# A Sound Direction for File-based Workflows

How one automated, file-based audio tool integrates with video workflows, transforming TV sound

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This paper discusses the essential role that automated, file-based audio processing plays in today's file-based video workflows—from single-edit bays to enterprise-class requirements.

Offering a path to greater workflow efficiencies, better personnel allocation, and ultimately higher content processing throughput, Minnetonka AudioTools Server from the Telos Alliance TV Solutions Group (TVSG) helps enterprise-scale video content facilities, post houses, and broadcasters keep pace with their ever-growing need to repurpose content for multiple platforms and markets.

Minnetonka AudioTools Server does this by automating frequently required audio tasks—such as loudness monitoring and compliance, upmixing, downmixing, and audio encoding and decoding—in a way that ultimately satisfies TV viewers by creating an enjoyable listening experience.

# Introduction

For at least a decade, file-based video workflows have dominated the landscape as tape-based acquisition, post, and distribution have faded into the recesses of history.

By promising and delivering lower costs, greater efficiencies, and enterprise-scale production throughput, these file-based workflows have helped an industry in transition keep pace with the ever-growing demand to repurpose content. Most content is repurposed multiple times to meet the specific requirements of domestic broadcast and cable TV distributors. In addition, content is distributed for worldwide consumption via OTT, mobile, and internet.

Video content owners, post houses, and broadcasters commonly deploy asset management tools to manage and repurpose video. While these tools have done an excellent job with video content—and have carried embedded audio along for the ride—most of them were not built to provide audio engineers with a full range of processes and more sophisticated audio capabilities.

Moreover, it's not uncommon for those who are responsible for preparing this video content to lack the audio expertise needed to match the equally demanding requirements of audio for video that will be repurposed for distribution to multiple platforms and countries—each of which has its own peculiarities.

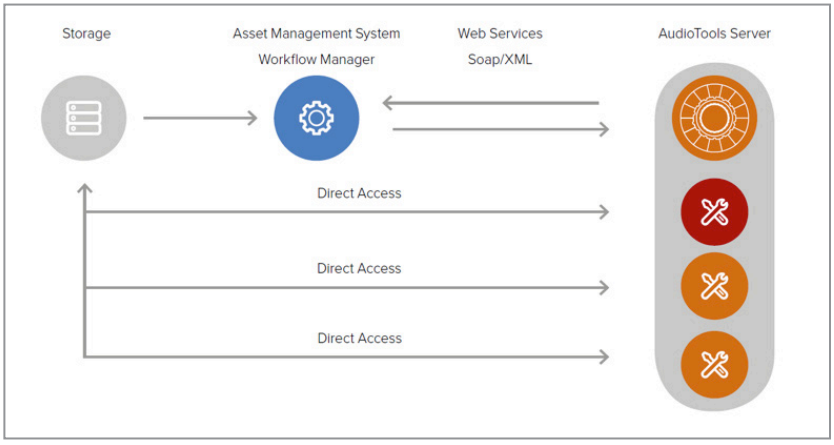
One popular approach to addressing the situation is to integrate audio-specific solutions, such as Minnetonka AudioTools Server, into these video workflows to bring advanced, specialized audio handling, processing, and delivery to a group of users whose expertise is commonly video, not audio.

# The Two Sides of Workflow Integration

At first glance, the concept of workflow integration may appear simply to describe a technical means of tying the tools of audio processing deeply into a video workflow, but as we will see, there is another side to the equation.

As early as 2011, Minnetonka AudioTools Server was already being integrated with enterprise class video workflow engines. With increased customer demand came the eventual integration with Telestream's Vantage video management tool, which enabled more sophisticated functionality.

This tight integration with Vantage gives users full access to the Minnetonka AudioTools Server workflow, in any style they desire to meet their specific requirements. Audio processing is handled by an independent Minnetonka AudioTools Server and processing cycles are allocated to Vantage.




