time Code	0	0%
Date	**15**	**56%**
Film Foot and Frame	3	11%
Other	2	7%
Nothing	7	26%

77%
Engagement

27
Responses

48. What does the term "Time Label" mean to you?

Responses

metadata

Real clock time. Not timeofday TC necessarily.

Individual temporal marks of media units

Time stamp per start of media

New term for "better timecode"

time stamp plus time and rate related metadata

An exact time, not related to video frame rate.

Master TC

An identifiable point in the container

Don't know

Address of video frame

Identifier of time

Accurate, absolute time stamp

The info attached to every time stamp

Gps time

?

Nothing yet.

Stamp

?!?

?

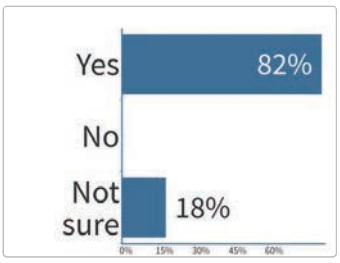
Identifier

Say what

60%
Engagement

22
Responses

49. Should a Time Label contain the frame rate?

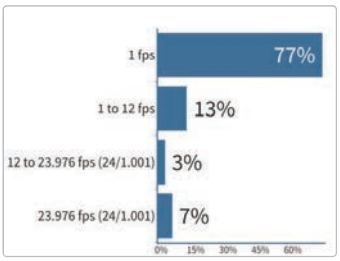


Response options	Count	Percentage
Yes	**23**	**82%**
No	0	0%
Not sure	5	18%

80%
Engagement

28
Responses

50. What would be the minimum frame rate for a Time Label?

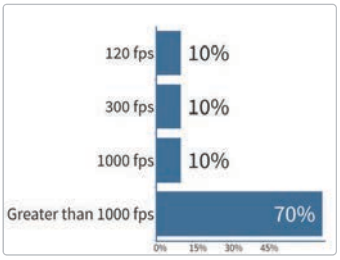


Response options	Count	Percentage
1 fps	**23**	**77%**
1 to 12 fps	4	13%
12 to 23.976 fps (24/1.001)	1	3%
23.976 fps (24/1.001)	2	7%

86%
Engagement

30
Responses

51. What would be the maximum frame rate for a Time Label?

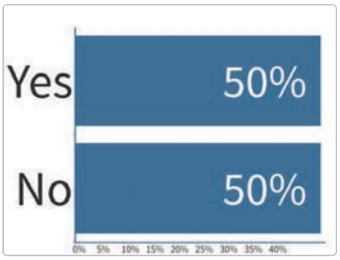


Response options	Count	Percentage
120 fps	3	10%
300 fps	3	10%
1000 fps	3	10%
Greater than 1000 fps	**21**	**70%**

86%
Engagement

30
Responses

52. Do you work with Film?

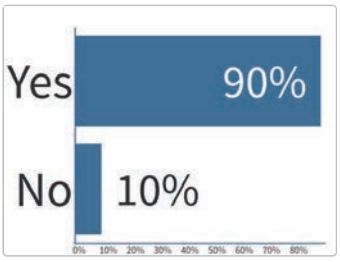


Response options	Count	Percentage
Yes	**15**	**50%**
No	**15**	**50%**

86%
Engagement

30
Responses

53. Do you need Time Labels to keep track of a Film 3:2 or 2:2 sequence?

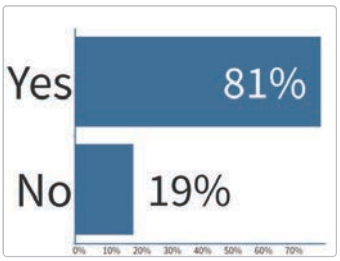


Response options	Count	Percentage
Yes	**19**	**90%**
No	2	10%

60%
Engagement

21
Responses

54. Do you need a Time Label to support Feet and Frame counts?

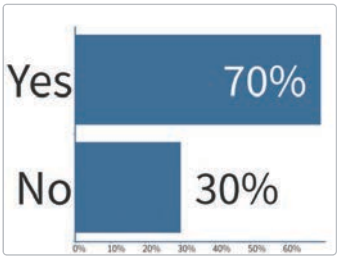


Response options	Count	Percentage
Yes	**17**	**81%**
No	4	19%

60%
Engagement

21
Responses

54a. Do you need a Time Label to support Keycode?

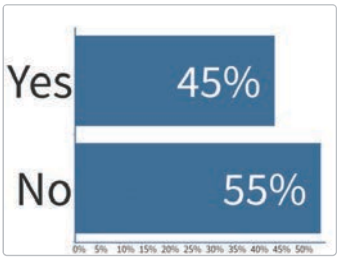


Response options	Count	Percentage
Yes	**14**	**70%**
No	6	30%

57%
Engagement

20
Responses

55. Do you need Time Labels to keep track of legacy Color Framing (CF)?

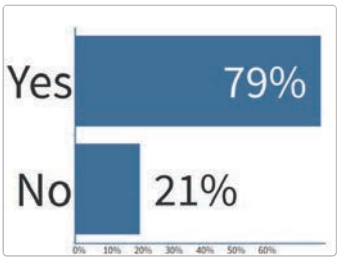


Response options	Count	Percentage
Yes	13	45%
No	**16**	**55%**

83%
Engagement

29
Responses

56. Do you need your Time Label to be human readable?

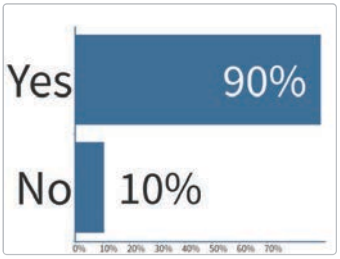


Response options	Count	Percentage
Yes	**23**	**79%**
No	6	21%

83%
Engagement

29
Responses

57. Does a new Time Label system need to be compatible with Legacy Time Code systems? (ST 12-1, ST 12-2, ST 12-3)

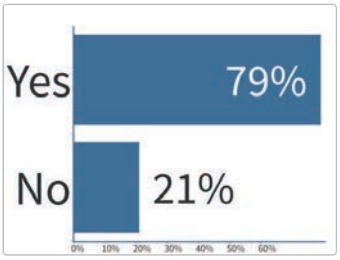


Response options	Count	Percentage
Yes	**26**	**90%**
No	3	10%

83%
Engagement

29
Responses

58. Does a new Time Label need to be able to embed ST-12 Time Code?

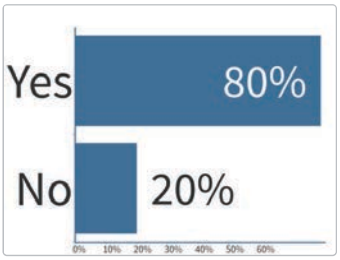


Response options	Count	Percentage
Yes	**19**	**79%**
No	5	21%

69%
Engagement

24
Responses

59. Does a new Time Label need to embed User Bits for ST-12 Time Code?

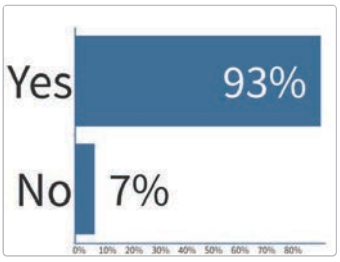


Response options	Count	Percentage
Yes	**20**	**80%**
No	5	20%

71%
Engagement

25
Responses

60. Does a new Time Label need the ability to generate ST-12 Time Code?

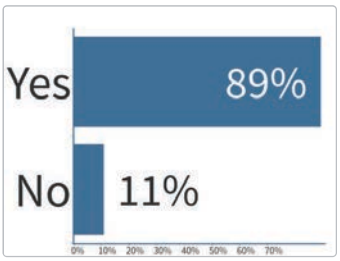


Response options	Count	Percentage
Yes	**26**	**93%**
No	2	7%

80%
Engagement

28
Responses

61. Do you need your Time Label to be a frame counter?

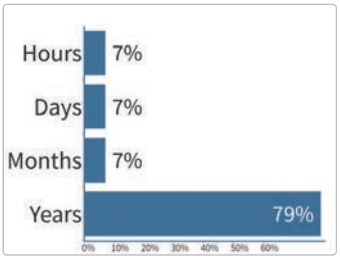


Response options	Count	Percentage
Yes	**25**	**89%**
No	3	11%

80%
Engagement

28
Responses

62. How far should a Time Label be able to count up to?

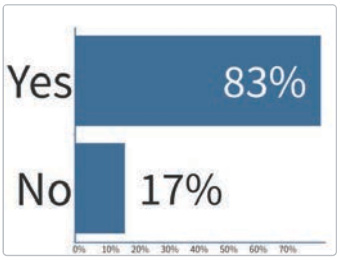


Response options	Count	Percentage
Hours	2	7%
Days	2	7%
Months	2	7%
Years	**23**	**79%**

