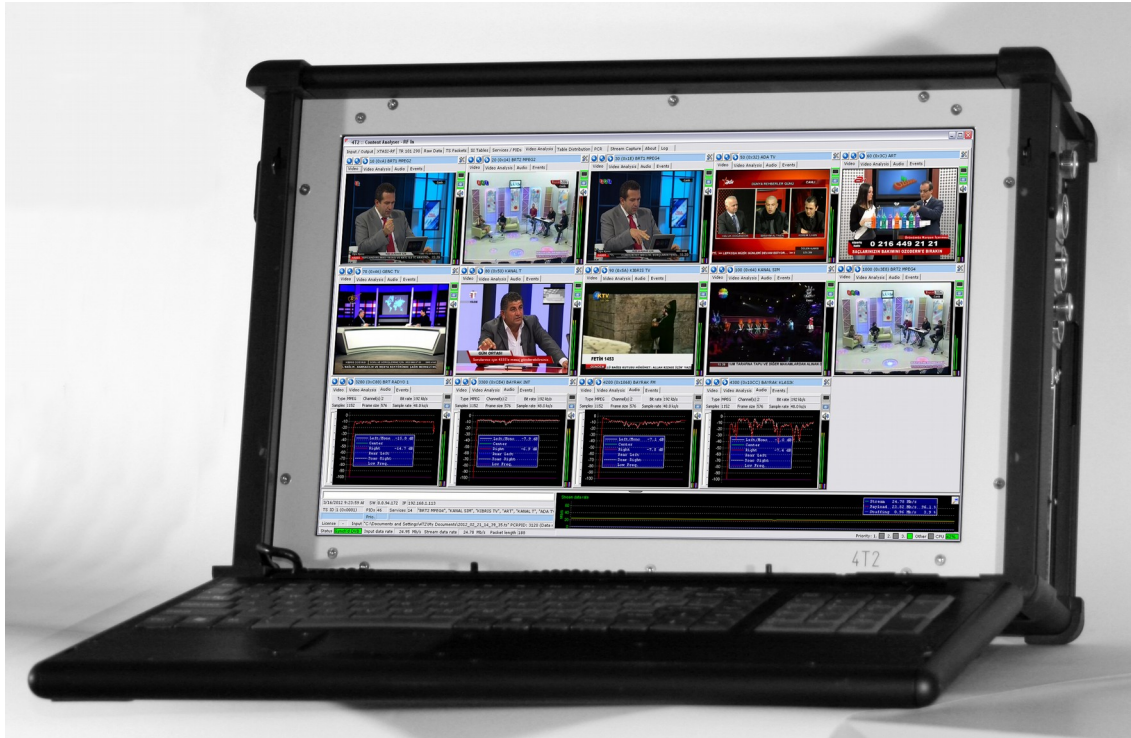


4T2 Portable

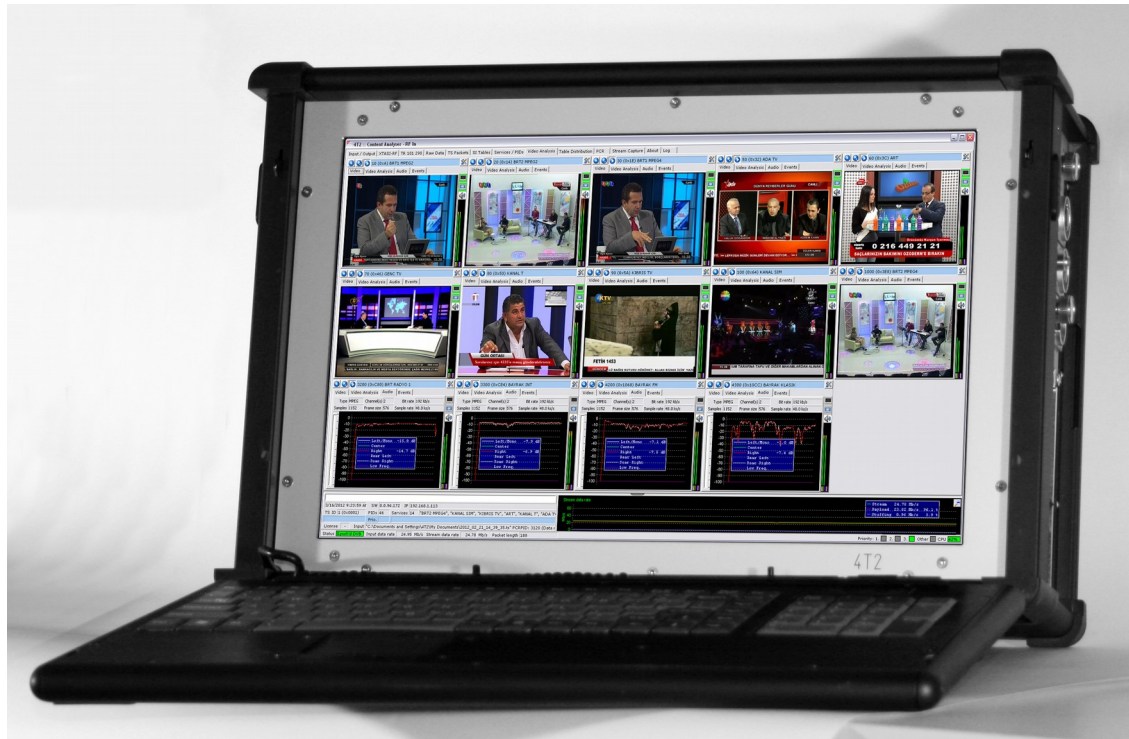
digital broadcast measurement receiver

Advanced Broadcast Components
Frankfurterstrasse 21
64720 Michelstadt
www.4T2.eu

4T2 Portable



4T2 Portable



- Windows™ 10 64bit measurement platform
- robust aluminium housing
- portable 7.7 kg
- compact 40 x 30 x 15 cm
- six-core i7 CPU
- m2.e solid state drive
- high resolution 15.4" monitor
- full size keyboard
- 4k HDMI output
- stereo speakers

