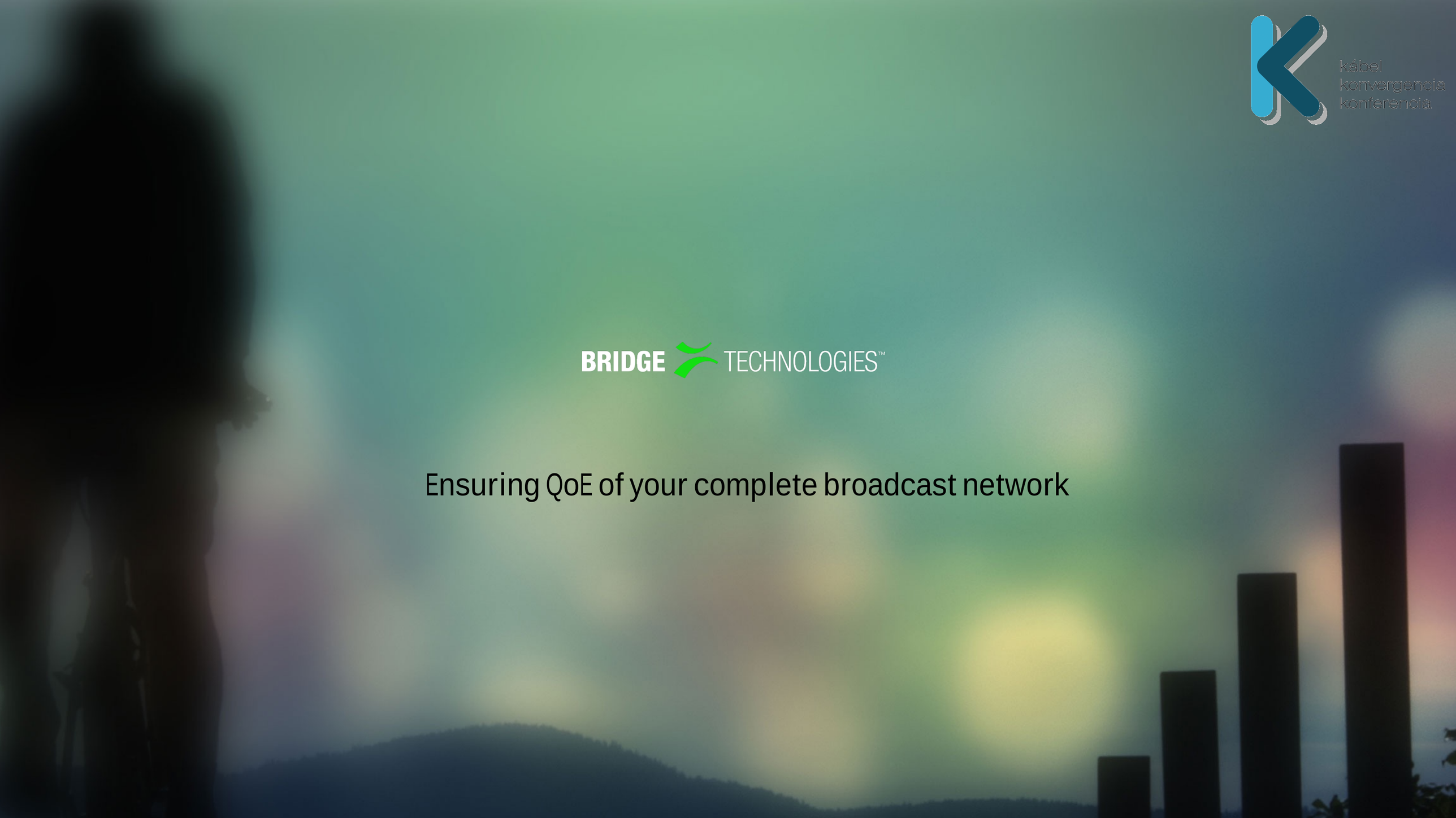
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BRIDGE TECHNOLOGIES™
Ensuring QoE of your complete broadcast network

# Attempts at definitions

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## QoE – Quality of Experience

- Looks at picture quality as opposed to quality of underlying transport mechanisms
- Sometimes extended to cover the overall user experience such as customer satisfaction, feelings, price, cognition, ease/difficulty of operating remote control
- Two predominant methods: Reference-based QoE vs Non-reference based QoE