83%
Engagement

29
Responses

63. Would you like an acquisition equipment ID in a Time Label?

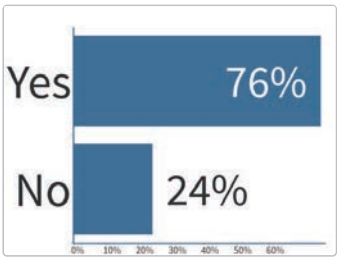


Response options	Count	Percentage
Yes	**25**	**83%**
No	5	17%

86%
Engagement

30
Responses

64. Do you want your Time Label to support Camera Roll, Scene and Take numbers?

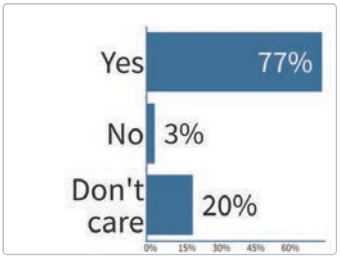


Response options	Count	Percentage
Yes	**22**	**76%**
No	7	24%

83%
Engagement

29
Responses

65. Do you want a new Time Label to carry the Source Time Label through to post-production and into a final master?

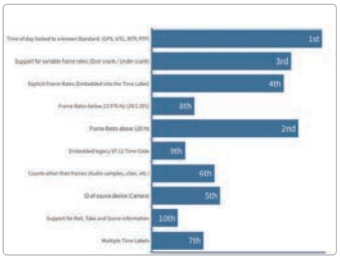


Response options	Count	Percentage
Yes	**23**	**77%**
No	1	3%
Don't care	6	20%

86%
Engagement

30
Responses

66. What are your Top Ten Priorities for a future Time Label System? (Rank in order)



Response options	Rank
Time of day locked to a known Standard. (GPS, UTC, NTP, PTP)	1st
Frame Rates above 120 Hz	2nd
Support for variable frame rates (Over crank / Under crank)	3rd
Explicit Frame Rates (Embedded into the Time Label)	4th
ID of source device (Camera)	5th
Counts other than frames (Audio samples, uSec, etc.)	6th
Multiple Time Labels	7th
Frame Rates below 23.976 Hz (24/1.001)	8th
Embedded legacy ST-12 Time Code	9th
Support for Roll, Take and Scene information	10th

60%
Engagement

21
Responses

Constant Contact Survey Results

Survey Name: Time Code Summit Survey

Response Status: Partial & Completed

Filter: None

11/28/2016 3:09 PM EST

TextBlock:

Part 1: General

*What part of the industry do you work in?

Answer	0% 100%	Number of Response(s)	Response Ratio
Feature Film Production		10	12.3 %
Episodic Production		5	6.1 %
Live Television Production		3	3.7 %
Post Production		20	24.6 %
Visual Effects		0	0.0 %
Broadcast Television		13	16.0 %
Audio Production		4	4.9 %
Live Events (Theatrical, Concert)		3	3.7 %
Theme Parks		2	2.4 %
Other		13	16.0 %
No Response(s)		8	9.8 %
	Totals	**81**	**100%**

*Does the use of Time Code impact your job?

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		73	90.1 %
No		1	1.2 %
No Response(s)		7	8.6 %
	Totals	**81**	**100%**

If you answered yes to the previous question, is the experience a positive one?

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		59	72.8 %
No		12	14.8 %
No Response(s)		10	12.3 %
	Totals	**81**	**100%**

Where does Time Code fall short?

47 Response(s)

*Where do you create Time Code? (Select all that apply)

Answer	0% 100%	Number of Response(s)	Response Ratio
In the Camera		24	33.8 %
In a Digital Audio Workstation (DAW)		21	29.5 %
In Production		46	64.7 %
In Post Production		39	54.9 %
In Playout		16	22.5 %
In File Distribution		17	23.9 %
In OTT Distribution		4	5.6 %
In Secon Screen applications		3	4.2 %
In Captioning and Ancillary services		9	12.6 %
	Totals	**71**	**100%**

Where do you use Time Code? (Select all that apply)

Answer	0% 100%	Number of Response(s)	Response Ratio
In the camera		26	36.6 %
In a DAW		23	32.3 %
In Production		42	59.1 %
In Post Production		55	77.4 %
In Playout		26	36.6 %
In file distribution		30	42.2 %
In OTT distribution		7	9.8 %
In second screen applications		8	11.2 %
In captioning and ancillary services		19	26.7 %
	Totals	**71**	**100%**

Where does Time Code work well in those applications?

40 Response(s)

Where does Time Code fall short in those applications?

39 Response(s)

Do you record the image of a Time Code slate/marker or display as a part of your production?

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		41	50.6 %
No		31	38.2 %
No Response(s)		9	11.1 %
	Totals	**81**	**100%**

TextBlock:

Part 2: Facility/System Usage

*Do you use multiple Time Code frame rates in your facility or system? (ex. 24,25,30 etc.)

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			47	58.0 %
No			17	20.9 %
No Response(s)			17	20.9 %
		Totals	**81**	**100%**

How well does Time Code work well in multi-rate applications?

33 Response(s)

*Do you use Drop Frame?

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			32	39.5 %
No			32	39.5 %
No Response(s)			17	20.9 %
		Totals	**81**	**100%**

*Do you use "Jam Sync"?(A momentary synchronization from one Time Code source to another Time Code generator.)

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			43	53.0 %
No			21	25.9 %
No Response(s)			17	20.9 %
		Totals	**81**	**100%**

Does your facility perform a "Daily Jam Sync"?

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			25	30.8 %
No			36	44.4 %
No Response(s)			20	24.6 %
		Totals	**81**	**100%**

What time base do you "Jam Sync" to?

Answer	0% 100%	Number of Response(s)	Response Ratio
Time of Day (ex. UTC, GPS, PTP)		14	17.2 %
Master Clock (ex. camera, sound recorder, slate, master generator)		17	20.9 %
Both		17	20.9 %
No Response(s)		33	40.7 %
	Totals	**81**	**100%**

How often do you "Jam Sync"?

Answer	0% 100%	Number of Response(s)	Response Ratio
Less than every week		8	9.8 %
Once a week		1	1.2 %
Once a day		8	9.8 %
Twice a day		13	16.0 %
More than twice a day		11	13.5 %
No Response(s)		40	49.3 %
	Totals	**81**	**100%**

*Do you use Hour per Reel Time Code?

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		23	28.3 %
No		41	50.6 %
No Response(s)		17	20.9 %
	Totals	**81**	**100%**

*Do you use Continuous Time Code?

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		50	61.7 %
No		14	17.2 %
No Response(s)		17	20.9 %
	Totals	**81**	**100%**

Do you use Time Code to sync to MIDI?

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		14	17.2 %
No		50	61.7 %
No Response(s)		17	20.9 %
	Totals	**81**	**100%**

Do you use MIDI Time Code?

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		15	18.5 %
No		49	60.4 %
No Response(s)		17	20.9 %
	Totals	**81**	**100%**

Do you sync Time Code to Word Clock?

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		31	38.2 %
No		33	40.7 %
No Response(s)		17	20.9 %
	Totals	**81**	**100%**

What rate of Word Clock do you use? (Select all that apply)

Answer	0% 100%	Number of Response(s)	Response Ratio
44.1 kHz		12	25.5 %
47.976 kHz (48/1.001)		6	12.7 %
48 kHz		46	97.8 %
48.048 kHz (48*1.001)		9	19.1 %
96 kHz		10	21.2 %
	Totals	**47**	**100%**

What other Word Clock rates do you use?

7 Response(s)

How do you distribute Time Code in your facility or system? (Select all that apply)

Answer	0% 100%	Number of Response(s)	Response Ratio
Analog audio channel		39	61.9 %
AES3		8	12.6 %
SDI		35	55.5 %
Ethernet		14	22.2 %
Wireless / RF		12	19.0 %
Other		16	25.3 %
	Totals	**63**	**100%**

What is the farthest distance you have to distribute time Code Time?

Answer	0% 100%	Number of Response(s)	Response Ratio
Under 10 feet (3 meters)		8	9.8 %
10 to 100 feet (3 to 30 meters)		21	25.9 %
100 to 1000 feet (30 to 300 meters)		16	19.7 %
More than 1000 feet (>300 meters)		19	23.4 %
No Response(s)		17	20.9 %
	Totals	**81**	**100%**

What is your master sync generator?

Answer	0% 100%	Number of Response(s)	Response Ratio
Word Clock		9	11.1 %
Video (Black, Tri-sync etc.)		21	25.9 %
NTP		4	4.9 %
PTP		2	2.4 %
GPS		6	7.4 %
Camera		2	2.4 %
Other		20	24.6 %
No Response(s)		17	20.9 %
	Totals	**81**	**100%**

Is your facility or system locked to a remote source? (ex. GPS)

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		20	24.6 %
No		34	41.9 %
Not sure		9	11.1 %
No Response(s)		18	22.2 %
	Totals	**81**	**100%**

Do you use Time Code to have devices chase that code?(Time Code as position data)

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		30	37.0 %
No		34	41.9 %
No Response(s)		17	20.9 %
	Totals	**81**	**100%**

What is the expected lock-up time for Time Code slave chase devices?

Answer	0% 100%	Number of Response(s)	Response Ratio
Seconds		16	19.7 %
Milliseconds (frames)		33	40.7 %
Microseconds (sub-frames)		15	18.5 %
No Response(s)		17	20.9 %
	Totals	**81**	**100%**

TextBlock:

Part 3: Time Code in Files

*Do you encounter files with multiple Time Codes?

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			28	34.5 %
No			32	39.5 %
No Response(s)			21	25.9 %
		Totals	81	100%

*Do you make use of multiple Time Codes in a file?

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			19	23.4 %
No			41	50.6 %
No Response(s)			21	25.9 %
		Totals	81	100%

*Do you encounter "illegal" Time Code values in files? (ex. 25DF)

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			15	18.5 %
No			45	55.5 %
No Response(s)			21	25.9 %
		Totals	81	100%

*Do you encounter non-continuous Time Code values in files?