*AudioTools Server integrates into many existing asset management system workflows, reducing complication.*

# Top Five Takeaways

1. Video workflows are changing as file-based, virtualized solutions replace multiple, standalone devices.
2. Integrating automated audio processing with these systems enables broadcasters, content facilities, and post houses to maximize quality and production throughput.
3. Minnetonka AudioTools Server brings advanced, specialized audio handling, processing, and delivery to these modern video workflows.
4. With Minnetonka AudioTools Server, it is possible to allocate personnel more effectively, reduce the number of times someone must touch audio content outside the file domain, and lower the overall cost of content production.
5. As new audio functions and features become available for TV, Minnetonka AudioTools Server will provide the core audio solution to enable an even higher quality audio experience for viewers.


Other such integrations abound, including those with Dalet AmberFin, Sony Media Backbone, and Avid Interplay MAM. With its SOAP (Simple Object Access Protocol) API, it is also possible to create integrations with custom video file-based workflows. And as video workflows migrate off the premises, Minnetonka AudioTools Server is “cloud-ready” with private, public, or hybrid-enabled deployments as well.

Now we can see the other side of this concept of workflow integration that corresponds to the staffing requirements and personnel allocation of broadcasters or other content producers.

Historically, audio has been treated as a separate discipline. A team of audio experts was assigned to editing and mixing before the audio was embedded into video for distribution. By and large, the process of preparing audio for video was quite hands-on. However, as video workflows transitioned to file-based modalities, this manual audio editing and mixing approach increasingly seemed like a vestigial appendage rather than an integrated part of the whole.

As video asset management and preparation tasks, such as encoding and transcoding, have become more automated, the need has arisen to automate many of the processes that audio experts perform regularly in their edit suites and in front of their consoles.

Automating loudness monitoring, loudness compliance, dropout detection, upmixing, downmixing, encoding, and decoding in a file-based audio workflow that seamlessly integrates into a file-based video workflow offers a variety of benefits to facility and operations management. For example, file-based automation makes it possible for a facility to keep pace with production volume demands and maintain competitive pricing for its services.

At a hypothetical facility with 10 Avid ProTool suites, for instance, an audio operator would have to spend 30 minutes in each room every day to open the Dolby Media Meter plug-in in order to monitor in real time and ensure that projects are output with the correct loudness levels. That translates into five hours a day spent simply opening a plug-in and watching a meter—a process that may not even be billable.

Automating loudness conformance at the end of a ProTools session by dropping the prepared file into a Minnetonka AudioTools Server watch folder saves hours of precious time. In addition, it allows those same ProTools operators to spend their time working on higher revenue-generating tasks.

Here's another example. Minnetonka AudioTools Server's automated features can help a facility better allocate its personnel by monitoring files for problems and alerting an audio engineer when a file needs to be fixed. This type of monitoring can also distinguish between the types of problems that arise, allowing a facility to assign its highly skilled audio engineers to the most complex cases and interns to those that are easily corrected.


*AudioTools FOCUS for Loudness Control is an easy-to-use, standalone Windows application that eliminates complexity from the audio equation.*

# Under the Hood

## *The AudioTools Server Backstory*

Discussion of a new audio server began in 2006, and as Minnetonka's AudioTools Server was being conceptualized, the team charged with developing the product laid out five criteria for its design, says Markus Hintz, VP of business development for the Telos Alliance. At the time, Hintz was a lead member of the product's design team.

While more than a decade has passed since those earliest days of Minnetonka AudioTools Server, the product continues to deliver the processing functionality necessary to make audio a powerful means to engage audiences in viewing experiences. Minnetonka AudioTools Server also continues to adapt to significant changes in the workflow employed for its preparation, says Hintz.

