Loudness control is the hot discussion of nearly every recent publication. With the formal passing of the CALM act that was signed into law on December 15th, 2010, advice and guides for loudness control are readily discussed and information is widely available. However, what seems to be missing is an application note advising the best location in the air chain to install your new investment and the advantages and disadvantages associated.

As more stations get equipped with loudness control technology, we're seeing a common practice of finding these processors in three strategic locations, namely at the signal acquisition stage; immediately pre or post master control; or just prior to the encoding stage. All three areas hold merit and fortunately there are solutions available for each scenario; however the best fit location is ultimately up to the internal practices of the facility.

Evertz has been successful in all three environments with the award winning IntelliGain™ loudness processor. With over 7000 installs to date, IntelliGain is designed as a core technology that can be optionally ordered on an extensive range of products, making it a suitable and practical solution for any part of the signal chain.

Loudness Control at Acquisition

Many facilities are applying loudness control as soon as the signal is landed and prepared for baseband video processing. Loudness control is sometimes applied as far up the signal chain as the output of the IRD (integrated receiver decoder) or the output of a fiber receiver. Loudness control could also be applied at the frame synchronizer immediately prior to hitting the core plant router or at the output of a playout port from the media server. This practice is specifically designed to normalize all inbound signals into the facility in order to meet the defined target loudness levels before any downstream plant processing. Operations and engineering now have an anchor level to any audio source flowing through the veins of the plant. Any downstream deviation from the target level can be quickly identified and quality controlled before it passes into the transmission stage.

Loudness control at the signal acquisition stage
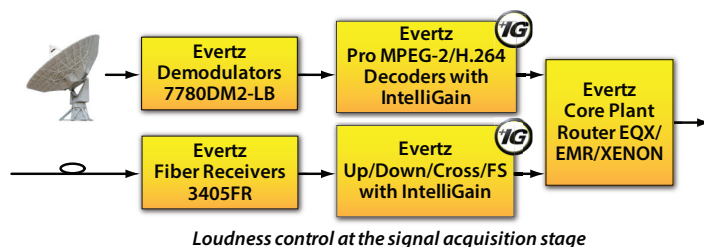
Evertz has met this requirement by offering a number of IntelliGain enabled solutions suitable for loudness processing at the acquisition stage of the signal chain. Some of the more popular solutions include the Evertz professional mpeg decoder products such as the 3480DEC18-MP2SD and 3480DEC6-MP2HD bulk MPEG-2 decoders which offer high density MPEG-2 decoding with integrated IntelliGain loudness processing on all 18 or 6 decoded outputs respectively.

Another common solution is Evertz' 7812 and 7746 series family of up/down/cross converters and frame synchronizers. These devices provide an integrated solution, one less point of failure, and a common point for monitoring audio and video signal integrity including all the tools necessary to adhere to the CALM act. The output will provide the correct audio levels enabling the desired target audio level to be achieved.

Loudness Control at Master Control

Of all the places within the station, loudness variation is likely to occur during Master Control due to the high traffic of switching between multiple program feeds and commercial servers. Using a smart loudness processor automatically adjusts levels to meet a target and also provides real time loudness monitoring and trending of the audio content. This allows operations to gain back some working bandwidth from the traditional process of manually applying gain adjustments to a multitude of audio tracks.

This "set it and forget it" methodology can be applied to a wide range of audio signals passing through master control including voice-overs and discrete audio tracks such as Dolby-e encoded audio. When dealing with Dolby encoded sources, the master control system can also provide the necessary audio handling to decode mix and re-encode the audio data while managing the Dolby metadata to coincide with the defined target loudness.

Evertz has recently launched the EMC (Evertz Master Control and Switcher platform) with integrated IntelliGain loudness technology. A strong demand from the field has led us to develop this integration enabling operations and engineering to normalize all audio levels at the Master Control stage of the broadcast chain. All audio levels can be monitored in real time with Evertz VistaLINK® Network Management System (NMS). Automation also plays a key role by dynamically engaging the loudness control engine to only apply gain control during commercials or interstitials while leaving the program segments unaltered.