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			27	33.3 %
No			33	40.7 %
No Response(s)			21	25.9 %
		Totals	81	100%

*Do you find Time Code sequences in files that (no longer) match the essence? (ex. frame count does not equal Time Code)

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			27	33.3 %
No			33	40.7 %
No Response(s)			21	25.9 %
		Totals	81	100%

Do you find audio-only MXF files with essentially random Time Code sequences?(e.g. two related audio-only files, such as language dubs with one having 24p Time Code and another language having 30DF Time Code)

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			8	9.8 %
No			42	51.8 %
No Response(s)			31	38.2 %
		Totals	**81**	**100%**

*Do you understand how Time Code is used in AS-11 files?

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			11	13.5 %
No			23	28.3 %
I don't know what AS-11 files are			26	32.0 %
No Response(s)			21	25.9 %
		Totals	**81**	**100%**

*Do you understand how Time Code is used in IMF files?

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			12	14.8 %
No			27	33.3 %
I don't know what IMF files are			21	25.9 %
No Response(s)			21	25.9 %
		Totals	**81**	**100%**

TextBlock:

Part 4: Editorial

*Do you process files with Time Code based EDL's?

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			33	40.7 %
No			26	32.0 %
No Response(s)			22	27.1 %
		Totals	**81**	**100%**

If yes, how well does it work?

28 Response(s)

Do you use frame counts to establish position or offset on a timeline instead of Time Code?

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			31	38.2 %
No			22	27.1 %
No Response(s)			28	34.5 %
		Totals	**81**	**100%**

Do you use frame counts to establish durations on a timeline?

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			31	38.2 %
No			20	24.6 %
No Response(s)			30	37.0 %
		Totals	**81**	**100%**

When establishing an edit out point, do you use the label of the next frame? (Beginning of the next frame)

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			16	19.7 %
No			19	23.4 %
I don't know, the application takes care of it for me			19	23.4 %
No Response(s)			27	33.3 %
		Totals	**81**	**100%**

When establishing an edit out point, do you use the label of the last frame of the element that is being used on the time line? (Film editing aka "Inclusive")

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			19	23.4 %
No			15	18.5 %
I don't know, the application takes care of it for me			19	23.4 %
No Response(s)			28	34.5 %
		Totals	**81**	**100%**

TextBlock:

Part 5: Granularity and Accuracy

*What granularity of time stamping do you require?

Answer	0%	100%	Number of Response(s)	Response Ratio
Image frame rate?			29	35.8 %
Audio Block rate?			5	6.1 %
Audio sample rate?			24	29.6 %
No Response(s)			23	28.3 %
		Totals	**81**	**100%**

*Does a new time stamp need to be synchronized to real time?("Time of Day")

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			36	44.4 %
No			22	27.1 %
No Response(s)			23	28.3 %
		Totals	**81**	**100%**

What "Time of Day" granularity of sync is required?

Answer	0%	100%	Number of Response(s)	Response Ratio
Seconds			8	9.8 %
Milliseconds (Frames)			21	25.9 %
Microseconds (Sub-frames)			17	20.9 %
Nanoseconds (Sub-pixels)			6	7.4 %
No Response(s)			29	35.8 %
		Totals	**81**	**100%**

Does the "Time of Day" Time Label need to support Daylight Savings Time (DST)?

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			27	33.3 %
No			25	30.8 %
No Response(s)			29	35.8 %
		Totals	**81**	**100%**

Does the "Time of Day" Time Label need to adjust for Leap Seconds? (UTC)

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			26	32.0 %
No			25	30.8 %
No Response(s)			30	37.0 %
		Totals	81	100%

How long should a Time of Day Time Label maintain its synchronization to (UTC)?

Answer	0%	100%	Number of Response(s)	Response Ratio
Days			17	20.9 %
Months			7	8.6 %
Years			21	25.9 %
No Response(s)			36	44.4 %
		Totals	81	100%

*Do you use variable frame rates?("over crank" or "under crank")

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			25	30.8 %
No			33	40.7 %
No Response(s)			23	28.3 %
		Totals	81	100%

*Should a new Time Label support off speed rates? (ex. 22 fps, 70 fps etc.)

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			45	55.5 %
No			13	16.0 %
No Response(s)			23	28.3 %
		Totals	81	100%

TextBlock:

Part 6: Time Labels

*Do you make use of User Bits?

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			27	33.3 %
No			17	20.9 %
Don't know			8	9.8 %
No Response(s)			29	35.8 %
		Totals	**81**	**100%**

What do you put into User Bits? (Select all that apply)

Answer	0%	100%	Number of Response(s)	Response Ratio
Audio time code			8	23.5 %
Date			25	73.5 %
Film foot and frame			3	8.8 %
Nothing			6	17.6 %
Other			7	20.5 %
		Totals	**34**	**100%**

What does the term "Time Label" mean to you?

22 Response(s)

*Should a new Time Label contain the frame rate?

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			38	46.9 %
No			2	2.4 %
Not sure			11	13.5 %
No Response(s)			30	37.0 %
		Totals	**81**	**100%**

What should be the minimum frame rate for a new Time Label?

Answer	0%	100%	Number of Response(s)	Response Ratio
1 fps			23	28.3 %
1 to 12 fps			4	4.9 %
12 to 23.976 fps (24/1.001)			7	8.6 %
23.976 fps (24/1.001)			6	7.4 %
Other			11	13.5 %
No Response(s)			30	37.0 %
		Totals	**81**	**100%**

What should be the maximum frame rate for a new Time Label?

Answer	0%	100%	Number of Response(s)	Response Ratio
120 fps			8	9.8 %
300 fps			9	11.1 %
1000 fps			6	7.4 %
Greater than 1000 fps			28	34.5 %
No Response(s)			30	37.0 %
		Totals	**81**	**100%**

Do you work with film?

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			25	30.8 %
No			26	32.0 %
No Response(s)			30	37.0 %
		Totals	**81**	**100%**

Do you need a new Time Stamp to keep track of a film 3:2 or 2:2 sequence?

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes			20	24.6 %
No			22	27.1 %
No Response(s)			39	48.1 %
		Totals	**81**	**100%**

Do you need a new Time Label to support feet and frame counts?

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		14	17.2 %
No		28	34.5 %
No Response(s)		39	48.1 %
	Totals	**81**	**100%**

Do you need a new Time Label to support Keycode?

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		12	14.8 %
No		27	33.3 %
No Response(s)		42	51.8 %
	Totals	**81**	**100%**

Do you need a new Time Labels to keep track of legacy Color Framing (CF)?

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		12	14.8 %
No		39	48.1 %
No Response(s)		30	37.0 %
	Totals	**81**	**100%**

Do you want a new Time Label to be human readable?

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		44	54.3 %
No		7	8.6 %
No Response(s)		30	37.0 %
	Totals	**81**	**100%**

Does a new Time Label system need to be compatible with Legacy Time Code Systems?

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		39	48.1 %
No		12	14.8 %
No Response(s)		30	37.0 %
	Totals	**81**	**100%**

Does a new Time Label need to be able to embed ST-12 Time Code?

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		27	33.3 %
No		24	29.6 %
No Response(s)		30	37.0 %
	Totals	**81**	**100%**

Does a new Time Label need to be able to embed the User Bits from ST-12 Time Code?

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		29	35.8 %
No		22	27.1 %
No Response(s)		30	37.0 %
	Totals	**81**	**100%**

Does a new Time Label need the ability to generate ST-12 Time Code?

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		29	35.8 %
No		22	27.1 %
No Response(s)		30	37.0 %
	Totals	**81**	**100%**

Do you need a new Time Label to be a frame counter?

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		35	43.2 %
No		16	19.7 %
No Response(s)		30	37.0 %
	Totals	**81**	**100%**

How far should a new Time Label be able to count up to?

Answer	0% 100%	Number of Response(s)	Response Ratio
Hours		7	8.6 %
Days		16	19.7 %
Months		4	4.9 %
Years		24	29.6 %
No Response(s)		30	37.0 %
	Totals	**81**	**100%**

Would you like an acquisition equipment ID in a new Time Label?

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		37	45.6 %
No		14	17.2 %
No Response(s)		30	37.0 %
	Totals	**81**	**100%**

Do you want a new Time Label to support Camera Roll, Scene and Take numbers?

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		33	40.7 %
No		15	18.5 %
No Response(s)		33	40.7 %
	Totals	**81**	**100%**

*Do you want a new Time Label to carry the source Time Label through post-production and into the final master?

Answer	0% 100%	Number of Response(s)	Response Ratio
Yes		41	50.6 %
No		10	12.3 %
No Response(s)		30	37.0 %
	Totals	**81**	**100%**

TextBlock:

Part 7: Priorities

*What are your Top Ten priorities for a future Time Label standard? (Rank in order)

1 = Least

Answer	1 2 3 4 5 6 7 8 9 10	Number of Response(s)	Ranking Score*
Time of Day locked to know Standard (GPS, UTC, NTP, PTP)		49	5.8
Support for variable frame rates (over/under crank)		49	4.8
Explicit frame rate (embedded into the Time Label)		49	5.4
Frame rates below 23.98Hz (24/1.001)		49	5.0
Frame rates above 120Hz		49	5.1
Compatible with legacy ST 12 TC		49	5.7
Counts other than frames (audio samples, uSec, etc.)		49	5.7
ID of source device (camera)		49	6.1
Support for roll, take, scene numbers		49	5.6
Multiple Time Labels (file)		49	5.8

*The Ranking Score is the weighted average calculated by dividing the sum of all weighted rankings by the number of total responses.

