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The Next Generation of Video Monitoring: Focusing on the Subscriber Experience

By Steve Liu, Mixed Signals

For some time, operators have focused on - and invested heavily in - monitoring their video networks. But video and audio quality issues still remain among the top complaints from subscribers. And while this challenge is well-recognized in the industry, solving it has proven much more difficult. The solution begins with choosing and utilizing the right tools that allow operators to perform effective monitoring based on the actual subscriber experience with the video service.

Traditional Video Monitoring Shortfalls

Traditional monitoring and analyzing tools are designed to ensure video services are constructed properly and comply with a standardized set of parameters. Although these parameters may be useful for testing and measuring purposes, they do not illustrate what the actual subscriber experiences are with the program being watched.

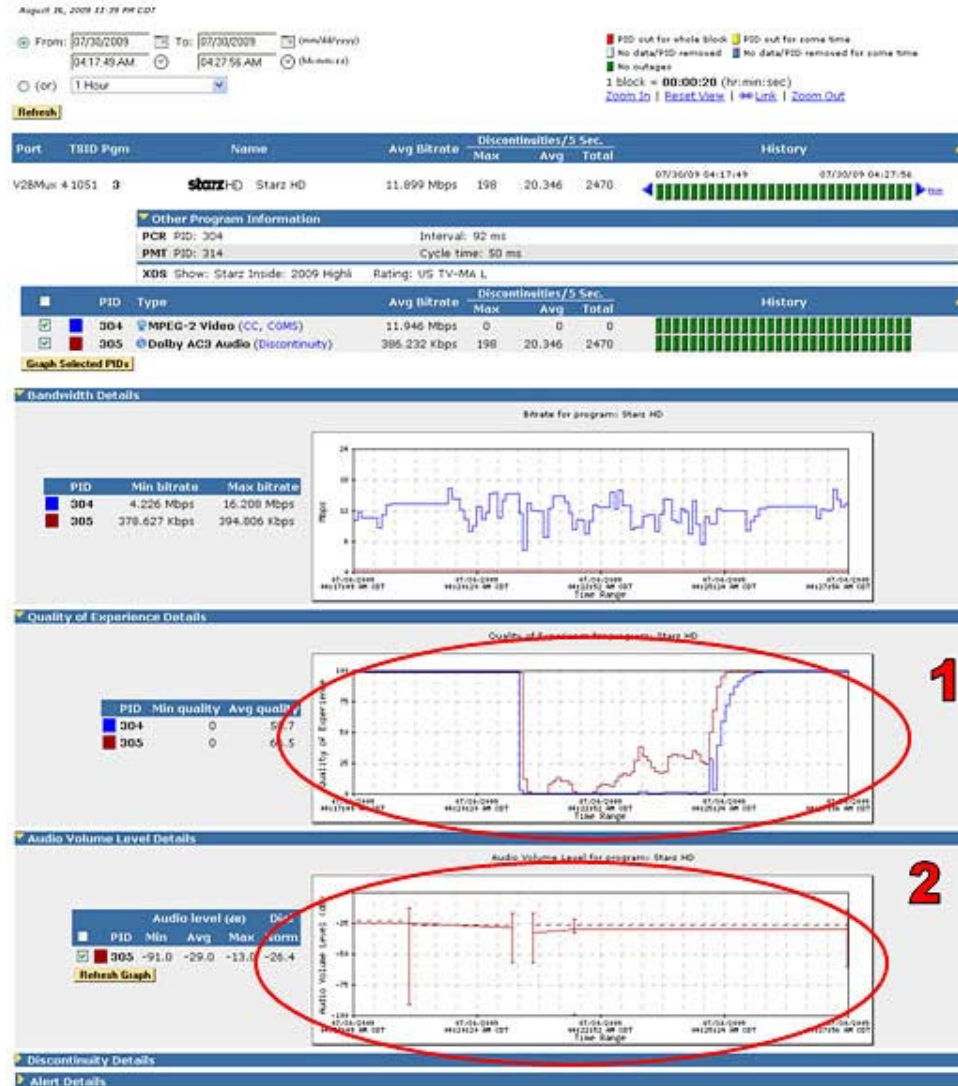
For example, subscribers often see tiling video or have audio level issues (i.e., when changing channels or transitioning to commercials) while traditional test and measurement metrics are all within specification and show no sign of errors. In addition to often missing subscriber-affecting errors, these first-generation tools also routinely identify errors while subscribers experience no perceived impairments. These "false positives" occur when MPEG or IP specification errors are detected but are not correlated with how they actually manifest to the subscriber. The first-generation tools simply report a limited set of specification errors, not just the ones that matter. This makes it very difficult for operators to prioritize which errors to repair first - until subscribers start flooding the call center with complaints.