4T2 Portable

- Gbit LAN-interface
 - UDP/RTP transport stream input
 - SNMP remote interface, instrument remote control
- ASI transport stream input
 - Content Analysis
- DVB-T/T2
 - RF interface measurements & Content Analysis
- DVB-S/S2
 - RF interface measurements & Content Analysis
- ASI transport stream playback or demodulator output



4T2 Portable

- 3rd generation expert functions
 - raw data menu with trigger functions for transport stream byte-level analysis
 - packet menu with trigger function for transport stream packet-level analysis
 - integrated report-generator function providing access to all measurement results
 - open interface to windows applications
 - multi-channel coverage on map display with key performance parameter analysis

4T2 Portable

- DVB-T2 MI analyser
 - on ASI and on IP input
- Transport Stream analyser with Multi-Viewer
 - SI-Tree, SI-table repetition, TR.101.290 1st, 2nd, 3rd priorities, Services & PIDs display, Data-rates display & graph, PCR-rate & Jitter, Black/Freeze detector, Audio mute, triggered capture, log-file
- H.262 SD/HD, H.264 SD/HD, and H.265 Ultra HD decoder on internal display and with 4k capable hdmi output
- DVB-T/T2 RF analyser with
 - Level, MER, EVM, bit errors
 - Constellation display, Impulse Response display, Spectrum display
- Quad channel coverage analyser

4T2 Portable coverage

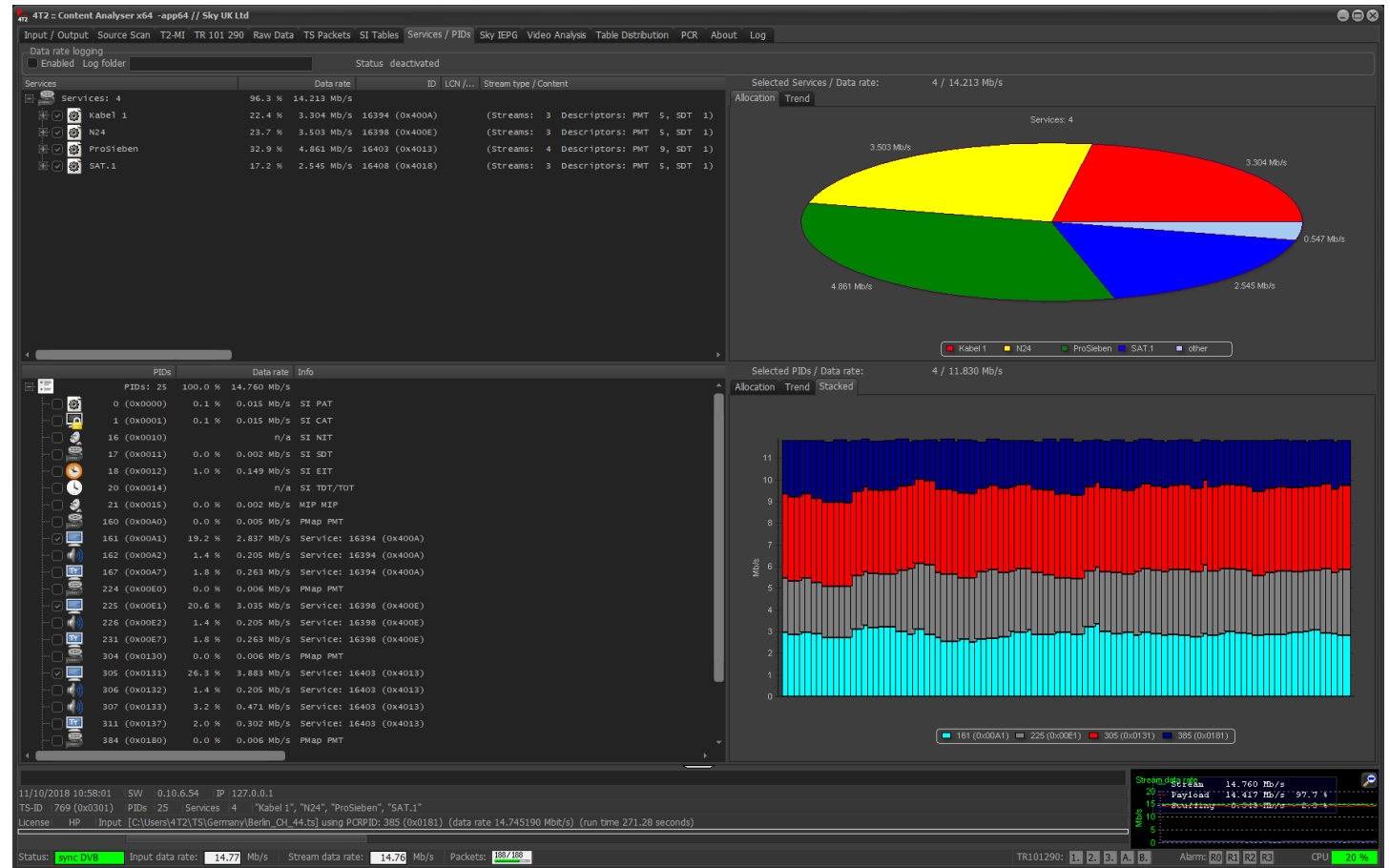
- Up to 4 RF channels to be measured simultaneously
- DVB-T and DVB-T2 standards
- Transport Stream analysis available on all channels
- Vehicle power supply and mains power supply as standard
- Optimised screen resolution (1440x900 pixels or 1920x1200 pixels on request)
- Shockproof receiver mounting
- Storage file format fully compatible to other ABC instruments
- Map Maker application for map-file download over the internet