Time Code Summit

Howard Lukk

Director, Engineering and Standards
SMPTE

Special Thanks

- The Academy
- Local Hollywood SMPTE Section
  - Jim De Filippis
  - Marty Meyer
  - Volunteers
- SMPTE Standards
  - Bruce Devlin
  - Jack Douglas
  - Pat Waddell
  - Andy Quested
  - Jim Houston
  - Sieg Heep

The Agenda

- Survey
  - Establish User Requirements
- Time Label Tutorial
  - Time Code to Time Stamp to Time Labels
- Discussion
  - What did we not think about?
  - Free form discussion

Survey

WiFi Name: Eukelade
Password: TheSoundOfMusic1965#
Survey URL: PollEv.com/smpte
Or Text SMPTE to 22333 (two 2's three 3's)

Time Label Tutorial

Time Code

- You may know it as “Time Code” or “SMPTE Time Code”
  - Three types of ST-12 Time Code
    - Linear Time Code – LTC - Audio
    - Vertical Interval Time Code – VITC - Video
    - Ancillary Time Code - ATC – SDI

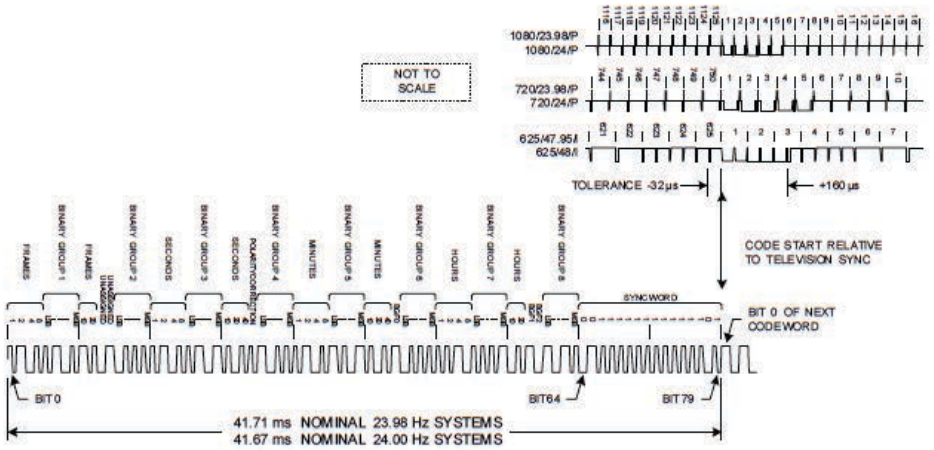
- Uses Binary Coded Decimal (BCD) Encoding
  - Hours : Minutes : Seconds : Frames
  - Flag Bits
    - Drop/Non Drop Frame etc.
  - User Bits

SMPTE linear timecode

Bit	Weight	Meaning	Bit	Weight	Meaning	Bit	Weight	Meaning	Bit	Weight	Meaning	Bit	Value	Meaning
00	1	Frame number units (0–9)	16	1	Seconds units (0–9)	32	1	Minutes units (0–9)	48	1	Hours units (0–9)	64	0	Sync word, fixed bit pattern 0011 1111 1111 1101
01	2		17	2		33	2		49	2		65	0	
02	4		18	4		34	4		50	4		66	1	
03	8		19	8		35	8		51	8		67	1	
04	User bits field 1		20	User bits field 3		36	User bits field 5		52	User bits field 7		68	1	
05			21			37			53			69	1	
06			22			38			54			70	1	
07			23			39			55			71	1	
08	10	Frame number tens (0-2)	24	10	Seconds tens (0–5)	40	10	Minutes tens (0–5)	56	10	Hours tens (0-2)	72	1	
09	20		25	20		41	20		57	20		73	1	
10	D	Drop frame flag.	26	40		42	40		58	0	*Reserved, zero*	74	1	
11	C	"Color frame" flag	27	P	Even parity bit	43	1	Binary group flag	59	2	Binary group flag	75	1	
12	User bits field 2		28	User bits field 4		44	User bits field 6		60	User bits field 8		76	1	
13			29			45			61			77	1	
14			30			46			62			78	0	
15			31			47			63			79	1	

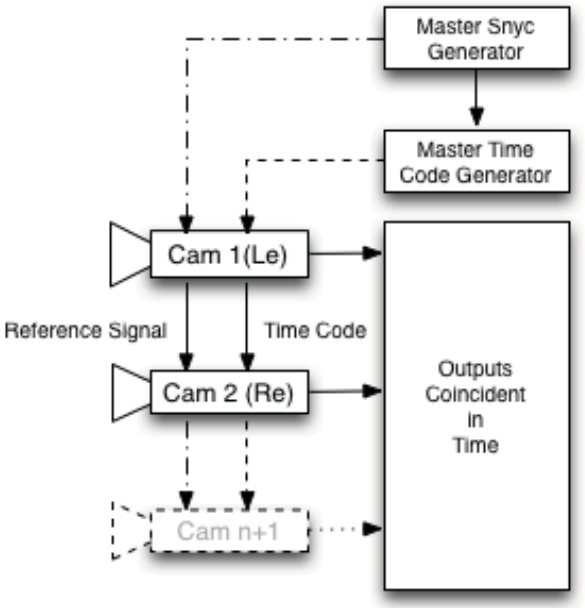
Timecode has “Time Labels”

- The application of timecode to identify frames of video or audio content is called “time labelling.”
- SMPTE ST 12-1 format timecode can uniquely identify frames over a timespan of up to 24 hours at frame rates of up to 30 or 30/1.001 fps
  - It can identify frame-pairs for 50 an 60/1.001 fps video



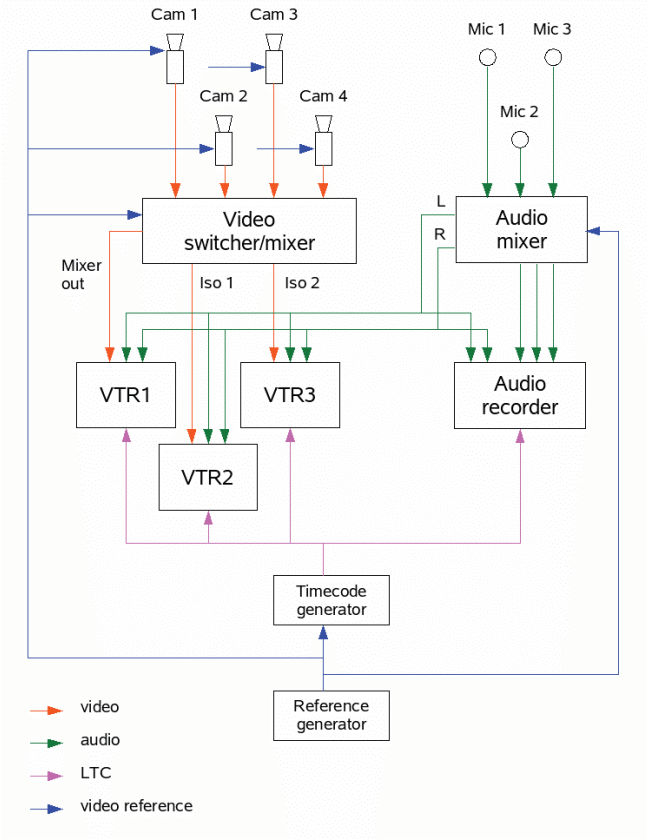
Linear Time Code (LTC) Distribution

- These signals are delivered from a master time code generator to each device via an independent cable (typically not carrying genlock)