Next-Gen Video Monitoring Benefits

Fortunately, next generation video monitoring equipment is capable of providing, in addition to the traditional test and measurement metrics, digital "content" level intelligence and a set of "scores" reflecting exactly how good (or bad) subscribers' audio/video experiences are while watching TV.

The following screenshot is an example of how audio and video can be continuously scored (tracked) based on subscribers' experiences with a particular program. The quality of experience (QoE) detail chart (red circle number 1) can be viewed as a subscriber "satisfaction meter," which continuously tracks how subscribers respond to the audio and video quality respectively (audio in red and video in blue color). The lower score represents a lower satisfaction level, and the curve trending back up simulates subscribers regaining confidence to the service quality after the quality returns to good/normal. The audio level detail chart (red circle number 2) illustrates how a subscriber's perceived audio level changes through time - the lower the level of the solid line

(audio mean value) the quieter the audio becomes. The candlestick indicates the quietest and loudest audio volume for that time period with the dial norm value shown in a dotted line.



The next screenshot shows an event where the subscriber's experience was impacted over a longer time frame - from 04/09 to 04/13 (red circle number 3). It is worth noting that traditional test and measurement metrics, which rely on using "MPEG discontinuities" to identify errors, will most likely miss content-related errors that impact subscribers. For example, the discontinuity chart on the screenshot below (red circle number 5) completely missed the subscriber impacting issues as illustrated from the QoE portion of the screenshot (red circle number 4). This exemplifies how traditional metrics fail in detecting and reporting video tiling, and audio disruptions that result in significant trouble calls from subscribers.

April 27, 2009 11:11 AM

From: 04/09/2009 To: 04/13/2009 (mm/dd/yyyy) 3
 01:24:45 AM 11:10:16 AM (hr:min:sec)
 (or) 1 Hour Refresh

No data No outages
 PID out for some time PID out for whole block
 1 block = 03:00:00 (hr:min:sec)
[Zoom In](#) [Reset View](#) [Zoom Out](#)

Port	TSID	Pgm	Name	Avg Bitrate	Discontinuities/5 sec			History
					Max	Avg	Total	
SD 07 2131	226		Discovery Kids	3.055 Mbps	0	0	0	04/09/09 05:24:45 04/13/09 11:10:16

Other Program Information

PCR PID: 2262 Interval: 92 ms
 PNT PID: 2261 Cycle time: 266 ms
 XDS Provider: Discovery Kids - RT Show: MCB: HIP HOP HARRY: GET INVOLVED Rating: US TV-G

PID	Type	Avg Bitrate	Discontinuities/5 sec			History
			Max	Avg	Total	
<input checked="" type="checkbox"/>	2262 MPEG-2 Video (CC)	2.819 Mbps	0	0	0	
<input checked="" type="checkbox"/>	2263 Dolby AC3 Audio	134.360 Kbps	0	0	0	
<input checked="" type="checkbox"/>	2264 Dolby AC3 Audio	101.664 Kbps	0	0	0	

[Graph Selected PID\(s\)](#)

