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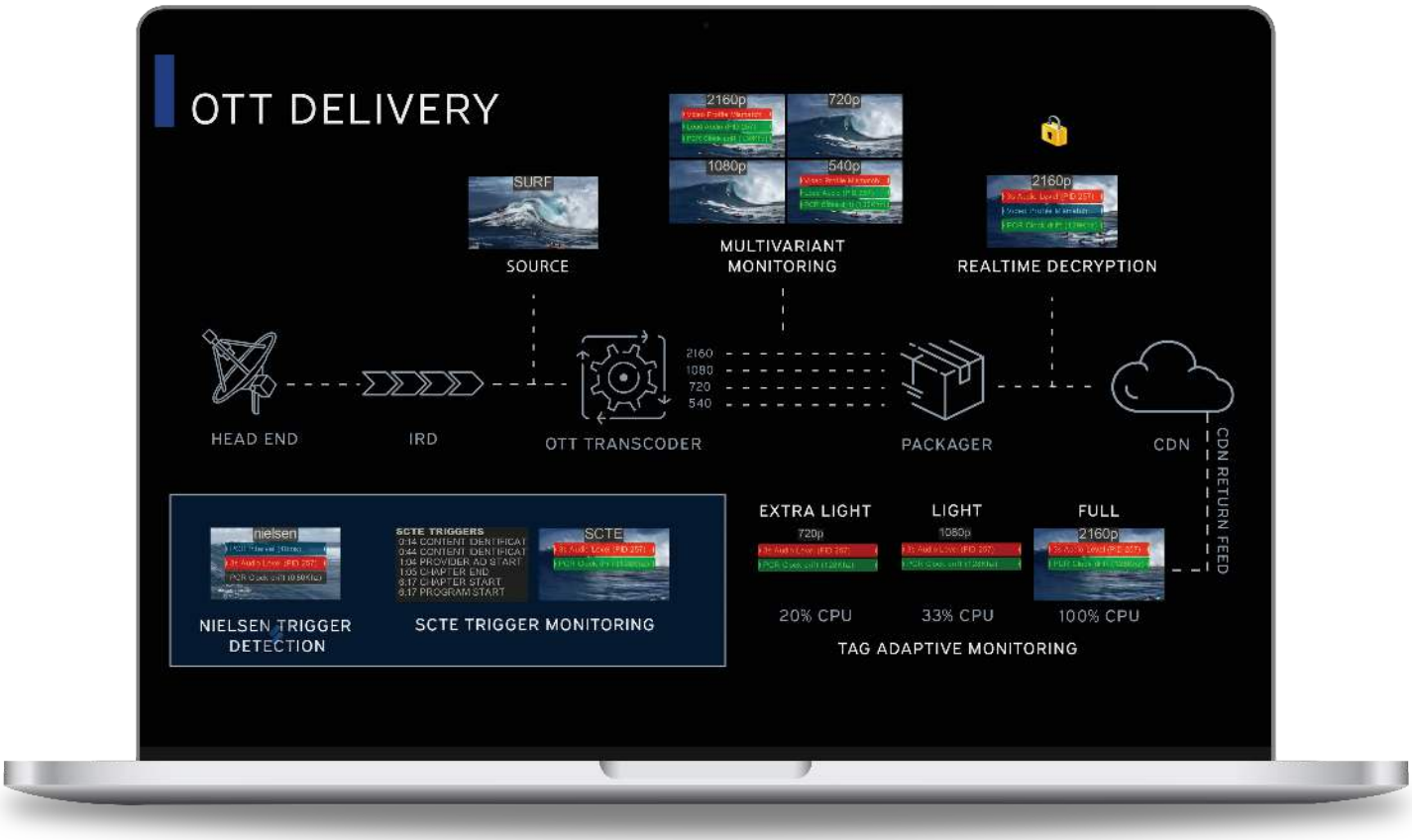
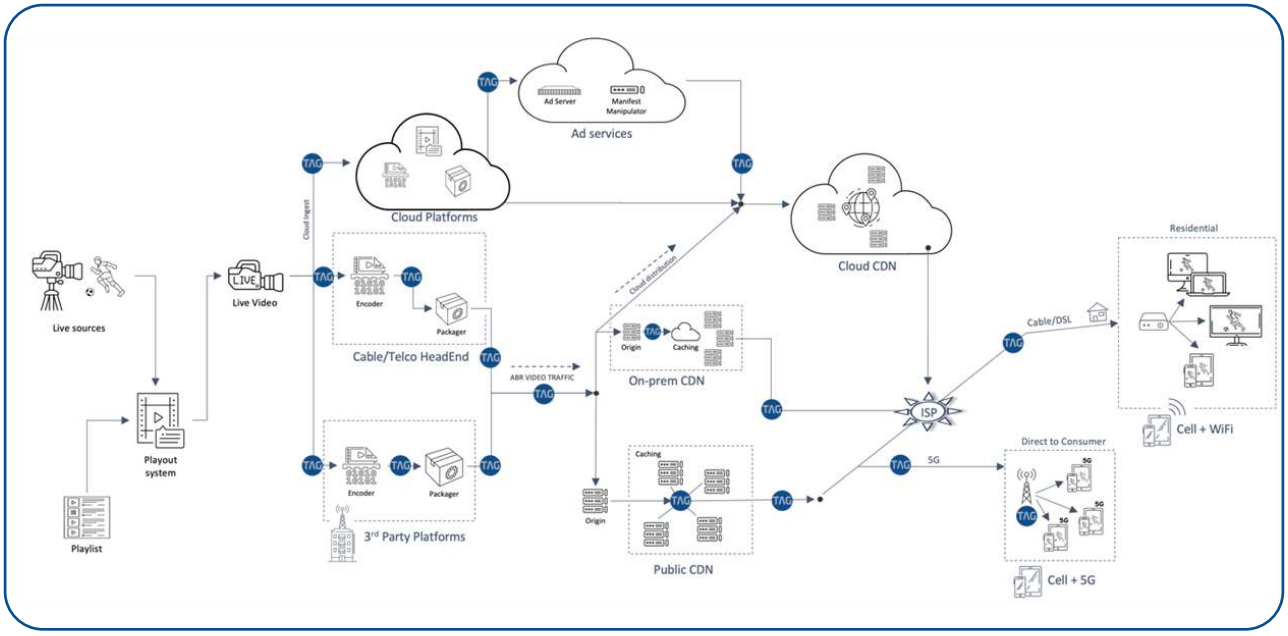
OTT WORKFLOW MONITORING: BEST PRACTICES



OTT WORKFLOW MONITORING: **BEST PRACTICES**

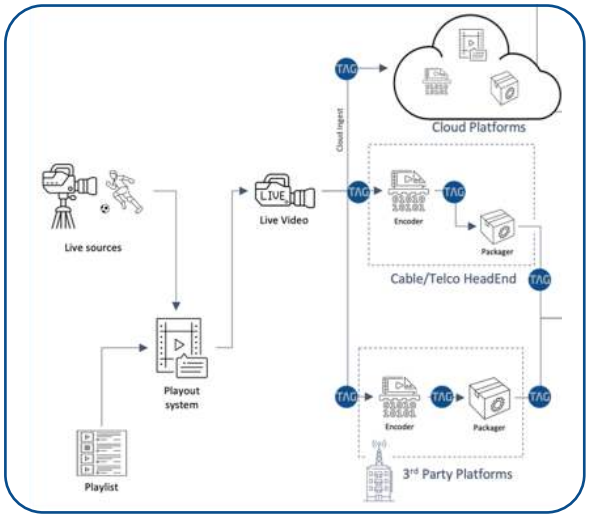
Effective monitoring across the OTT workflow is essential for maintaining high-quality content delivery. This involves establishing strategic monitoring setups at various stages of the delivery chain, from content acquisition to DRM/metadata to include the whole end-to-end infrastructure. This guide provides best practices for setting up a monitoring system at each critical point in the workflow, ensuring issues are promptly identified and resolved to maintain content integrity and service quality.



Content Acquisition and Playout System:

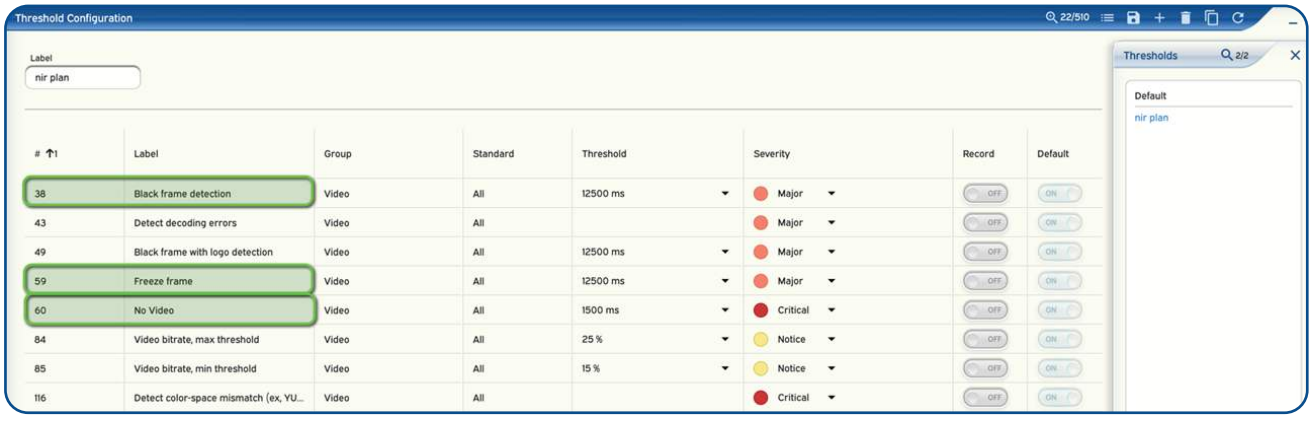
- What to Monitor: Source content acquisition, live feeds, and playout system
- Why Are We Monitoring: Ensures the integrity of the original content and checks for issues in live feeds
- Probing Point Actions: Real-time monitoring for signal integrity, frame rate, and resolution

Configure monitoring at the Content Acquisition and Playout System to ensure the quality of source feeds. Implement real-time monitoring to assess signal integrity, frame rate, and resolution. This stage is crucial for maintaining the quality of the content at the start of the workflow.