## QoS – Quality of Service

- Looks at the carriage quality of all transport layers except the picture itself
- Well established through a number of standards
- Covers many technologies and applications: RF, Transport Stream, IPTV, OTT/ABR and more

seen by users

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# QoE - content quality

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- Produces hard, empirical QoE data without the false positives
- Objective video and audio monitoring of MPEG-2, h.264/MPEG-4 and h.265/HEVC streams
- Monitors services objectively at the point of transmission
- Unique web browser based remote video wall
- Visual status anywhere
- Software/Hardware based solution
- Thumbnail and metadata extraction and content alarming


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# QoS - service quality

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- Detailed data and visuals for Error, Jitter, Dropped packets, Latency and low throughput analysis
- Visual at-a-glance monitoring in the NOC, VOC, head-end or remotely via any standard web browser
- Condensed mosaic data view of all services monitored
- Data correlation, historical and real time understanding
- Alarming for up to 100 TV multicast streams/OTT concurrently
- PDF Reports for easy system performance analysis by management/engineering staff


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# Complexity dictates a simplification through a Mean Opinion Score number (MOS)

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- Number between 1 and 5 where 1 is worst and 5 is best – common in voice systems
- Some (often vendor spesific) weighting of primary parameters into MOS score
- Makes it easy to compare and sometimes pinpoint fault but not so easy to spot root cause of what is wrong

| Scores | Quality | Impairment |
|---|---|---|
| 5 | Excellent | Imperceptible |
| 4 | Good | Perceptible, but not annoying |
| 3 | Fair | Slightly annoying |
| 2 | Poor | Annoying |
| 1 | Bad | Very annoying, unwatchable |


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# “Is my customer happy with the good image quality?”

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# “QoE with my latest and most performant encoder is bad”

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# “My QoE score is low because of a long freeze frame”

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# “Blurry pictures result in unhappy customers”

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# QoE and QoS: Use the right tool for the task at hand

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QoS – Quality of Service

Measures at transport level (RF, Ethernet, IP, TS layer)

Examples: IP packet loss, TR 101 290, RF MER

Does not require content to be decrypted/decoded

Can derive service affecting issues by using proper threshold templates and Errored Seconds concept

Do many times throughout signal chain to pinpoint faults

**QoE – Quality of Experience**

Measures at picture content level

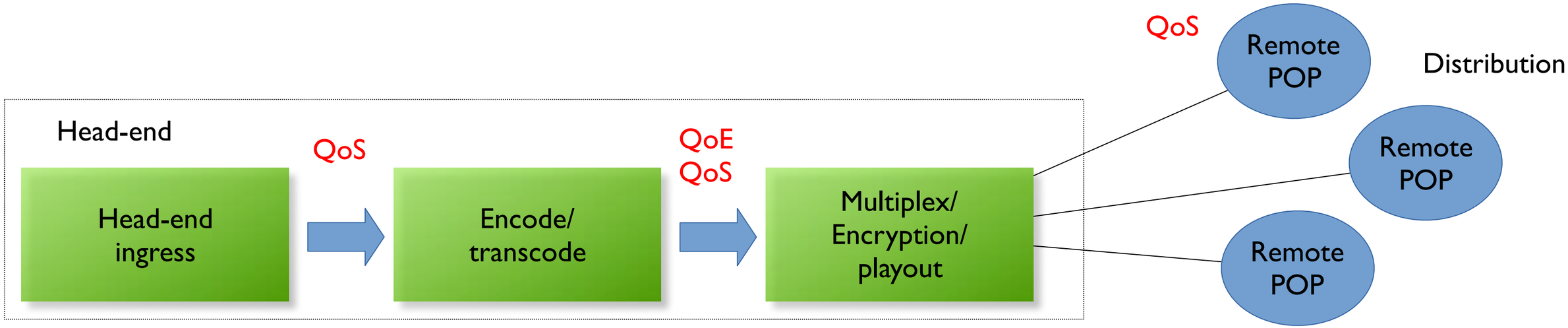
Black frame, Freeze frame

Audio silence/excessive audio level

Resolution discrepancies

Requires **decryption/decoding**

Use when signal is **transcoded** or **re-encoded**





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# End-to-end monitoring user experience

