



AUDIO+
VIDEO+
DATEN
MANAGEMENT



März 2016

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Qualitätssicherung

**Compliance-
Monitoring
Recording**

von DVB Diensten

- Wer ist AVDM?
- Loudness Monitoring
- Compliance Recording
- Monitoring von DVB-Diensten
- Qualitätssicherung von 2nd Screen Applikationen

Zwei Geschäftsfelder

| Geschäftsfeld | Qualitätssicherung | | | Infrastruktur & Werkzeuge | | |
|-----------------|--|---|--|--|---|---|
| Benutzergruppen | Labortechniker  | Feldtechniker  | Techniker in NOC's  | Feldtechniker  | Netzwerk Techniker  | |
| Lösungen | Labor Testinstrument  | Mobile Feld Testinstrument  | Monitoring, Fault & Asset Management  | Verbindungstechn  | Werkzeuge  | SFP/SFP+  |
| Bereiche | <ul style="list-style-type: none"> • Verfügbarkeits- und Leistungsmessung und Überwachung • Qualitätsmanagement • Asset Management | | | <ul style="list-style-type: none"> • 1GE / 10GE / 100GE Transceiver • Infrastruktur (passive und aktive Komponente) • Werkzeuge für Verbindungstechnik | | |
| Nutzen | <ul style="list-style-type: none"> • Überprüfung von SLA's und QoS • MTU (Mean Time To Understand) Minimierung im Fehlerfall • Erhöhung der Kundenzufriedenheit durch Netzwerk und Service Verfügbarkeit und Qualität. • Effizienter Einsatz von Infrastruktur | | | <ul style="list-style-type: none"> • Reduktion von potentiellen Störquellen durch Langlebige Verbindungstechnik • Kurze Montagezeiten durch innovative Werkzeugtechnik | | |
| Partner: |  | | |  | | |



Begriffserklärung Lautheit - Lautstärke

Lautheit ist die messtechnische Erfassung die eine proportionale Abbildung des menschlichen Lautstärke-Empfindens (Einheit **sones**)

Lautstärke ist die physikalische Maßeinheit des Schalldrucks (Einheit **phon**)

Lautheit kommt aus der Psychoakustik und beschreibt die persönliche Wahrnehmung die sich zusammensetzt aus physischen Schallstärke (Amplitude), der Frequenz, der Bandbreite, der spektralen Zusammensetzung, dem Informationsgehalt, der zeitlichen Struktur, der subjektiven Einstellung, sowie der Einwirkungsdauer des Schallsignals

Begriffe aus dem „Loudness Control“

Programm:

- Individuelles, eigenständiges Programmstück (Sendung)
- Aber auch ein Trailer, Werbespot, Eigenreklame, Pauseneinspielung

Programmlautheit:

- Programmlautheitspegel ist der integrierte Wert über die Dauer eines Programms, der resultierende Wert ist „LUFS“
 - LUFS=Loudness Units Full Scale

Lautheitsbereich: (LRA)

- Verteilung des Lautheitspegels innerhalb eines Programms

Maximaler Spitzenpegel:

- Maximale Wert der Audio-Wellenform eines Programms

Loudness Control gemäß EBU R128



- Die Parameter Programmlautheit, Lautheitsbereich und maximaler Spitzenpegel beschreiben ein Audiosignal
- Zielwert der Programmlautheit ist **-23,0 LUFS** (loudness units full scale)
- Abweichungen maximal **± 1 LU** (loudness units)
- Der maximale Spitzenpegel soll höchstens **-1dBTP** (dB TruePeak) sein

Ziel:

innerhalb eines Programmes soll eine gemittelte Lautheit konstant bleiben

Die zu überwachenden Parameter

- **Momentary (0,4s)**
 - Kurzzeit Messung der Lautheit
- **Short term (3s)**
 - Sampling über 3 Sekunden
- **Integral (von Start bis Stop)**
- **Loudness Range (>60s)**
 - Variation der Lautheit über einen längeren Zeitraum