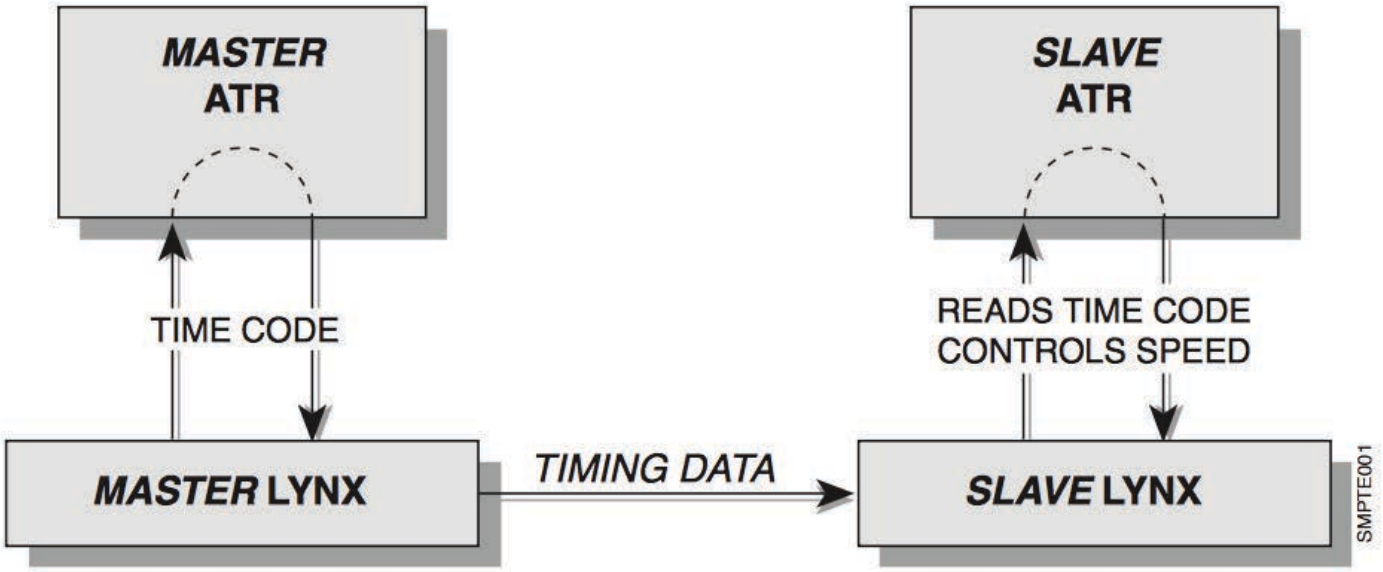


LTC in Live Television

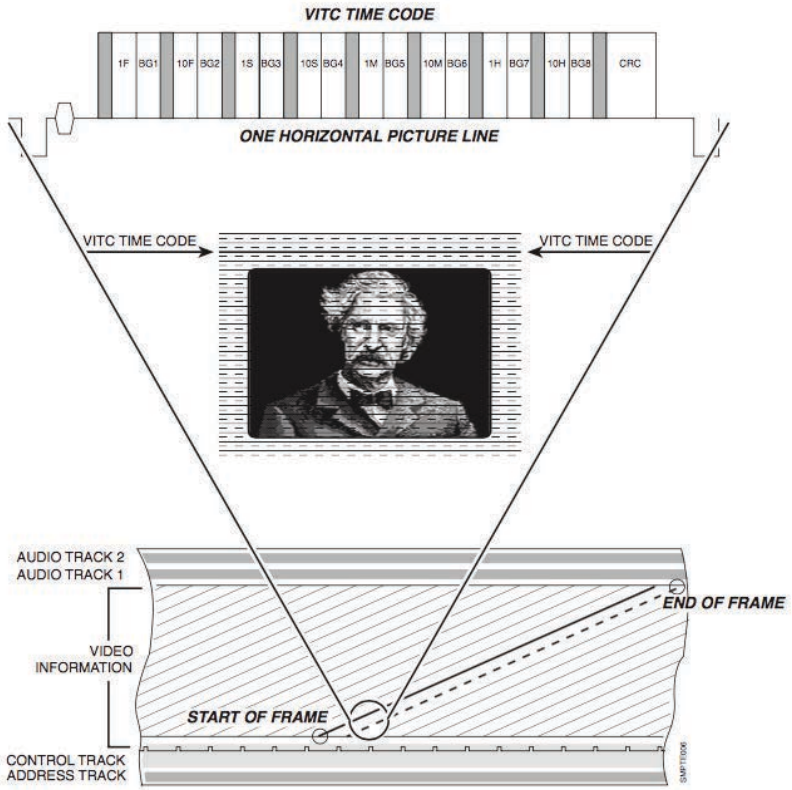
- The purpose of timecode in a live to tape system is not for synchronization of live media streams in real time, but as a reference to line-up recorded media in production/post-production



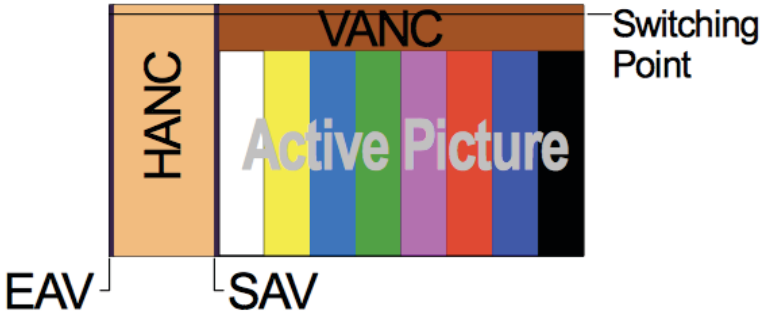
LTC as a Sync Chase

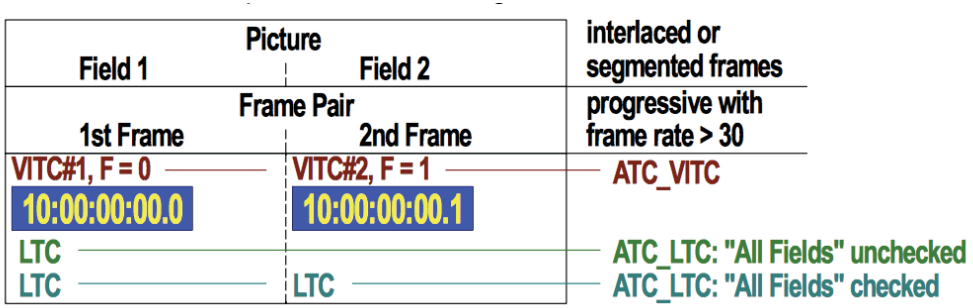


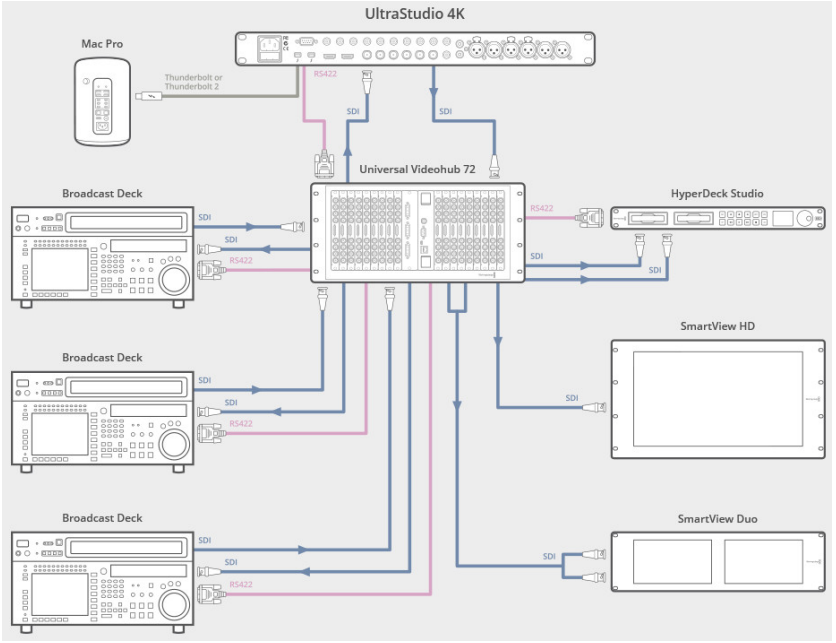
Vertical Interval Time Code (VITC)

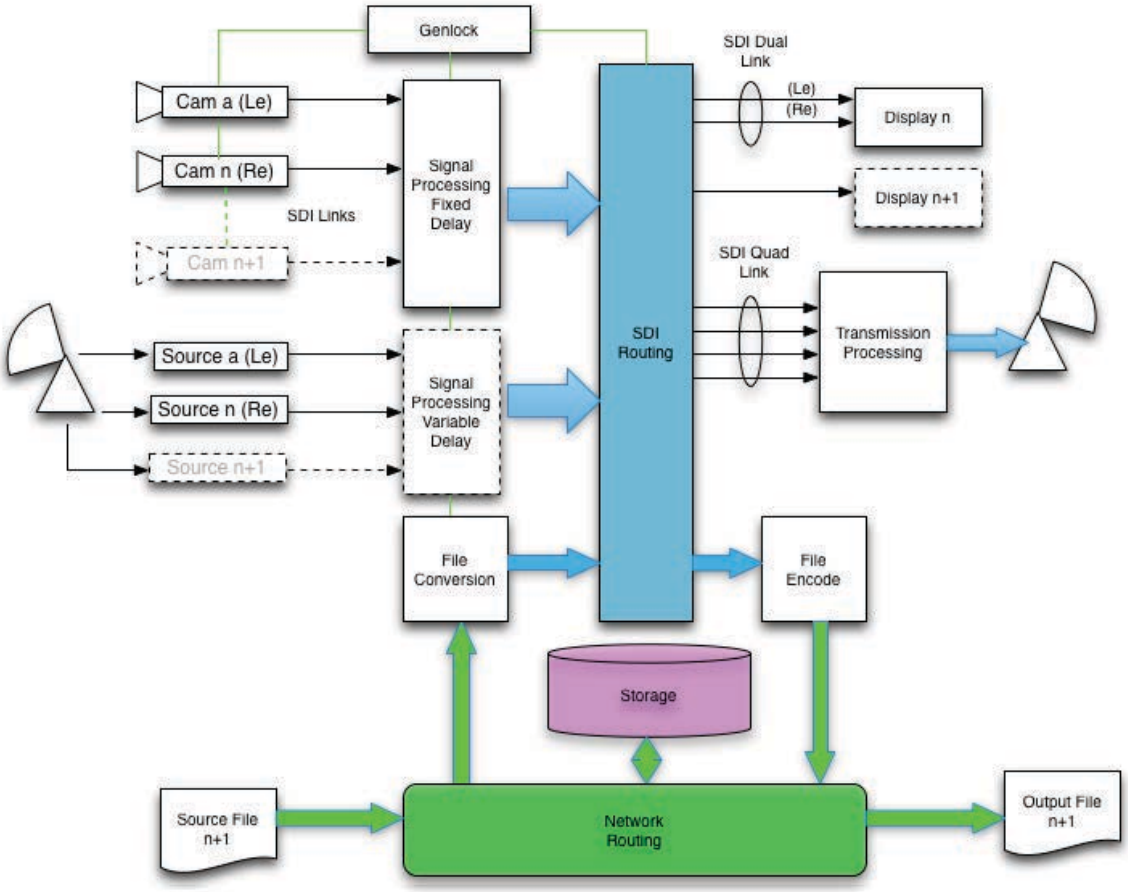


ST 12-2 Ancillary Time Code (ATC)