SERVICES PIDs (all inputs)

Data-rate displays with virtual and logical channel numbers sorted by services and PIDs

Pie-chart and trend-line displays with relative and absolute data-rates

All components of service displayed



MultiViewer (all inputs)

Video/Audio of all services in transport stream

Black/Freeze detection

Audio bargraphs with history

DVB-Subtitles

DVB-Teletext

GOP-Structure

SMPT-35 Ad-Insert

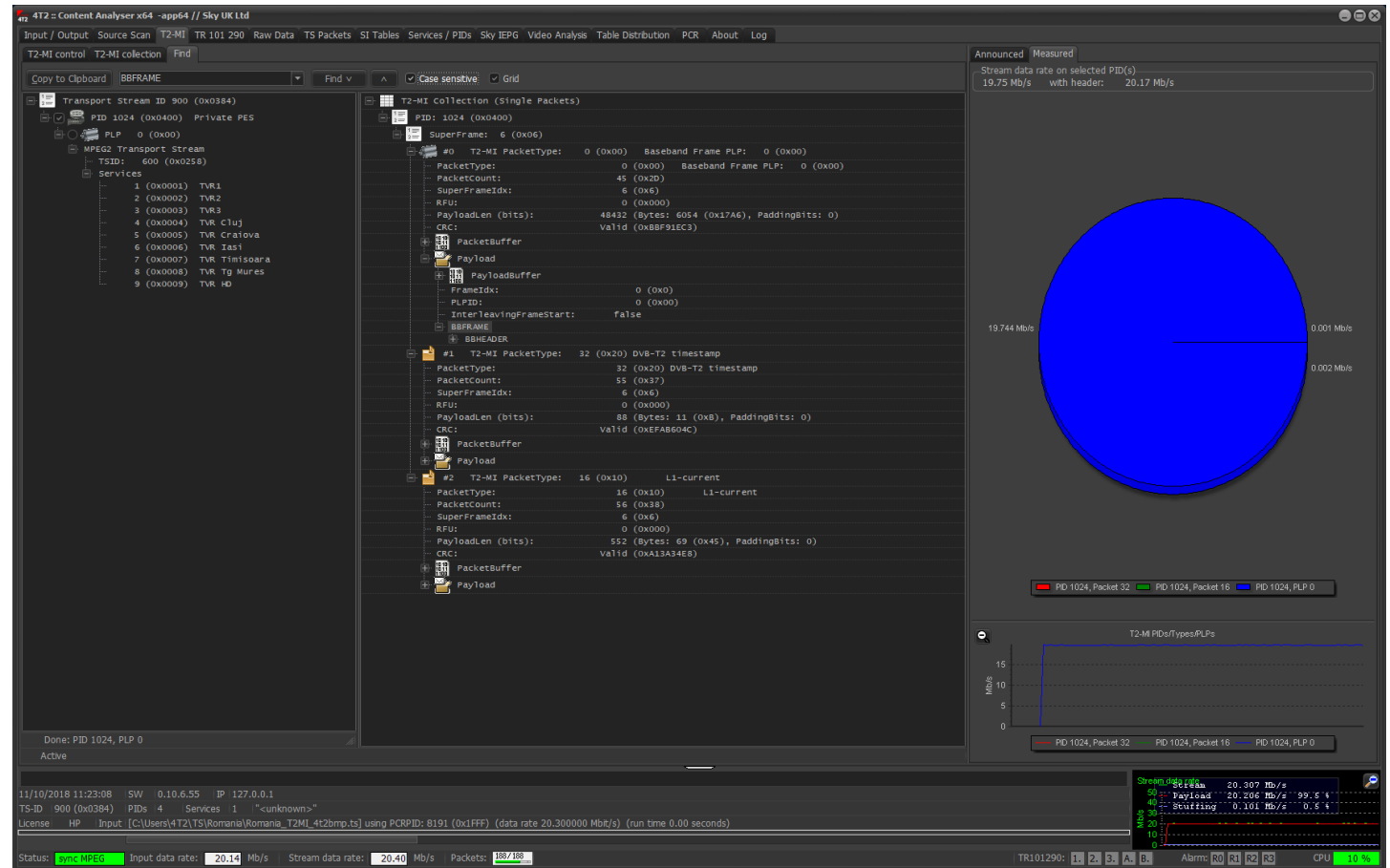


T2-MI (ASI, IP inputs)