Alarms Info Packets Alarm Settings Loudness

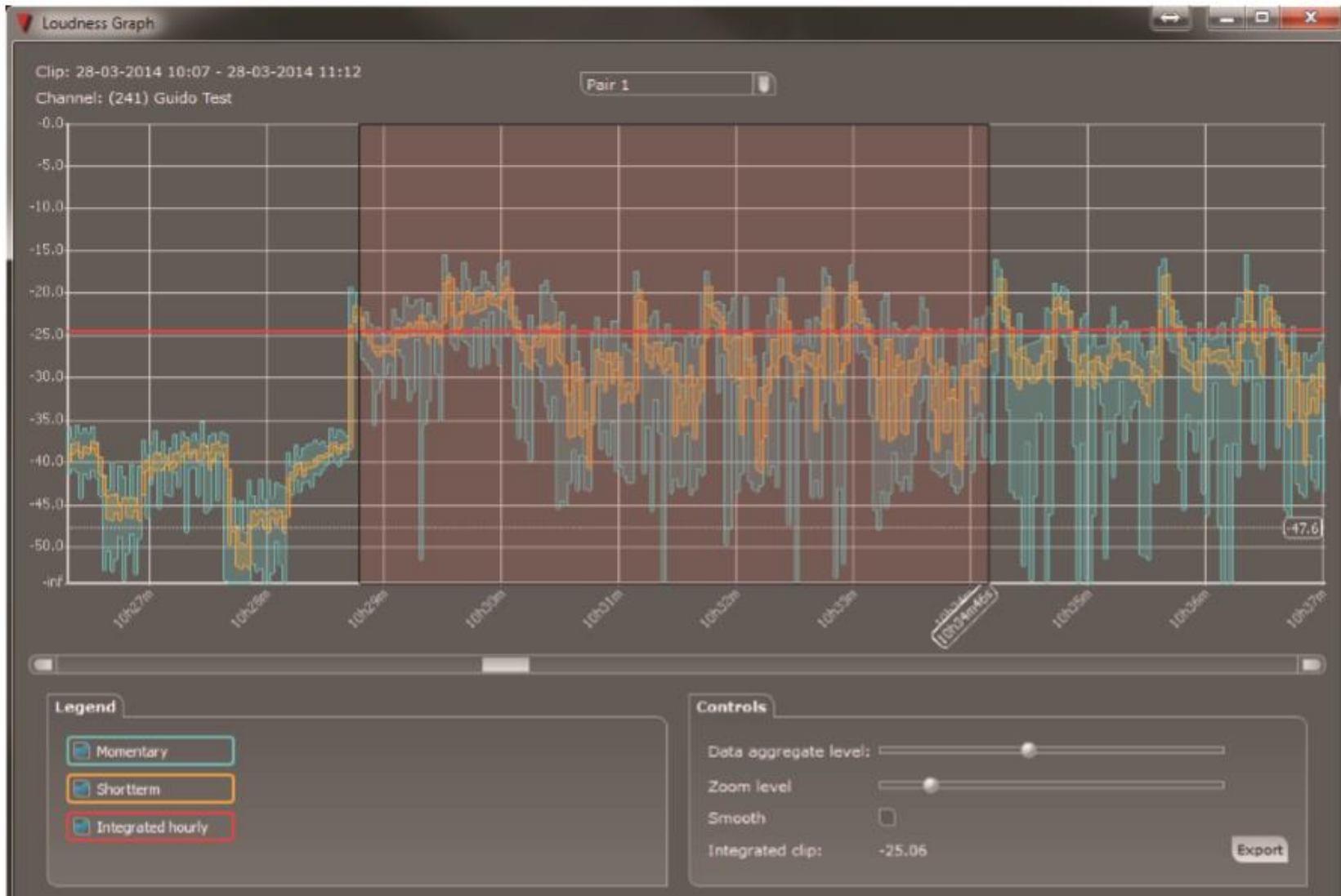
Loudness values for PID 2433 : Audio

Reset

Loudness values

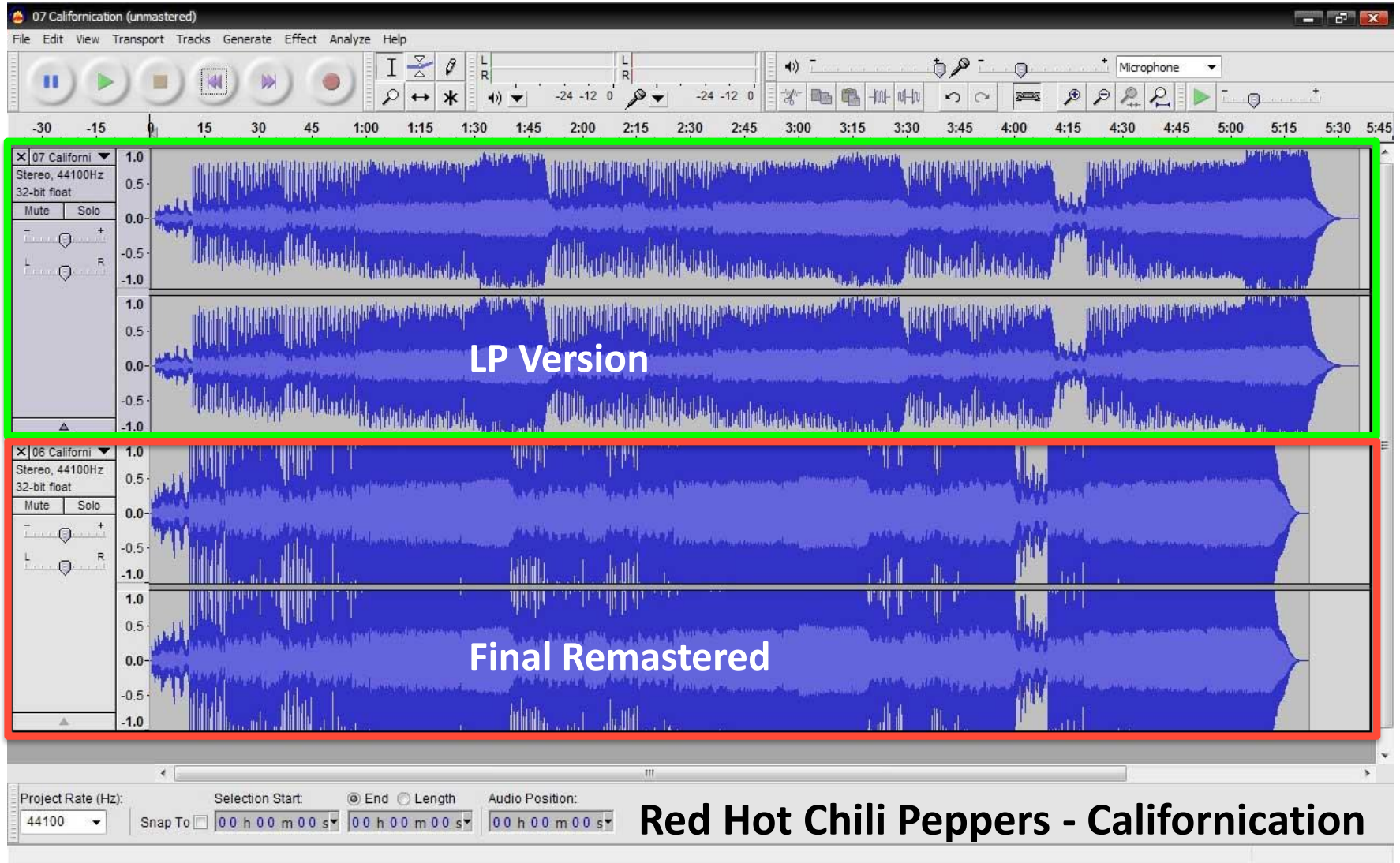
| | |
|------------------------|------------|
| Momentary (M): | -19.9 LUFS |
| Short term (S): | -20.8 LUFS |
| Range (LRA): | 4.3 LU |
| Integrated (I): | -21.2 LUFS |
| Station: | Unknown |

AXON – Tracs: Compliance recording-monitoring



Das ist nicht gemeint.....

Im Musik Business gibt es den „Loudness-War“



Get rid of the tapes



Was wird aufgezeichnet?

- 7x24h Video und Tonaufzeichnung
- Zusatzdienste wie Teletext und Untertitel
- Signalisierungen wie „WSS“, etc..

Warum wird aufgezeichnet?

