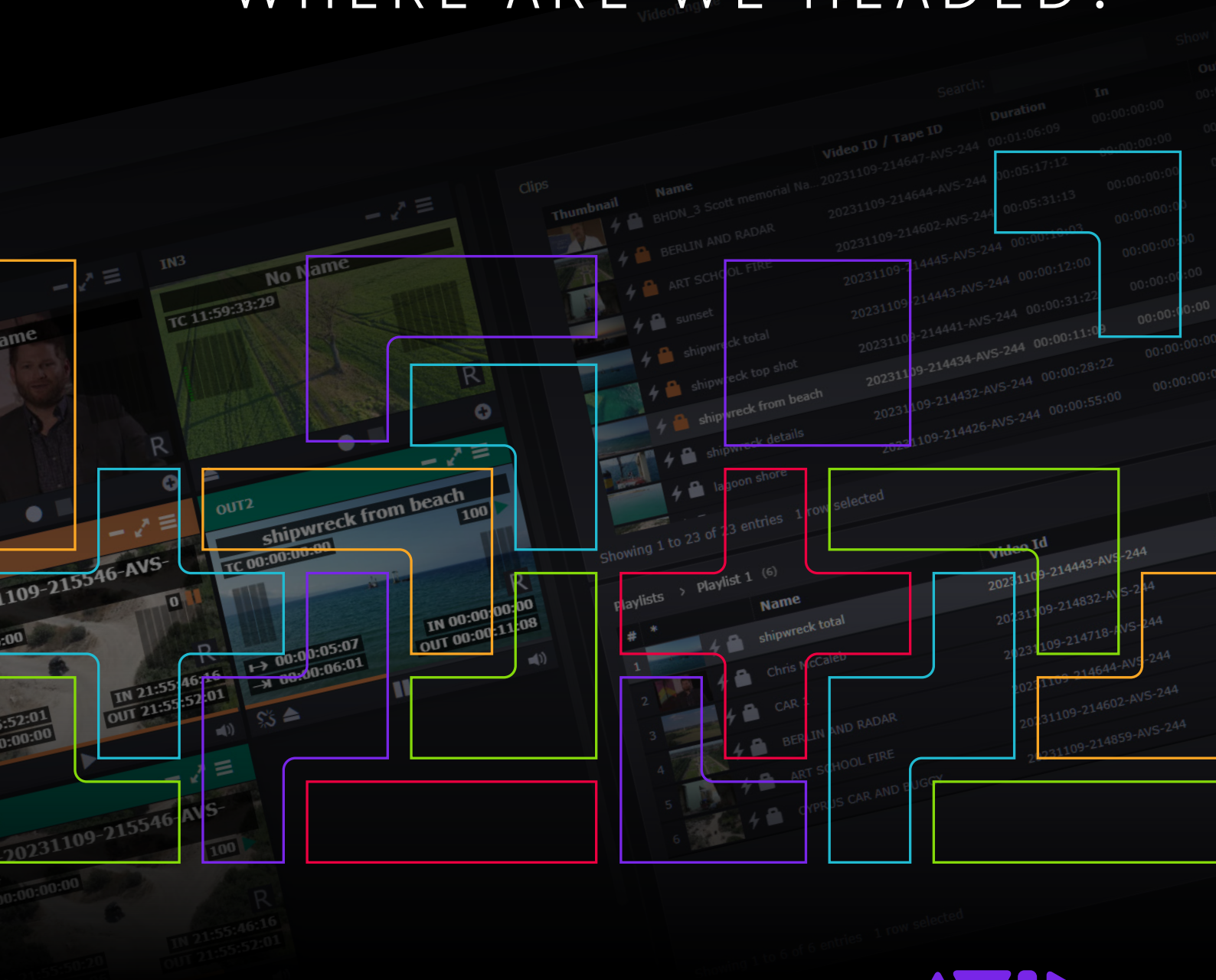


INGEST AND PLAYOUT: WHERE ARE WE HEADED?



The ingest and playout server market is constantly evolving, particularly when looking back to the 1990s and the development of the first truly end-to-end digital media solutions. Through that time the broadcast



industry has seen massive change – not just from tape to digital and SD to HD and beyond, but an explosion in formats, new methods of delivery, new ways to distribute stories and video, and a radical shift in viewer behavior and their ability to access media and information anytime, anywhere, and on a multitude of devices.