T2-Modulator interface
real-time analyser

De-capsulation of
embedded single-, or
multi-program transport
streams

Re-routing into Content-
Analyser for full
visualisation and
analysis



DVB-T2 specific RF measurements

(XTASI-RF)

Constellations
L1 post and
Data-PLP,
Impulse-Response,
Spectrum displays

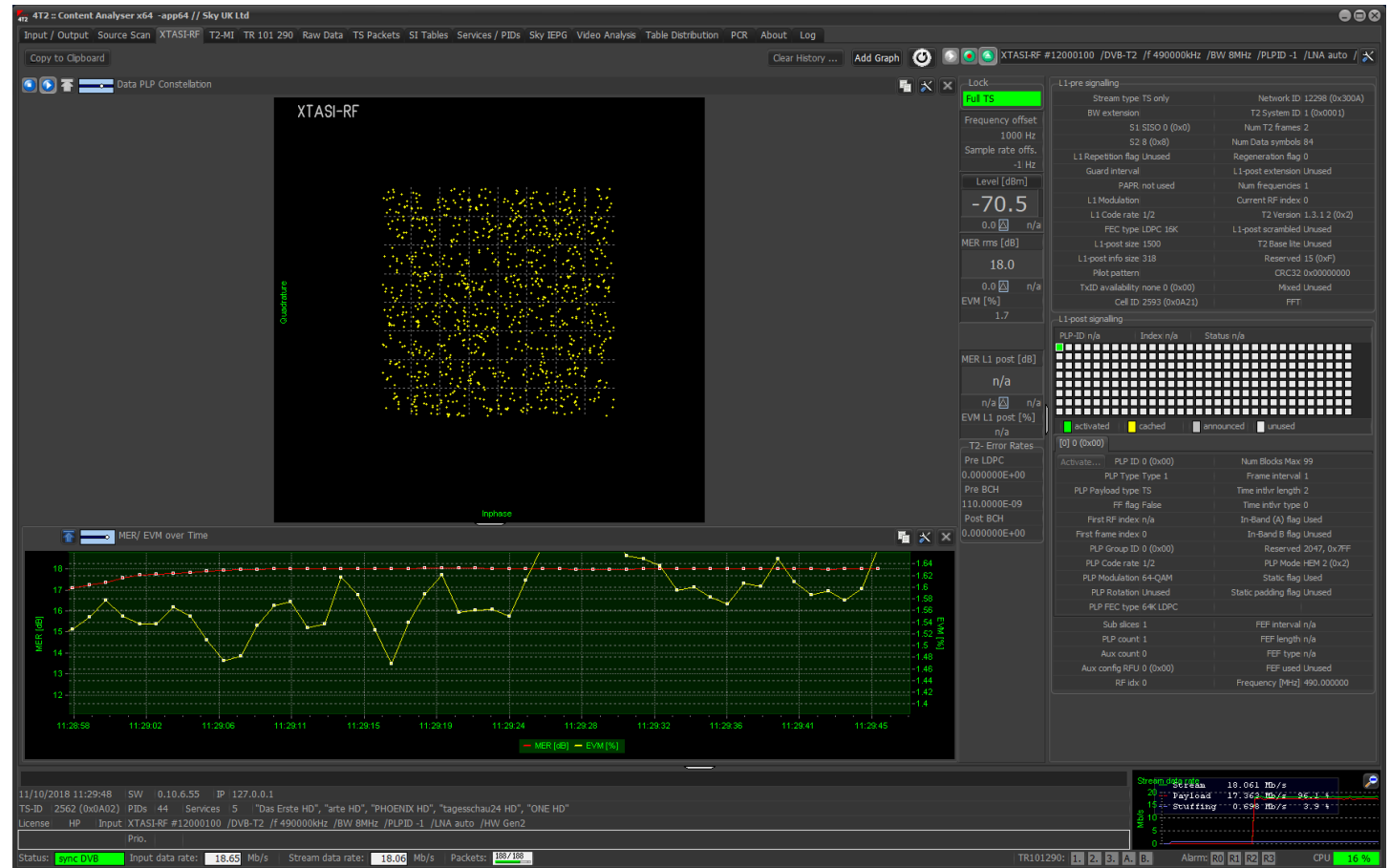
Level, MER, EVM,

BER before LDPC, and BCH

L1-pre, and L1-post
decoded information

data logging