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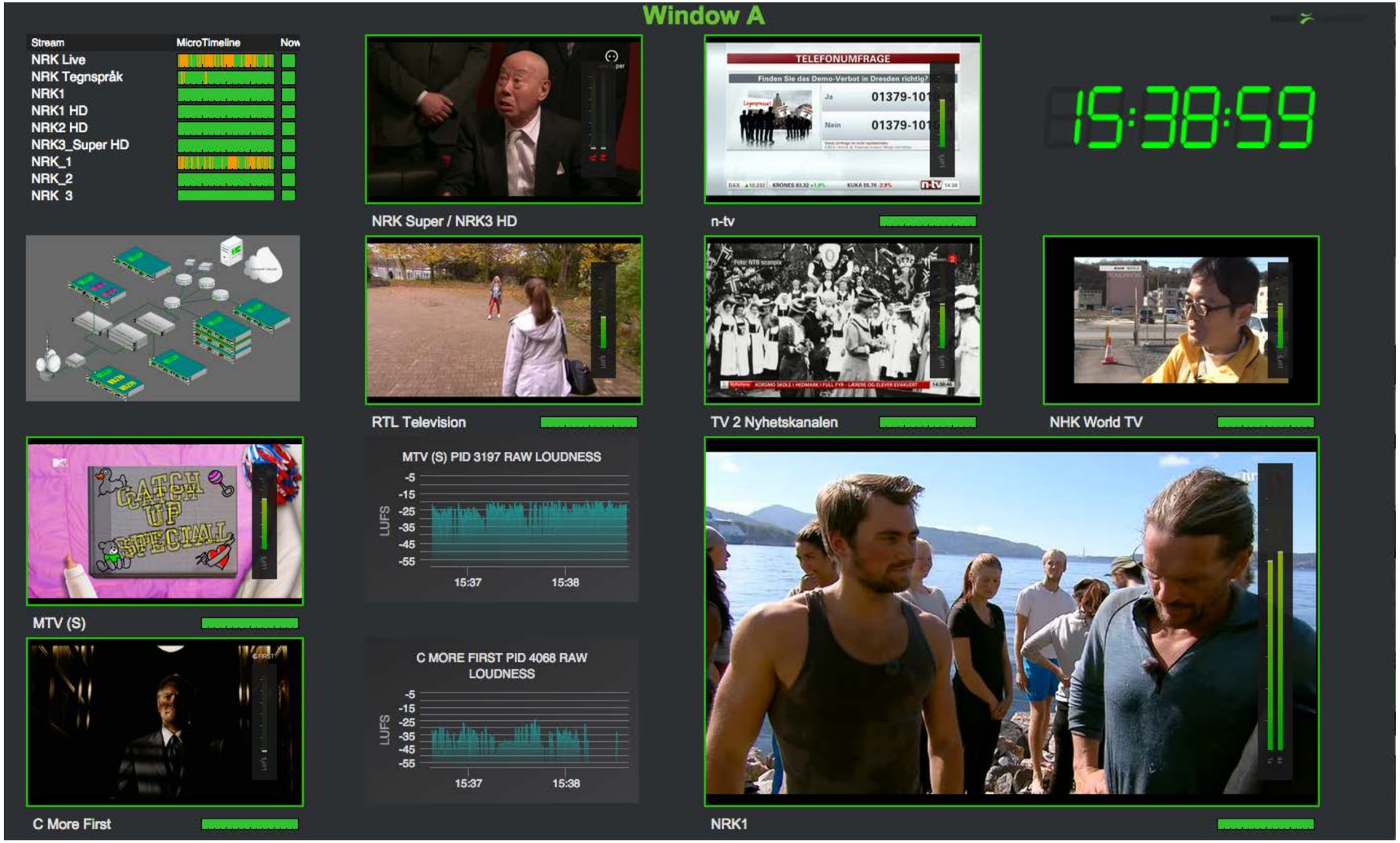
- Top level view for NOC
- Combination of:
  - Video thumbnails
  - Microtimeline™
  - Alarm list
  - Other meta data
- Alarm aggregation
- Drill down to stream details




Visualisation is a key factor for efficient service assurance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# Over The Wall