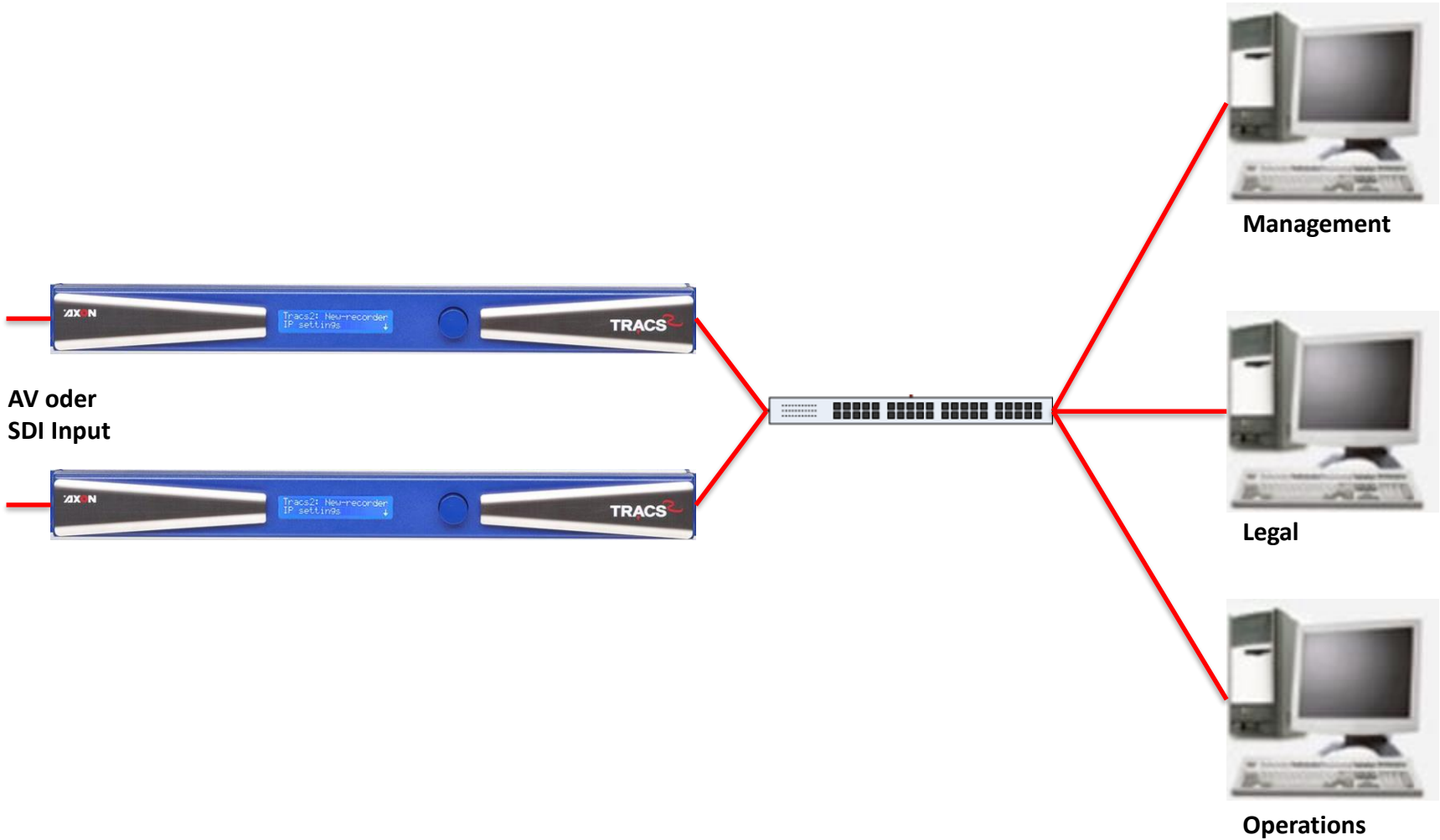
- Als Beleg bei Rechtsstreitigkeiten
- Überprüfung von Werbeschaltungen
- Zur Unterstützung bei der Fehlersuche

Wie wird aufgezeichnet?

- In einem nicht editierbaren Format
- Mit Zugriffsschutz (Benutzerrechte)
- Auf ausfallsicheren Storalösungen

Vorteile solcher Systeme?

- Einfache Suche nach Datum/Uhrzeit
- Multi-User / unterschiedliche Rechte
- Multicast-streaming für den „Aircheck“



Bandlose Aufzeichnung

The screenshot shows the TRACS software interface with a grid of eight video thumbnails. The thumbnails are arranged in two rows and four columns. The top row contains thumbnails for (243) NL1, (90) NL2, (247) News, and (245) Sports1. The bottom row contains thumbnails for (245) Sports2, (246) TeleShop, (245) Movies1, and (245) PreviewTV. Each thumbnail displays a different video scene, such as a news anchor, a map, a news ticker, a person with balloons, a person on a beach, children holding hands, a movie scene, and a person on a phone. The interface includes a sidebar on the left with options like Monitor, Search, Profile, and System. At the top, there are buttons for Add, Remove, Edit, Monitor live, and Save layout. At the bottom, there is a Logout button and system information.

Organisation der thumbnails mittels Arbeitsblätter

Live und Real time Monitoring von beliebigen Kanälen

Video, Audio und VBI Status Indikatoren pro thumbnail

Monitoring Seitenlayout ist Benutzerspezifisch

Thumbnails sind in der Grösse anpassbar

TRACS - Logged in as: tracs
Add Remove Edit Monitor live Save layout
All channels Local channels News Sports
(243) NL1 (90) NL2 (247) News (245) Sports1
(245) Sports2 (246) TeleShop (245) Movies1 (245) PreviewTV
Logout
Server version: 2.3.9
Client version: 2.3.2
Connection: Ok

The screenshot shows the TRACS web interface for video playback. The main window displays a video clip with the following text overlay: "01-03-2010 (245) Sports1 13:29:08.19". The interface includes a left sidebar with navigation buttons (Monitor, Search, Profile, System), a central video player, and a right sidebar with clip information and controls. A timeline at the bottom shows a sequence of clips, with a playlist below it. The interface is annotated with red callout boxes pointing to various features:

- Fast forward, backward, and frame by frame clip controls**: Points to the playback controls below the video player.
- Selection of audio pair playback**: Points to the "Audio control" section in the right sidebar.
- Extensive clip information**: Points to the "Clip info" section in the right sidebar, which displays details like Channel Name, Video Codec, Bitrate, Resolution, and Audio Codec.
- TxT and CC decoding on playback**: Points to the "TXT/CC control" section in the right sidebar, which includes a "Display TXT or CC" checkbox and a "Page" selector.
- Thumbnail representation of the timeline**: Points to the timeline strip below the video player.
- Time slider to quickly skip in time**: Points to the time slider and "Playhead" area below the video player.
- Built up your own playlist and download multiple clips in one go**: Points to the "Add to playlist" button and the "Playlist" section at the bottom.
- Set in and out points in the clip**: Points to the "Set in point" and "Set out point" buttons below the timeline.

DVB - Monitoring

Displaying

Analysis

Monitoring

Recording

Streaming

Alarming

Multi-viewer

ShowView

High level
1st Line
Operators

Low level
2nd & 3rd
Line Experts

Logging

Reporting

TS
recording

Triggered
recording

Service
recording

UDP

RTP

Data
Extraction

Email
notification

SNMP Trap
forwarding

WWW
Status

Was wird analysiert?

- **Transportstrom Zustand**
 - TR 101.290 Priority Level 1/2/3
 - TS Gesamtbitraten
 - Service und Netzwerk Signalisierung
- **Service Zustand und Status**
 - Bitraten der einzelnen Services
 - Conditional Access Signalisierung, Timing
 - Video/Audio Probleme (Black/Freeze-Frame, Audio level, loudness)
 - DVB Untertitel und Teletext
 - AIT für OTT
- **Metadaten Status und Inhalt**
 - EPG
- **Visuelle Überprüfung – Multiviewer/Streaming**
- **Reporting**

TR101.290 gibt Auskunft wo Probleme auftreten können

AXON-SMARTDVB_90 ****NAB_2015*** - C:\Users\frank.enkelan\Desktop\demo.cfg (autosave)

File View Configuration Help

Transport Stream

FRANK-PC (local)