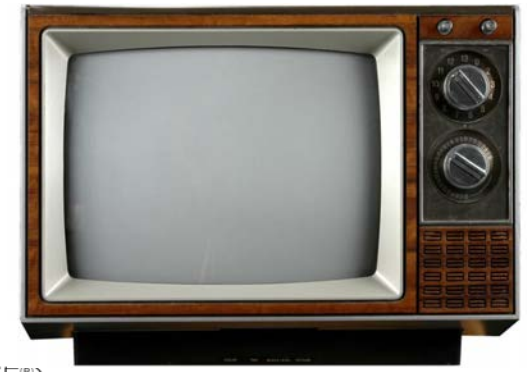
"What time is it?"
"Do we care?" or "How 30/1.001 ≠ 30 minutes"

Why 29.97 (30/1.001)?

- Black and white television was 30 frames per second, with luminance (FM) and audio (AM) at a fixed frequency distance (4.5 MHz)
- **Adding the color carrier frequency required inserting a third band…**
  - →*Without causing artifacts on the existing black and white TV sets*
  - →*So, color carrier frequency needed to be an odd harmonic of half line frequency*
  - →*Some math was done…*

Ratio of Horizontal line rate change = 1.001 : 1, 30fps / 1.001 = 29.97

"It's Backwards Compatible!"



The problem with 29.97 time code…

“It’s just like leap years”

Your video is running at 29.97 frames per second
If you count to 30 for every second, you will be off by **108 frames per hour**
This is 3.6 seconds per hour, or roughly **2 minutes every day**

Congress refused to change the standard duration of a minute and refused to speed up the rotation of the earth, so…

A new time code scheme was invented to account for the difference

Teaching your child to count the DF way

“It’s just like leap years”

- Duration of a solar year is slightly less than **365.25 days**
- We have February 29th when the year number is a factor of 4
  - Except on centuries…
  - *… that are not multiples of 400*

Example:

- 1701 and 1700 were **not** leap years
- 1996 and 2000 **were** leap years

Teaching your Editor to count the DF way

“It’s just like leap years”

- Duration of a 29.97fps hour (at 30fps) is 108 frames too long
- So, we **skip two frames every minute**
  - Drop-frame timecode skips **;00 and ;01**
  - *… except on multiples of ten minutes*

Example:

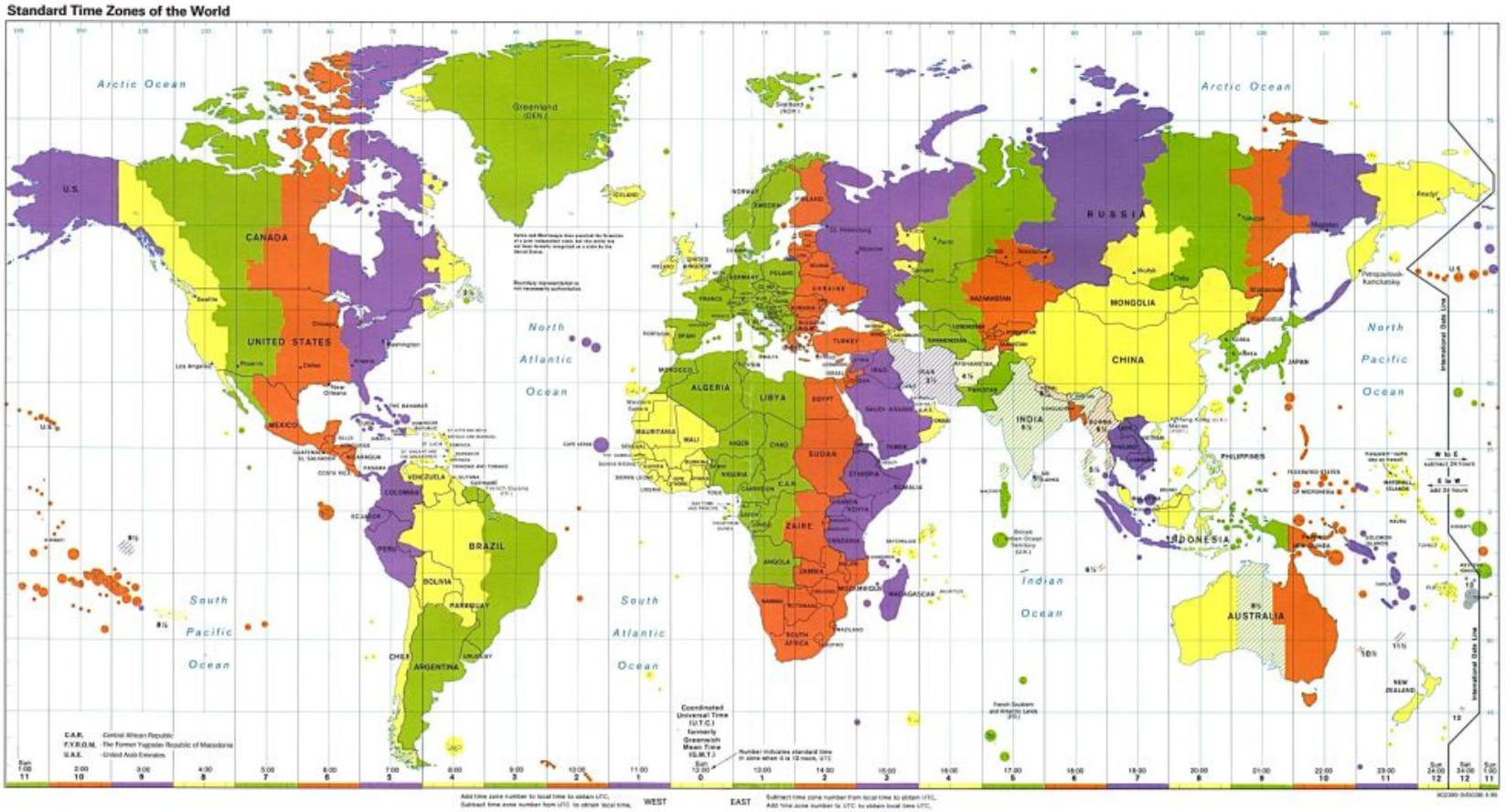
- 00:05:59;28 – 00:05:59;29 – **skip two** – 00:06:00;02 – 00:06:00;03
- 00:09:59;28 – 00:09:59;29 – 00:10:00;00 – 00:10:00;01

Who is Father Time?

Or

Why does the name Greenwich sound familiar?

Coordinated Universal Time (UTC)

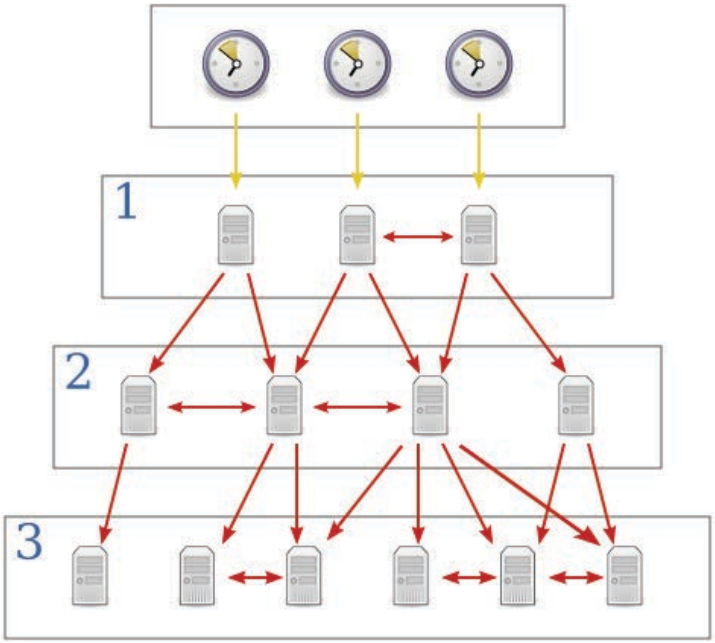


Atomic and Solar Time

- Two components are used to determine UTC:
  - **International Atomic Time** (TAI): A time scale that combines the output of some 400 highly precise atomic clocks worldwide, and provides the exact speed for our clocks to tick.
  - **Universal Time** (UT1), also known as astronomical time or solar time, refers to the Earth's rotation. It is used to compare the pace provided by TAI with the actual length of a day on Earth.

