2013 Survey Summary for Storage in Professional Media and Entertainment

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Introduction

Digital storage plays a significant role in the professional media and entertainment industry. Digital storage for the M&E industry has demand characteristics often very different from typical IT storage because of the performance requirements of real-time video in capture, editing and post-production as well as distribution. On the other hand, the ever growing archive of long-tail digital content and increasing digitized historical analog content is swelling the demand for cold as well as warm archives using tape, optical discs and hard drive arrays.

In March through May of 2013 Coughlin Associates, Inc. conducted a survey of professional media and entertainment professionals on various digital storage topics. The survey was broken down into several segments: content capture, editing and post-production, content delivery as well as archiving and digital preservation. The Society of Motion Picture and Television Engineers (SMPTE), Digital Production Buzz, Hollywood Post Alliance, Post Magazine and other organizations assisted by soliciting survey participants. Digital Production Buzz helped with the 2012 and 2013 surveys and that group represents many smaller facilities. As a result, these survey includes a greater number of smaller facilities than prior Coughlin Associates surveys.

Coughlin Associates wished to conduct the survey in order to discover new trends for storage in the industry and improve the accuracy of the company's annual report on digital storage for the media and entertainment industry. This summary contains some of the results from that survey and where appropriate we will compare the 2013 results from those of a similar survey in May and June of 2012; February, November and December of 2010 and March of 2009.

Of the 189 people that started the survey, 171 completed at least some part of the survey (90.5%). All of the people surveyed worked with professional media and entertainment content. 114 were involved in content capture, 111 were involved in digital editing or post-production., 53 were involved in content distribution and 85 were involved in long term digital archiving or digital preservation.

Table 1 shows the percentage of survey participants in various professional content market segments and **Table 2** show the general locations of the survey

participants. Note that the "other" category in Table 1 included responses such as sports, education, content restoration, documentaries, and audio production.

The following sections of this document give some of the results of the survey for each of the major survey sections described above. Note that the results given in this survey are representative of the full data but they are often a simplification of the more complex survey results. The full survey, including a more complete analysis of the survey results as well as some multi-factor dependencies is available from Coughlin Associates as part of the 2013 Digital Storage in Media and Entertainment report (www.tomcoughlin.com/techpapers.htm).

Table 1. Percentage of survey participants in content market segments.

TV Episodics	40.9%
TV Other	47.7%
Feature Film	38.9%
Short Features, Commercials and Trailers	55.0%
Web Casts	29.5%
Games	4.0%
Other (please specify)	26.2%

Table 2. Survey participant locations.

US or Canada	66.4%
Mexico or Latin America	4.0%
Europe	18.8%
Africa	2.0%
Japan or Korea	0.0%
China or Rest of Asia	2.7%
Australia	6.0%
Antartica	0.0%

Content Capture

Professional video cameras are undergoing rapid evolution, driven by higher resolution content as well as multi-camera content capture, including stereoscopic content capture. In addition, the physical storage media for professional cameras is undergoing rapid evolution as film and magnetic digital tape is impacted by the rapid file access convenience of hard disk drives, LTO

LTFS tape and optical discs, and the ruggedness of flash-based solid-state storage. **Figure 1** shows the percentage of various recording media used by the 2013 survey recipients in professional video cameras.

Figure 1. Percentage of various recording media in professional video cameras.