- stream 1 (0 alarms)
- stream 3 (0 alarms)
 - Bitrate
 - PSI/SI
 - Analyzed services
 - Das Erste HD
 - arte HD
 - EIT p/f
 - Alarm Settings
 - Video AVC, pid 5111 (0x13F7)
 - Audio, pid 5112 (0x13F8)
 - Audio, pid 5113 (0x13F9)
 - AC3, pid 5116 (0x13FC)
 - Audio, pid 5117 (0x13FD)
 - AIT, pid 1270 (0x4F6)
 - Teletext, pid 5114 (0x13FA)
 - DVB subtitles, pid 5115 (0x13FB)
 - DVB subtitles, pid 5118 (0x13FE)
 - Not in displays
 - SWR BW HD
 - EIT p/f
 - Alarm Settings
 - Video AVC, pid 5121 (0x1401)
 - Audio, pid 5122 (0x1402)
 - Audio, pid 5123 (0x1403)
 - AC3, pid 5126 (0x1406)
 - AIT, pid 1370 (0x55A)
 - Teletext, pid 5124 (0x1404)
 - DVB subtitles, pid 5125 (0x1405)
 - Not in displays
 - TV Gelderland
 - Radio 538
 - Radio 10 gold
 - VOX Austria
 - RTL CH
 - Audio Test 3 HE-AAC 5.1 LATM_LAOS / MPE
 - VTM HD
 - Non Analyzed services
 - Analyzed components
 - stream two (0 alarms)

Alarms | Bitrates | PID | TS Services | EPG | Alarm settings | TR290

TR290: stream 3 Last Reset: 20150518 13:16:42 (start TS)

| TR 290 Priority level 1 | # | last_occurrence | Pid | Description |
|-------------------------|---|----------------------|-------------|---|
| 1.1 | | | | TS sync loss |
| 1.2 | | | | Sync Byte |
| 1.3 | | | | PAT |
| 1.4 | 7 | 2015-05-18, 13:32:06 | 611 (0x263) | ETR290: Continuity counter error on PID 611, continuity counter = 5, previous counter = : |
| 1.5 | | | | PMT |
| 1.6 | | | | PID |

| TR 290 Priority level 2 | # | last_occurrence | Pid | Description |
|-------------------------|---|-----------------|-----|-------------------|
| 2.1 | | | | Transport |
| 2.2 | | | | CRC |
| 2.3a | | | | PCR repetition |
| 2.3b | | | | PCR discontinuity |
| 2.4 | | | | PCR accuracy |
| 2.5 | | | | PTS |
| 2.6 | | | | CAT |

| TR 290 Priority level 3 | # | last_occurrence | Pid | Description |
|-------------------------|---|----------------------|-----------|--|
| 3.1 | | | | NIT |
| 3.1a | 1 | 2015-05-18, 13:32:04 | 16 (0x10) | NIT timing error occurred, no NIT received |
| 3.1b | | | | NIT other |
| 3.2 | 2 | 2015-05-18, 13:32:15 | | TDT timing error occurred, no TDT received |
| 3.4 | | | | Unreferenced pid |
| 3.5 | | | | SDT |
| 3.5a | | | | SDT actual |
| 3.5b | | | | SDT other |
| 3.6 | | | | EIT |
| 3.6a | | | | EIT actual |
| 3.6b | | | | EIT other |
| 3.6c | | | | EIT p/f |
| 3.8 | 1 | 2015-05-18, 13:32:15 | 20 (0x14) | TDT timing error occurred, no TDT received |

■ No Alarm
 ■ Partly active
 ■ Alarm
 ■ Recent Alarm
 ■ Since reset
 ■ No Check
 ■ Undefined

Überwachung der Audio- und Videoströme

Video Monitoring:

- Überwachung der Bandbreite und ob das Bild einfriert, oder schwarz bleibt

Audio Monitoring:

- Überwachung der Bandbreite und ob der Ton ausfällt

The screenshot displays the AVDM software interface. On the left, a tree view shows the 'Transport Stream' structure, including 'SMART (local)', 'Ger-test (7 alarms)', and 'Analyzed services'. The 'Analyzed services' section is expanded to show 'ORF, ORF1 HD' with various alarm settings like 'Min bitrate', 'Max bitrate', and 'VBR variation'. The main window is titled 'Alarms: ORF1 HD' and contains a table of alarm events. Below the table, a video player window titled 'ORF1 HD' shows a scene from a movie with a vertical audio waveform overlay on the right side.

| Category | Type | Date / Time | TS / Service | Message |
|----------|------|-----------------------|--------------------|---|
| ALARM1 | A | 03-08-16 01:29:40.790 | Ger-test - ORF1 HD | Service Bitrate = 9260.326 Kbits (too high, max=8.000 Kbits) |
| ALARM3 | D | 03-08-16 15:37:00.990 | Ger-test - ORF1 HD | Variation Bitrate PID 1135 (CBR) = 1391.485 Kbits (too high, max=0.010 Kbits) |
| ALARM3 | D | 03-08-16 15:38:18.398 | Ger-test - ORF1 HD | Bitrate overflow (burst) on PID = 1135 (Video), measured bitrate = 4020.00 Kbits/sec (804 packets within 1000 TS Packets) |
| ALARM4 | D | 03-08-16 15:39:18.867 | Ger-test - ORF1 HD | Audio amplitude too low on pid 1137 (amplitude=-90, min = -12) |
| ALARM4 | D | 03-08-16 15:39:19.072 | Ger-test - ORF1 HD | Audio amplitude too low on pid 1136 (amplitude=-90, min = -12) |
| ALARM3 | D | 03-08-16 16:07:31.107 | Ger-test - ORF1 HD | Variation Bitrate PID 1135 (VBR) = 4904.484 Kbits (too low, min=5000.000 Kbits) |
| ALARM3 | D | 03-08-16 16:07:48.676 | Ger-test - ORF1 HD | PTS min PCR = 1005, above threshold (1000) on PID 1135 |

AXON-SMARTDVB_90 ****NAB_2015*** - C:\Users\frank.enkelaar\Desktop\demo.cfg (autosave)

File Tools View Run Help

Transport Stream

Alarms Bitrates PID TS Services EPG Alarm settings TR290

FRANK-PC (local)