This rapid pace of change shows no sign of letting up, but while this development is exciting and drives new industry innovations, how do media organizations navigate that change and make investment decisions about their future infrastructure when there is uncertainty about exactly what that future will hold?

In this ingest and playout white paper we seek to assess the current state of the ingest and playout market, with a focus on broadcast-based and OTT distribution, debating what the industry can do now to futureproof their investments in this area, all the while maintaining legacy workflows but evolving their solutions to ensure they are best placed to deliver what audiences of tomorrow require.

WHAT THE INEVITABLE MOVE TO IP-BASED WORKFLOWS MEANS FOR THE MEDIA INDUSTRY



The media industry accepts that the move to IP-based workflows is inevitable and that the drive to deliver production capabilities and workflows to the cloud will play a part in accelerating this transition. But what are the challenges around IP-based ingest and playout and what can be done to aid and accelerate the transition from SDI, which has served the industry well for so long? How have early adopters coped with the transition and what have they learned? Will there be unification around a single standard or will there need to be support for multiple standards, addressing different workflow requirements? Also, what business benefits and creative workflow benefits can be derived from the move to IP, particularly around ingest and playout? Ultimately, will this deliver more for audiences already swamped with information overload?

To assess the future, however, we also need to reflect on how we reached this point. Are there lessons from the past we can learn from for a more successful future outcome?

< HOW DID WE > GET HERE?

THE JOURNEY FROM ANALOG TO IP

As is often the case, it is important to look back as well as look forward when it comes to technological innovation and change. It has been a long road from the initial analog signals to digital and now heading toward the use of internet protocol (IP) networks.



The transition to digital – specifically SDI (serial digital interface) – drove through the 1990s after SDI was first standardized by SMPTE (Society of Motion Picture and Television Engineers) in 1989. This change was also a revolution, advancing the way in which video and audio could be transferred and shared. It eliminated many of the quality issues associated with analog. Those of us who grew up during the 1960s and 70s will recall the fun and games of trying to get a picture on a small portable TV with an antenna hanging off the back and being happy with any kind of image, even if it looked like it was constantly snowing!

As broadcasters updated their legacy infrastructure to move to SDI, it became widely adopted, transmitting uncompressed, unencrypted digital video signals, renowned for their reliability, delivering in a point-to-point, one way manner. Its performance provided (and as we will discuss, continues to provide) a robustness and consistency which the industry craved, and it also moved with the times to reflect growing quality requirements.

It is this very robustness and reliability of SDI – a technology once revolutionary that became commonplace – which is a tribute to the standards behind it. There is an enormous amount of SDI equipment installed across the world, and it forms the backbone of many broadcasting organizations' infrastructure. It is also incredibly well-understood by the legions of broadcast engineers who have worked with it for more than thirty years.

SDI itself is not simply one standard. As the years rolled by, the industry moved from SD-SDI to HD-SDI and beyond, meeting the growing requirements of broadcasters, but also a more sophisticated market of viewers keen for higher quality imagery and audio. It is an interesting question – and one that we will not dwell on here – of which area was the most influential in driving the technology forward? Was it the need for improved standards in the broadcast industry as technology evolved, the drive to sell more HD televisions by manufacturers (having converted almost everyone from black and white to color), or in fact, was it the demand for an enhanced home experience by the consumer? (In reality, it was probably a combination of all three).

Since that standardization of SD-SDI in 1989, there have been six further SDI standards introduced as resolutions increased, higher bitrates were introduced, and more color ranges were also exposed. The latest SMPTE SDI standard – 24G-SDI – made its debut only a few years ago, in 2020.



But can its success and reliability also be seen as a limiting factor when it comes to the adoption of IP-based ingest and playout technologies? There are undoubtedly many within the industry who, while acknowledging the benefits IP can bring, question, “If we have something that works, why break it?”.

But perhaps there is a need to, if not break it, then evolve a strategy to incorporate IP alongside SDI, where it is most appropriate to gain benefits, confidence and, quite frankly, more knowledge of what it can deliver. Rather than throw out SDI completely, it is time to look to the future.

Having established the reality of where we are now, and how this was achieved, we need to move on to address the future state, eliciting some of the benefits which can be accrued.

< WHY THE > EVOLUTION TO IP?

If SDI is so robust, has served the industry well for so long, and evolved to accommodate new standards, why is there such a push to move to IP? The answer is multi-faceted, and we explore these reasons here.