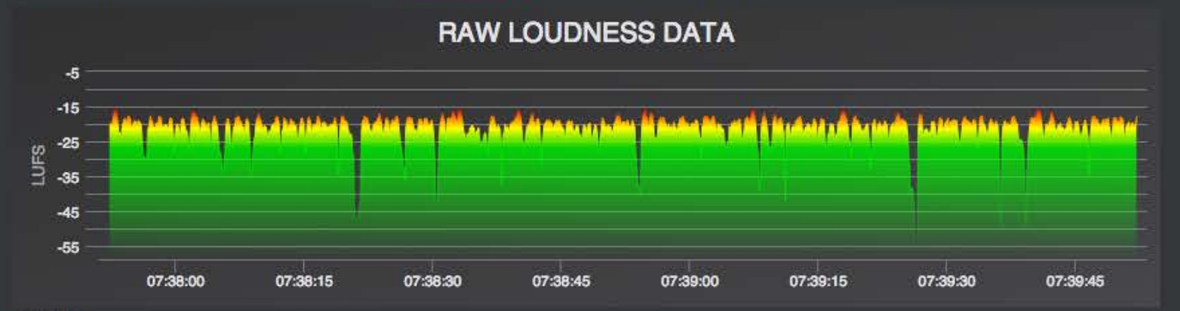
NRK1

NRK2

CNN (multicast)

CNN (OTT)

n-tv




CNN

NASA TV

Thursday 9 October 2014
9:40:08 a.m.

Tic toc

| | Service | Alarm type | Site:Blade | Activated | Interface |
|---|---|---|---|---|---|
| | 1ST BALTIC MUSIC@A | No signal | HEADEND_CONTENT:125 | Oct 8 20:06:16 | Ethernet |
| | 3sat@A | No signal | HEADEND_CONTENT:125 | Oct 8 20:06:16 | Ethernet |
| | 6eren HD@A | No signal | HEADEND_CONTENT:125 | Oct 8 20:06:16 | Ethernet |
| | 6eren HD@B | No signal | HEADEND_CONTENT:125 | Oct 8 20:06:16 | Ethernet |
| | 7eren@A | No signal | HEADEND_CONTENT:125 | Oct 8 20:06:16 | Ethernet |
| | ALJAZEERA_INT@A | No signal | HEADEND_CONTENT:125 | Oct 8 20:06:16 | Ethernet |
| | ANIMAL_PLANET@A | No signal | HEADEND_CONTENT:125 | Oct 8 20:06:16 | Ethernet |
| | Arirang TV@A | No signal | HEADEND_CONTENT:125 | Oct 8 20:06:16 | Ethernet |
| | BBC_ENTERTAINMENT@A | No signal | HEADEND_CONTENT:125 | Oct 8 20:06:16 | Ethernet |
| | BBC_KNOWLEDGE@A | No signal | HEADEND_CONTENT:125 | Oct 8 20:06:16 | Ethernet |
| | BBC_LIFESTYLE@A | No signal | HEADEND_CONTENT:125 | Oct 8 20:06:16 | Ethernet |