Loudness Control at Transmission

Automatic loudness control near or at the transmission stage is the most popular of locations for level adjustment. This in effect becomes the catch-all for any unwanted audio levels prior to entering the compression ring. The advantage of this being that any loudness deviation from the target loudness is dynamically adjusted at the end of the chain to ensure compliance. Typically at this stage the facility would like to maintain the specified target loudness and confirm the dialnorm level is programmed correctly. Monitoring in real time is also performed at this stage for record keeping and future recall.

Evertz has met this requirement by offering IntelliGain on familiar products commonly used in the transmission stage. Such products include automatic protection changeovers; integrated Dolby-E and Dolby Digital audio encoders; and professional MPEG-2 and H.264/AVC HD and SD-SDI encoders. The 7700R2x2-HES and 7700ACO2-HD family of smart automatic changeovers provide the necessary backup protection to the critical air path while performing automatic loudness control in real time on the program output. The final result is a valid signal with level adjusted audio that is wired to the final transmission mpeg encoder.

For those that are in the market for new encoders, either MPEG-2 or H.264, Evertz has integrated IntelliGain loudness control directly into the 9782ENC and 7880ENC family of professional MPEG encoders. This becomes an ideal location to validate all the video, audio and data signal requirements, including the dialnorm. All these devices can transmit audio trending information samples over SNMP to VistaLINK® whereby average and instantaneous loudness calculations are logged and analyzed for compliancy.

Loudness control at the transmission stage
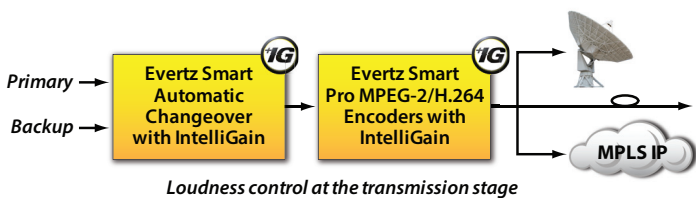
Monitoring the Loudness Chain

The FCC has been tasked to police the average loudness over time to confirm that the facilities loudness responsibilities are met. This is where accurate records management becomes a crucial part of the entire system. Every facility should consider the ability to log and track all audio levels over time with the ability to data mine the necessary information to prove compliancy. This is where the IntelliGain option for the VistaLINK® NMS ties the whole system together.

This solution provides a central location to configure, store and analyze all signal metrics including loudness throughout the plant. At anytime an operator, engineer or supervisor can access the system and extract the necessary logs to prove compliancy.
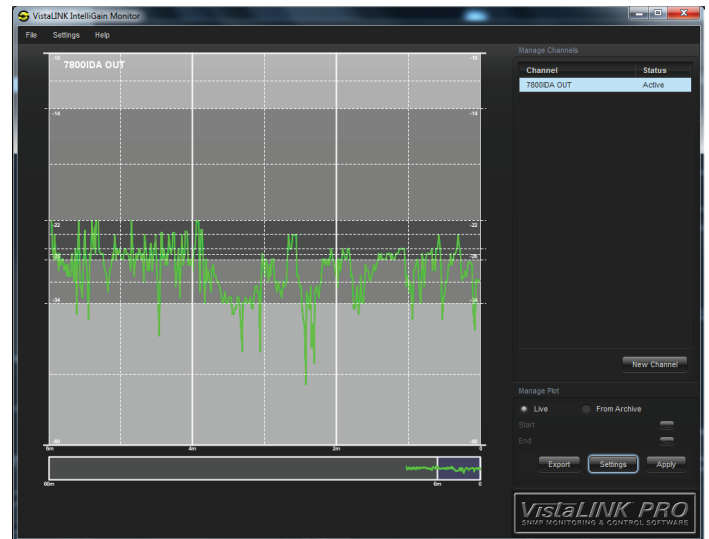
In contrast to some other loudness solutions in the industry, IntelliGain has been developed as a modular core technology which allows a user to selectively order IntelliGain control as a soft ordering option on a module-by-module basis. This advanced integration provides ultimate flexibility and cost savings. IntelliGain can be ordered on a wide range of Evertz products, which includes everything from core routing solutions to the simplest of processing equipment such as a distribution amplifier.

With over 600 unique products in the Evertz portfolio and over 7000 IntelliGain installations worldwide, this loudness solution has proved to be the most comprehensive and flexible solution to the loudness puzzle. For more information about DTV audio or compliance solutions, please feel free to contact your local Evertz representative.

IntelliGain Loudness control. It's not just a good idea … it's the law