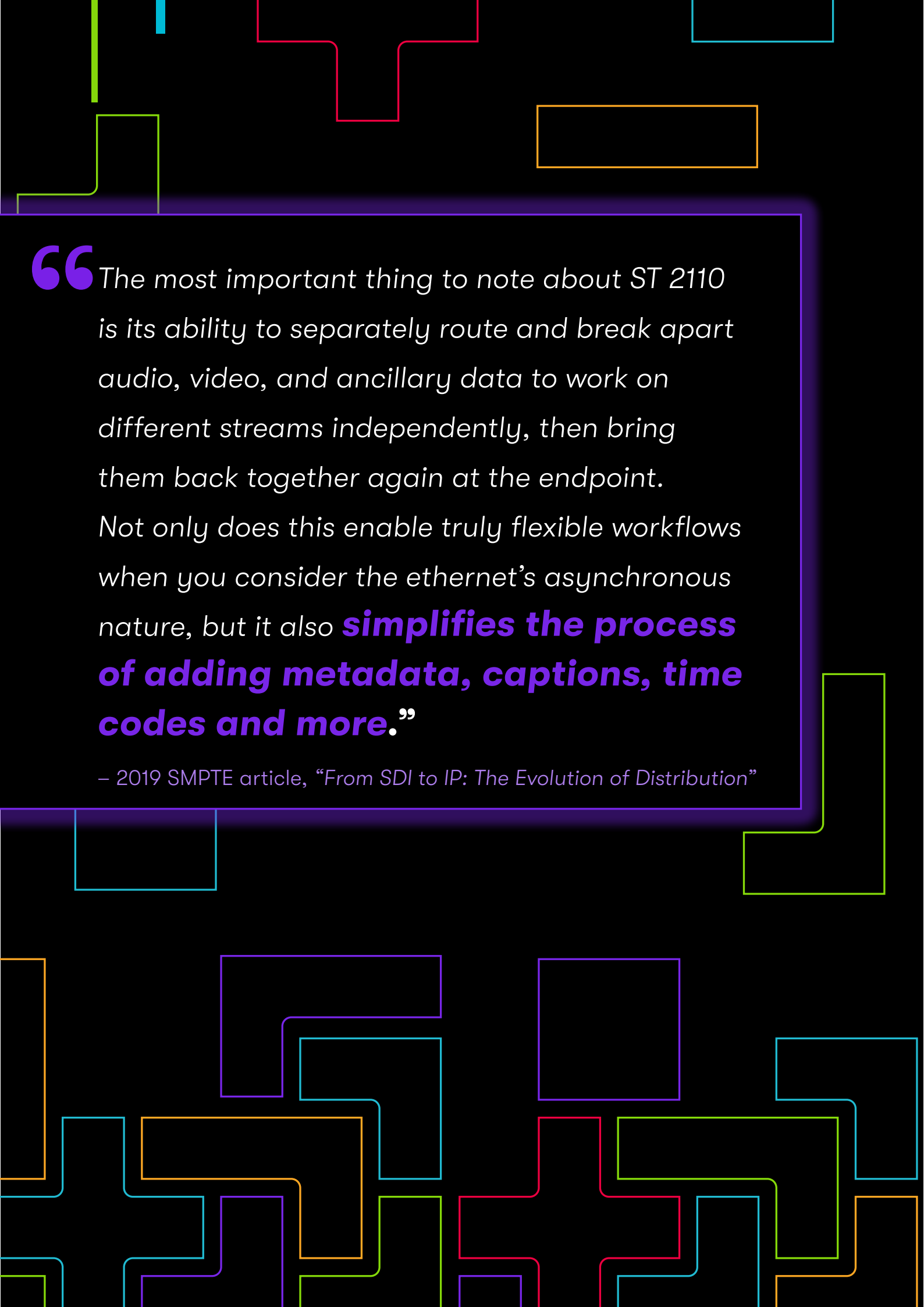


The reality is that SDI cannot, and will not, be capable of addressing the requirements of an industry moving to the cloud and facing audience demands not just for higher quality standards, but also for the convenience of consuming film and TV where and when they want, on their device of choice.

There are continued debates around the benefits of ultra-high-definition (UHD), 4K, 8K, and high dynamic range (HDR) content and which delivers the highest quality and best viewer experience. While that debate rages one thing is clear. There are simply going to be increasing demands on bandwidth to accommodate the transmission and distribution of ultra-high-definition content.