Thresholds/Alarms

- We recommend monitoring **video, audio, subtitles,** and possibly **SCTE markers** to make sure originally received stream is good quality and complies with all internal relevant requirements. For example, ensuring the stream includes audio tracks for all of the different available languages for the specific programming and associated subtitles.
- The major thresholds are relevant to video: **black video, video freeze, blocking, bars and no video.**



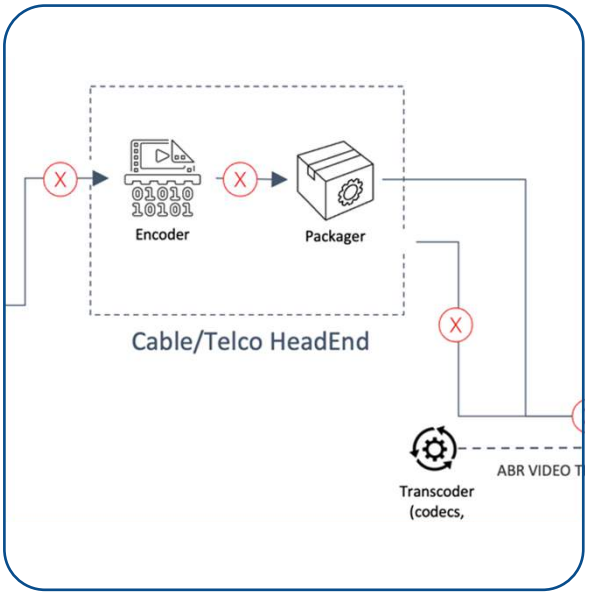
- For audio we will most importantly monitor **silence/no audio** and then additional thresholds based on type (i.e **dolby**) and if it was **uncompressed also audio phasing.**

- This monitoring allows us even to troubleshoot the workflow because, obviously, if the source is bad, it will be bad throughout.

Encoders:

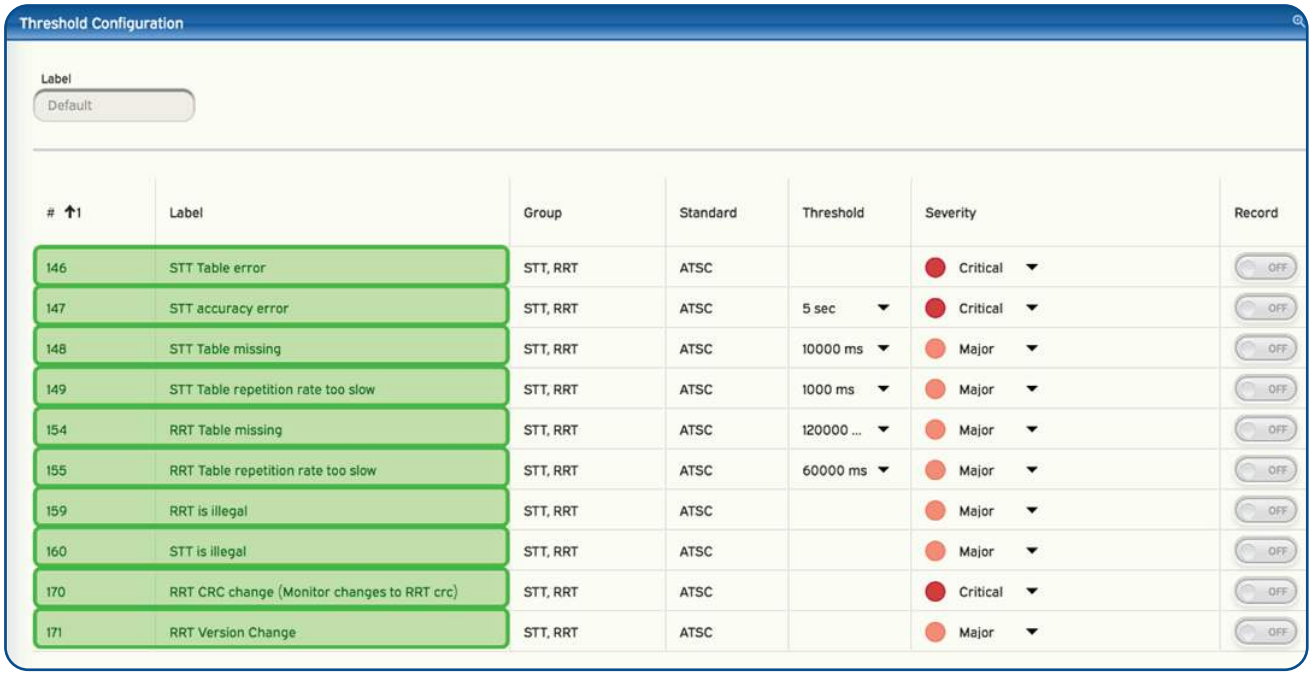
- What to Monitor: Encoding process for format conversion and compression
- Why Are We Monitoring: Verifies proper encoding to avoid quality degradation and format incompatibility
- Probing Point Actions: Check for compression artifacts and conformity to specified codecs and resolutions

Set up the monitoring system to scrutinize the encoding process, focusing on compression and format conversion. Include checks for compression artifacts and verify codec compliance and resolution accuracy. Proper monitoring at this stage prevents quality degradation and format incompatibility.

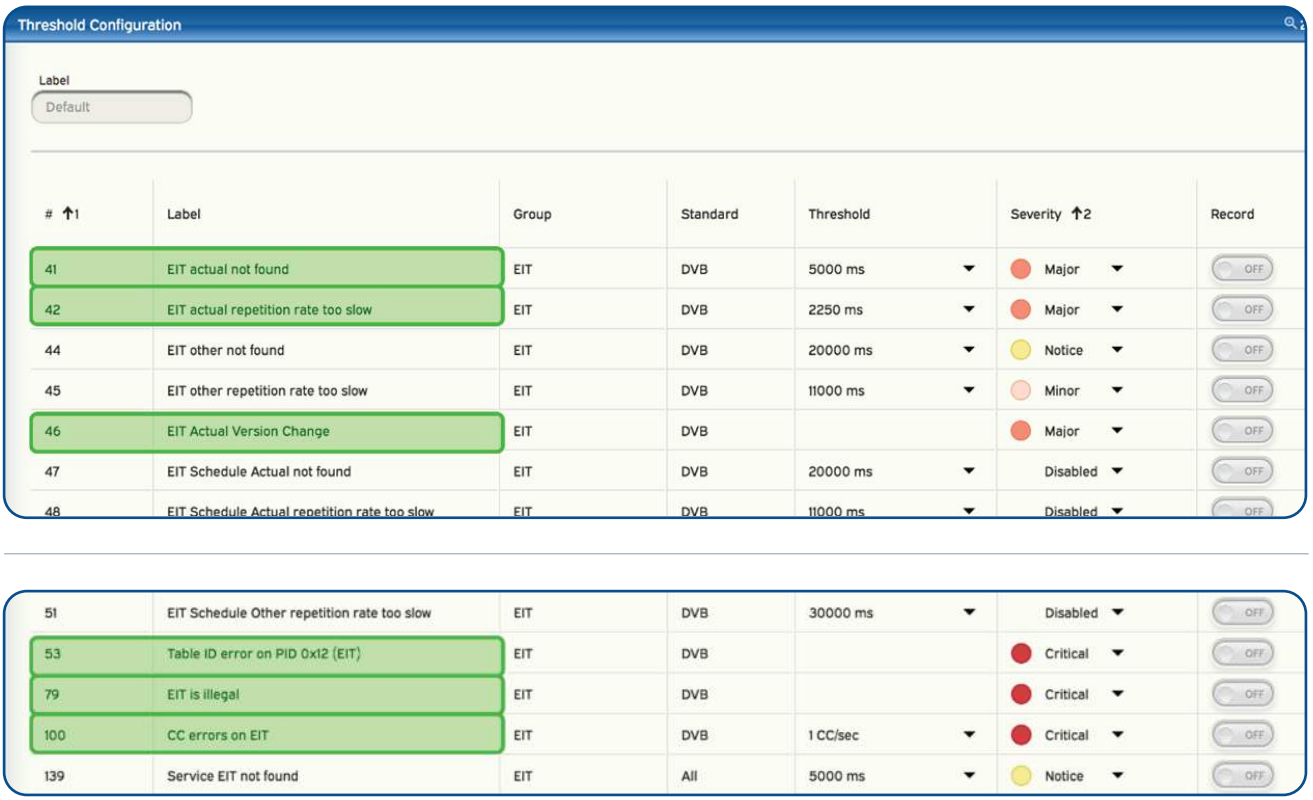


There are two common formats of Packager created wrapping of compressed sources: DVB (Digital Video Broadcasting – European Consortium) and ATSC (Advanced Television Systems Committee – American set).