# Objective QoE – an open approach

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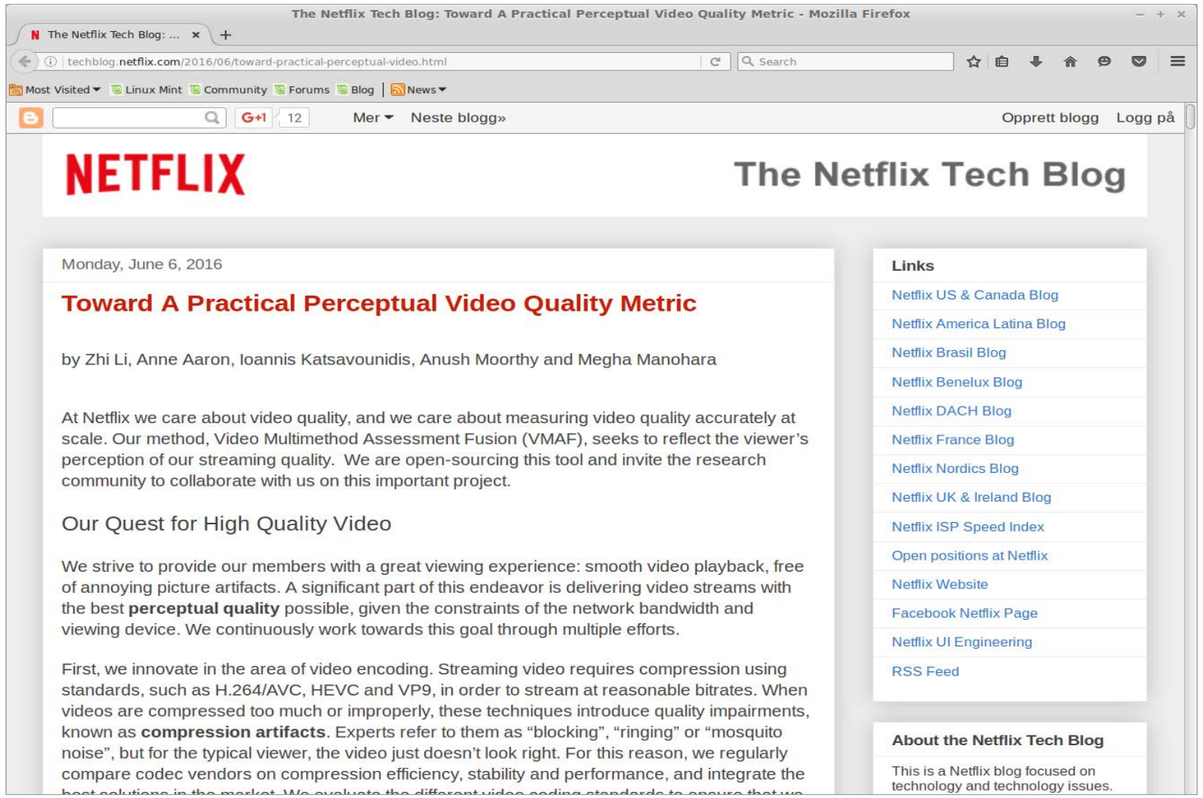
- Open-source framework called Video Multimethod Assessment Fusion (VMAF)
- Driven by Netflix: http://techblog.netflix.com/2016/06/toward-practical-perceptual-video.html
- Reference-based approach to QoE
  - We always compare against something

- VMAF is implemented in VB288 and VB330-V
- Bridgetech added own code to do frame alignment so we can compare VMAF readings across different probes





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# Objective QoE – VMAF in VB288 for ABR/OTT streams:

- We see the VMAF score in % of each OTT profile
- The top (highest bandwidth) profile is the reference profile and has score 100%

# Objective QoE – VMAF with trending over time

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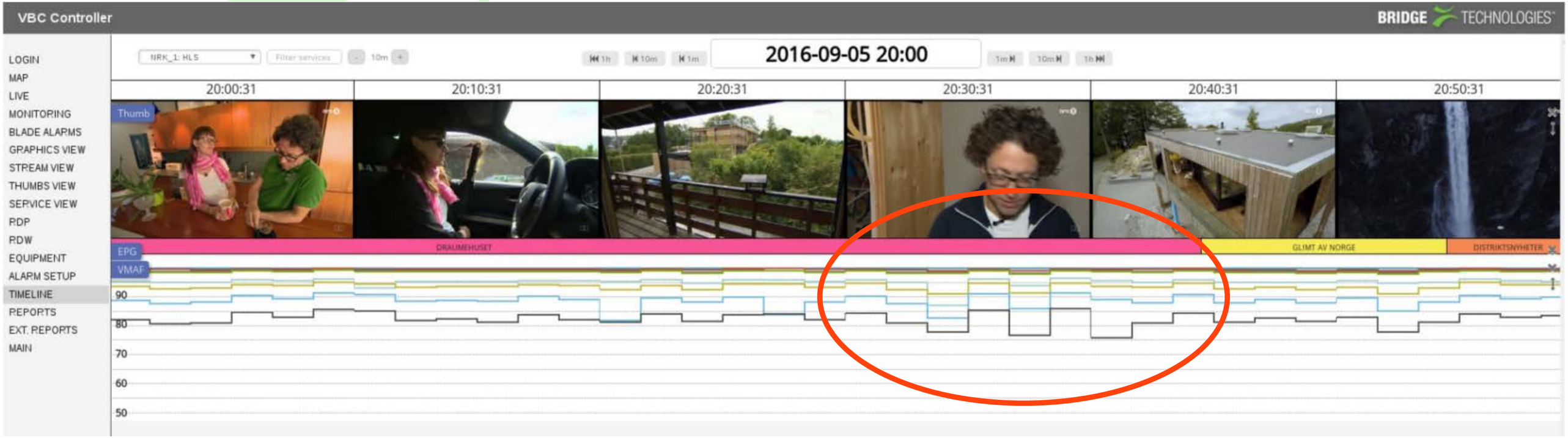