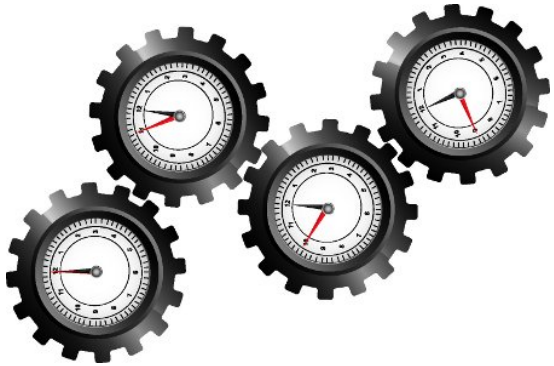
Network Time Protocol (NTP)

- Network Time Protocol (**NTP**) is a networking protocol for clock synchronization between computer systems over packet-switched, variable-latency data networks.
- NTP is intended to synchronize all participating computers to within a few milliseconds of Coordinated Universal Time (UTC).



IEEE 1588 Precision Time Protocol (PTP)

- IEEE 1588 is complex, rich, and widely supported
  - That is both good and bad news
  - Runs the cell-phone networks, the power grid, and many factories
  - A method for distributing precise, GPS referenced time stamps over an IP network for ***synchronization*** and ***alignment*** of signals



Problem: Legacy Technology Lacks **Precision** and **Span**

Black Burst

PRECISION: Sub µsec
SPAN: One frame

Digital Audio Reference Signal (DARS)

PRECISION: Sub µsec
SPAN: One Audio Frame

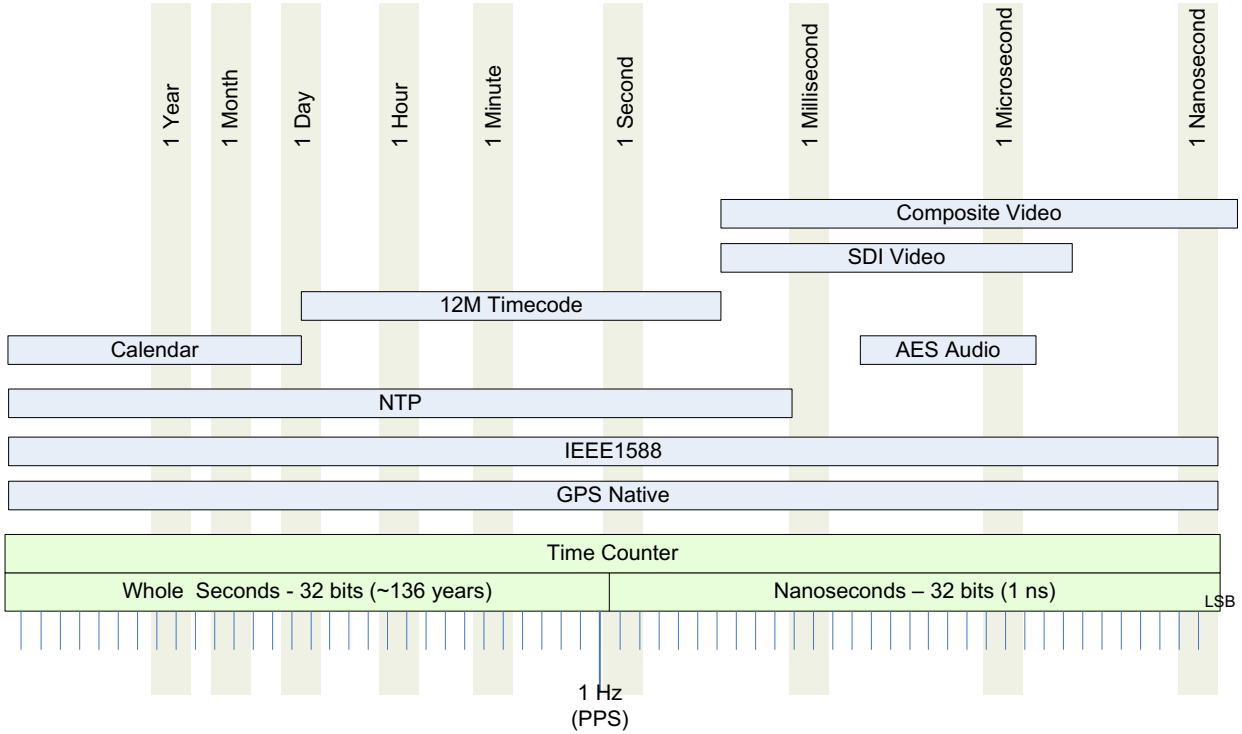
LTC and VITC (Longitudinal Time Code, Vertical Interval Timecode)

PRECISION: 1 video field
SPAN: 24 hours

PTP has resolution to 1 nanosecond and spans ~136 years
PTP has sufficient precision for all signal types and rates

PTP Range and Granularity

Timestamps are 80 bits long
- –48 bits of seconds
- –32 bits of nanoseconds
- –Accurate!



Problem: Legacy Technology Requires **Multiple Infrastructures**

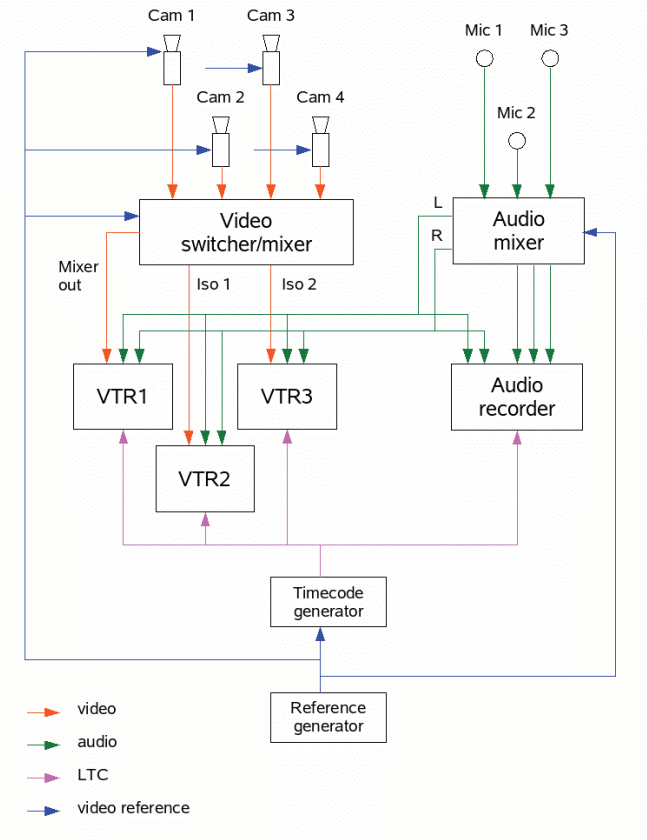
- Today we use separate standards for video, audio, timecode

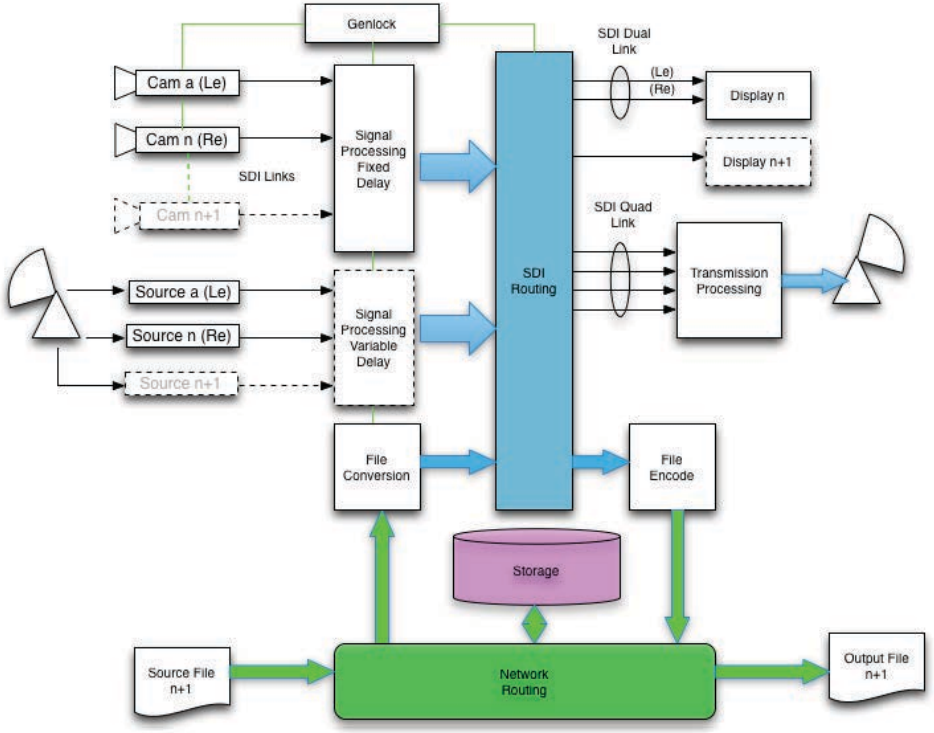
Black Burst

Digital Audio Reference Signal (DARS)