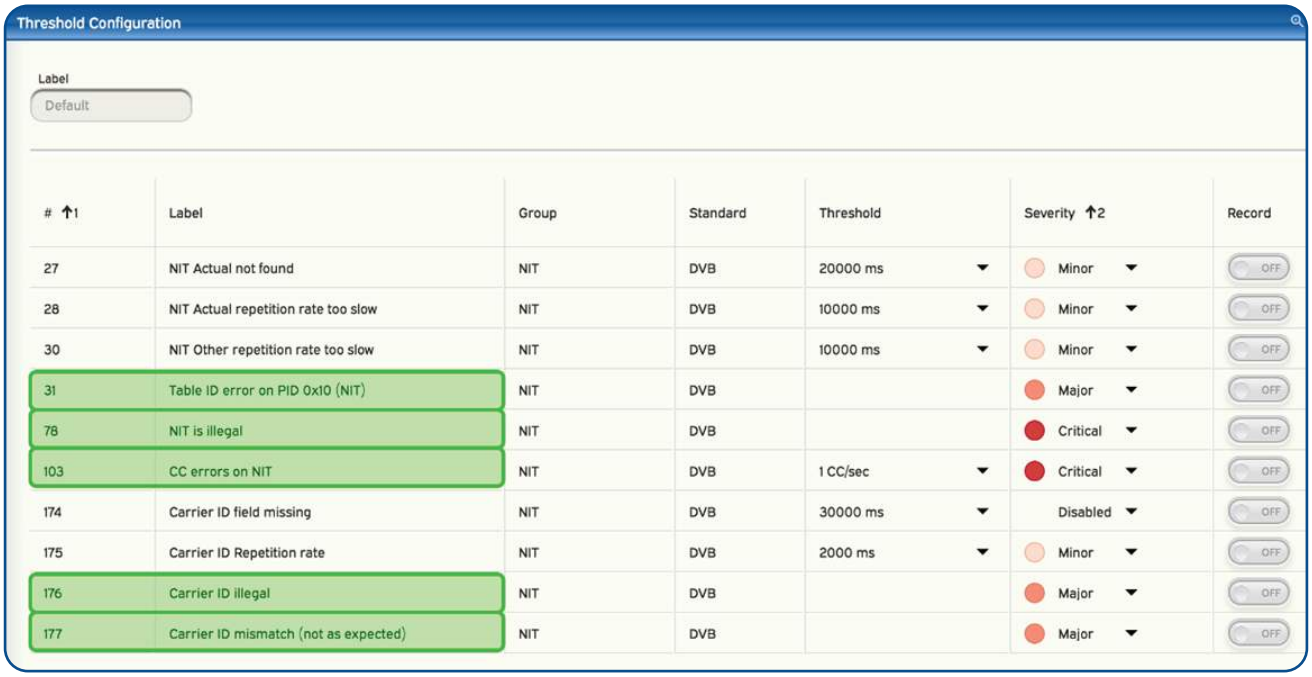
DVB is often used for satellite and fiber feeds of signals, there are recommended set of thresholds for SDT, BAT, EIT, NIT, AIT, TDT tables used in this standard.



- Starting off the recommended SDT (Service Description Table), and BAT (Bouquet Association Table) Thresholds, all alarms on these sub-tables of DVB are either Critical or Major
  The DVB's EIT (Event Information Table) is an optional table, but if it is enabled 'after scan' we recommend these alarms.

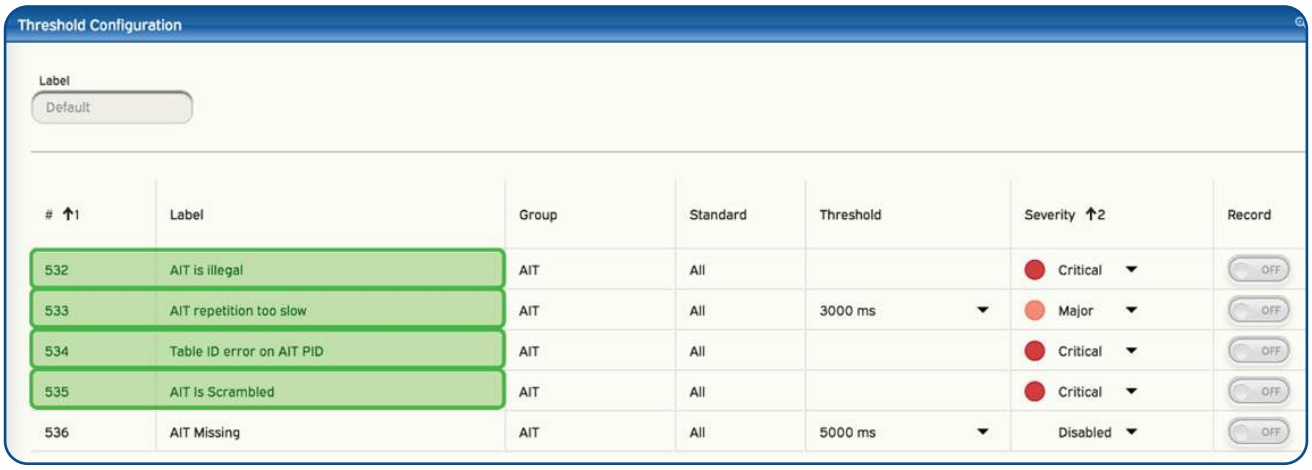


- DVB's NIT (Network Information Table) gives information on organization of multiplexes carried via network.



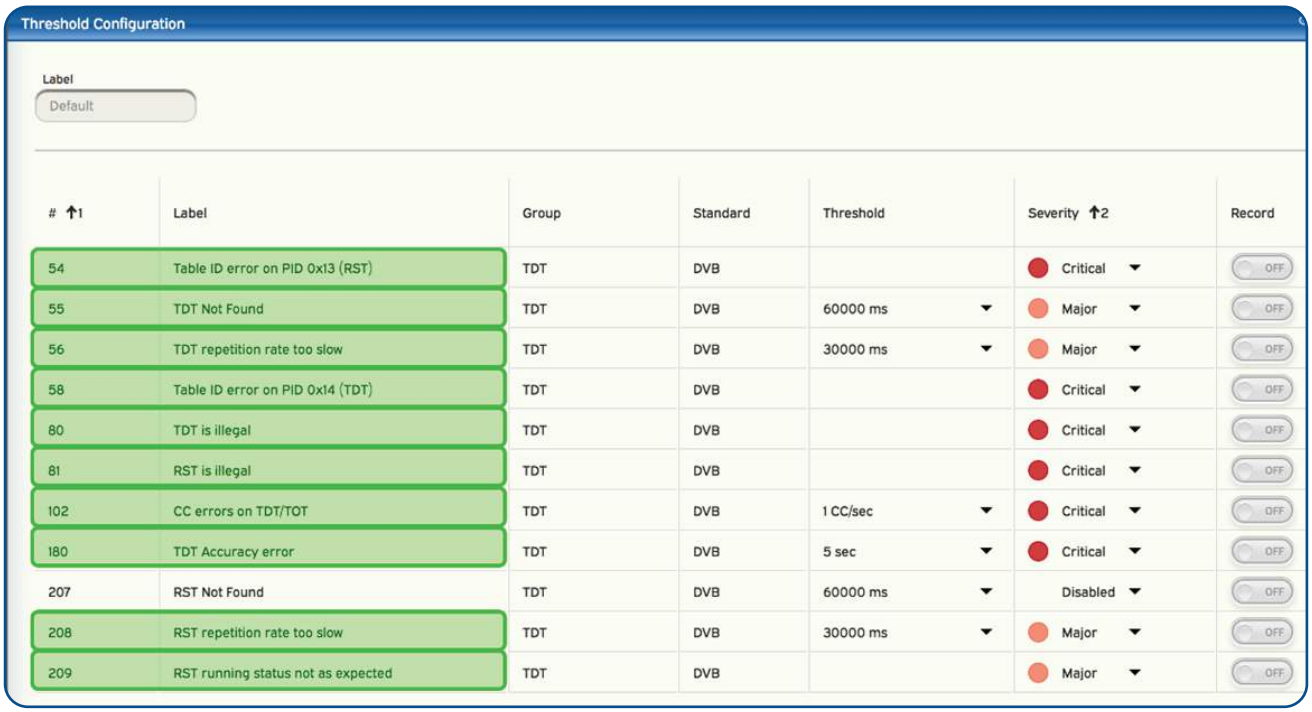
# ↑1	Label	Group	Standard	Threshold	Severity ↑2	Record
27	NIT Actual not found	NIT	DVB	20000 ms	Minor	OFF
28	NIT Actual repetition rate too slow	NIT	DVB	10000 ms	Minor	OFF
30	NIT Other repetition rate too slow	NIT	DVB	10000 ms	Minor	OFF
31	Table ID error on PID 0x10 (NIT)	NIT	DVB		Major	OFF
78	NIT is illegal	NIT	DVB		Critical	OFF
103	CC errors on NIT	NIT	DVB	1 CC/sec	Critical	OFF
174	Carrier ID field missing	NIT	DVB	30000 ms	Disabled	OFF
175	Carrier ID Repetition rate	NIT	DVB	2000 ms	Minor	OFF
176	Carrier ID illegal	NIT	DVB		Major	OFF
177	Carrier ID mismatch (not as expected)	NIT	DVB		Major	OFF

- DVB's AIT (Application Information Table) gives full information on the data broadcast and the required state of applications used.