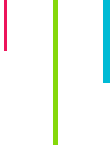
IP is also seen as enabling a pathway to more cloud-hosted workflows. Without IP, the reality is, there is no cloud, and we have seen increasing numbers of large organizations move workflows, where appropriate and where they can see true benefits to cloud-hosted private data center infrastructure. But the true cost (and benefits) of the cloud remains an ongoing question within the industry. Organizations continue to grapple to get a handle on their real total cost of ownership across their estate for a full comparison with what a move to the cloud would mean. Often hidden costs of onsite infrastructure can be difficult to uncover as they are considered “part of the fabric.”

We have previously discussed the qualities of SDI, but IP offers more flexibility, both in how it handles audio, video, and ancillary data, and how IP switches are bidirectional, contrasting with the one-way nature of SDI switches and their inability to carry multiple uncompressed signals simultaneously.

The background features a dark field with various colorful geometric shapes and lines. At the top, there are several rectangular outlines in cyan, red, and orange. A large, dark purple L-shaped border frames the central text area. At the bottom, there is a complex pattern of overlapping, colorful lines (cyan, orange, purple, red, green) that form a grid-like structure with many right-angle turns, resembling a circuit board or a data flow diagram.

“The most important thing to note about ST 2110 is its ability to separately route and break apart audio, video, and ancillary data to work on different streams independently, then bring them back together again at the endpoint. Not only does this enable truly flexible workflows when you consider the ethernet’s asynchronous nature, but it also **simplifies the process of adding metadata, captions, time codes and more.**”

– 2019 SMPTE article, “From SDI to IP: The Evolution of Distribution”



However, it is also worth calling out that various IP standards have emerged, and it seems unlikely that there will be consolidation around a single IP standard any time soon. In addition to the SMPTE ST 2110 standard for uncompressed video, which a few years ago seemed to be the one the industry would coalesce around, the rise of compressed IP standards, such as SRT, RTMP, NDI and others, complicates the landscape. Broadcast organizations and vendors require solutions which address these requirements, but also provide the flexibility to meet other protocols which may yet emerge.

Workflow simplification can never be underestimated when it comes to transformational projects. It is one thing for a technical solution to be understood and then implemented, but end users must be able to recognize and appreciate the benefits such a change will bring. If they fail to be convinced that IP is better than SDI then that transition will be more challenging.

One element often overlooked by organizations is that of effectively driving and implementing change for long-term benefits. While the ambition may be great, how often is that realized, and how often, even after implementing new technologies, do staff return to old habits and familiar ways of working, rather than seeing the change through to realize true change?

This is not a challenge (or even a failure) of technology. This is a people challenge, and often they are the most complex challenges to solve.



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The DPP highlighted this quandary in its 2023 European Broadcast Leaders Report, which states, “Media companies face internal barriers to effective technology change. There was widespread acknowledgement that the complexity of historic systems creates integration complexity at a time when media companies are looking for greater interoperability.”

This is not to say that effective change can be brought about by technological advances, but it does reinforce the message that the approach should be a holistic one, with milestones along the way to acknowledge what has been achieved.

If what we are saying here is that a big bang approach to the move to IP is not going to happen – due to the need to maintain legacy infrastructure and systems for a period of time, and for a true evaluation of costs to emerge – then how can IP be effectively implemented to guarantee a successful outcome?

< WHAT BENEFITS > CAN BE GAINED?

Let's be honest. This whole move to IP thing sounds horrendously complex, replacing something we do not need to get rid of, time consuming, potentially costly, and with no guarantee that things will be better by the time we have done it! But hold fast, as someone famously once said, "The sunlit uplands" are just ahead.

Simply put, if there were not demonstrable benefits to be had from moving to IP, no one would be doing it. And the reality is that everyone is doing it, though they are all at different stages of the journey. No one has reached the end game, and some are barely out of the starting gate, but the move to IP is inevitable. However, it will take time and therefore it is important that technology vendors adapt to this new reality. The reality is that SDI will be around for a while yet as the preponderance of IP grows no one will throw out their existing infrastructure until they have sweated every last pound, dollar, euro, rupee or yen from it.

Martin Appleton, Senior Manager of Product Management for Graphics and Video Servers, Avid, recognizes this need.



"It has been clear for some time that this transition to IP is going to take time." Appleton explains.