According to these five design criteria below, the Minnetonka AudioTools Server team would:

1. Provide the best audio processing in the market
2. Create a solution that fits into the existing TV ecosystem where automation directs content processing
3. Develop a modular and highly scalable platform
4. Make the product accessible to operators despite supporting automated workflows
5. Offer the flexibility to enable on-premise, virtual, and cloud-based deployments

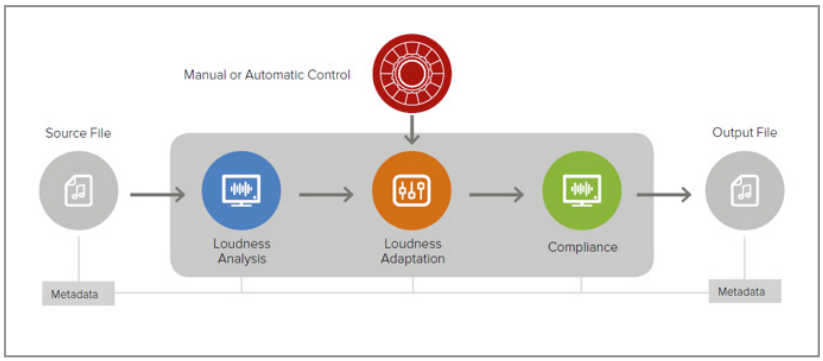
"Minnetonka AudioTools Server is designed differently than many workflow products," says Hintz. "What we did was look back into years of how people used audio servers and identified more than 1,000 XML profiles [to describe them]. That's a very powerful way to give access to the engine of the machine."

Under the hood of Minnetonka AudioTools Server, the product is fully scriptable, which allows support for not only the 1,000 profiles originally identified, but also for future requirements not yet imagined at the time it was created.

This approach enabled Minnetonka AudioTools Server to avoid the common trap of limiting functionality to what is presented to users via the product interface.

This strategy, which aimed to maximize flexibility, in addition to the forethought put into its initial design criteria, has enabled Minnetonka AudioTools Server to adapt and fit into file-based video workflows while continuing to offer superior audio tools that deliver an audio experience that helps the viewing public more fully engage with the content they are watching.

AudioTools™ SERVER




*Various modules, such as Loudness Analysis, Loudness Adaptation and Compliance, can be automatically combined using AudioTools Server's decision engine or accessed manually depending on workflow requirements.*

For a facility that is preparing thousands or even tens of thousands of hours of content per week, having this ability can translate into huge savings—the difference between assigning a $100-an-hour staff member and a $20-per-hour staff member to a problem.

Facilities can further increase the efficiency of their operations by relying on Minnetonka AudioTools Server's decision engine, which enables various processing modules to be engaged for a given job without human intervention. For example, if a six-channel audio file is detected, one module may be automatically used, while another is deployed if a two-channel file is detected.

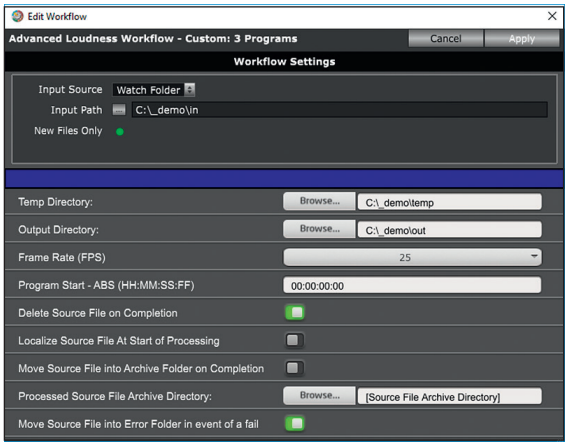
As with the video side of the workflow, automating file-based audio monitoring and processing functions also helps to enable the proliferation of versioning that's needed today to support the industry trend of content commoditization. Further, in today's regulatory environment, delivering different audio versions of the same content is becoming commonplace for some facilities. Various nations and regions have adopted different television loudness requirements, such as the CALM Act in the United States and European Broadcasting Union (EBU) R128 in Europe.