- We see VMAF score in % of each OTT profile over time
- Complex scenes with movement drop in score on the lower-bandwidth profiles as expected


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# VB330 10G PROBE: Monitor everything in one probe - not only video

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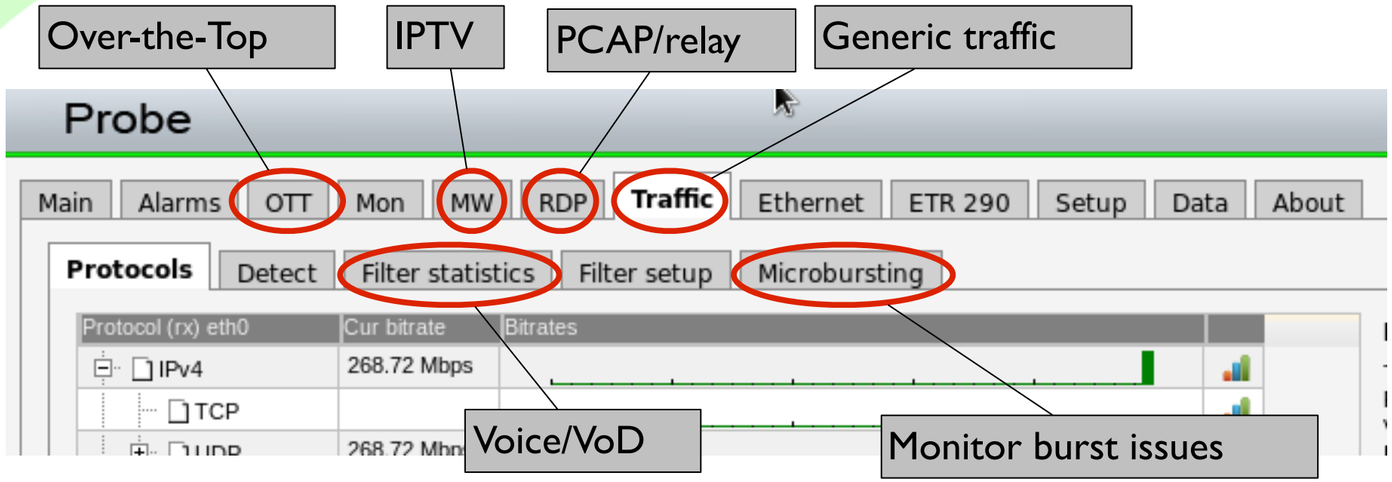


Up to 2000 multicasts for IPTV television
Up to 500 channels for Over-the-Top (OTT) streaming
Monitor quality of all sessions in a Video-on-Demand trunk without having to join
Monitor RTP Voice trunks
Inspect and graph individual bandwidth of all major protocols
Perform PCAP packet capture for off-line analysis