# ↑1	Label	Group	Standard	Threshold	Severity ↑2	Record
532	AIT is illegal	AIT	All		Critical	OFF
533	AIT repetition too slow	AIT	All	3000 ms	Major	OFF
534	Table ID error on AIT PID	AIT	All		Critical	OFF
535	AIT Is Scrambled	AIT	All		Critical	OFF
536	AIT Missing	AIT	All	5000 ms	Disabled	OFF

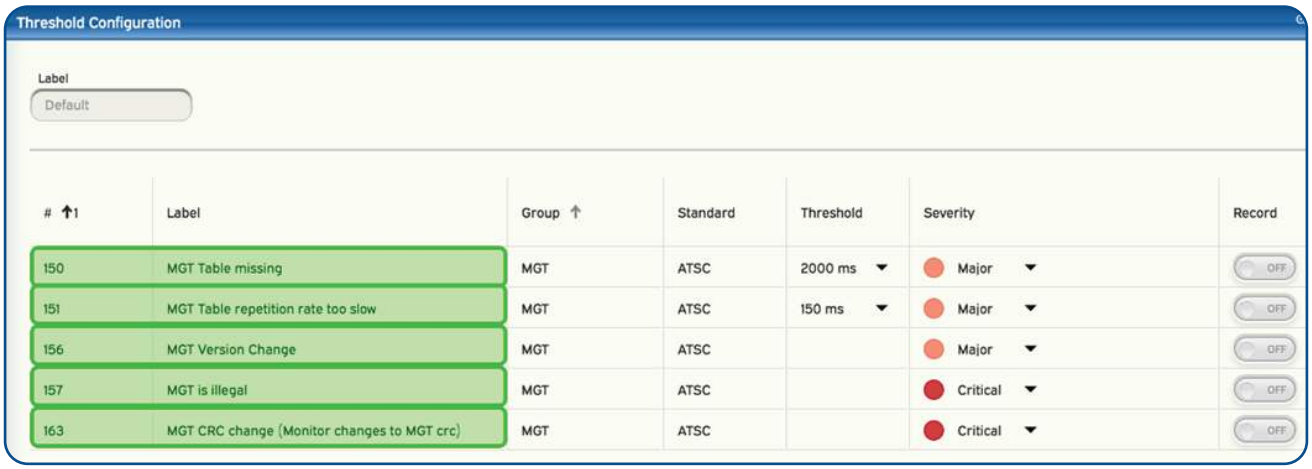
- Finally, the last DVB Table we have alarms on is the TDT (Time and Date Table) time signals are required for smooth playback of DVB streams



# ↑1	Label	Group	Standard	Threshold	Severity ↑2	Record
54	Table ID error on PID 0x13 (RST)	TDT	DVB		Critical	OFF
55	TDT Not Found	TDT	DVB	60000 ms	Major	OFF
56	TDT repetition rate too slow	TDT	DVB	30000 ms	Major	OFF
58	Table ID error on PID 0x14 (TDT)	TDT	DVB		Critical	OFF
80	TDT is illegal	TDT	DVB		Critical	OFF
81	RST is illegal	TDT	DVB		Critical	OFF
102	CC errors on TDT/TOT	TDT	DVB	1 CC/sec	Critical	OFF
180	TDT Accuracy error	TDT	DVB	5 sec	Critical	OFF
207	RST Not Found	TDT	DVB	60000 ms	Disabled	OFF
208	RST repetition rate too slow	TDT	DVB	30000 ms	Major	OFF
209	RST running status not as expected	TDT	DVB		Major	OFF

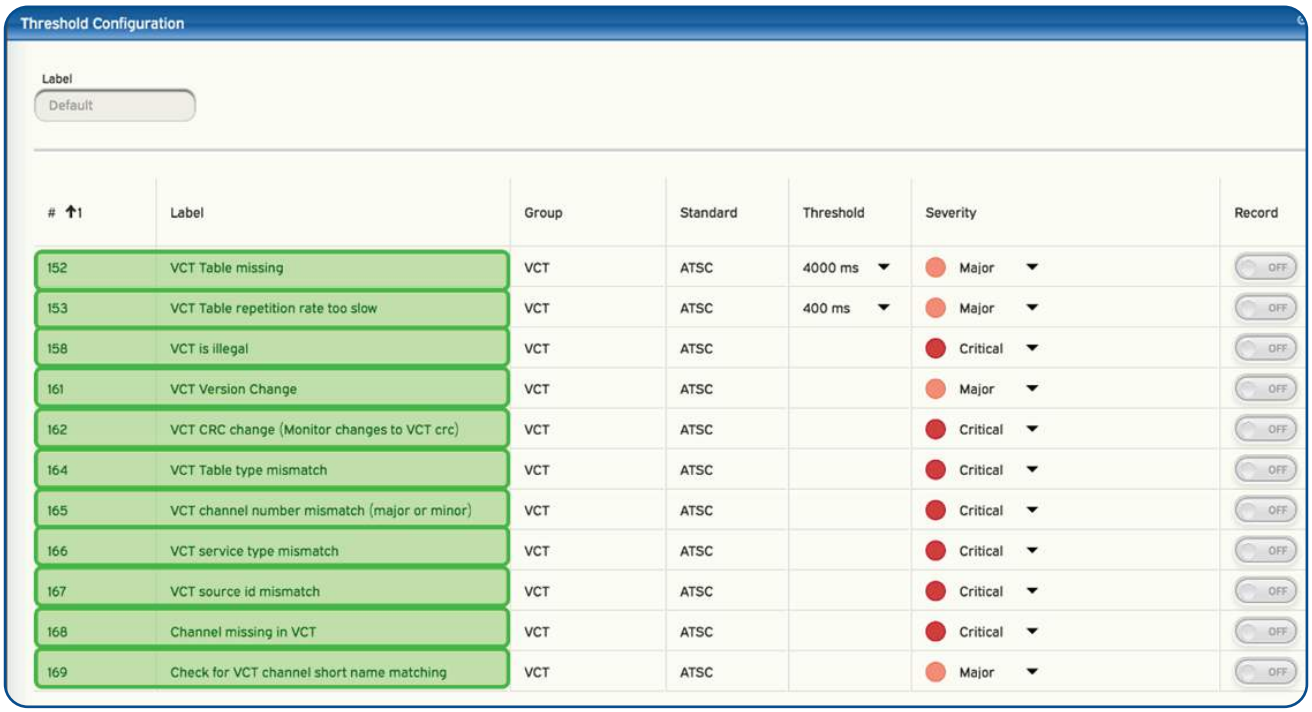
In North America, a simpler wrapping is used by packagers, especially if OTT streams originated in over-the-air broadcasts; that wrapping standard is ATSC (Advanced Television Systems Committee – American set). Here are thresholds for MGT, VCT, STT, and RTT tables used in this standard.

- ATSC's MGT (Master Guide Table) is the primary description of the stream, and we recommend these thresholds.



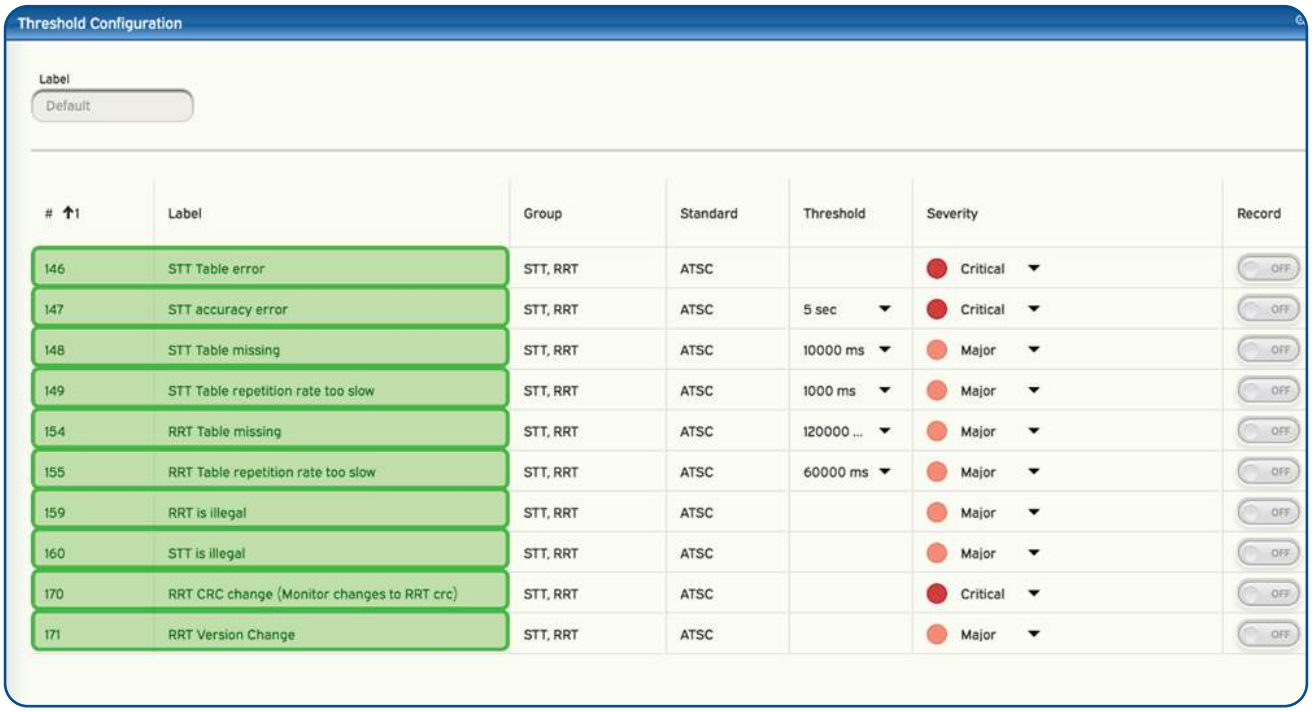
# ↑1	Label	Group ↑	Standard	Threshold	Severity	Record
150	MGT Table missing	MGT	ATSC	2000 ms	Major	OFF
151	MGT Table repetition rate too slow	MGT	ATSC	150 ms	Major	OFF
156	MGT Version Change	MGT	ATSC		Major	OFF
157	MGT is illegal	MGT	ATSC		Critical	OFF
163	MGT CRC change (Monitor changes to MGT crc)	MGT	ATSC		Critical	OFF

- ATSC's VCT (Virtual Channel Table) contains a list of attributes for the channels within the stream, most probed element of this table are critical.