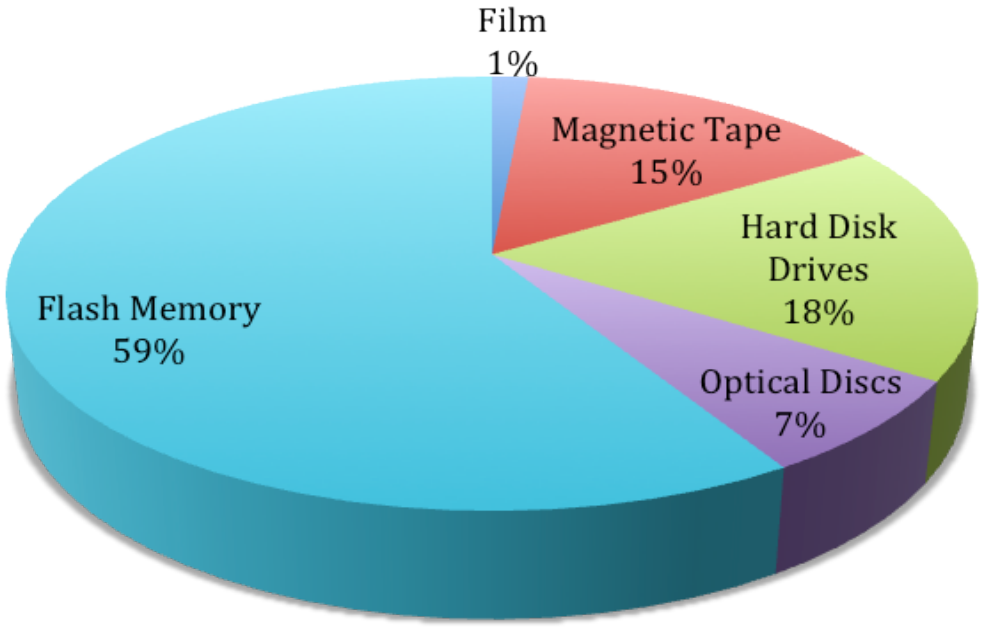


Table 3 compares the results from the 2009, 2010 and 2012 surveys with those from 2013. Note that after reviewing the raw data from the 2012 survey we have adjusted the percentages for that year. Flash memory is the clear leader in professional video camera media, increasing from 19% to 59% from 2009 to 2013 while magnetic tape and HDDs show a consistent decline over the same period, in particular magnetic tape declines from 34% to 15%. Optical discs increased from 2009 to 2010 but experienced a decline in the following years to 7% in 2013. Film shows a steady decline with the revised 2012 percentages from 15% in 2009 to 1% in 2013. The trend with film follows the trend towards completely digital workflows.

Table 3. Comparison of Professional Video Camera Media Trends

Year	Magnetic Tape	HDD	Optical	Flash Memory	Film
2009	34%	23%	9%	19%	15%
2010	25%	22%	17%	28%	8%
2012	20%	22%	12%	44%	2%
2013	15%	18%	7%	59%	1%

In 2013 84.5% of the survey respondents that participated in this section reuse their recording media (compared to 86% in 2012, 79% in 2010 and 75% in 2009). In 2013 81.4% of respondents said they archive their camera recording media (compared to 85% in 2012 and 77% in 2010). Digital storage on tape, hard disk drives or flash storage allows reuse of media, which is very common.

In the professional Media and Entertainment Survey we asked how much of the participants content was born digital and got the responses shown in **Table 4**. We included responses for the same ranges from the 2012 and 2010 survey. In 2013 75% said that over 80% of their content is created in a digital format vs. 80% in the 2012 and 63% in the 2010 survey.

Table 4. Survey Question: What % of your Content is Born Digital

Percent Born Digital	2010	2012	2013
<10%	3.9%	0.9%	1.1%
11% to 20%	1.3%	0.4%	0.0%
21% to 30%	3.2%	0.0%	0.0%
31% to 40%	3.2%	2.6%	1.1%
41% to 50%	5.2%	2.2%	3.3%
51% to 60%	5.2%	1.7%	2.2%
61% to 70%	5.8%	3.1%	6.5%
71% to 80%	8.4%	8.3%	10.9%
81% to 90%	16.1%	10.9%	15.2%
91% to 100%	47.7%	69.9%	59.8%

Digital Editing and Post Production

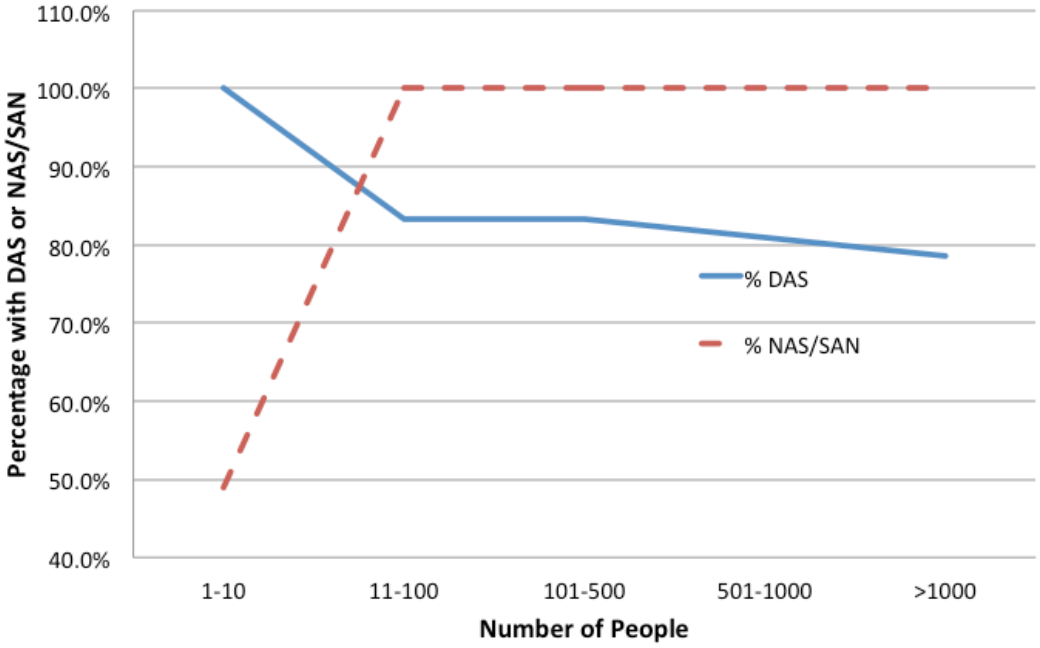
Figure 2 shows that for the survey participants there were a general increase in the use of shared storage (SAN/NAS), and a decrease in DAS storage as the number of people working in a post-production facility increases. 100% of the participants in larger facilities (greater than 10 seats) used shared storage. Even in the largest facilities 80% of the respondents used DAS as well as NAS.