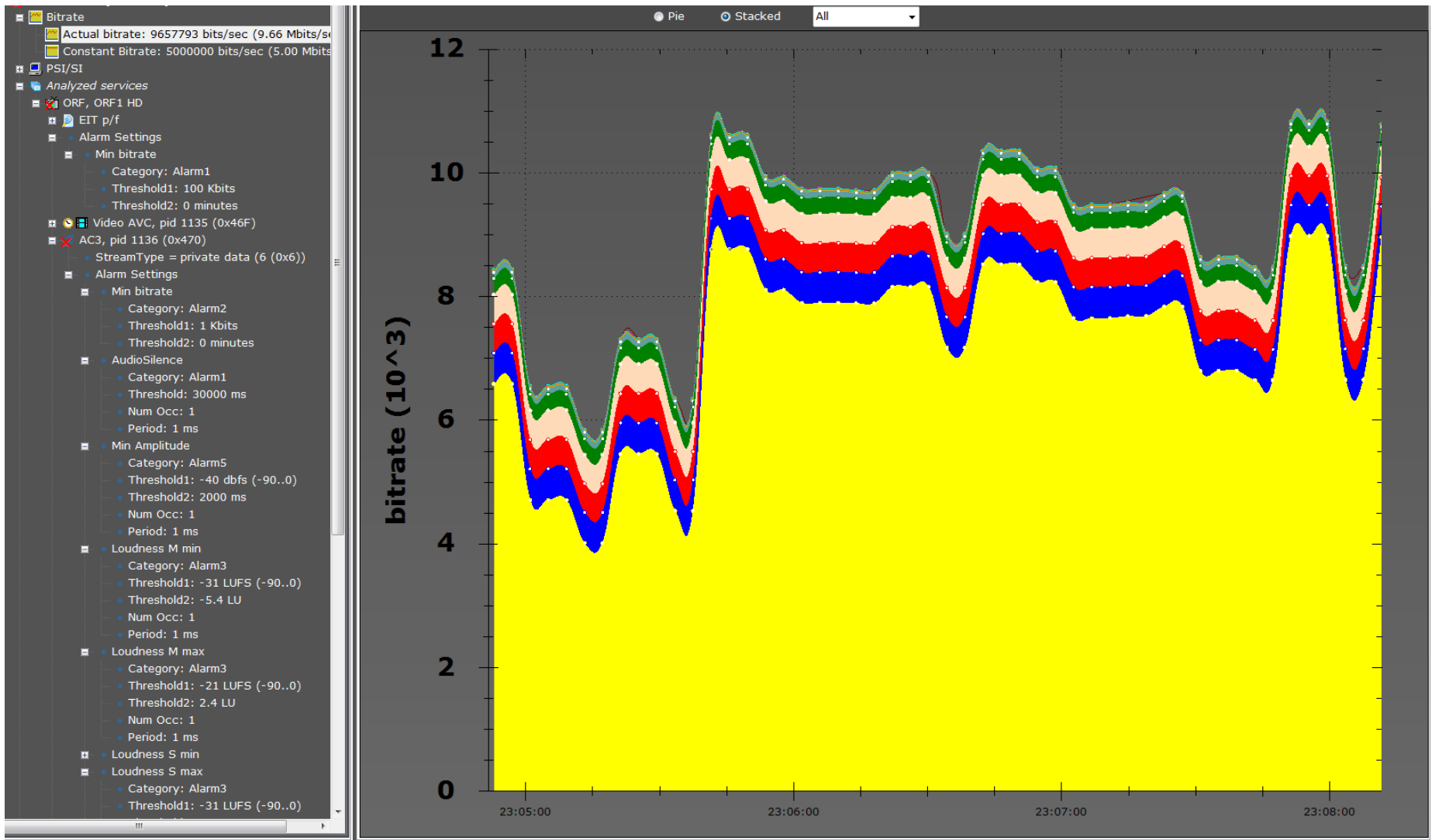
- stream 1 (1 alarms)
 - Bitrate
 - Actual bitrate: 59993172 bits/sec (59,99 Mbit/s)
 - Constant Bitrate: 60000000 bits/sec (60,00 Mbit/s)
 - PSI/SI
 - PAT table_id: 0 (0x0)
 - PMT table_id: 2 (0x2)
 - NIT (actual) table_id: 64 (0x40)
 - SDT (actual) table_id: 66 (0x42)
 - TOT table_id: 115 (0x73)
 - TDT table_id: 112 (0x70)
 - Analyzed services
 - Film 1 Premiere HD
 - Film1 Family
 - Film1 Sundance
 - Film1 Action
 - Sport1 Voetbal
 - Sport1 Golf
 - EDL2
 - Cartoon/TCM
 - Extreme Sports
 - MTV NL
 - TV Oranje
 - Film 1 Premiere HD Copy
 - Sport1 SELECT HD
 - JIM
 - 2BE
 - VIJF
 - VIJF
 - Viitaya
 - Acht
 - KetOp12
 - Non Analyzed services
 - Analyzed components

Bitrates: stream 1

| PID | Description | bitrate | bitrate(graph) | Min | Max | Average |
|---------------|-------------|---------|----------------|--------|--------|---------|
| 86 (0x56) | Audio | 198,5 | [Bar] | 183,2 | 198,5 | 196,0 |
| 88 (0x58) | Audio | 198,3 | [Bar] | 183,2 | 198,5 | 196,1 |
| 90 (0x5A) | Audio | 198,5 | [Bar] | 183,0 | 198,5 | 196,1 |
| 92 (0x5C) | Audio | 198,5 | [Bar] | 183,0 | 198,5 | 196,0 |
| 94 (0x5E) | Audio | 198,5 | [Bar] | 183,2 | 198,5 | 196,0 |
| 95 (0x5F) | Audio | 198,5 | [Bar] | 183,0 | 198,5 | 196,0 |
| 100 (0x64) | Audio | 198,5 | [Bar] | 183,0 | 198,5 | 196,0 |
| 102 (0x66) | Audio | 198,5 | [Bar] | 183,0 | 198,5 | 196,0 |
| 111 (0x6F) | AC3 | 364,4 | [Bar] | 364,4 | 394,9 | 390,0 |
| 120 (0x78) | Audio | 198,5 | [Bar] | 183,2 | 198,5 | 196,0 |
| 122 (0x7A) | Audio | 198,5 | [Bar] | 183,2 | 198,5 | 196,1 |
| 124 (0x7C) | Audio | 198,5 | [Bar] | 183,2 | 198,5 | 196,0 |
| 128 (0x80) | Audio | 198,5 | [Bar] | 183,2 | 198,5 | 196,0 |
| 130 (0x82) | Audio | 198,5 | [Bar] | 183,2 | 198,5 | 196,0 |
| 132 (0x84) | Audio | 198,5 | [Bar] | 183,2 | 198,5 | 196,0 |
| 136 (0x88) | Audio | 167,1 | [Bar] | 154,3 | 167,1 | 165,1 |
| 512 (0x200) | AVC Video | 733,5 | [Bar] | 606,8 | 2103,4 | 1106,3 |
| 513 (0x201) | AVC Video | 1374,9 | [Bar] | 1302,2 | 3029,3 | 1927,0 |
| 514 (0x202) | AVC Video | 1250,1 | [Bar] | 721,5 | 2649,9 | 1731,6 |
| 515 (0x203) | AVC Video | 2432,1 | [Bar] | 2098,6 | 2946,5 | 2520,8 |
| 516 (0x204) | AVC Video | 2397,6 | [Bar] | 804,5 | 2397,6 | 1489,2 |
| 517 (0x205) | AVC Video | 626,8 | [Bar] | 609,0 | 717,1 | 633,4 |
| 518 (0x206) | AVC Video | 2524,0 | [Bar] | 969,1 | 2524,0 | 1610,4 |
| 519 (0x207) | AVC Video | 2883,0 | [Bar] | 2691,8 | 3253,6 | 2950,9 |
| 520 (0x208) | AVC Video | 1508,2 | [Bar] | 1366,8 | 1563,3 | 1477,2 |
| 521 (0x209) | AVC Video | 2312,0 | [Bar] | 2070,5 | 3136,5 | 2510,0 |
| 522 (0x20A) | AVC Video | 6074,8 | [Bar] | 5316,5 | 6544,4 | 6038,4 |
| 523 (0x20B) | AVC Video | 3070,1 | [Bar] | 834,1 | 3122,3 | 2594,2 |
| 550 (0x226) | AVC Video | 3051,5 | [Bar] | 2459,0 | 3275,2 | 2988,1 |
| 552 (0x228) | AVC Video | 1353,6 | [Bar] | 1308,2 | 1969,7 | 1706,3 |
| 554 (0x22A) | AVC Video | 884,4 | [Bar] | 606,4 | 903,5 | 740,0 |
| 558 (0x22E) | AVC Video | 2175,3 | [Bar] | 681,1 | 2788,4 | 1875,2 |
| 560 (0x230) | AVC Video | 2753,8 | [Bar] | 2211,6 | 3221,1 | 2687,7 |
| 562 (0x232) | AVC Video | 2588,6 | [Bar] | 2387,7 | 3094,0 | 2812,7 |
| 566 (0x236) | AVC Video | 2539,7 | [Bar] | 2539,7 | 3246,5 | 2905,4 |
| 8191 (0x1FFF) | Null Packet | 8383,8 | [Bar] | 6751,2 | 8385,1 | 7771,9 |