#	Label	Group	Standard	Threshold	Severity	Record
152	VCT Table missing	VCT	ATSC	4000 ms	Major	OFF
153	VCT Table repetition rate too slow	VCT	ATSC	400 ms	Major	OFF
158	VCT is illegal	VCT	ATSC		Critical	OFF
161	VCT Version Change	VCT	ATSC		Major	OFF
162	VCT CRC change (Monitor changes to VCT crc)	VCT	ATSC		Critical	OFF
164	VCT Table type mismatch	VCT	ATSC		Critical	OFF
165	VCT channel number mismatch (major or minor)	VCT	ATSC		Critical	OFF
166	VCT service type mismatch	VCT	ATSC		Critical	OFF
167	VCT source id mismatch	VCT	ATSC		Critical	OFF
168	Channel missing in VCT	VCT	ATSC		Critical	OFF
169	Check for VCT channel short name matching	VCT	ATSC		Major	OFF

- ATSC's SST (System Time Table) and RRT (Rating Region Table) are either for packet timing or ratings for multiple geographical regions.

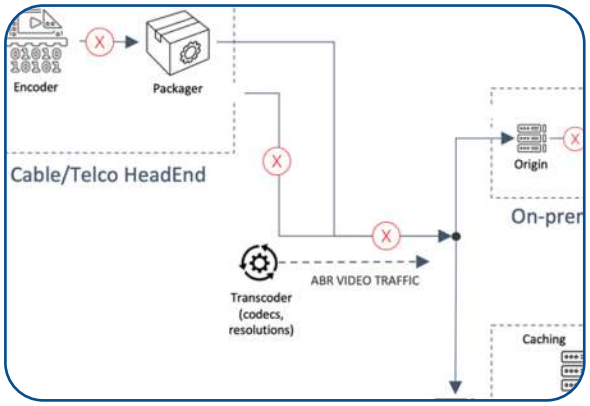


#	Label	Group	Standard	Threshold	Severity	Record
146	STT Table error	STT, RRT	ATSC		Critical	OFF
147	STT accuracy error	STT, RRT	ATSC	5 sec	Critical	OFF
148	STT Table missing	STT, RRT	ATSC	10000 ms	Major	OFF
149	STT Table repetition rate too slow	STT, RRT	ATSC	1000 ms	Major	OFF
154	RRT Table missing	STT, RRT	ATSC	120000 ...	Major	OFF
155	RRT Table repetition rate too slow	STT, RRT	ATSC	60000 ms	Major	OFF
159	RRT is illegal	STT, RRT	ATSC		Major	OFF
160	STT is illegal	STT, RRT	ATSC		Major	OFF
170	RRT CRC change (Monitor changes to RRT crc)	STT, RRT	ATSC		Critical	OFF
171	RRT Version Change	STT, RRT	ATSC		Major	OFF

Transcoders (if applicable):

- What to Monitor: Transcoding operations for multiple formats and bitrates
- Why Are We Monitoring: Ensures availability of content in formats suitable for various devices
- Probing Point Actions: Monitor for successful creation of all required profiles and bitrates

For transcoding operations, extend monitoring to oversee the creation of multiple-format profiles and bitrates. Ensure all required profiles are generated accurately and bitrates align with specified standards. This monitoring ensures content compatibility across various devices and network conditions.

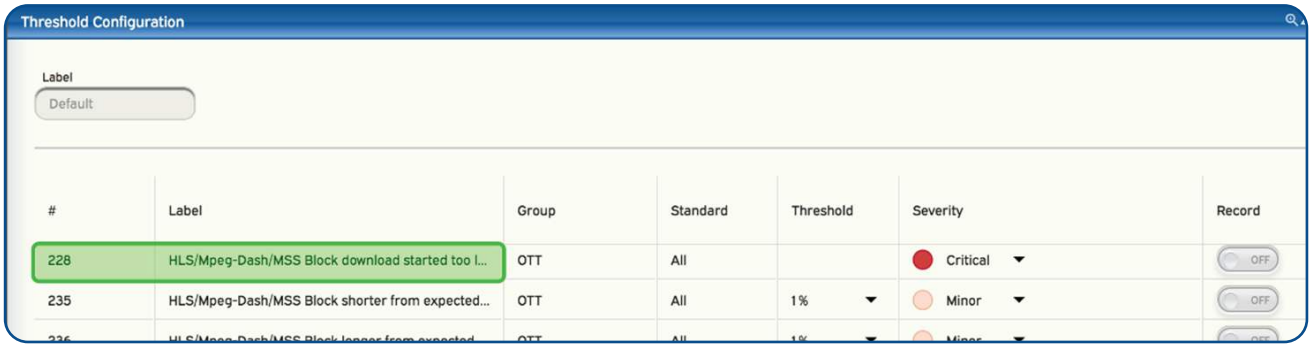


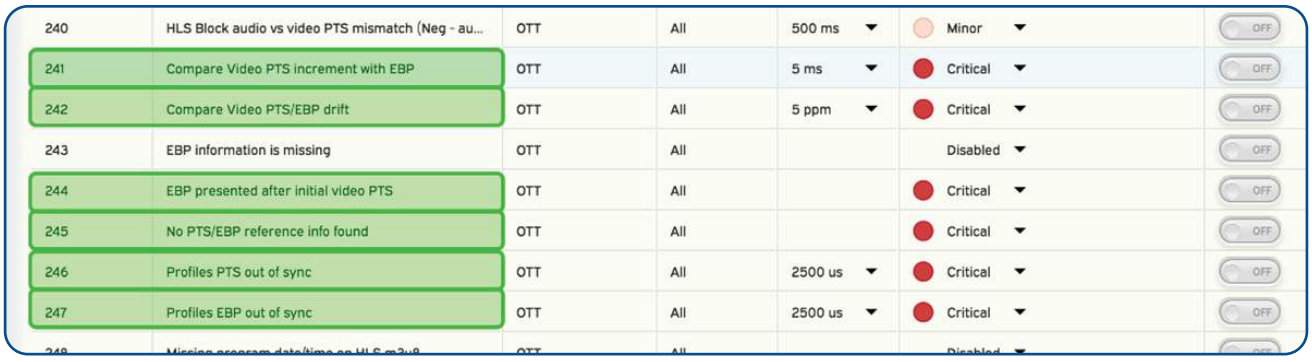
Transcoded OTT signals into HLS and other formats can have numerous errors; the number of these OTT thresholds and alerts is such a large group that three screens are needed to show all the settings, with TAG's recommendation on Critical and Major levels highlighted.