When participants were asked about their use of direct attached and network storage in digital editing and post-production, the survey showed the following summary statistics:

- 87.3% had DAS (compared to 92% in 2012, 91% in 2009 and 83.8% in 2010)
  - Over 88% of these had more than 1 TB of DAS (up from 78% in 2012, 96% in 2010 and 52% in 2009)

  - 18.3% of these had more than 50 TB of DAS storage
  - Over 7% had more than 500 TB of DAS storage
- 70.9% had NAS or SAN (compared to 53.8% in 2012, 81% in 2010 and 2009—probably due to the addition of many smaller post-production facilities, 53.4% were in 1-10 people facilities in 2013 (compared to 67% in 2012 and about 26% in 2010)
  - 57.8% had 50 TB or more of NAS storage (note that we changed scales in the 2013 survey to capture the larger storage capacities)
  - About 11% had more than 500 TB of NAS/SAN storage
  - In 2012 about 48% had more than 16 TB of NAS or SAN (compared to 44% in 2009 and 58% in 2010)
- Many survey participants had considerable storage capacities in both DAS and NAS/SAN.

Figure 2. DAS vs. Shared Storage and Number of People in a Post Facility



In the 2012 and 2013 surveys we asked whether survey participants used cloud-based storage for editing and post production. In 2013 24.7% of responding participants said yes vs. 15.1% in 2012. In 2013 23% of the respondents said that they had 1 TB or more storage capacity in the cloud vs. 26.7% in 2012.

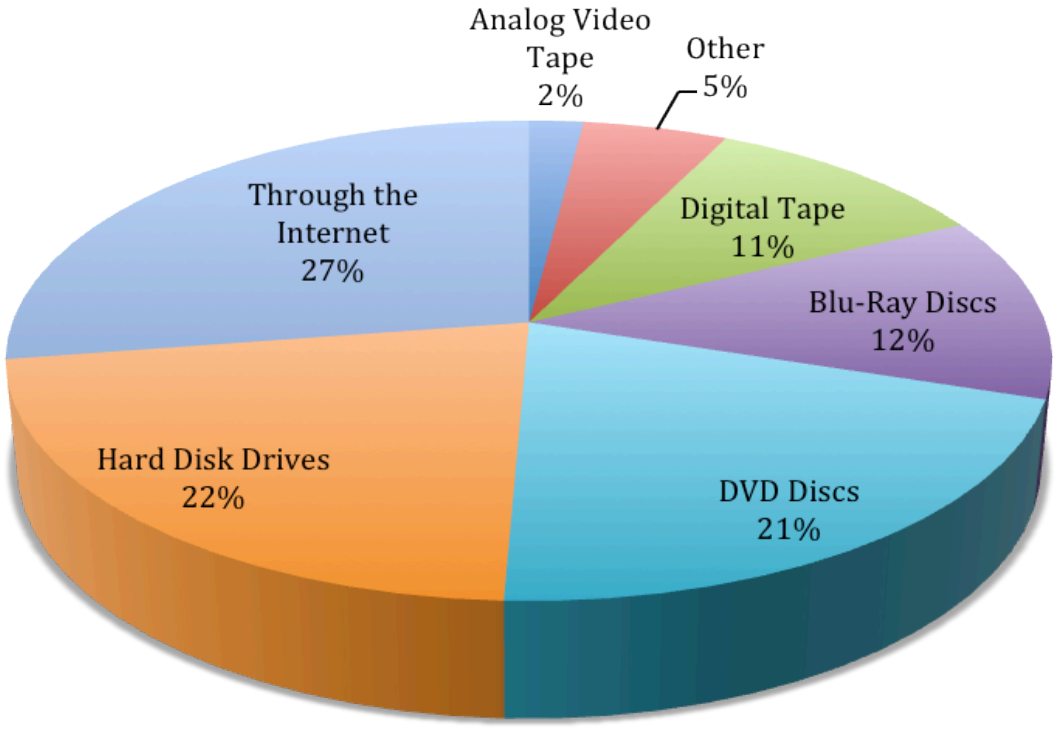
Table 5 compared the 2009, 2010, 2012 and 2013 survey results for distribution media used for proxies or completed editing work. Note that in the 2013 and 2012 survey we added proxy distribution through the Internet as a response option. Analog tape shows a continuous while digital tape is steady from 2012. Optical discs change little (except that DVD grows and Blu-Ray increases) and HDDs after declining in 2012 seem to be higher in 2013. Internet distribution at