Anzeige der Bandbreiten Variation

Überwachung des Bandbreitenbedarfs



AIT Analysen

Transport Stream

- SMART (local)
 - Ger-test (7 alarms)
 - Bitrate
 - Actual bitrate: 8798657 bits/sec (8.80 Mbits/sec)
 - Constant Bitrate: 5000000 bits/sec (5.00 Mbits/s)
 - PSI/SI
 - PAT table_id: 0 (0x0)
 - PMT table_id: 2 (0x2)
 - CAT table_id: 1 (0x1)
 - SDT (actual) table_id: 66 (0x42)
 - TOT table_id: 115 (0x73)
 - TDT table_id: 112 (0x70)
 - EIT present following (actual) table_id: 78 (0x4E)
 - EIT scheduled (actual) table_id: 80 (0x50)-95 (0x57)
 - 0..3 days
 - 4..7 days
 - Analyzed services
 - ORF, ORF1 HD
 - EIT p/f
 - No present event
 - No following event
 - Alarm Settings
 - Video AVC, pid 1135 (0x46F)
 - AC3, pid 1136 (0x470)
 - StreamType = private data (6 (0x6))
 - Alarm Settings
 - AC3, pid 1137 (0x471)
 - Teletext, pid 1138 (0x472)
 - AIT, pid 1139 (0x473)**
 - StreamType = private sections (5 (0x5))
 - Alarm Settings
 - Data, pid 1140 (0x474)
 - StreamType = ISO/IEC 13818-6 type B (11)
 - Alarm Settings
 - Not in displays
 - Non Analyzed services
 - Analyzed components

Alarms Info Packets Alarm Settings

Component info

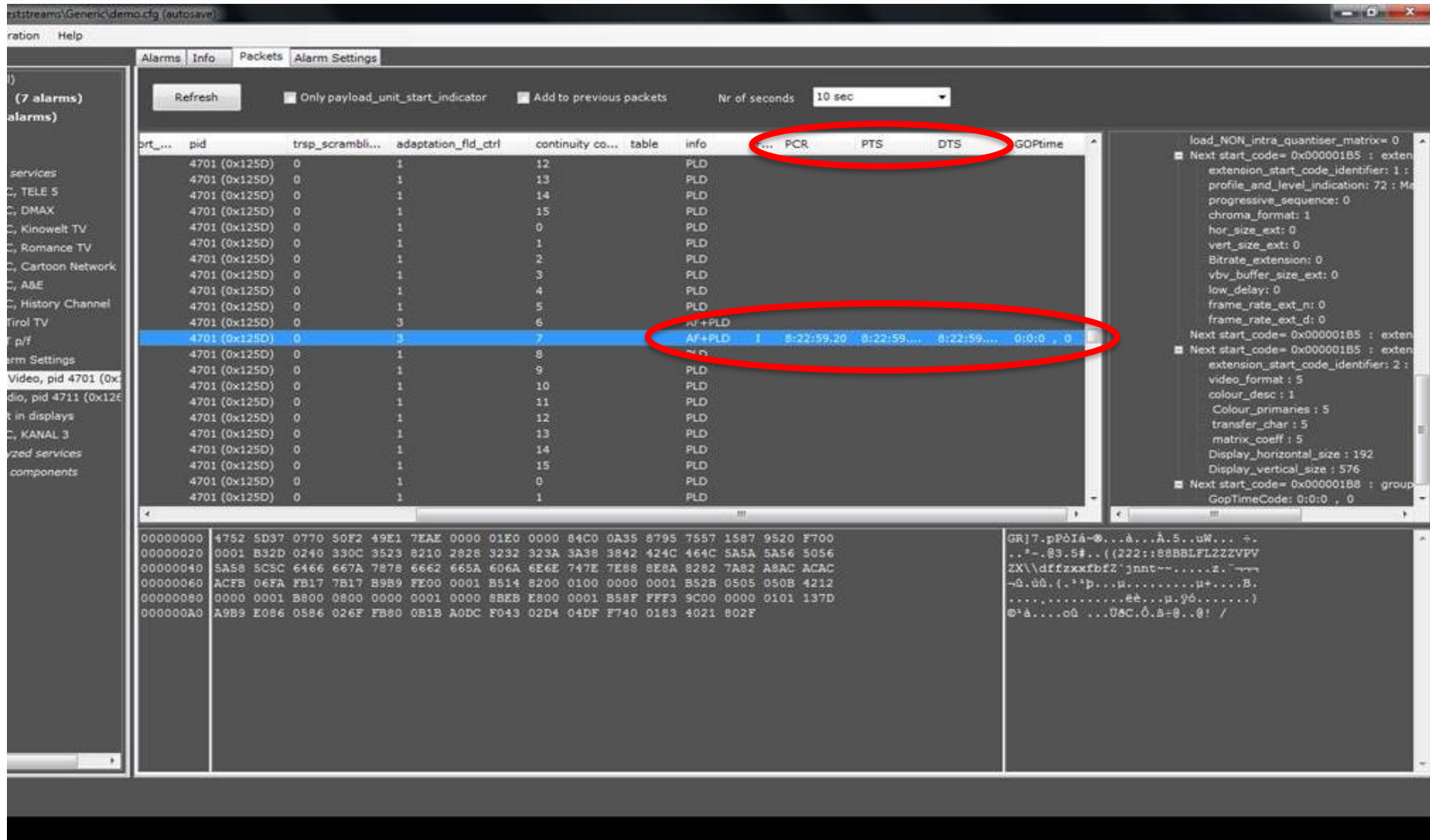
Generic information

| | | | |
|------------------|--------------|---------------------|----------------------------|
| PID: | 1139 (0x473) | StreamType: | private sections (5 (0x5)) |
| Current Bitrate: | 1 Kbits/sec | Scrambling_control: | 0x0 Not scrambled |