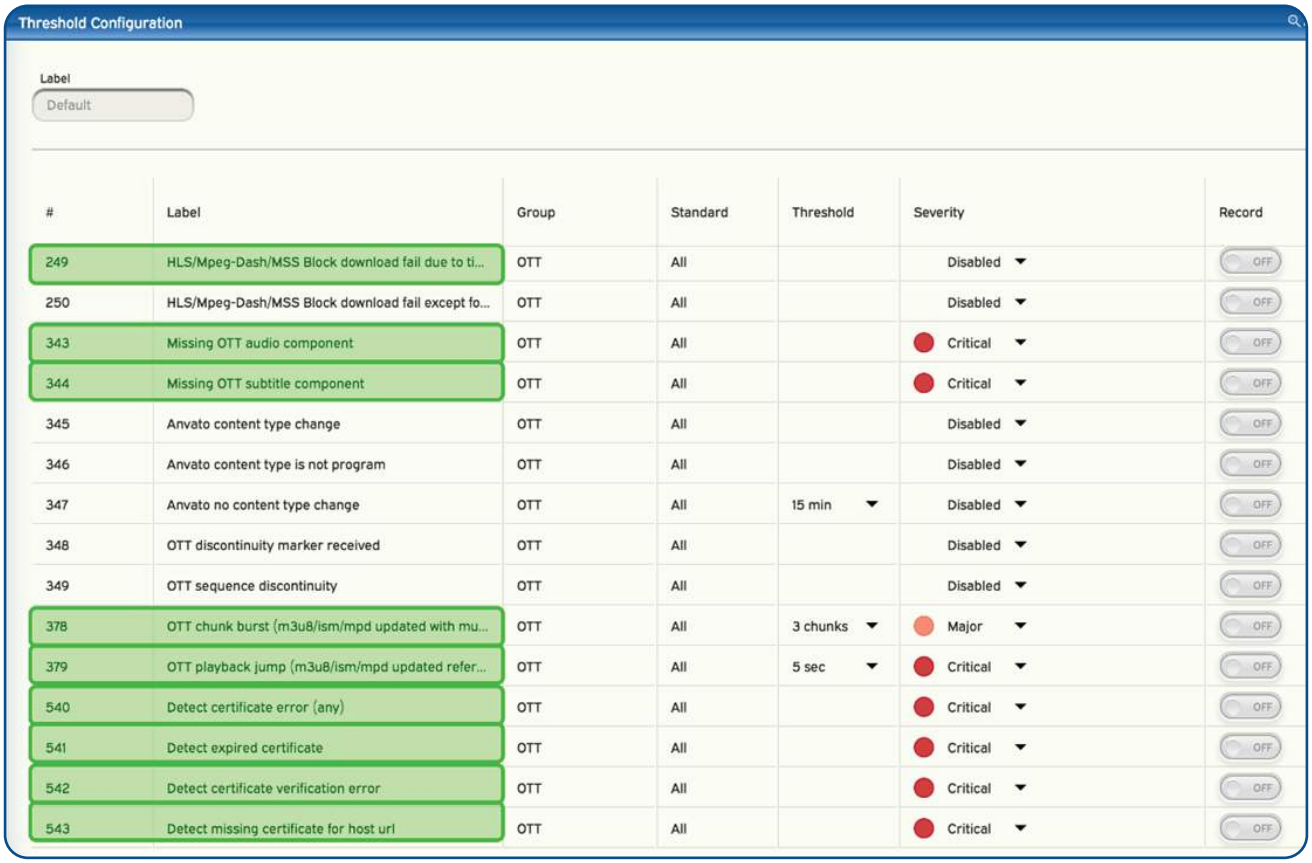
Threshold Configuration

Label: Default

#	Label	Group	Standard	Threshold	Severity	Record
213	HLS block doesn't start with PAT	OTT	All		Critical	OFF
214	HLS block doesn't start with PMT	OTT	All		Critical	OFF
215	HLS Block sequence error	OTT	All		Critical	OFF
216	HLS Block sequence stopped changing	OTT	All		Critical	OFF
217	HLS Profile not found on the master M3U8 file	OTT	All		Critical	OFF
218	HLS M3U8 / Mpeg-Dash MPD / MSS ISM parsing er...	OTT	All		Critical	OFF
219	HLS/Mpeg-Dash/MSS Block download fail	OTT	All		Critical	OFF
220	HLS/Mpeg-Dash/MSS Block download time too long	OTT	All	10000 ms	Critical	OFF
221	HLS Profile version not equal to playlist version	OTT	All		Critical	OFF
222	HLS Version not as expected	OTT	All		Critical	OFF
223	HLS/Mpeg-Dash/MSS download retry (but success...	OTT	All		Minor	OFF
224	HLS content not scrambled	OTT	All		Major	OFF
225	OTT content scrambled (and not decrypted)	OTT	All		Major	OFF
226	RTMP/CTP Connection failure	OTT	All		Critical	OFF
227	RTMP/CTP Underrun	OTT	All		Critical	OFF

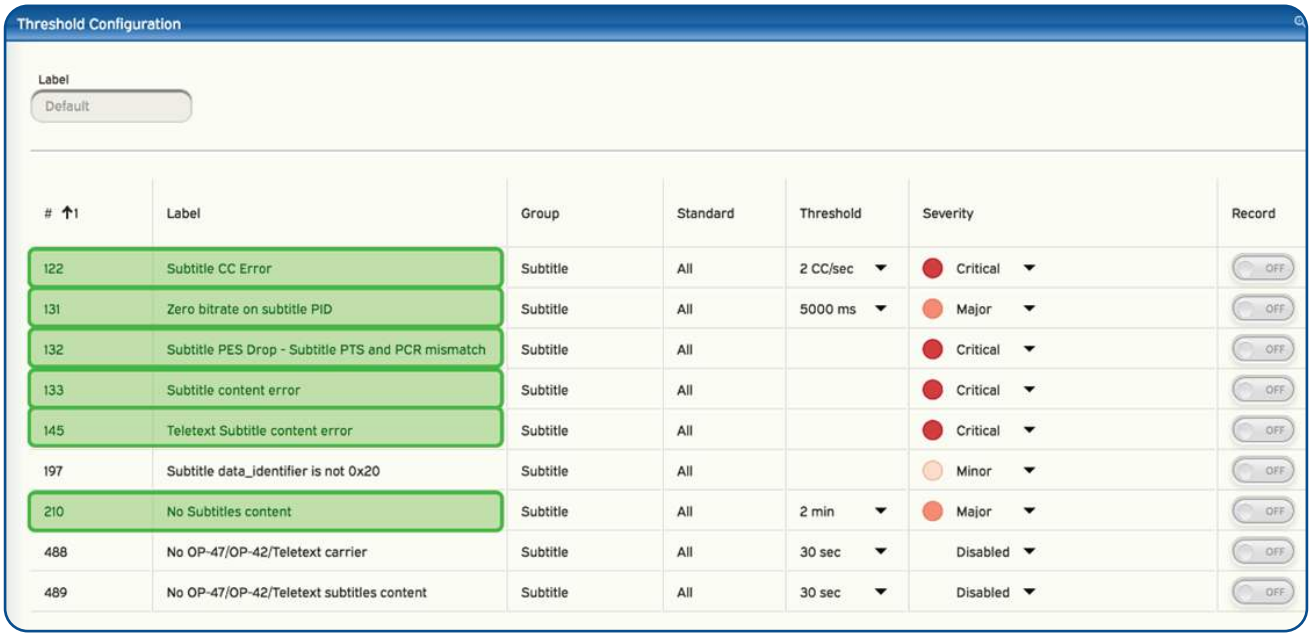

Threshold Configuration
Label
Default
Label Group Standard Threshold Severity Record
228 HLS/Mpeg-Dash/MSS Block download started too l... OTT All Critical OFF
235 HLS/Mpeg-Dash/MSS Block shorter from expected... OTT All 1% Minor OFF

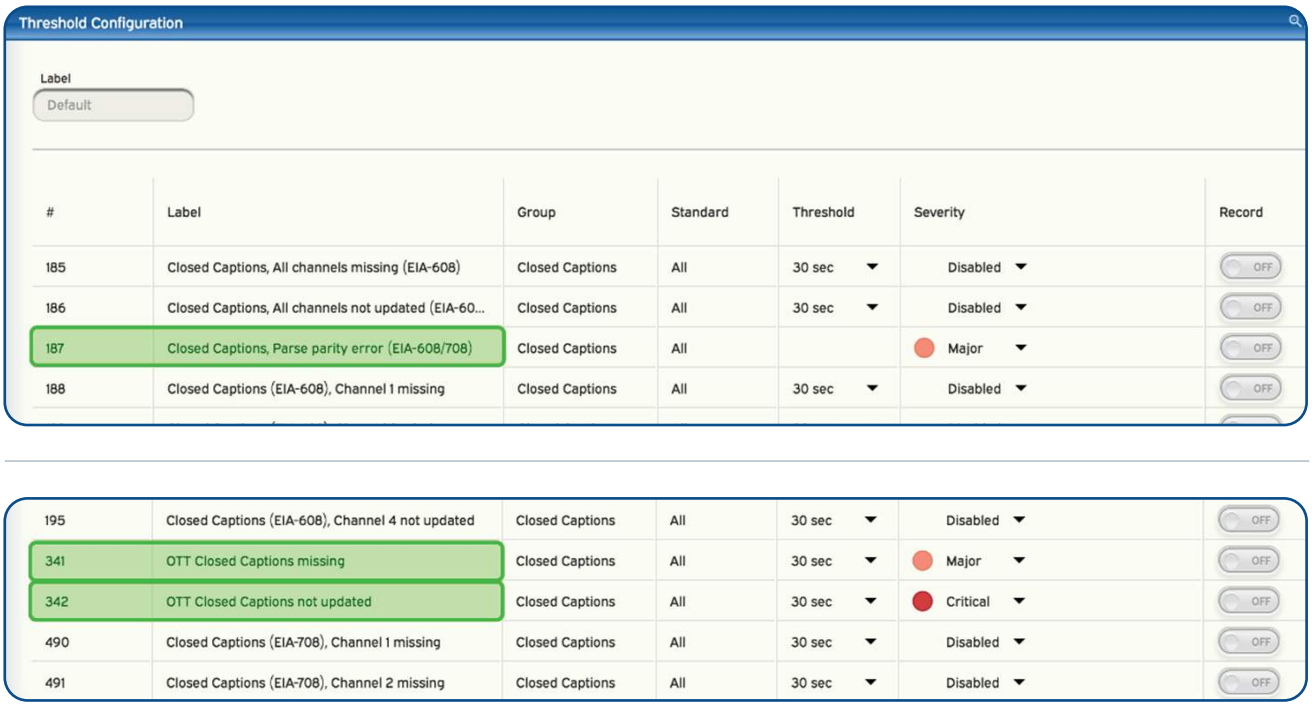

240 HLS Block audio vs video PTS mismatch (Neg - au... OTT All 500 ms Minor OFF
241 Compare Video PTS increment with EBP OTT All 5 ms Critical OFF
242 Compare Video PTS/EBP drift OTT All 5 ppm Critical OFF
243 EBP information is missing OTT All Disabled OFF
244 EBP presented after initial video PTS OTT All Critical OFF
245 No PTS/EBP reference info found OTT All Critical OFF
246 Profiles PTS out of sync OTT All 2500 us Critical OFF
247 Profiles EBP out of sync OTT All 2500 us Critical OFF


Threshold Configuration
Label
Default
Label Group Standard Threshold Severity Record
249 HLS/Mpeg-Dash/MSS Block download fail due to ti... OTT All Disabled OFF
250 HLS/Mpeg-Dash/MSS Block download fail except fo... OTT All Disabled OFF
343 Missing OTT audio component OTT All Critical OFF
344 Missing OTT subtitle component OTT All Critical OFF
345 Anvato content type change OTT All Disabled OFF
346 Anvato content type is not program OTT All Disabled OFF
347 Anvato no content type change OTT All 15 min Disabled OFF
348 OTT discontinuity marker received OTT All Disabled OFF
349 OTT sequence discontinuity OTT All Disabled OFF
378 OTT chunk burst (m3u8/ism/mpd updated with mu... OTT All 3 chunks Major OFF
379 OTT playback jump (m3u8/ism/mpd updated refer... OTT All 5 sec Critical OFF
540 Detect certificate error (any) OTT All Critical OFF
541 Detect expired certificate OTT All Critical OFF
542 Detect certificate verification error OTT All Critical OFF
543 Detect missing certificate for host url OTT All Critical OFF