27% in 2013 and 29% in 2012 appears to be the dominant method for proxy distribution. **Figure 3** is a pie chart of the 2013 survey proxy distribution media results.

Table 5. Proxy Distribution Media Trends

	2009	2010	2012	2013
Other	11%	17%	5%	5%
Analog video tape	10%	6%	2%	2%
Blu-ray discs	9%	11%	10%	12%
Digital tape	24%	18%	11%	11%
Hard disk drives	24%	25%	19%	22%
DVD discs	23%	23%	24%	21%
Through internet	NA	NA	29%	27%

Figure 3. Distribution format for proxies or completed work.



Content Distribution

Distribution of professional video content has many channels. It can use physical media for getting content to digital cinema or to consumers or it can be done electronically using broadcast, cable or satellite transmission; or through the internet or mobile phone networks. **Table 6** gives responses for the percentage of physical media used by the survey respondents for content distribution in 2013, 2012 and 2010 (for the 29, 82 and 62 respondents that used physical content distribution media in 2013, 2012 and 2010 respectively). Note that these are the average for the survey population giving their percentage for each physical media and do not and should not be expected to add to 100%. HDDs experienced the most growth from the 2010, 2012 and 2013 surveys (45%, 51% and 55% respectively).

Table 6. Percentage content on physical media for professional content distribution

Media	2010	2012	2013
Digital tape	59%	34%	32%
CD or VCD discs	13%	18%	23%
DVD discs	48%	79%	67%
Blu-ray discs	18%	24%	10%
Hard disk drives	45%	51%	55%
Flash memory or SSDs	25%	24%	22%

Following are survey observations for electronic content distribution (such as video on demand).

- Average hours on central content delivery system was about 2,275 hours (up from 1,900 hours in 2012, 700 hours in 2010 and 200 hours in 2009) with about 837 hours ingested monthly (this was 500 hours in 2012, 200 hours in 2010 and 150 hours in 2009)
- In 2013 42.5% of respondents had more than 5% of their content on edge servers (this compares to about 24% in 2012, 54% in 2010 and 46.8% in 2009)
- About 12% used flash memory on their edge servers (this was 14% in 2012, 16% in 2010 and 20% in 2009)

High-speed enterprise flash solid-state drives (SSDs) and other solid-state storage technology for edge content delivery appear to have been in decline since 2009.

Digital Archiving and Preservation

Today most new entertainment and media content is born digital and it is natural that this content should be preserved in digital form. This requirement places new demands on format preservation for long-term digital archives as well as management and systematic format refreshes during the expected life of a digital archive. In addition, the cost of analog content digitization and preservation in a digital format has gone down considerably and many digitization projects are proceeding apace. The growth of digital content archiving will swell the amount of content available for repurposing and long tail distribution. It will also swell the amount of storage and storage facilities required to store these long-term professional content archives.