Bandwidth Details

Bitrate for program: Discovery Kids

PID	Min bitrate	Max bitrate
2262	784.439 Kbps	6.751 Mbps
2263	134.313 Kbps	134.381 Kbps
2264	101.628 Kbps	101.680 Kbps

Quality of Experience Details

Quality of Experience for program: Discovery Kids

PID	Min quality	Avg quality
2262	20	100.0
2263	94	100.0
2264	94	100.0

Audio Volume Level Details

Discontinuity Details

Discontinuities for program: Discovery Kids

Alert Details

View: all alerts triggered in timeframe Refresh

One of the key values of the audio/video quality of experience scoring capability is that a user can customize the alert trigger conditions by severity levels. This provides flexibility for different users depending on the programs being monitored and operational objectives of the organization. The next two screens demonstrate how alerts pertaining to audio and video quality (marked by numbers 6 and 7 respectively) can be customized based on how bad the subscriber experience or the score becomes, the duration and the frequency of each occurrence.

Creating Program Alerts 6

Select alert type: Audio QoE Use program template: Testtemp

Out of a possible score of 100, generate an alert when the audio QoE score for any program goes 75 the primary audio PID

Whenever these conditions are reached (or)
 Only if these conditions are sustained for second(s)
 Each time the condition occurs (or)
 Only after condition(s) occur in minute(s)

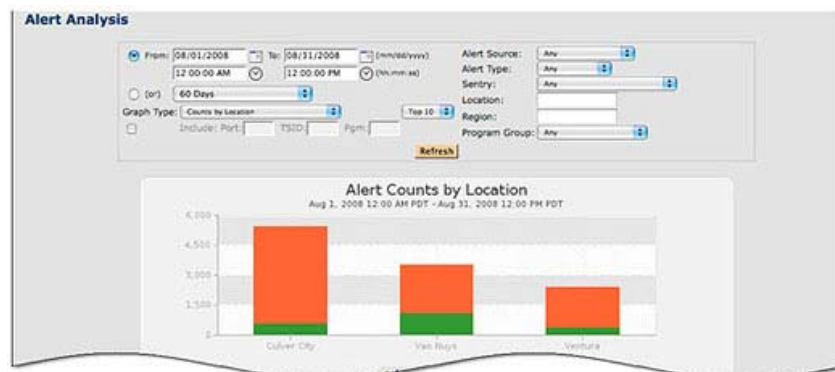
Creating Program Alerts 7

Select alert type: Video QoE Use program template: TestSDP

Out of a possible score of 100, generate an alert when the video QoE score for any program goes 75 the primary video PID

Whenever these conditions are reached (or)
 Only if these conditions are sustained for second(s)
 Each time the condition occurs (or)
 Only after condition(s) occur in minute(s)

Once an alert is set up, operators can objectively evaluate their service quality across other systems and networks at different locations. For example, the report below displays the number of subscriber impacting video (orange bar) and audio (green bar) events at the three different locations in the last 30 days. This is just one of the many ways quality reports that can be generated by next-generation monitoring products. The reports also can be exported for collaborative troubleshooting internally and externally (e.g., with content providers and equipment vendors). The goal is to make sure that serious subscriber impacting issues can be quickly identified, isolated and resolved.



It's All About Subscriber Perceived Quality

To sum up, key success metrics of the service should be based on subscribers' perceived quality and their experiences with the video services. It's difficult for operators to manage the business without a reliable and automated way to measure actual subscriber experience, because they do not know which problems to prioritize and focus valuable resources to resolve. Next-generation subscriber experience-based monitoring enables operators to continually measure subscriber QoE in an understandable, easy to track and cost-effective way. This represents a significant competitive advantage that cable operators must consider as ensuring optimal QoE is key to reducing operational cost and subscriber churn. Without superior service quality, operators face losing subscribers to telcos and satellite providers that offer low introductory prices to lure away cable subscribers.

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