AIT

- Version : 2
- application_type : 16 (0x10)
- common_descriptors_length : 0 (0x0)
- application_loop_length : 114 (0x72)
- application 0
 - application_identifier
 - organisation_id : 13 (0xD)
 - application_id : 2 (0x2)
 - application_control_mode : 1 (0x1)
 - Descriptors
 - transport_protocol_descriptor 2 (0x2)
 - protocol_id = 3 (0x3)
 - transport_protocol_label = 0 (0x0)
 - Selector bytes
 - Data, length = 37
 - transport_protocol_descriptor 2 (0x2)
 - application_descriptor 0 (0x0)
 - application_name_descriptor 1 (0x1)
 - application_names
 - application_name = ORF HbbTV - SAT HD
 - ISO_639_language_code = deu
 - application_name_length = 18 (0x12)
 - application_name = ORF HbbTV - SAT HD
 - Data, length = 22
 - unknown 21 (0x15)
 - Data, length = 21
 - Value = 6E657773706F7274616C2F696E6465782E68746D6C
 - Nr Sections: 1

Konformität der DVB-Transportstrom Informationen



The screenshot shows a software interface for analyzing DVB transport streams. The main window displays a table of packets with the following columns: `port...`, `pid`, `trsp_scrmbli...`, `adaptation_fld_ctrl`, `continuity co...`, `table`, `info`, `PCR`, `PTS`, `DTS`, and `GOTime`. The `PCR`, `PTS`, and `DTS` columns are circled in red. The selected row (pid 4701) shows the following values: `AF+PLD`, `1`, `8:22:59.20`, `8:22:59...`, `8:22:59...`, and `0:0:0 , 0`.

| port... | pid | trsp_scrmbli... | adaptation_fld_ctrl | continuity co... | table | info | PCR | PTS | DTS | GOTime | |
|---------|---------------|-----------------|---------------------|------------------|-------|--------|-----|------------|------------|------------|-----------|
| | 4701 (0x125D) | 0 | 1 | 12 | | PLD | | | | | |
| | 4701 (0x125D) | 0 | 1 | 13 | | PLD | | | | | |
| | 4701 (0x125D) | 0 | 1 | 14 | | PLD | | | | | |
| | 4701 (0x125D) | 0 | 1 | 15 | | PLD | | | | | |
| | 4701 (0x125D) | 0 | 1 | 0 | | PLD | | | | | |
| | 4701 (0x125D) | 0 | 1 | 1 | | PLD | | | | | |
| | 4701 (0x125D) | 0 | 1 | 2 | | PLD | | | | | |
| | 4701 (0x125D) | 0 | 1 | 3 | | PLD | | | | | |
| | 4701 (0x125D) | 0 | 1 | 4 | | PLD | | | | | |
| | 4701 (0x125D) | 0 | 1 | 5 | | PLD | | | | | |
| | 4701 (0x125D) | 0 | 3 | 6 | | AF+PLD | | | | | |
| | 4701 (0x125D) | 0 | 3 | 7 | | AF+PLD | 1 | 8:22:59.20 | 8:22:59... | 8:22:59... | 0:0:0 , 0 |
| | 4701 (0x125D) | 0 | 1 | 8 | | PLD | | | | | |
| | 4701 (0x125D) | 0 | 1 | 9 | | PLD | | | | | |
| | 4701 (0x125D) | 0 | 1 | 10 | | PLD | | | | | |
| | 4701 (0x125D) | 0 | 1 | 11 | | PLD | | | | | |
| | 4701 (0x125D) | 0 | 1 | 12 | | PLD | | | | | |
| | 4701 (0x125D) | 0 | 1 | 13 | | PLD | | | | | |
| | 4701 (0x125D) | 0 | 1 | 14 | | PLD | | | | | |
| | 4701 (0x125D) | 0 | 1 | 15 | | PLD | | | | | |
| | 4701 (0x125D) | 0 | 1 | 0 | | PLD | | | | | |
| | 4701 (0x125D) | 0 | 1 | 1 | | PLD | | | | | |

The bottom section of the interface shows a hex dump of the selected packet's data, starting with `00000000 4752 5D37 0770 50F2 49E1 7EAE 0000 01E0 0000 84C0 0A35 8795 7557 1587 9520 F700`.

Multiviewer Darstellung

Multiviewer preset editor

File Edit View

Redraw all

++ 1:1 -- (X=241,Y=1)

MV points: 144 License: 200

Display 12 : <service name>
Display 13 : <service name>
Display 14 : <service name>
Display 15 : <service name>
Display 16 : <service name>
Display 17 : <service name>
Display 18 : <service name>
Display 19 : <service name>
Display 20 : <service name>
Panel 1
Panel 2

Default width video services 300

offset pixels (Hor/Ver) 1 1

Show properties dialog when adding

- Attributes
 - Clock
 - Panel
 - TSPanel
 - Display
- TS: stream 1
 - Film 1 Premiere HD
 - Film1 Family
 - Film1 Sundance
 - Film1 Action
 - Sport1 Voetbal
 - Sport1 Golf
 - EDL2
 - Cartoon_TCM
 - Extreme Sports
 - MTV NL
 - TV Orange
 - Film 1 Premiere HD Copy
 - Sport1 SELECT HD
 - JIM
 - 2RE
 - VIER
 - VUJF
 - Vitaya
 - Acht
 - KetOp12
- TS: stream 3
 - Das Erste HD
 - arte HD
 - SWR BW HD
 - TV Gelderland
 - Radio 538
 - Radio 10 gold
 - VOX Austria
 - RTL CH
 - Audio Test 3 HE-AAC 5.1 LATM_LAOS_MPE
 - VTM HD
- TS: stream two
 - Ketnet_Canvas HD
 - Veronica_DianeYXD HD

stream 1 169

stream 3

stream two etopf

<TS name> etopf

169

169

169

169

169

169

169

169

169

169

43

43

14:40:22

SMART DVB

SMART DVB

Services All Hide selected

Display Window Size (wzh): 1920 x 1080

Multiviewer Darstellung

AXON
THE HEART OF BROADCAST

stream 1
stream 3
stream two
<TS name>

stream 1: Vitaya
stream 3: Acht
stream two: KetOp12
<TS name>

Grid of video streams (rows from top to bottom):

- Row 1: Film1 Family, Film1 Sundance, MTV NL, TV Oranje, VOX Austria
- Row 2: Film1 Action, Sport1 Voetbal, JIM, 2BE, RTL CH
- Row 3: Sport1 Golf, EDL2, VIER, VIJF, No Signal
- Row 4: Cartoon/TCM, Extreme Sports, (Empty), (Empty), Audio Test 3 HE-AAC 5.1 LATM

Bottom bar: SMART DVB (left), SMART DVB (right)

Large digital clock: 14:33:51

| | SMART 10 | SMART25 | SMART 50 | SMART 90 |
|---------------------------------------|----------|---------|----------|----------|
| IP In | ✓ | ✓ | ✓ | ✓ |
| DVB-T/C/S | ✓ | ✓ | X | X |
| Anzahl MPTS/SPTS | 3/20 | 3/20 | 8/60 | 8/40 |
| Multiviewer | ✓ | X | ✓ | ✓ |
| Black / Freeze Frame Audio silence | X | ✓ | ✓ | ✓ |
| Video und Audio Decode | ✓ | ✓ | ✓ | ✓ |
| Loudness | X | X | ✓ | ✓ |

Wie reagiert meine Applikation unter Last?

