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# ETV Performance Assurance Becomes Priority for MSOs

## *Comprehensive Reporting On Performance of Highly Complex EBIF Functionalities Is now in Reach*

By Steve Liu, vice president, product management & new business development, Mixed Signals

As the cable industry accumulates ever more evidence confirming the monetizing power of enhanced television technology, there's nothing more vital to success than a rigorous means of ensuring that the complex processes underlying ETV work as intended.

Understandably MSOs have been heavily focused on preparing headends and provisioning set-tops to support the applications made possible by the Enhanced TV Binary Interchange Framework (EBIF). But now, as early commercial implementations begin to validate expectations, it's none too soon to be thinking about what will be required to verify performance and service availability when high volumes of precisely timed apps are routinely inserted into scores of advertising and programming segments every day.

Fortunately, a solution is at hand. Mixed Signals, working closely with industry engineers, has put its extensive service monitoring knowhow to work in developing an EBIF performance assurance platform which soon will be ready for implementation.

The technical capabilities required to meet the stringent EBIF requirements are already embodied in the Sentry system Mixed Signals has developed for other cable applications, including the even more complex tru2way processes. Sentry-based products provide managers, engineers and technicians access to 60-day historical and aggregated (roll-up) reports driven by a local relational database for immediate performance assessment and troubleshooting.

The new EBIF performance assurance platform represents a relatively straight-forward extension of Sentry's tru2way monitoring capabilities, which have been field proven over the past few years.

### The EBIF Challenge

The scope of the EBIF performance assurance challenge becomes apparent when one considers what happens when an application is used to enhance the viewer's engagement with just a single 30-second commercial. Let's say, for example, that a nationally distributed ad allows EBIF-equipped operators to deliver a version of the ad that features a prompt asking if the viewer would like to see information on purchase discounts, free samples or other interactive options.

The prompt is timed to follow an introductory message appearing a few seconds into the ad. When the user clicks on the prompt with the select button on the remote control, an overlay view describing the options on offer (information package or coupon sent directly to the address on file) appears with instructions to confirm with another click. This segment of the application is timed to disappear when no selection is made, or an event will take place when the option is selected (i.e. "Thank you for your order.") with the ad continuing to appear on the screen throughout that viewer's experience.

Often the programmer has contracted to pay the operator for adding the ETV component to that ad, possibly with a bonus percentage if the enhancement generates a desired reaction on the part of the viewer. In such cases the operator must be able to verify that every process associated with that ad occurs according to plan. The operator must know that the correct applications and triggers were delivered in the transport stream at the right time and at the right place for execution.

Clearly, traditional generators of performance metrics that focus on measuring the bit rate or drop packets are not comprehensive enough for monitoring application performance. Such a system doesn't tell the operator whether the right applications and event triggers are associated with the right program at the right time. For example, you would not want a car information package to appear on a pizza commercial. Traditional metrics also fail to report the content of the applications and triggers which need to be validated to ensure that every event runs correctly (i.e. no packet drop but the payload was corrupted). Equally important, it does not help engineers identify where the problem lies if everything isn't working properly.

By gaining a general working knowledge of the ETV architecture and processes, operations managers can secure themselves against underestimating what needs to be done. Fundamentally they need to be sure that any monitoring and reporting solution they choose is capable of monitoring and reporting at the content level to make the tool useful.

*Steve Liu, VP, product management & new business development, Mixed Signals*

## Applications and Signal Monitoring

EBIF relies on the fact that MPEG-2 transport streams can accommodate distribution of application data through use of registration descriptors placed in program management tables (PMTs) that indicate the packet identifier (PID) locations of specific app streams. In addition, EBIF uses a specially designated MPEG-2 data stream, known as the ETV Integrated Signaling Stream (EISS), to send the signals that trigger various events associated with each application.

This allows for a great degree of flexibility for application ingestion and insertion by cable and broadcast networks, programming aggregators, broadcast affiliates or cable operators or by combinations of these entities in joint initiatives. This architecture provides maximum flexibility for designing applications to fit a wide range of programmer and cable operator service goals and advertising models. But, of course, it adds to the complexity of any effort to provide comprehensive performance assurance.

There are two components that are critical to normal operations of an ETV application. The first is the application data PID, which contains the module files that comprise the complete application. The other is the signaling PID (EISS) for each specific ETV event that triggers transmission of an app module to a set-top and tells the EBIF user agent in the set-top box when to run that module.

All facets of the prescribed contents of these two major components must be monitored across all points in the distribution chain. And performance data must be aggregated to provide a holistic view that allows the operator to determine its performance.