Audio is no longer about simply mixing a TV show for broadcasters. Repurposing content for a global audience to access what they want to watch on a variety of diverse platforms is the rule rather than the exception.

# Real-Time vs. File-Based

It was not all that long ago that TV broadcasters relied exclusively on a real-time audio processor at the end of their playout chains to enhance audio quality and stay within the legal limits of loudness.

Live programming, such as sports and news, still requires loudness monitoring and correction in real time




*AudioTools Server's Advanced Loudness Workflow allows facilities to customize where audio files are accessed and how they are handled to minimize manual intervention in a workflow.*

because there is no file-based production stage. Nor is there a spare moment to perform the more sophisticated processes available in a file-based environment before taking live content to air.

However, for non-live programming finished in a file-based video workflow, Minnetonka's AudioTools Server can examine the loudness of a program from start to finish. Multiple passes of

***Case Study:***

## AudioTools Server Delivers Quality, Security for ARD Degeto

Degeto Film faced a complex set of challenges in its role as the film archive and production partner of ARD, a joint organization of German regional public broadcasters, says Stefan Raupp, senior technologist at Degeto.

One of the biggest challenges was a series of workflow bottlenecks, including a major ingest constraint that lagged because a real-time audio processor was used that created processing delays during decoding and encoding. Those delays made it necessary to compensate by delaying video relative to the audio in order to stay in sync, he says.

Other workflow problems impeded efficiency as well. For instance, the need to do audio description for the sight-impaired meant that the eight audio tracks available with XDCAM HD were insufficient. To get around the obstacle, XDCAM HD's discrete 5.1 tracks had to be transcoded into Dolby E, which then had to be decoded to discrete tracks when introduced to Degeto's Final Cut systems.

However, with the help of the Minnetonka Audio team at the Telos Alliance, Degeto created workflows for adding and embedding descriptive audio WAV files to its existing MXF files, says Raupp. For editing films, Minnetonka AudioTools Server is used to do Dolby E decoding and re-encoding, and all files are checked and corrected for EBU R128 loudness compliance with AudioTools Server.

Eventually, Degeto began relying on its Minnetonka AudioTools Server so much that it was reaching about 80 percent of its capacity on any given day. So, the film archive invested in a second Minnetonka AudioTools Server to optimize its workflow and provide redundancy, says Raupp. "With the Minnetonka AudioTools Server system, we bought quality and safety," Raupp says. "It's a great product."

# Up Close with Minnetonka AudioTools Server

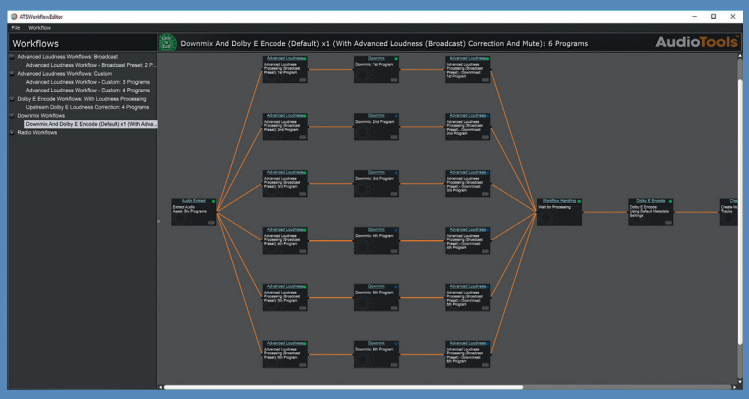
Minnetonka AudioTools Server from the Telos Alliance is an enterprise-ready audio processing solution offering all of the functions required for audio-for-video applications that can be integrated seamlessly in video workflows, such as Telestream Vantage. Other integration partners include Arvato, Aspera, Aveco, AVID, Civolution, Dalet, Dolby, Evertz, Geminisoft, IBM, Root 6, Sony, Tedial, Vector 3, Vizrt, and Wohler.