data export

>42dB MER performance



Terrestrial RF expert functions

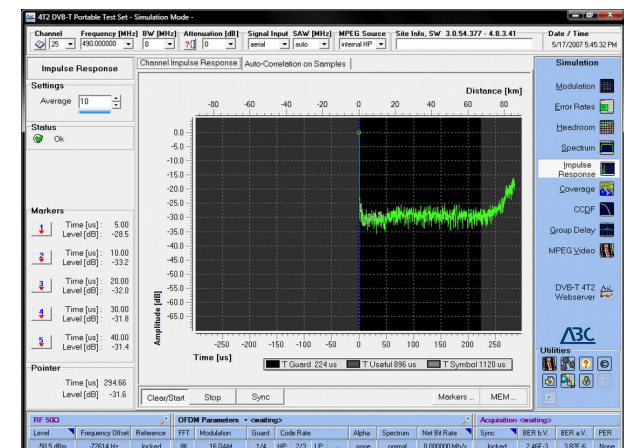
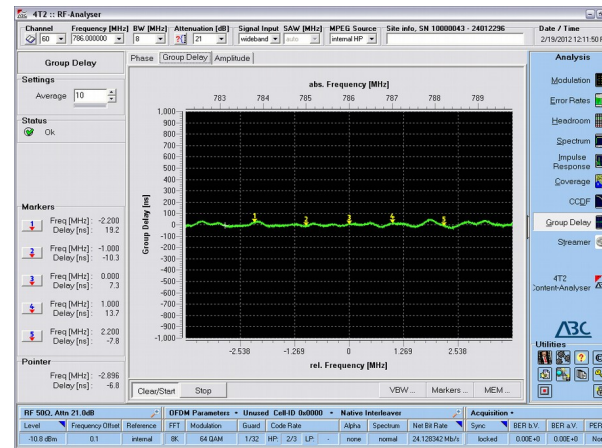
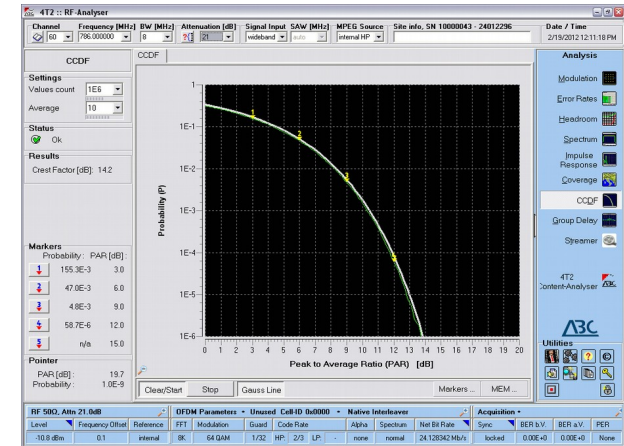
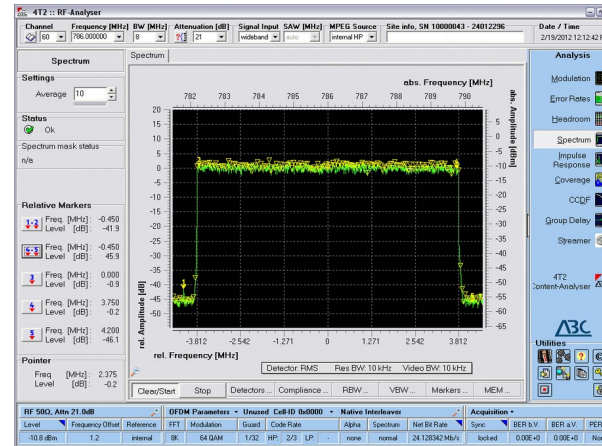
Spectrum Analyser

CCDF

Phase and Group Delay

Impulse Response

All measurement menus with masks and markers and sophisticated analysis and export functions



DVB-S2 specific RF measurements

(XTASI-S2)