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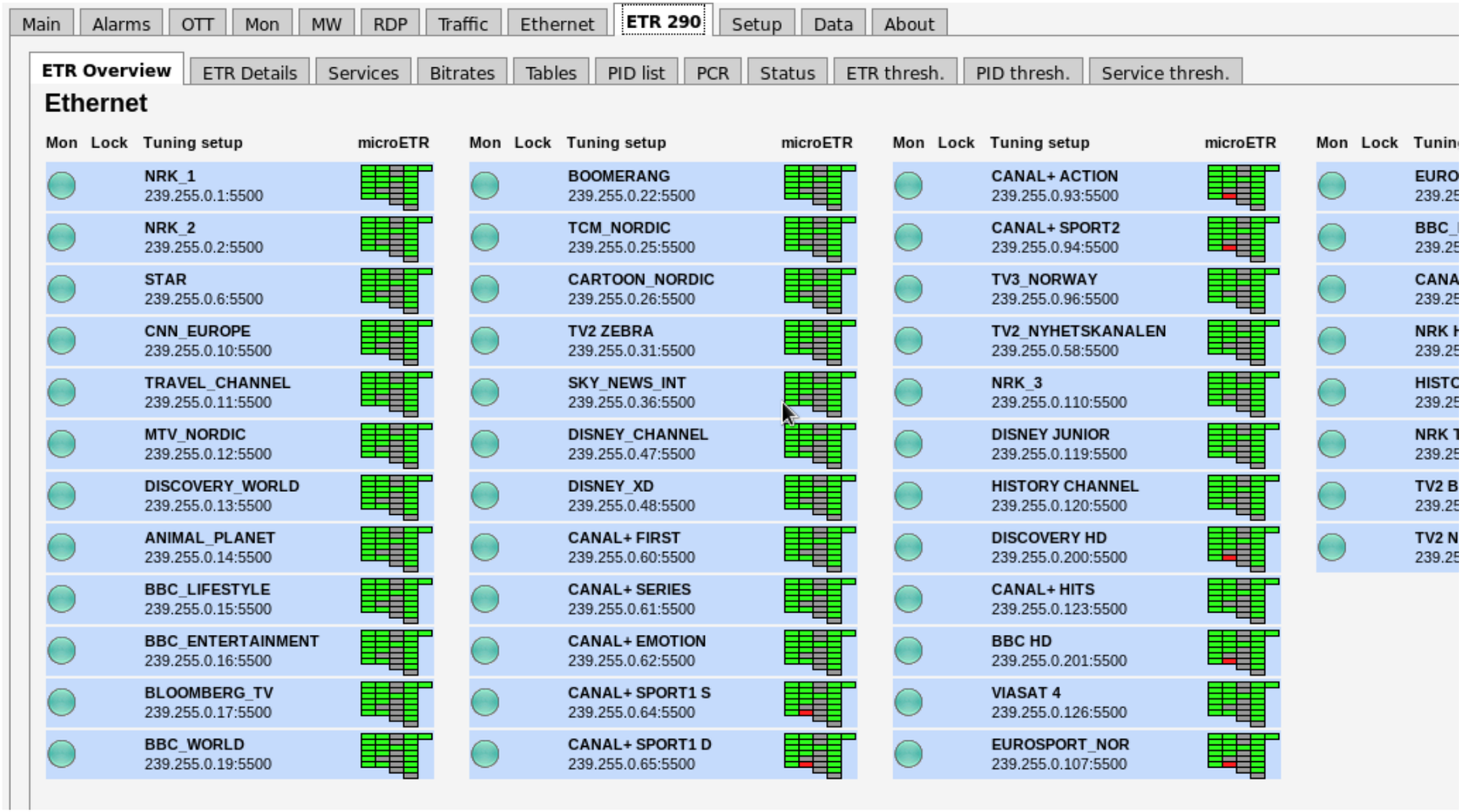
# High capacity ETSI TR 101 290