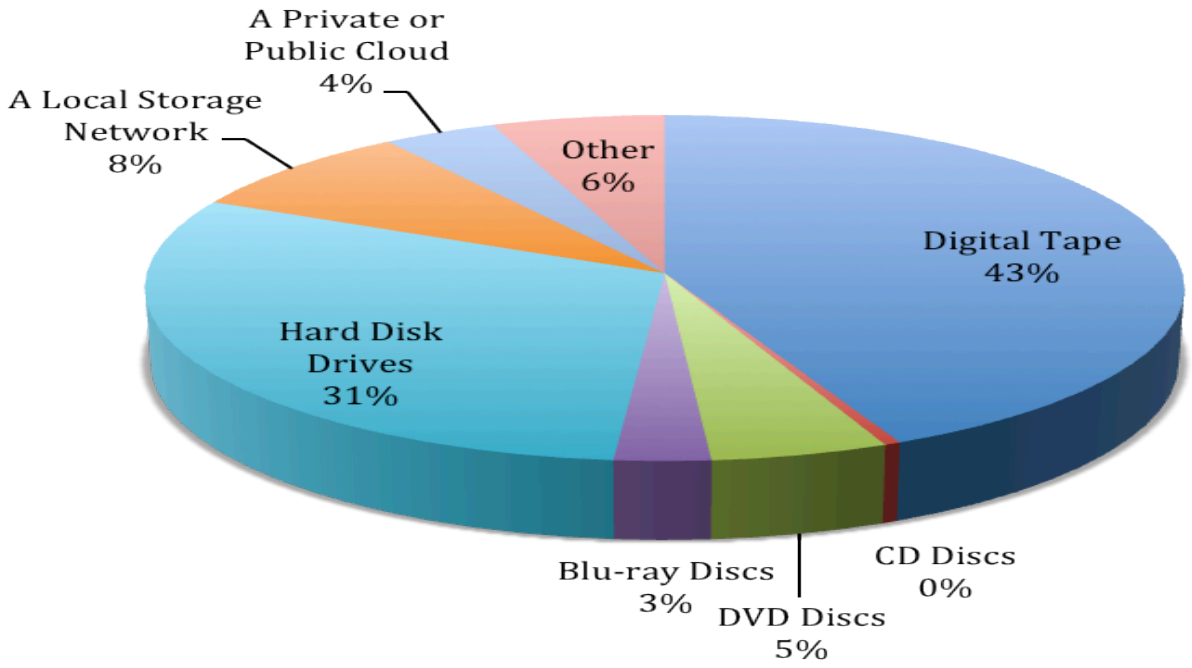
Following are some observations from the professional media and entertainment survey on trends in digital archiving and content preservation. The ease of capturing and storing digital content has encouraged many facilities and organizations to store more of their raw captured content and even copies of all their distribution formats.

We also note that in 2013 about 27% of the survey respondents have an annual conversion rate of 2% or less (compared to 56% in 2012) while about 61% had a conversion rate of 6% or less. Many respondents have considerable analog content libraries to convert to digital form. Following are some detailed results from the 2013 survey, compared to the 2012, 2010 and 2009 surveys.

- 43.8% had >2,000 hours of content in a long term archive (compared to 18% in 2012—note large number of smaller survey participants, 52% in 2010 and 44% in 2009,
- In 2013 9.6% of participants had over 5,000 hours of unconverted analog content
- 48.6% archived all the content captured from their cameras (this was 63% in 2012, 34% in 2010 and 40% in 2009)
- 56.9% archived copies of content in all of their distribution formats (this 71% in 2012, 57% in 2010 and 55% in 2009)
- 37.7% digitally archived all content captured from their dailies (this was 40% in 2012 and 24% in 2010)
- 46.6% digitally archived all content captured from rough cuts (this was 46% in 2012, and 23% in 2010)
- 46.3% digitally archived all content captured from their intermediaries (this was 48% in 2012 and 30% in 2010)
- In 2013 65.3% of the respondents said that their annual archive growth rate was >6% and the average rate is about 7.6%. This is within the general range observed in 2012, 2010 and 2009)
- 34.4% added 1,000 hours or greater to their archive annually (compared to 19.3% in 2012 and 39% in 2010. The 2012 results was probably due to the inclusion of many smaller producers)
- About 24.2% had >2,000 hours of unconverted analog content (compared to 18% in 2012, 54% in 2010 and 48% in 2009)

Professional media and entertainment content was traditionally archived on film or analog videotapes. Today the options available for archive media to store digital content depend upon the preferences and existing infrastructure of digital archive facilities. **Figure 6** gives the percentage distribution of archive media used by the survey participants.