From the applications side, the performance monitoring system must ensure that all the modules associated with an application are present in the transport stream so they can be executed correctly. There can be two or three dozen applications files associated with an application, and each of these must be monitored to determine whether every file is delivered uncorrupted on schedule.

Knowing what apps have been correctly delivered in the last 24 hours is only part of the puzzle. If an EBIF enabled commercial has just one app associated with it but it's running three times in different time slots on different programs, all of the triggering events associated with each of those app runs must be recorded in the data base. And then the system must be able to confirm that those files are present at the time in conformance with the commands contained in the signaling stream.

Thus comprehensive monitoring and reporting on what's happening in the MPEG-2 EISS signal stream is essential. The complexities here are equal to if not more pronounced than they are on the applications side, owing to the fact that many types of signals are required to trigger all the transmissions and renderings of application files.

Some of these signals are tied to prescribed actions in the application timeline conveyed in the signal known as the media timeline descriptor. For example, if the application is part of a commercial and the timeline descriptor calls for the presentation of a menu with click prompts three seconds into the ad, a start timestamp signal using the master clock counter as the reference point will trigger the release of the menu for display on viewers' TV screens at the appointed time.

Accompanying the menu app module there will be another app module to receive the message from the remote control, thereby activating another signal back for release of the next app file. Other signals will serve to trigger more events as the application runs, some in accord with the pre-set schedules contained in the timeline descriptor and others in response to specific actions on the part of viewers.

Along with triggering the various app modules within a given application, the signaling process plays a vital role in prompting the set-top to drop an application once it is finished running. This process is essential to EBIF's ability to support a highly dynamic application environment on set-tops that don't have sufficient memory to retain multiple apps.

## The Solution

As soon as possible operators need to have in hand a monitoring and reporting system that can generate reports that provide a comprehensive accounting of all the applications and signaling events across the entire ETV ecosystem as described above. They must be able to look at detailed information for each application and for each triggered event as their first line of defense. And they must be able to reference this highly detailed record of all signaling and app file events as they occurred over a given time span against the master schedules that are ingested with each app, thereby providing operations personnel the means to determine whether everything is working as required and, if not, where the sources of the problems lie.

All of these monitoring, analysis and reporting requirements are supported by the EBIF performance assurance platform developed by Mixed Signals. Moreover, through use of the platform in conjunction with other Sentry-based monitoring systems operators can gain a more comprehensive view of how the performance of other network processes such as stat muxing, ad splicing and de-coding/re-encoding may be impacting EBIF performance.

The scope and depth of the Mixed Signals EBIF performance assurance platform can be understood by its comprehensive reporting tools. They are as follows:

**The Events report**: This shows the status of all application files by reporting whether files have been added, removed or changed. The event view instantly displays the file reports across whatever timeframe the user chooses for up to sixty days.

**The Applications report:** Through this report operators can see all the details pertaining to applications that have been delivered to set-top boxes over whatever timeframe they choose for up to sixty days. Using this data, operators can verify if the right application content was present in the right timeframe.

**The Files report:** This provides operators a highly flexible overview of all application files and their respective locations with average bit rates and cycle times of each. A color-coded visual presentation list allow operators to immediately identify the status of the file (e.g., file changed, file out, file removed) within a given timeframe.

**Transport status report**: Shows bandwidth utilization over time, as well as the bit rate and cycle time on each EISS table discovered in the transport stream

**Program detail report**: Designed specifically for monitoring performance of bound applications, which are apps that are associated with a specific piece of programming content. This view will provide the program detail on the signaling and app PIDs associated with bound apps, the audio and video quality-of-experience parameters, bandwidth graphing of each PID in the service, and any instances of discontinuities, etc. This allows the engineer to be able to identify the root cause by correlating the application and video/audio streams when problems occur.

## Conclusion

Much is riding on the operators' ability to execute a robust implementation of ETV in the months and years ahead. The key is to be able to monitor and validate that every facet of ETV operations conforms to advertiser, programmer and subscriber expectations.

The Mixed Signals EBIF performance assurance platform will provide operators the tools they need to meet this challenge. Eventually, as the reporting requirements are better understood and more specifications are defined, it will be possible to automate the validation process and to minimize human involvement while increasing overall performance, maximizing revenue and reducing operational costs associated with running EBIF applications.

Consequently, operators can be assured that no matter how pervasively they use EBIF, they will be able to sustain performance that is essential to meeting advertiser and subscriber requirements. ■