- Up to 400 TR 101 290 analyze engines running in parallel
- Full Priority 1, 2 and 3 analysis & alarming except Buffer Fill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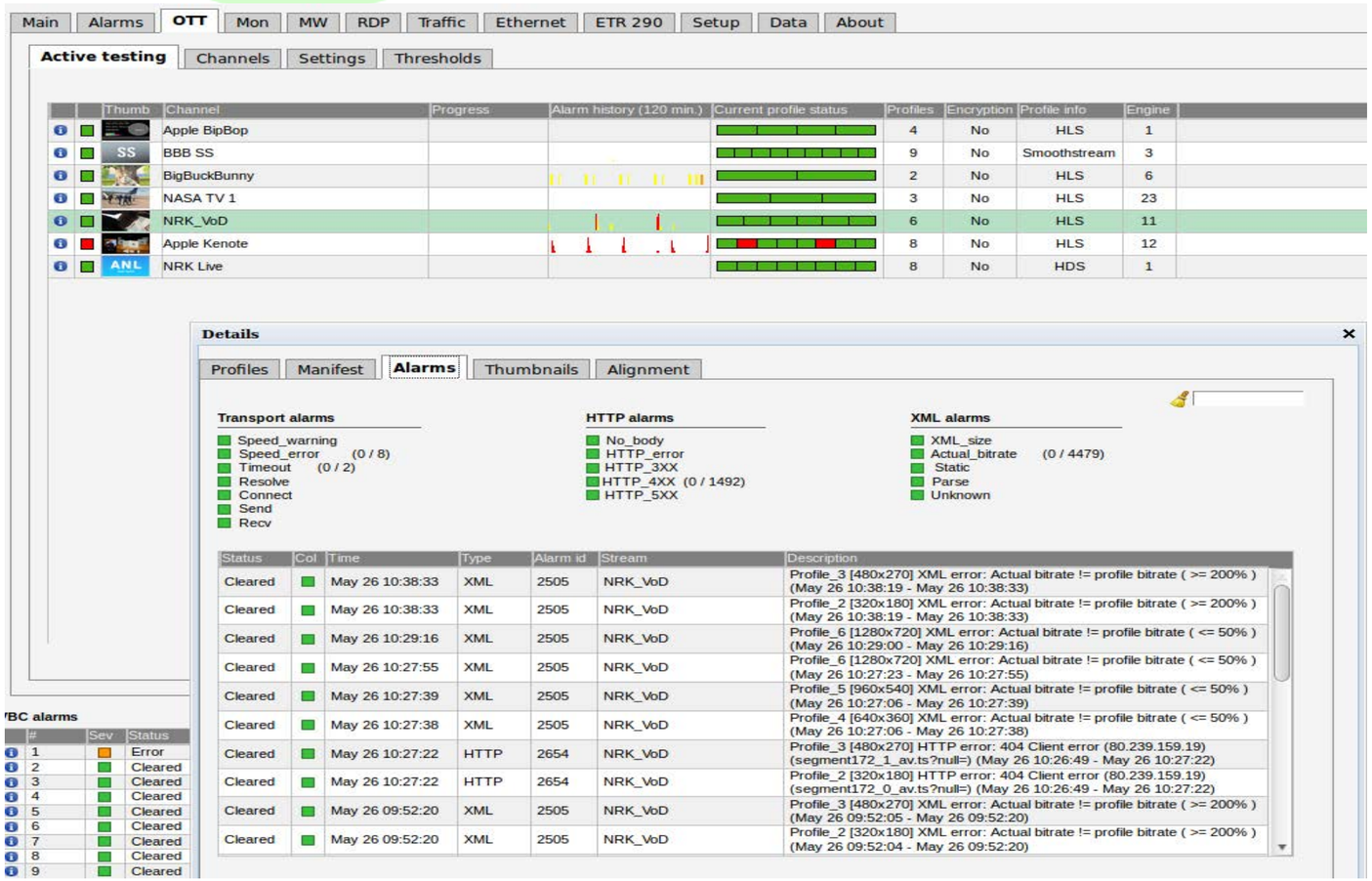
# OTT monitoring




- 50 engines monitoring up to **500** TV channels with as many profiles you like
- Apple **HLS**, microsoft **Smoothstream**, Adobe **HDS**, MPEG **DASH**, **RTMP** VALIDATION
- Ideal at Origin server, core nodes and at ISP handover points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# Gold TS - advanced QoS

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**Gold TS Protection™**

• Gold TS Protection is a new technology that makes monitoring for digital services much quicker to set up, and fault-tracking much faster, more accurate and secure. Developed exclusively by Bridge Technologies, Gold TS Protection includes all the checks specified in the ETR290 standard, but goes much further to include testing for critical conditions missed by ETR290.


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# VBC data model

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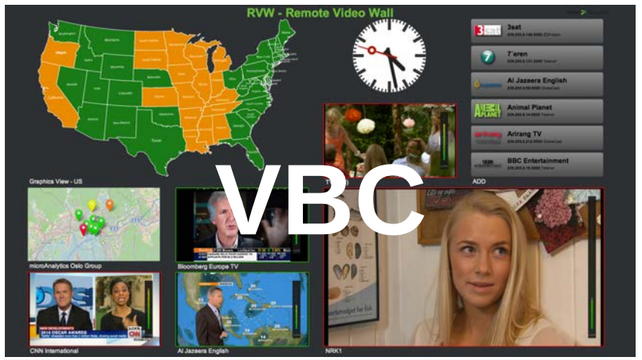
ARCHIVE SERVERS




TIMELINE

RDW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# Right tool for the right task

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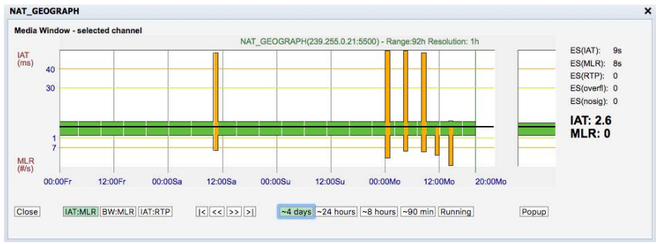
Protected content




QoS

Gold TS PROTECTION

Unique tools

QoE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# Thank You