Figure 6. Percentage of Digital Long-Term Archives on Various Media



Among the survey participants Digital Tape was the most common storage media (43% compared to 23% in 2012, 36% in 2010 and 33% in 2009). Hard Disk Drives are the next most common at 31% compared to 28% in 2012, 24% in 2010 and 25% in 2009). Optical discs of all sorts were about 8% (compared to 28% in 2012, 21% in 2010 and 23% in 2009). For the 2013 and 2012 survey we added archiving on a local storage network and in a private or public cloud and found that 8% used local network storage (in 2012 this was 12%) and 4% used a private or public cloud (compared to 5% in 2012). For the "other" category we had 6% in 2013 (compared to 4% in 2012, 19% in 2010 and 18% in 2009).

We are guessing that in the earlier surveys archiving on local or remote network storage was a significant part of the "other" archive methods. Presumably many of the HDDs used for archiving are in arrays for warm (near-line) archives and that storage in a local network or in the cloud is likely on hard disk drives as well (making likely HDD archiving about 43% of the total, note though that there are now LTO LTFS based cloud storage systems using tape so the HDD number could be a bit lower). These these numbers are abstracted from the actual response distribution since many facilities may use one or more archive storage media.

Table 7 gives the average projected growth rate for these archive storage media based upon the 2013, 2012, 2010 and 2009 surveys. This data is a simplification of the complete results from the survey.

The growth rate of digital tape is less than that of hard disk drives (reversing the trends from 2010 and 2009 and much higher than any one of the optical disc media. Hard disk drives, either in local storage systems and devices or through network and remote storage appears to be getting a significant growth spurt. Note though that there are LTO tape based cloud archives now being introduced to the market, so actual cloud archive storage will likely be split between tape and HDDs. It is also clear from the survey that there is a segment of this market that will continue to rely on optical media for digital archives.

Table 7. Simplified percentage growth rate of various archival media types.

	2013	**2012**	**2010**	**2009**
Digital Tape	64.5%	56.8%	76.1%	69.2%
CD Discs	12.9%	20.1%	56.6%	63.5%
DVD Discs	21.0%	34.5%	32.7%	32.7%
Blu-ray Discs	16.1%	26.6%	26.5%	25.0%
Hard Disk Drives	48.4%	69.8%	21.2%	26.9%
Local Network Storage	29.0%	24.5%		
A Private or Public Cloud	19.4%	17.3%		
Other	9.7%	12.2%	19.5%	27.9%

Some other observations from the archive and preservation section of the survey:

- About 42.4% never update their digital archives (compared to 44% in 2012, 39% in 2010 and 41% in 2009)
- About 81.8% used different storage for archiving and working storage (up from 71% in 2012, 77% in 2010 and 75% in 2009)
- About 47% half copied and replaced their digital long term archives every 10 years or less (this was 50% in 2012 and about half copied and replaced their archive every 7 years in the 2010 survey)
- 40% said that they would use a private or public cloud for archiving content

2013 DIGITAL STORAGE FOR MEDIA AND ENTERTAINMENT REPORT

This updated and expanded report is the ninth annual comprehensive reference document on this topic. The report analyzes requirements and trends in worldwide data storage for entertainment content acquisition; editing; archiving and digital preservation; as well as digital cinema; broadcast; satellite; cable; network; internet and VOD distribution. Capacity and performance trends as well as media projections are made for each of the various market segments. Industry storage capacity and revenue projections include direct attached storage, cloud, real time as well as near-line network storage.

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About the Author

Tom Coughlin, President, Coughlin Associates is a widely respected digital storage analyst and consultant. He has over 30 years in the data storage industry with multiple engineering and management positions at high profile companies.

Tom has many publications and six patents to his credit. Tom is also the author of Digital Storage in Consumer Electronics: The Essential Guide, which was published by Newnes Press. Coughlin Associates provides market and technology analysis (including reports on several digital storage technologies and applications and a newsletter) as well as Data Storage Technical Consulting services. Data abstracted in this paper are from the ***2013 Digital Storage for Media and Entertainment Report*** from Coughlin Associates. Order information on this report can be found at: www.tomcoughlin.com/techpapers.htm.

Dr. Coughlin is active with SMPTE, IDEMA, SNIA, the IEEE and other professional organizations. Tom is the founder and organizer of the Annual Storage Visions Conference (www.storagevisions.com), a partner to the annual Consumer Electronics Show as well as the Creative Storage Conference which is held in Culver City, CA (www.creativestorage.org). Tom is also the chairman of the annual Flash Memory Summit. He is a Leader in the Gerson Lehrman Group Councils of Advisors and a member of the Consultants Network of Silicon Valley (CNSV). For more information on Tom or his publications go to www.tomcoughlin.com.