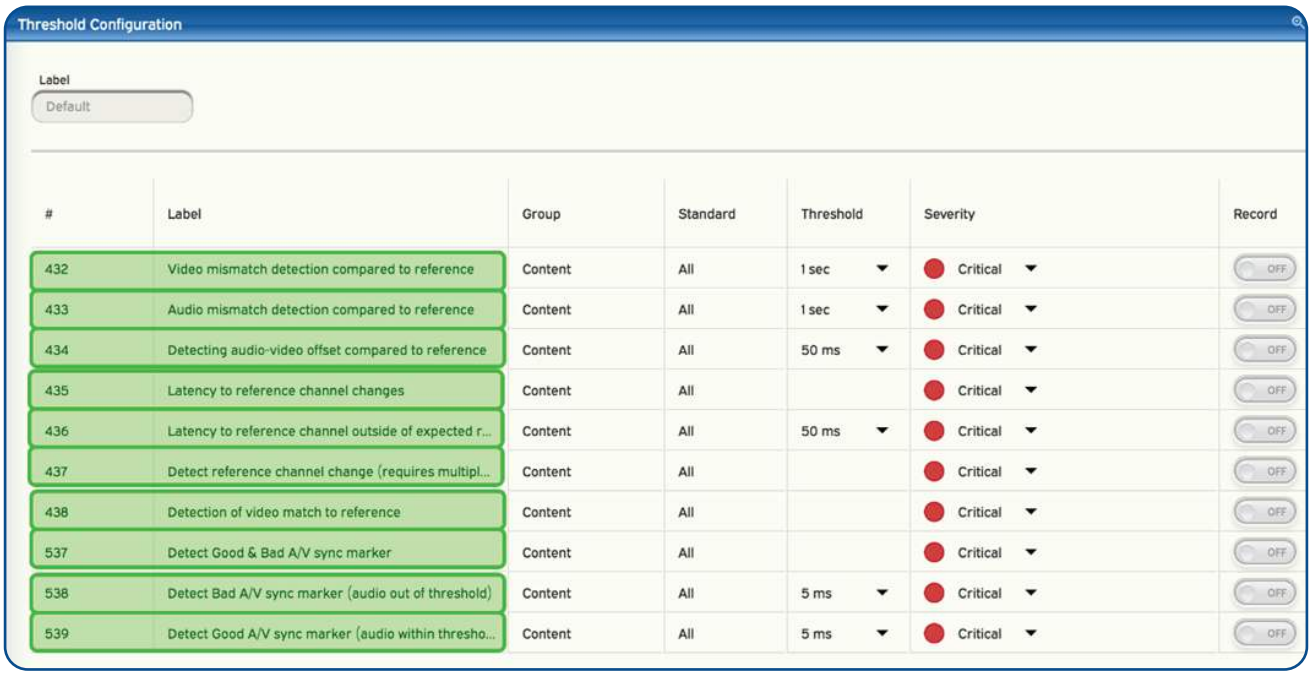
ISPs or Final Delivery to Customers

Subtitles, Teletext or Closed Captions not only assist hearing-impaired persons, but also OTT streams being monitored with audio turned down in waiting rooms and the like.





Then, we probe the primary content of the OTT streams and recommend these threshold settings, including mismatches of signals to the reference in the stream.



Packagers:

- What to Monitor: Segmenting and packaging content for adaptive streaming (eg, HLS, DASH)
- Why Are We Monitoring: Critical for smooth adaptive bitrate streaming, crucial for different network conditions
- Probing Point Actions: Validate segment availability, integrity, and compliance with streaming protocols

TAG MCM has many thresholds for things like expired DASH certificates that we have developed over the years with input from our clients to catch common errors with packagers.

Content Delivery Networks (CDNs):

- What to Monitor: CDN performance, including edge servers
- Why Are We Monitoring: Affects content delivery speed and buffering; key for global distribution
- Probing Point Actions: Monitor latency, packet loss, and throughput at various geographic locations

If a CDN server gets overwhelmed with clients but has not yet failed, it will often increase the inter-packet timing, and the MCM has an alarm threshold to report that change.

Origin Servers:

These servers are usually the last point before CDN servers, where video is stored or composed.

- What to Monitor: Server performance and content availability
- Why Are We Monitoring: Ensures content is readily available for distribution to CDNs
- Probing Point Actions: Check server health, load, and response times

Many clients use TAG MCMs to confirm high-quality audio, video, and metadata in all streams from Origin Servers. An example would be our video blocking level alerts, where the compression blocks are evident to the viewer.

Cloud Computing Resources (if used):

- What to Monitor: Cloud infrastructure and services
- Why Are We Monitoring: Cloud failures can impact content availability and delivery
- Probing Point Actions: Monitor cloud resource utilization, scalability, and redundancy

Most cloud providers provide monitoring services, but the TAG MCS software just shows the health of the cloud instances where MCM is running.

Edge Devices (Set-top boxes, Sticks like Chromecast, Roku, and Amazon Fire Stick):

- What to Monitor: Final content delivery and playback on consumer devices
- Why Are We Monitoring: Directly impacts viewer experience, crucial for QoE
- Probing Point Actions: Collect data on playback issues, buffering, app crashes, and device compatibility

Some non-TAG software products monitor devices; we can only monitor one of these devices if its output is converted to an IP stream by a third-party converter and sent back to an MCM.

Metadata and DRM Systems:

- What to Monitor: Metadata accuracy and DRM (Digital Rights Management) functionality
- Why Are We Monitoring: Ensures content discoverability and compliance with licensing agreements
- Probing Point Actions: Validate metadata integrity and DRM effectiveness

TAG MCMs have several thresholds for OTT certificate errors, and DVB Conditional access specific data to help monitor DRM before being sent to the end customer. It is also common for the DRM vendors to also have monitoring tools in this area.

Network Infrastructure:

- What to Monitor: Internal and external network performance
- Why Are We Monitoring: Network issues can lead to delivery failures or degraded quality
- Probing Point Actions: Continuous monitoring of network health, bandwidth, and connectivity

Many MCMs alert thresholds can be used to detect network issues, like continuity errors or even an increase in Inter Packet Timing.

#	Description	Short name displayed on tile	Group	Default setting	Standard DVB or ATSC	Content Acquisition	Encoders	Transcoders	Packagers	CDNs	Origin Servers	Cloud Computing	Edge Devices	DRM & Metadata Systems	Network Infrastructure
1	No Input Stream	No Input Stream	Stream	Critical		■	■	■	■	■	■	■	■	■	■
30	NIT Other repetition rate too slow	NIT-other Rep slow	NIT, AIT	Minor	DVB	■	■								
31	Table ID error on PID 0x10 (NIT)	NIT Table ID Error	NIT, AIT	Major	DVB		■								
35	Detect unreferenced pids	Unreferenced PID	PAT	Disabled		■	■								
36	SDT Actual not found	SDT-actual	SDT, BAT	Major	DVB		■								
37	SDT Actual repetition rate too slow	SDT-actual Rep slow	SDT, BAT	Major	DVB		■								
38	Black frame detection	Black Frame	Video	Major		■	■	■							
39	SDT Other repetition rate too slow	SDT-other Rep slow	SDT, BAT	Minor	DVB		■								
40	Table ID error on PID 0x11 (SDT)	SDT Table ID Error	SDT, BAT	Critical	DVB		■								
41	EIT actual not found	EIT-actual	EIT	Major	DVB		■								
42	EIT actual repetition rate too slow	EIT-actual Rep slow	EIT	Major	DVB		■								
43	Detect decoding errors	Decoding Error	Video	Major		■	■	■							
44	EIT other not found	EIT-other	EIT	Notice	DVB		■								
45	EIT other repetition rate too slow	EIT-other Rep slow	EIT	Minor	DVB		■								
46	EIT Actual Version Change	EIT Version Changed	EIT	Major	DVB		■								
47	EIT Schedule Actual not found	EIT-actual/sch	EIT	Disabled	DVB		■								
52	PAT CRC change (Monitor changes to PAT crc)	PAT CRC Changed	PAT	Major			■								
53	Table ID error on PID 0x12 (EIT)	EIT Table ID Error	EIT	Critical	DVB		■								
54	Table ID error on PID 0x13 (RST)	RST Table ID Error	TDT	Critical	DVB		■								
55	TDT Not Found	TDT	TDT	Major	DVB		■								
56	TDT repetition rate too slow	TDT Repetition slow	TDT	Major	DVB		■								
57	PMT CRC change (Monitor changes to PMT crc)	PMT CRC Changed	PMT	Critical			■								
58	Table ID error on PID 0x14 (TDT)	TDT Table ID Error	TDT	Critical	DVB		■								
59	Freeze frame	Freeze Frame	Video	Major		■	■	■	■	■	■	■			
60	No Video	No Video	Video	Critical		■	■	■	■	■	■	■			
61	No Audio	No Audio	Audio	Critical		■	■	■							
62	Audio Silence	Audio Silence	Audio	Critical		■	■	■							
63	Audio Phase	Audio Phase Error	Audio	Major		■	■	■							
64	PAT Version Change	PAT Version Changed	PAT	Major			■								
77	SDT is illegal	SDT illegal	SDT, BAT	Critical	DVB		■								
78	NIT is illegal	NIT illegal	NIT, AIT	Critical	DVB		■								
79	EIT is illegal	EIT illegal	EIT	Critical	DVB		■								
80	TDT is illegal	TDT illegal	TDT	Critical	DVB		■								
81	RST is illegal	RST illegal	TDT	Critical	DVB		■								
82	CAT is illegal	CAT illegal	CAT	Critical			■								
99	CC errors on PAT	CC Error on PAT	PAT	Critical		■	■								
100	CC errors on EIT	CC Error on EIT	EIT	Critical	DVB	■	■								
101	CC errors on SDT/BAT	CC Error on SDT	SDT, BAT	Critical	DVB	■	■								
102	CC errors on TDT/TOT	CC Error on TDT	TDT	Critical	DVB	■	■								
103	CC errors on NIT	CC Error on NIT	NIT, AIT	Critical	DVB	■	■								
104	CC errors on CAT	CC Error on CAT	CAT	Critical		■	■								
145	Teletext Subtitle content error	Tele-Sub Error	Subtitle	Critical		■									
146	STT Table error	STT Error	STT, RRT	Critical	ATSC		■								
147	STT accuracy error	STT accuracy	STT, RRT	Critical	ATSC		■								
148	STT Table missing	STT	STT, RRT	Major	ATSC		■								
149	STT Table repetition rate too slow	STT rep slow	STT, RRT	Major	ATSC		■								
150	MGT Table missing	MGT	MGT	Major	ATSC		■								