"We have learned vast amounts from early adopters and their experience has played a part in our ongoing product strategy and roadmap. Therefore, delivering solutions which continue to support SDI, but also include the benefits of IP – and a range of IP protocols – is a way in which the industry can help broadcasters smooth this transition process."

Another benefit of moving to IP infrastructure is that, for end users – and by this we mean staff such as the production crew, editorial team working in the newsroom, or the playout operators and the directors in the production control room or the gallery – this change is non-disruptive. Their edit suites will continue to work as they always have. Their browser-based tools for rough cut editing, viewing, and logging will work as smoothly as ever. In many ways, they will not even notice any difference, and referring to our statement in the previous chapter about driving change through technological transformation, a change which is non-disruptive to the creative team is one which can be regarded as a win. The additional benefit is that stories they produce or edited packages they create can be distributed to more viewers on more platforms.



But how can change be effectively achieved? Is it in small, incremental steps toward a goal or is it through a “rip off the band-aid” approach, removing the safety net of SDI with an all-in approach to IP?

BENEFITS GAINED FROM IP



- > **Ingest from anywhere, playout to everywhere** – With growing use of IP (and the rise of standards such as SRT and NDI), it is much easier for more people to contribute their content for distribution to more channels, more online destinations and ultimately more viewers, generating greater advertising or subscription revenues.
- > **Flexibility** – IP workflows can scale as requirements of an organization change and grow. Investment cycles in fixed infrastructure can potentially become a thing of the past.
- > **Pathway to the cloud or private data center** – Remote working and access to a larger talent pool becomes easier with an IP-based infrastructure securely accessible from anywhere and an ongoing reduction in hardware costs, support, and maintenance.
- > **Agility** – The rapid expansion of Free to Air Advertising Funded TV (FAST) channels is clear evidence of how IP can enable organizations to move quickly to set up Over the Top (OTT Channels) to deliver new revenue streams. As Nielsen says, “The streaming industry is coming full circle.”

< EVOLUTION > OR REVOLUTION?

When it comes to the introduction of new technologies, there is always the debate about whether the move will represent Revolution or Evolution? In the case of IP-based workflows, as we have seen from our previous chapters, progress has been incremental in how it has been deployed, for a variety of reasons. But that is not to say that, when considering how and where IP can be utilized, that a spark of revolution should not be sought.

There are, of course, practical realities around the requirement to continue to sweat existing infrastructure which has served the industry well for many years. For some proponents of the undeniable benefits of IP, this can feel a bit like entrepreneurs who turn up to *Shark Tank* or *Dragons' Den* to pitch the idea in which they have invested their lives only to be told by the wily old business angels sitting in front of them that they have invented a solution to a problem that did not exist in the first place.

But SDI does have its limitations and IP is a genuine solution to a problem which does exist. Therefore, why should there not be a revolution through its introduction?

Organizations such as Al Araby – who moved to a new facility in Doha, Qatar, in 2022, have made major strides in adopting IP as a fundamental of their new operations. But even here, they have had to include SDI components.



Al Araby is owned by Fadaat Media and their Director of Broadcast Operations and Visuals, Ali Hussein, told *Broadcast Pro ME* magazine,



“This facility is full IP end-to-end with redundancy built into the two networks, but to be accurate it is perhaps best to say that more than 90% of this TV station is built to be IP 2110-compliant. Some of the products are still baseband and need to be converted from SDI to IP and IP to SDI, and this puts more load on the system.”

The transition to IP was discussed in depth in the DPP’s European Broadcasters Summit which took place in Berlin in 2023. In a recent episode of the Making the Media Podcast, DPP Chief Executive Mark Harrison says it is clear how different parts of the industry will move at different paces toward the adoption of IP which may also be impacted by consideration of cloud adoption.

“Let’s take note that use of IP has been spectacular in news and, you know, rapid and dramatic and important adoption. So it’s another piece of revolutionary change that really has happened within news,” Harrison remarks. “But whereas perhaps others have been focusing on cloud, IP I think has been more of the focus for the world of news. And it feels as if news is coming to the cloud a bit later. But everyone can see the potential for what somebody described as being a bureau in a MacBook.”

“*...if you can virtualize both where the content is and the tools to work on that content, then the potential is enormous because like all other forms of media, **agility is king, and that's what the cloud is best at.***”

— MARK HARRISON,
CHIEF EXECUTIVE, DPP



As we have previously mentioned, IP adoption can often go hand-in-hand with considerations of a move to cloud-based workflows. A number of such moves have seen existing technologies transferred to the cloud through a “lift and shift” mechanism, essentially replicating the workflow on-prem, hosted on a VM in the cloud. There are many practical considerations to support this approach – time to market, familiarity of existing workflows, and more.