Constellation

QPSK+,
8 APSK+,
16 APSK+,
32 APSK+,

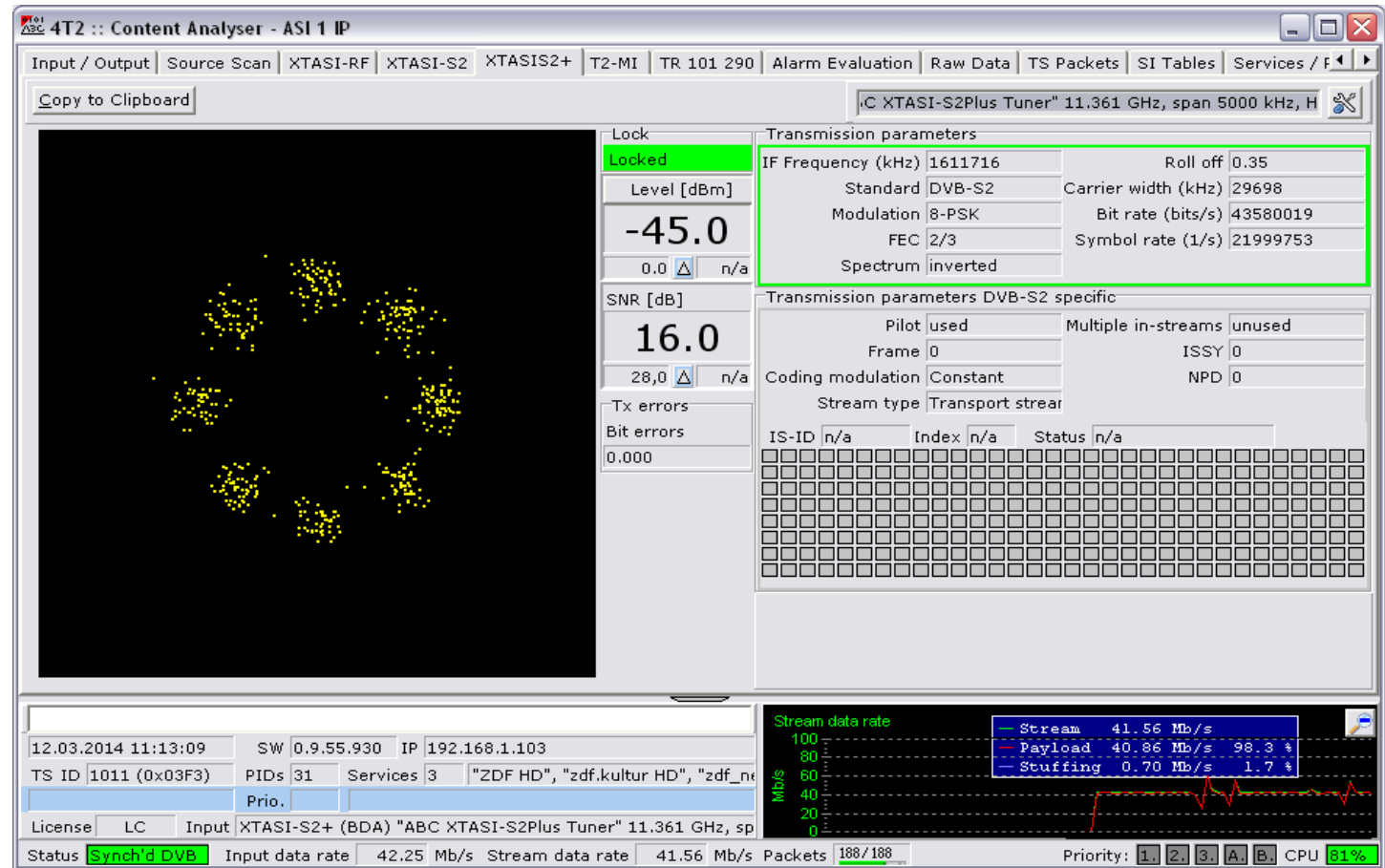
LDPC and BCH short and
normal mode

Level measurement

SNR measurement

0.2, 0.25, 0.35 Filter

Rolloff support



DVB-T/T2 4T2 RF-Analyser (terrestrial inputs)

Coverage Analysis

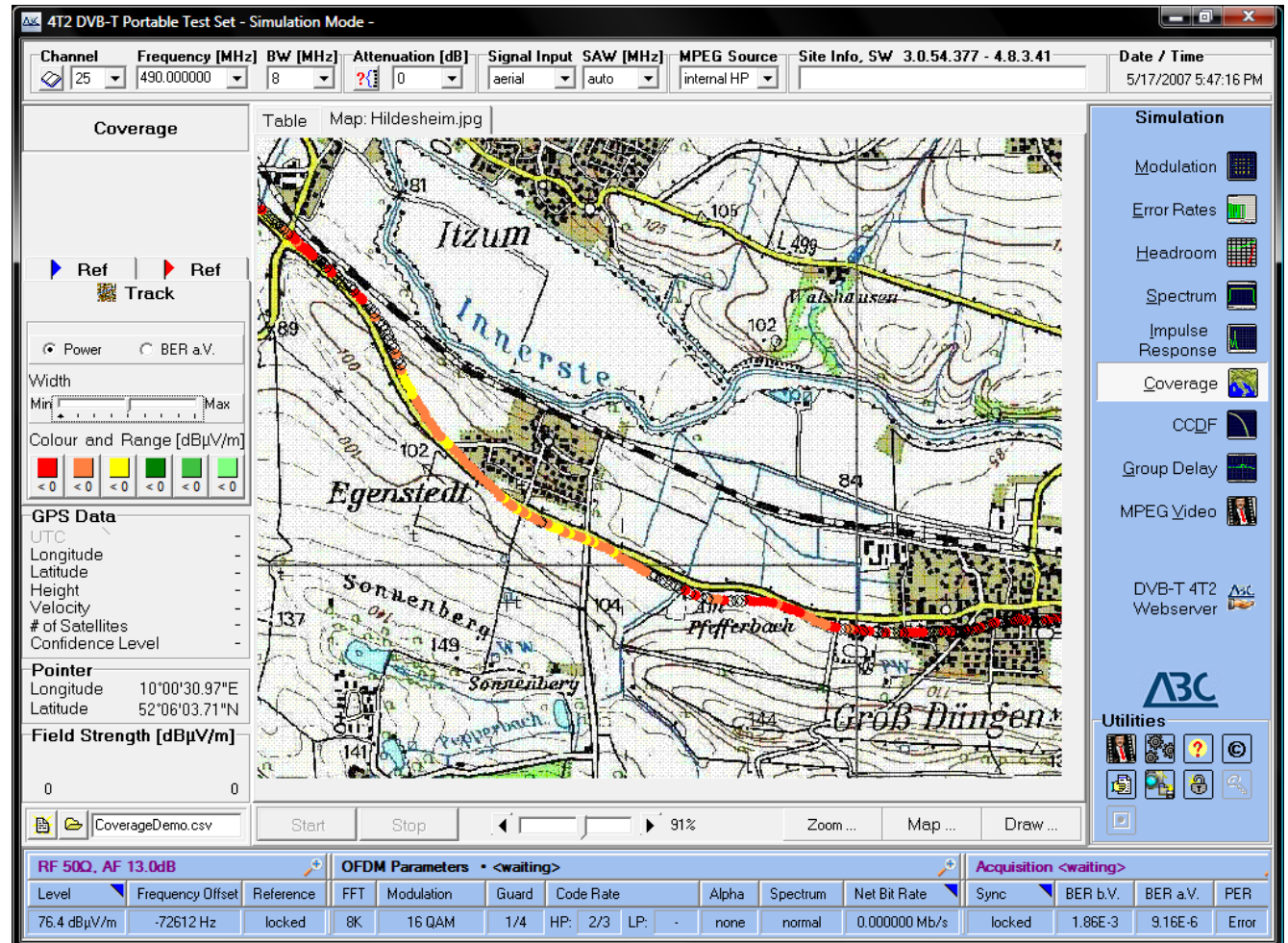
Up to four simultaneous channels supported