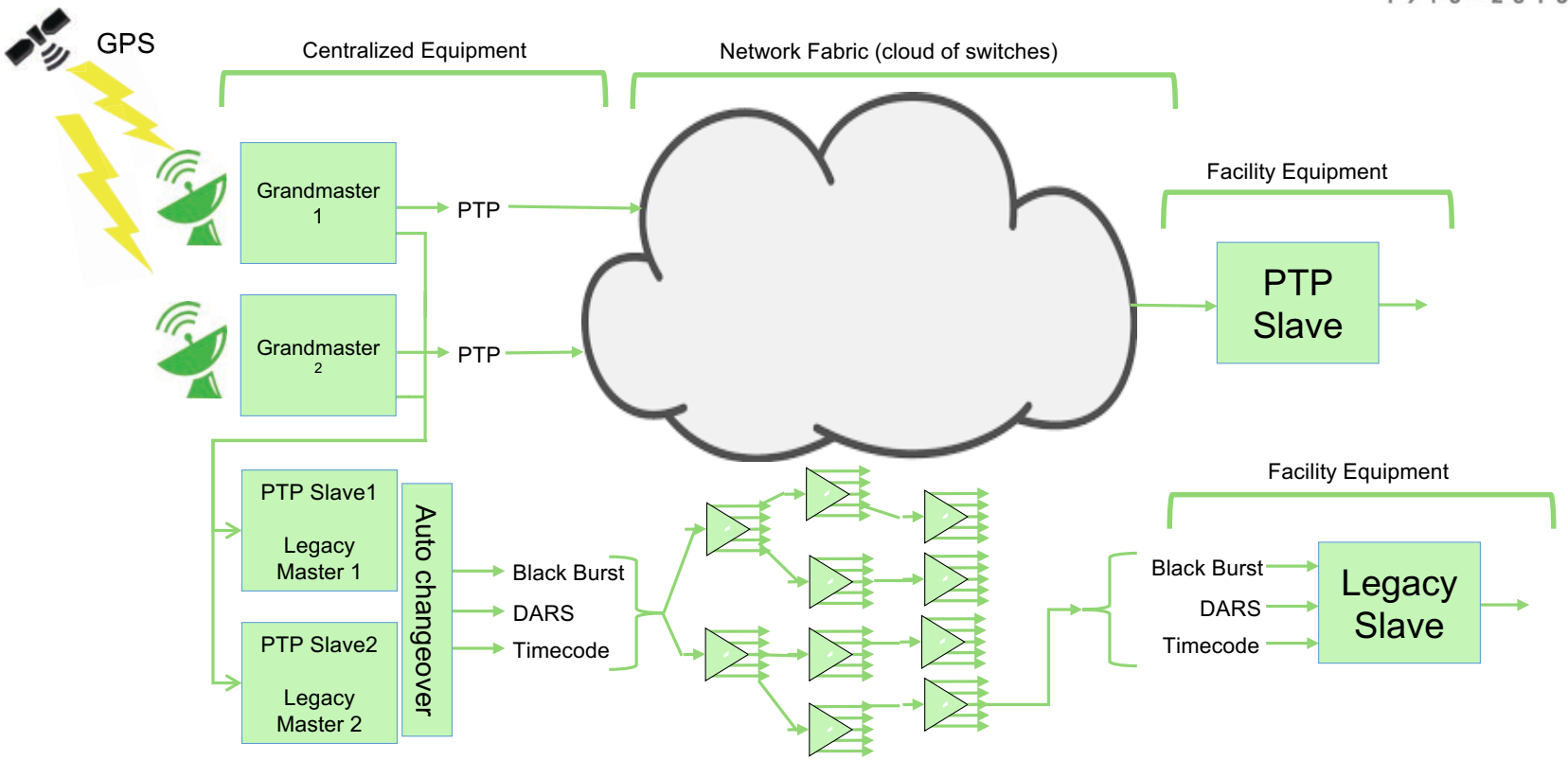
LTC and VITC (Longitudinal Time Code, Vertical Interval Time Code)

- Each requires a separate distribution network adding ***cost*** & ***complexity***



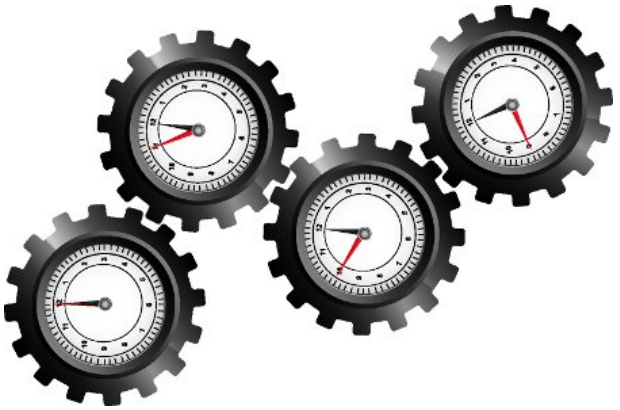


PTP Can Coexist with Legacy References in Same Facility



PTP for Our Industry

- SMPTE ST 2059 defines PTP for broadcast synchronization
  - Specifies relationship between traditional media signals and PTP
- AES67 defines PTP for audio synchronization
- SMPTE and AES have established ***common PTP operating points*** for ***guaranteed interoperability***
  - Validated through interoperability testing



“What’s the date today?”
“Do we care?”

“Happy Epoch to you”

What's an Epoch?

- a period of time in history or a person's life, typically one marked by notable events or particular characteristics.
- the beginning of a distinctive period in the history of someone or something.
- a division of time that is a subdivision of a period and is itself subdivided into ages, corresponding to a series in chronostratigraphy.

Epochs

Epoch date	Notable uses	Rationale for selection
January 0, 1 BC[10]	MATLAB[11]	
January 1, AD 1[10]	Microsoft .NET,[12][13] Go,[14] REXX,[15] Rata Die[16]	Common Era, ISO 2014,[17] RFC 3339[18]
January 1, 1601	NTFS, COBOL, Win32/Win64	1601 was the first year of the 400-year Gregorian calendar cycle at the time Windows NT was made.[19]
December 31, 1840	MUMPS programming language	1841 was a non-leap year several years before the birth year of the oldest living US citizen when the language was designed.[20]
November 17, 1858	VMS, United States Naval Observatory, DVB SI 16-bit day stamps, other astronomy-related computations[21]	November 17, 1858, 00:00:00 UT is the zero of the Modified Julian Day (MJD) equivalent to Julian day 2400000.5[22]
December 30, 1899	Microsoft COM DATE, Object Pascal, LibreOffice Calc, Google Sheets[23]	Technical internal value used by Microsoft Excel; for compatibility with Lotus 1-2-3.[24]
December 31, 1899	Microsoft C/C++ 7.0[25]	A change in Microsoft's last version of non-Visual C/C++ that was subsequently reverted.
January 0, 1900	Microsoft Excel,[24] Lotus 1-2-3[26]	While logically January 0, 1900 is equivalent to December 31, 1899, these systems do not allow users to specify the latter date.
January 1, 1900	Network Time Protocol, IBM CICS, Mathematica, RISC OS, VME, Common Lisp, Michigan Terminal System	
January 1, 1904	LabVIEW, Apple Inc.'s classic Mac OS, Palm OS, MP4, Microsoft Excel (optionally),[27] IGOR Pro	1904 is the first leap year of the 20th century.[28]
December 31, 1967	Pick OS and variants (jBASE, Universe, Unidata, Revelation, Reality)	Chosen so that (date mod 7) would produce 0=Sunday, 1=Monday, 2=Tuesday, 3=Wednesday, 4=Thursday, 5=Friday, and 6=Saturday.[29]
January 1, 1970	Unix Epoch aka POSIX time, used by Unix and Unix-like systems (Linux, macOS), and programming languages: most C/C++ implementations,[30] Java, JavaScript, Perl, PHP, Python, Ruby, Tcl, ActionScript. Also used by Precision Time Protocol.	
January 1, 1980	IBM BIOS INT 1Ah, DOS, OS/2, FAT12, FAT16, FAT32, exFAT filesystems	The IBM PC with its BIOS as well as 86-DOS, MS-DOS and PC DOS with their FAT12 file system were developed and introduced between 1980 and 1981
January 6, 1980	Qualcomm BREW, GPS, ATSC 32-bit time stamps	GPS counts weeks (a week is defined to start on Sunday) and January 6 is the first Sunday of 1980.[31][32]
January 1, 2000	AppleSingle, AppleDouble,[33] PostgreSQL,[34] ZigBee UTCTime[35]	
January 1, 2001	Apple's Cocoa framework	2001 is the year of the release of Mac OS X 10.0 (but NSDate for Apple's EOF 1.0 was developed in 1994).

Epoch's for us

- SMPTE has recently published a two part Standard:
  - SMPTE ST 2059-1, "Generation and Alignment of Interface Signals to the SMPTE Epoch"
  - SMPTE ST 2059-2, "SMPTE Profile for use of IEEE-1588 Precision Time Protocol in Professional Broadcast Applications"
    - Leverages a widely deployed IEEE standard (IEEE 1588 PTP)
    - Defines the "SMPTE Epoch"

Generate Video from Time?

- This requires devices calculate “where we are” based on the same starting point (called an “Epoch”)
  - “Where we are” would be “when is the next top of frame?” in a video system
- IEEE 1588 defines the Epoch as:
  “1 January 1970 00:00:00 TAI, which is 31 December 1969 23:59:51.999918 UTC.”
  - SMPTE ST 2059-1 adopts that Epoch
- Translation of PTP time values into other time bases is possible and straightforward (UTC, NTP, …)
  - We can also generate SMPTE ST 12-1 LTC and VITC time of day code words from PTP

What are we missing?

- Time Label consistent across all distributions (Streaming and File Based)
- Needs to be able to support high frame rates (HFR)
- Needs to support “First Birthday”?
  - Recorder ID
  - Absolute Time
- Needs to support Frame counts
- Needs to be compatible with ST-12-1 and -2.
- What else????

Discussion

Questions and Answers?

Thank You

Howard Lukk
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