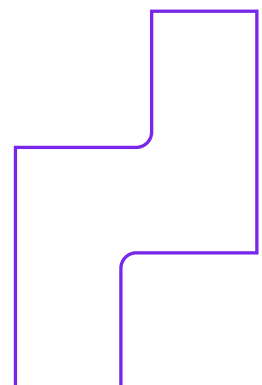
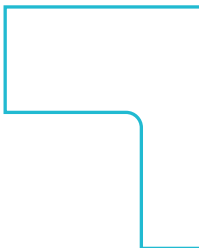
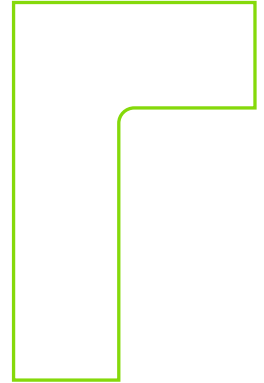
But the truth is that this approach will never be as efficient as working with tools which are cloud-native in their deployment. This has the potential to open up other types of workflows, perhaps ones which have never been explored before. Limitations that existed before are no longer an issue. New methods of deployment, new working patterns (such as efficient remote working), new security options, all become a possibility.

The DPP also identified the importance of software defined workflows when it came to best practices around IP.

Martin Appleton, Senior Manager of Product Management for Graphics and Video Servers, Avid, says, “Web-based tools are key when it comes to working in the cloud, and having common user interfaces for products can also help their adoption within the workforce. When it comes to ingest, we see customers becoming more reluctant to install thick clients to control devices, whether they are deployed on-prem or not. We are investing in web-based tools, whether they are controlling an ingest and playout solution directly or whether it is a control application which can run perhaps dozens or hundreds of channels simultaneously.”

Is it Revolution or Evolution then? While some may be manning the barricades and preparing for the revolution, practical realities will get in the way for most, and as such, evolution, with a steady adoption of IP when appropriate for the organization, and a long tail of phasing out SDI appears to be where the industry is headed.

How then can we summarize the current situation?



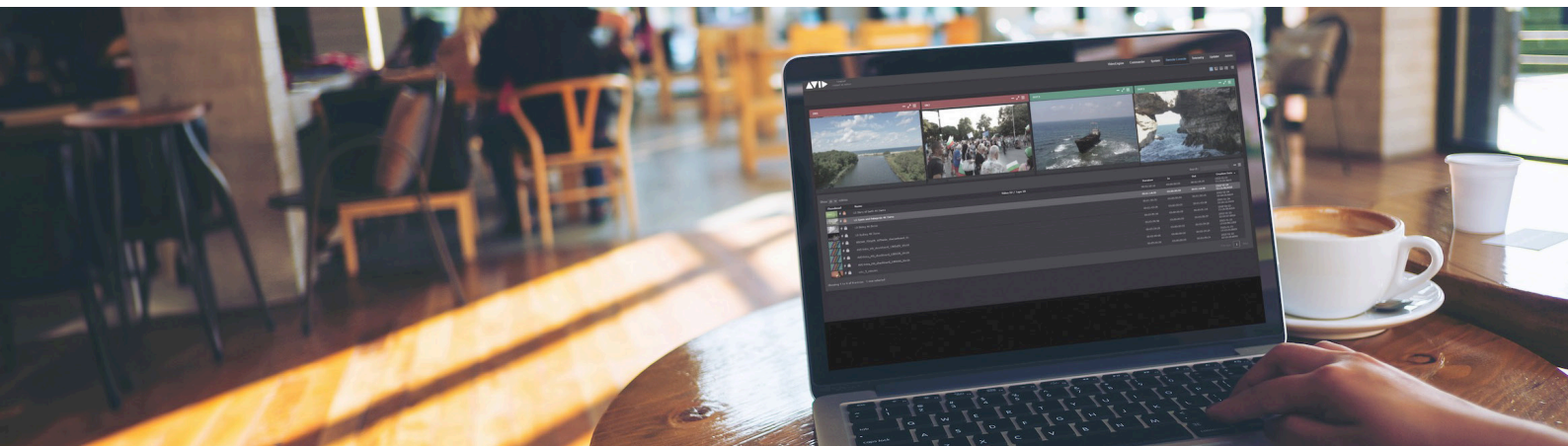
< CONCLUSIONS >

WHAT DOES THE FUTURE HOLD FOR THE INGEST AND PLAYOUT SERVER INDUSTRY?