Fully integrated GPS reception (Garmin, or Navilock devices)

Multiple Map format including OpenStreetMap

Level conversion with antenna factor entry

Comprehensive printing, and file-export features
With Kml, kmz support



TR 101 290 (all inputs)

Evaluation of TS following TR101290 1st, 2nd, 3rd priority (including T2-MI extensions)

Groups, or individual error measurements

All errors are logged with date and time of occurrence

Selection can be used as trigger for Stream Capture

Pre and post trigger capture

Adjustable quota for current file and overall storage

The screenshot displays the 4T2 Content Analyser x64 interface. The main window shows a tree view of error categories for TR 101 290. The categories are:

- 1 First priority
 - 1.1 TS_sync_loss
 - 1.2 Sync_byte_error
 - 1.3.a PAT_error_2
 - 1.4 Continuity_count_error
 - 1.5.a PMT_error_2
 - 1.6 PID_error
- 2 Second priority
 - 2.1 Transport_error
 - 2.2 CRC_error
 - 2.3 PCR_error
 - 2.3.a PCR_repetition_error
 - 2.3.b PCR_discontinuity_indicator_error
 - 2.4 PCR_accuracy_error
 - 2.5 PTS_error
 - 2.6 CAT_error
- 3 Third priority
 - 3.1 NIT_error
 - 3.1.a NIT_actual_error
 - 3.1.b NIT_other_error
 - 3.2 SI_repetition_error
 - 3.3 Buffer_error
 - 3.4.a Unreferenced_PID
 - 3.5 SDT_error
 - 3.5.a SDT_actual_error
 - 3.5.b SDT_other_error
 - 3.6 EIT_error
 - 3.6.a EIT_actual_error
 - 3.6.b EIT_other_error
 - 3.6.c EIT_PF_error
 - 3.7 RST_error
 - 3.8 TDT_error
 - 3.9 Empty_buffer_error
 - 3.10 Data_delay_error
- A.1 Packet_header_inconsistent
- B T2-MI errors
 - B.2 T2-MI syntax errors
 - B.2.1 T2MI_packet_type_error
 - B.2.2 T2MI_packet_payload_error
 - B.2.3 T2MI_packet_count_error
 - B.2.4 T2MI_PCR_error
 - B.2.5 T2MI_payload_error
 - B.2.6 T2MI_P1p_num_blocks_error

The interface also shows a status bar at the bottom with the following information:

- Status: sync OK
- Input data rate: 42.10 Mb/s
- Stream data rate: 41.99 Mb/s
- Packets: 188/188
- TR101290: 1 2 3 A B
- Alarms: R0 R1 R2 R3
- CPU: 42%

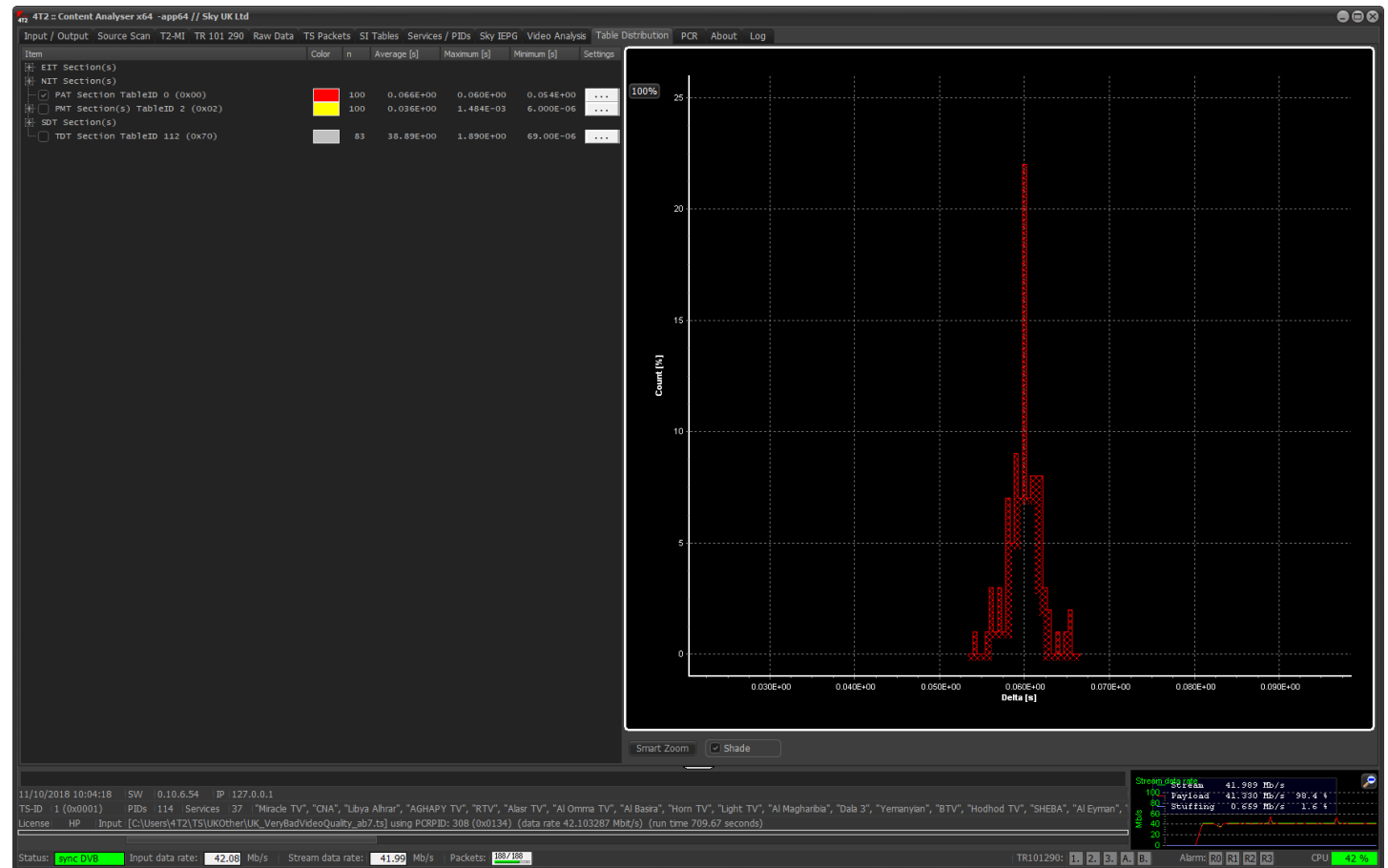
Table and PCR Distribution/Jitter (all inputs)