Klappt das Zusammenspiel von Client-Server?

Welche Ressourcen werden benötigt?

Quality of Experience - Kundenempfinden

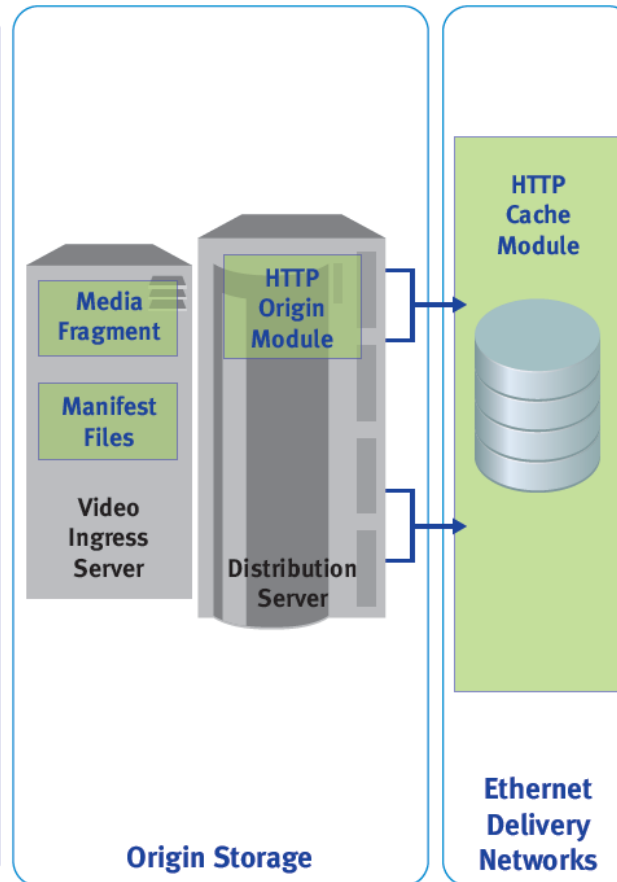
- Lasttest
 - Stresstest einzelner oder aller Komponenten
 - Simulation tausender Clients
 - Beeinflussungen durch DDOS, oder Netzwerkengpässe
- Funktionstest
 - Bitratentests
 - Simulation unterschiedliche Browser und Clients
- Test zur Bestimmung der Endkunden Empfindung
 - Quality of Experience

Over-the-top Video Distribution

ENCODING AND FRAGMENTATION



DISTRIBUTION



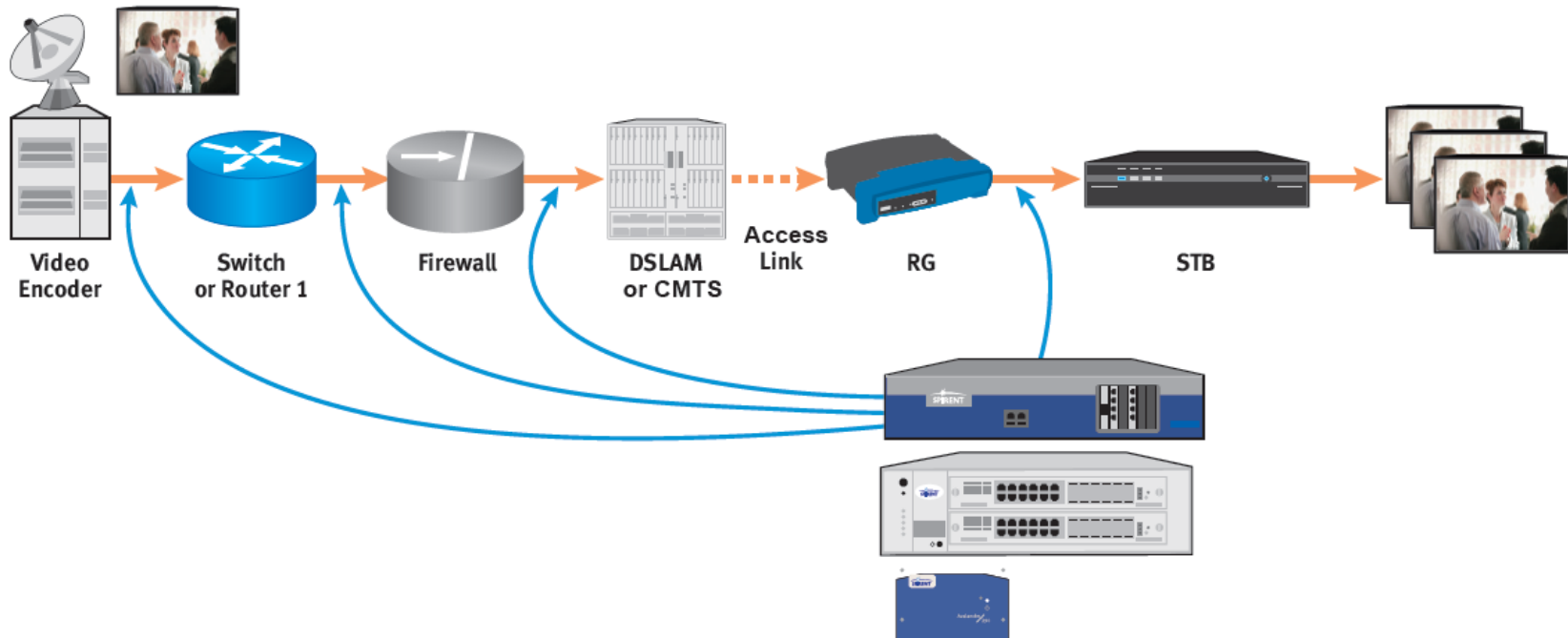
CONSUMPTION



Qualitätsanpassung gemäss Verbindungsgeschwindigkeit

| PARAMETERS | STREAMS | | | | | | | | |
|---------------|-------------|---------|---------|-------|---------|----------|-------|-----------|---------------|
| | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | #9 |
| audio_codec | dolby_heaac | | | | | | | | |
| video_codec | libx264 | | | | | | | | |
| profile | baseline | | | main | | | high | baseline | |
| size | 416x234 | 480x270 | 640x360 | | 960x540 | 1280x720 | | 1920x1080 | |
| framerate | 12 | 15 | 29.97 | | | | | | |
| keyframe | | 45 | 90 | | | | | | |
| bitrate | 200k | 400k | 600k | 1200k | 3500k | 5000k | 6500k | 8500k | |
| audio_bitrate | 64k | | | 96k | | 128k | | | 64k |
| two_pass | yes | | | | | | | | |
| audio_only | | | | | | | | | yes |
| still_image | | | | | | | | | first_segment |

Simulation von Clients und/oder Server Punkt zu Punkt Evaluierung



Durch Einblenden von Referenzmarker kann eine Bildqualitäts-Analyse gemacht werden





**Vielen Dank für Ihre
Aufmerksamkeit**

Gerald Nickel