Multiple tools, including Dolby E, Dolby Digital, and Dolby Digital Plus encoding, audio upmixing, downmixing, channel management, and frame rate conversion, as well as loudness adjustment and measurement, are supported in an automated, file-based environment. With Minnetonka AudioTools Server, Linear Acoustic APTO loudness normalization preserves existing audio and only applies a gain change combined with optional peak limiting. Minnetonka AudioTools Server FOCUS makes it easy to measure and adjust loudness levels of audio and video assets.

Minnetonka AudioTools Server command and control are done via AudioTools Workflow Control, which can be used for stand-alone or multi-threaded concurrent processes. This control interface also provides for load balancing and dynamic reconfiguration of workflows on the fly.

Minnetonka AudioTools Server workflows are set up and configured with AudioTools WorkflowEditor. Pre-installed with over 600 workflow templates, the WorkflowEditor enables users to customize workflows using the software's graphical interface.

AudioTools Cloud allows smaller shops to stay competitive with larger companies that can afford more complex systems. The simplified user interface, designed especially for the Amazon AWS Marketplace, further dilutes the competitive advantage by taking workflow complexity out of the equation. AudioTools Cloud enables on-demand, case-by-case use, so businesses only pay for the infrastructure they need when they need it.



processing ensure the absolute best possible audio that complies with loudness regulations. When this type of programming is aired, the real-time audio processor in the playout chain simply sits idle until the next piece of live content requires real-time processing.

Either way, broadcasters can be assured of remaining compliant with audio loudness requirements. Further, when programming processed in a file-based environment is aired, thanks to Minnetonka's AudioTools Server, the quality of the audio enables viewers to engage fully in the story.

The future is bright for audio that creates even more engaging viewer experiences as entirely new possibilities are exploited. Already, South Korea has deployed the AudioTools Server C 3.0 Next Gen TV standard with MPEG-H to deliver immersive, personalized, object-based audio. In the United States, Next Gen TV is in an earlier phase of its rollout, but it too will offer these audio enhancements via Dolby AC-4.

The Telos Alliance sits on relevant committees responsible for these new audio capabilities. The company plans to integrate support for them into AudioTools Server gradually as the broadcast community begins to experiment with them.

Thus, Minnetonka's AudioTools Server will continue to evolve to enable broadcasters and others to benefit from an automated file-based workflow even as new audio features become available to TV viewers.

# Conclusion

Broadcasters no longer have the luxury of creating a single version of a show to telecast to all viewers. Rather, "repurpose" is the watchword of the day as content is streamed to tablets, smartphones, game boxes, and computers. Different legal requirements for loudness compliance in various countries compound the complexity of creating multiple versions. Today, audio for television—and all types of mixed audio and video content—exists in file-based workflows designed to maximize efficiency and ensure viewer satisfaction.

Minnetonka's AudioTools Server provides a full complement of automated audio processing functions that integrate with file-based video workflows. This provides users with a highly cost-efficient and sophisticated tool that improves the time allocation and management of audio professionals while maintaining compliance and improving the viewer experience.

## Additional Resources

**AudioTools Server**
State-of-the-art audio processing for automated workflows.
https://www.telosalliance.com/MinnetonkaAudio/AudioTools-Server

**AudioTools Server in Depth**
A detailed look at AudioTools Server features, functions, and architecture.
https://www.telosalliance.com/MinnetonkaAudio/AudioTools-Server

**AudioTools Cloud**
Loudness control, encoding, decoding, channel management, frame rate conversion, and more in the cloud.
https://www.telosalliance.com/images/Minnetonka%20Audio/MNTKA_brochures/AudioTools%20CLOUD.pdf

## About the Author

Phil Kurz is a contributing editor for TVTechnology. Over his 30-plus year career covering the broadcast and non-broadcast video industry, he has served as editor of three magazines as well as multiple niche e-newsletters. In that time, Kurz has written more than a thousand articles, columns, and editorials on technology-related topics.