In summarizing conclusions for this white paper, it would be easy to say – SDI is dead, long live IP. But that would be to fundamentally misrepresent this paper and the current state of the industry. SDI is not dead, though it is probably fairer to say that it is on the way toward retirement. Across the world we are living longer and the retirement age in many countries risen in recent years, so let's be blunt. SDI will be around for a fair amount of time to come, a bit like some of the employees in the industry!

While there remains a role for SDI, of that there is no doubt, there is little point in focusing purely on that. The heyday is past. What is critical now is to prepare for an IP-based future, while continuing to maximize the value of existing infrastructure and workflows. Tools being developed and implemented now should address the reality of current and future business needs. They must cover both SDI and compressed and uncompressed IP streams and enable the industry to bridge the transition between the two.

However, while there may be no doubt where the future lies, there is uncertainty about how long it will take to get there fully. IP **IS** the future of ingest, contribution, and distribution and in many cases, it is already the NOW.





“There’s a lot of disruptive technology in our industry, but we need to think about the operational models first, **what creates the biggest win for the customer, the end user.**”

– KEVIN RILEY, AVID CHIEF TECHNICAL OFFICER

That may also be coupled with further cloud adoption or at least moving towards private data center deployments as opposed to fully public cloud infrastructure, again bolstering the requirement for software-defined workflows and web-based tools to fully realize potential benefits for an organization.

We have talked a lot about technology in this white paper, but there is one area which cannot be ignored when it comes to technological change and the adoption of new ways of working, and that is the staff themselves who are involved in deployment and implementation programs.

The DPP European Broadcasters Summit report acknowledges that, in some ways, staff and entrenched ways of working, can be seen as a major obstacle to change. However, that represents a failure to successfully explain and deploy a strategic approach to technological and workflow enhancements more than it is a reflection on the skillsets of the staff involved. Get the strategy, training, and support right and huge amounts can be achieved.

When it comes to adoption – and to reflect back on the last chapter, whether it is revolution or evolution – there are key topics to consider, and the response to these will be unique to each organization.

Every organization is at different phases of their investment cycle, audience engagement plan, and reshaping their own workforce, so there is no simple one-size fits all view.



BY ANSWERING THESE QUESTIONS

– and many more sure to crop up through the transition – organizations can be best prepared to thrive and to maximize their investments.

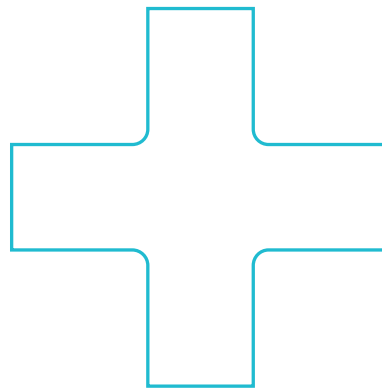
- What are you trying to achieve through a move to IP-based technologies?
- What does it mean for consumers?
- What is the phase out plan for SDI or is it still fundamental to your business requirements?
- What value will this change bring to the business?
- What is your change management plan to implement the change effectively?
- Do you have the appropriate training plan in place to support staff through the transition?
- Have you identified strategic partners who can help you achieve your aims?
- How will this value be measured to ensure the benefits are being maximized?

Fundamentally, it is about delivering the best programs, news packages, highlights shows, and more to audiences in more places in the most efficient way possible and at the highest quality. That is what the transition to IP can bring.

Avid® has solutions which address the changing needs of broadcasters faced with the challenges we have outlined here. These include integrated hardware-based solutions for SDI and uncompressed IP streams to software-only solutions available through subscription, and the ability to handle compressed IP streams. These can be integrated with Avid asset management and storage solutions or incorporated into other environments to meet the requirements of any production.

MAKE THE MOVE TO THE FUTURE OF INGEST AND PLAYOUT.

GET IN TOUCH



**Craig Wilson, Avid Product Evangelist,
Broadcast & Media Enterprise | Market Solutions**

Craig Wilson is a newsroom specialist with over thirty years of experience in the broadcast industry. Craig has held various roles with Avid and is now the Global Media and Cloud Product Evangelist and host of the Making the Media podcast.

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