#	Description	Short name displayed on tile	Group	Default setting	Standard DVB or ATSC	Content Acquisition	Encoders	Transcoders	Packagers	CDNs	Origin Servers	Cloud Computing	Edge Devices	DRM & Metadata Systems	Network Infrastructure
151	MGT Table repetition rate too slow	MGT rep slow	MGT	Major	ATSC		■								
152	VCT Table missing	VCT	VCT	Major	ATSC		■								
153	VCT Table repetition rate too slow	VCT rep slow	VCT	Major	ATSC		■								
154	RRT Table missing	RRT	STT, RRT	Major	ATSC		■								
155	RRT Table repetition rate too slow	RRT rep slow	STT, RRT	Major	ATSC		■								
156	MGT Version Change	MGT Version Changed	MGT	Major	ATSC		■								
157	MGT is illegal	MGT Illegal	MGT	Critical	ATSC		■								
158	VCT is illegal	VCT Illegal	VCT	Critical	ATSC		■								
159	RRT is illegal	RRT Illegal	STT, RRT	Major	ATSC		■								
160	STT is illegal	STT Illegal	STT, RRT	Major	ATSC		■								
161	VCT Version Change	VCT Version Changed	VCT	Major	ATSC		■								
162	VCT CRC change (Monitor changes to VCT crc)	VCT CRC Changed	VCT	Critical	ATSC		■								
163	MGT CRC change (Monitor changes to MGT crc)	MGT CRC Changed	MGT	Critical	ATSC		■								
164	VCT Table type mismatch	VCT type mismatch	VCT	Critical	ATSC		■								
165	VCT channel number mismatch (major or minor)	VCT channel mismatch	VCT	Critical	ATSC		■								
166	VCT service type mismatch	VCT service mismatch	VCT	Critical	ATSC		■								
167	VCT source id mismatch	VCT source id mismatch	VCT	Critical	ATSC		■								
168	Channel missing in VCT	Entry missing in VCT	VCT	Critical	ATSC		■								
169	Check for VCT channel short name matching	VCT Name mismatch	VCT	Major	ATSC		■								
170	RRT CRC change (Monitor changes to RRT crc)	RRT CRC Changed	STT, RRT	Critical	ATSC		■								
171	RRT Version Change	RRT Version Changed	STT, RRT	Major	ATSC		■								
172	Video blocking detection - scene	Video Blocking	Video	Minor		■	■	■							
173	Video blocking detection - peak	Frame Blocking	Video	Minor		■	■	■							
174	Carrier ID field missing	Carrier ID	NIT, AIT	Disabled	DVB		■								
175	Carrier ID Repetition rate	Carrier ID rep too slow	NIT, AIT	Minor	DVB		■								
176	Carrier ID illegal	Carrier ID illegal	NIT, AIT	Major	DVB		■								
177	Carrier ID mismatch (not as expected)	Carrier ID changed	NIT, AIT	Major	DVB		■								
178	Detect PCR clock jitter	PCR Jitter	Stream	Minor			■								
179	Service EIT empty	Service EIT error	EIT	Minor			■								
180	TDT Accuracy error	TDT Accuracy	TDT	Critical	DVB		■								
181	Embedded teletext clock error	Teletext Error	More	Critical			■								
207	RST Not Found	RST	TDT	Disabled	DVB		■								
208	RST repetition rate too slow	RST Repetition slow	TDT	Major	DVB		■								
209	RST running status not as expected	RST Running state mismatch	TDT	Major	DVB		■								
210	No Subtitles content	Subtitle Empty	Subtitle	Major		■	■	■	■	■	■				
211	Audio level below X LUFS for 60 seconds (or channel defined time)	Low Audio	Audio	Major		■	■	■							
212	New HLS/Mpeg-Dash/MSS Block	New OTT Block	OTT	Info					■						
213	HLS block doesn't start with PAT	HLS PAT missing	OTT	Critical					■						
214	HLS block doesn't start with PMT	HLS PMT missing	OTT	Critical					■						
215	HLS Block sequence error	HLS sequence error	OTT	Critical					■						
216	HLS Block sequence stopped changing	HLS sequence stopped	OTT	Critical					■						
217	HLS Profile not found on the master M3U8 file	HLS Profile Missing	OTT	Critical				■	■	■	■	■			
218	HLS M3U8 / Mpeg-Dash MPD / MSS ISM parsing error	OTT Parse Error	OTT	Critical				■	■	■	■	■			
219	HLS/Mpeg-Dash/MSS Block download fail	OTT Download Failed	OTT	Critical				■	■	■	■	■			
220	HLS/Mpeg-Dash/MSS Block download time too long	OTT Download Slow	OTT	Critical				■	■	■	■	■			
221	HLS Profile version not equal to playlist version	HLS version mismatch	OTT	Critical				■	■	■	■	■			
222	HLS Version not as expected	HLS wrong version	OTT	Critical				■	■	■	■	■			
223	HLS/Mpeg-Dash/MSS download retry (but successful)	OTT Download Retry	OTT	Minor				■	■	■	■	■			
224	HLS content not scrambled	HLS Not Scrambled	OTT	Major				■	■	■	■	■			
225	OTT content scrambled (and not decrypted)	OTT Scrambled	OTT	Major				■		■	■	■			
226	RTMP/WebRTC/CTP Connection failure	Connection Failure	OTT	Critical		■	■	■	■	■					
227	RTMP/WebRTC/CTP Underrun	Underrun	OTT	Critical		■	■	■	■	■					
228	HLS/Mpeg-Dash/MSS Block download started too late (Network load)	OTT Download Late	OTT	Critical					■	■	■	■			
229	HDR SEI data	HDR SEI	Video	Disabled		■	■	■							
240	HLS Block audio vs video PTS mismatch (Neg - audio before video)	HLS A/V PTS error	OTT	Minor					■	■	■	■			
241	Compare Video PTS increment with EBP	EBP Offset	OTT	Critical				■							
242	Compare Video PTS/EBP drift	EBP Drift	OTT	Critical				■							

#	Description	Short name displayed on tile	Group	Default setting	Standard DVB or ATSC	Content Acquisition	Encoders	Transcoders	Packagers	CDNs	Origin Servers	Cloud Computing	Edge Devices	DRM & Metadata Systems	Network Infrastructure
243	EBP information is missing	EBP Missing	OTT	Disabled				■							
244	EBP presented after initial video PTS	EBP after PTS	OTT	Critical				■							
245	No PTS/EBP reference info found	Missing EBP/ PTS reference	OTT	Critical				■							
246	Profiles PTS out of sync	PTS Misalignment	OTT	Critical				■							
247	Profiles EBP out of sync	EBP Misalignment	OTT	Critical				■							
248	Missing program date/time on HLS m3u8	Missing Timestamp	OTT	Disabled					■	■	■	■			
249	HLS/Mpeg-Dash/MSS Block download fail due to timeout or error 503	OTT Download Timeout	OTT	Disabled				■							
250	HLS/Mpeg-Dash/MSS Block download fail except for timeout and error 503	OTT Download Failed	OTT	Disabled					■	■	■	■			
342	OTT Closed Captions not updated	CC not updated	Closed Captions	Critical					■	■	■	■			
343	Missing OTT audio component	Audio Missing	OTT	Critical					■	■	■	■			
344	Missing OTT subtitle component	Subtitle Missing	OTT	Critical					■	■	■	■			
345	Anvato content type change	Content Change	OTT	Disabled		■									
373	V-Chip rating changed	VCHIP Changed	Program	Minor		■	■								
374	Detect Video Bars	Video Bars	Video	Major		■	■	■							
375	PAT Service count changed	PAT Service Count Change	PAT	Critical			■								
376	EIT expired	EIT Expired	EIT	Minor	DVB		■								
377	No EIT current, only in the past (or far in the future)	EIT in past	EIT	Minor	DVB		■								
378	OTT chunk burst (m3u8/ism/ mpd updated with multiple files at once)	OTT chunk burst	OTT	Major					■	■	■	■			
379	OTT playback jump (m3u8/ism/ mpd updated reference time jumped)	OTT playback jump	OTT	Critical					■	■	■	■			
532	AIT is illegal	AIT illegal	NIT, AIT	Critical			■								
533	AIT repetition too slow	AIT Repetition slow	NIT, AIT	Major			■								
534	Table ID error on AIT PID	AIT Table ID Error	NIT, AIT	Critical			■								
535	AIT Is Scrambled	Scramble Flag on AIT	NIT, AIT	Critical			■								
536	AIT Missing (is on PMT but not in the stream)	AIT	NIT, AIT	Major			■								
537	Detect Good & Bad A/V sync marker	AV-SYNC	Content	Critical			■	■	■	■	■				
538	Detect Bad A/V sync marker (audio out of threshold)	Bad AV-SYNC	Content	Critical			■	■	■	■	■				
539	Detect Good A/V sync marker (audio within threshold)	Good AV-SYNC	Content	Critical			■	■	■	■	■				
540	Detect certificate error (any)	Certificate Error	OTT	Critical				■	■	■	■	■			
541	Detect expired certificate	Certificate Expired	OTT	Critical				■	■	■	■	■			
542	Detect certificate verification error	Certificate Failure	OTT	Critical				■	■	■	■	■			
543	Detect missing certificate for host url	Certificate URL Error	OTT	Critical				■							
544	Logical Audio Silence (L/R/C for 5.1 or L/R for 2.0)	Logical Silence	Audio	Disabled											
999	Activated by user Snooze	Snooze	More	Critical											