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Overview - IPTV Endpoint Measurement

BeyondTest IPTV is an Endpoint Section's Quality Measurement Solution "HDMI Output based QoE¹⁾ Measurement" is the Key Feature which Enables Measuring End-User's experience



The Needs for Endpoint Quality Control

The actual quality of the end user experience can not be measured only by Headend or Network sections
 As the IPTV service requires more resolution, bandwidth and compression rate, the sensitivity of QoE deterioration has increased

Channel Zapping, An Example – Actual STB's channel zapping duration (1,641.14ms) is significantly different from N/W Leave-Join duration (16ms)



1) QoE : Quality of Experience / 2) QoS : Quality of Service

Features - Broadcasting Monitoring

Real-time QoE and QoS simultaneous monitoring is available

(1) Workflow



(2) Monitoring Criteria

QoE



Demonstration Videoclip

	Video Quality		Audio	Quality
Black Screen	Freeze	Macro Block	Loudness	Silence
Raises when whole screen remains black [for more than N ms (milli-seconds)]	Raises when screen keeps output same frame [for more than N ms (milli-seconds)]	Raises when Macro blocks occurred for more than N% of the screen area	Continuously Measures Loudness in LKFS¹⁾ unit (ITU-R BS.1770 Compatible)	Raises when audio remains mute [for more than N ms]
Remains	Uses Uses Differential Framing			

QoS

Media Delivery Index (MDI)									
Media Loss Rate (MLR)	Delay Factor (DL)								
Detects damaged packets from MPEG2TS	Detects Jitter from streaming packets								



Broadcasting Monitoring - Necessities for monitoring both QoE & QoS

The video may be broken even if the packet is normal, due to poor encoding

The poor encoding may be caused by

- The Head-end
- The contents itself which already created in low-quality

Common Macro-Block Cases

- MPEG2TS packets are damaged



Special Macro-Block Cases

- Although the packets are normal, Macro-Block may occur due to other reasons



(1) Head-end Encoding Issue

 The content is wrongly encoded at the Head-end



(2) Contents Quality Issue

- The content(vehicle black box's videoclip) is already created in low-quality



Broadcasting Monitoring - Deep-Learning based Monitoring

NEXTLab adopted deep-learning based monitoring technology for continuous detection improvement



1) "Method and apparatus for detecting screen broken from real time video streaming" : Korean Patent Registered(10-1849092) & PCT Pending

Features - STB Performance Testing

Quantitative Measurement of STB's performance is available Co-developed with SK Telecom between 2015~2016



(2) Testing Criteria





Features - STB Performance Testing (Cont'd)

Quantitative Measurement of STB's performance is available

(2) Testing Criteria (Cont'd)





STB Performance Testing – Measurement Comparison Samples





[Units : ms (milli-second)]



Features - STB Function Testing (Test Case based)

Available to test STB's functions with script based test cases

(1) Workflow



(2) Application examples



(Repeatable testing is possible)



▶ 프로젝트 개요

Case Study - SK Broadband in Korea

NEXTLab has been providing BeyondTest IPTV to SK Broadband since 2014

The Solution's Quantitative Measurement helped SK Broadband to improve service quality and STB performance

Customer Benefits Earned	Customer Needs	NEXTLab's Solution
Life Cycle Management at Every STB Development Process 2018	- Manage measurement history during STB development and upgrade process	 Upload every STB UI'sQoE test results Track issue processing status regarding test result
Optimized Servers & Network by Region Verified QoE Change Correlation with Servers & Network Load2017	 New cloud-based STB UI has leaded quality deviation by region and time Improve cloud-based UI quality 	 - 24/7 Iterative STB UI's QoE testing by region - Upload results to server
Improved STB Performance by Analyzing the Weaknesses against Competitors 2016	 Usability became major differentiation factor Improve STB's reaction quality 	- Quantitative measurement of STB UI's QoE
Optimized Headend & Network (Video Monitoring) Met Gov't Loudness Regulation (Audio Monitoring) 2014	 Improve channel streaming quality Compliance Loudness Level 	 Every Channel's real-time video & audio monitoring nationwide 24/7 unmanned monitoring

Capable Applications - 24/7 Broadcasting Monitoring

- 24/7 Nationwide IPTV Broadcasting monitoring is available
- Monitoring status can be checked at once on the website of the 'Management Bot'



Capable Applications – STB Verification Center

- Collecting test results and performing issue tracking are available
- You can compare test results or get Insights through the automated reporting



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Issue Tracking Feature Failed Test Cases are registered as Issues and tracked



Stations (Base or w/ Performance testing option)

Appendix. About NEXTLab

Innovative Testing Solution Provider since 2012

Core Competencies - Automated Testing & Quality of Experience(QoE) Measurement



History - Delivered to Korea's major Manufacturers & Service Providers



Direct Inquiry : Sungmin Kim (Director) smkim@nextlab.co.kr +82-10-9328-0336



• Location

9th floor of JS Bldg., 22 Seoun-ro, Seocho-gu, Seoul, Korea



sales@nextlab.co.kr



www.nextlab.co.kr