Distribution of SI-tables in the Transport Stream

Individual tables can be selected and the repetition rates are displayed in form of a histogram

Smart-zoom assists on positioning the histograms

PCR Distribution and Jitter allows for most detailed measurements



SI tables (all inputs)

Display of the service information tables (SI) with:

- find function
- comprehensive tree exporting options
 - all SI-tree
 - sub-tree
 - individual entries

SI of DVB, ATSC, and ISDB supported

The screenshot displays the 4T2 Content Analyser x64 interface. The main window shows a tree view of SI Tables under the 'Services / PIDs' section. The selected service is 'SAT.1' (PID 0x0301). The tree view shows the following structure:

- Actual Events 78 (0x4E)
 - Program: 16394 (0x400A) "Kabel 1"
 - Program: 16398 (0x400E) "N24"
 - Program: 16403 (0x4013) "ProSieben"
 - Program: 16408 (0x4018) "SAT.1"
- Sections
 - SectionCount: 100
 - SectionData:
 - 000: 4E F4 38 40 18 D5 00 01 03 01 21 14 01 4E BC 00 Nö88.Ö...t..NA.
 - 001: CD F1 15 00 00 01 00 00 84 1D 4D 43 64 65 75 1C In.....MCdeu.
 - 002: 05 53 74 61 72 20 54 72 65 68 20 2D 20 44 65 65 .Star Trek - Dee
 - 003: 70 20 53 70 68 63 65 20 4E 69 6E 65 22 05 53 63 p Space Nine", Sc
 - 004: 69 65 6E 63 65 20 46 69 63 74 69 6F 6E 2D 53 65 tende-Fiction-Se
 - 005: 72 69 65 2C 20 55 53 41 20 31 39 39 33 8A 00 4E rie, USA 19935.N
 - 006: FD 03 64 65 75 00 F7 05 41 75 66 20 22 44 65 65 y.deu.-, Auf "Dee
 - 007: 70 20 53 70 61 63 65 20 4E 69 6E 65 22 20 64 6F p Space Nine" do
 - 008: 68 68 74 20 65 69 6E 20 64 65 66 65 68 74 65 73 ckt ein defektes
 - 009: 20 52 61 75 6D 73 63 69 66 61 6E 6E 74 65 6E 20 end unbekannt
 - 00A: 64 65 6D 20 47 61 6D 6D 61 2D 51 75 61 64 72 61 dem Gamma-Quadra
 - 00B: 6E 74 65 6E 20 61 6E 2C 20 61 75 66 20 64 65 6D nten an, auf dem
 - 00C: 20 73 69 63 68 20 64 69 65 20 4D 69 74 67 6C 69 sich die Mitgll
 - 00D: 65 64 65 72 20 64 65 73 20 77 65 69 74 67 65 68 eder des weltgeh
 - 00E: 65 64 64 20 75 6E 62 65 68 61 6E 6E 74 65 6E 20 end unbekannt
 - 00F: 56 6F 6C 68 73 73 74 61 6D 6D 65 73 20 64 65 72 volkstammes der
 - 100: 20 53 68 72 72 65 65 61 20 62 65 66 69 6E 64 65 Skrreea befinde
 - 101: 6E 2E 20 56 6F 72 20 64 65 72 65 6E 20 75 6E 76 n. Vor deren unv
 - 102: 65 72 73 74 E4 6E 64 6C 69 63 68 65 72 20 53 70 erständlicher Sp
 - 103: 72 68 68 65 20 76 65 72 73 61 67 74 20 73 6F rache versage so
 - 104: 67 61 72 20 64 65 72 20 DC 62 65 72 73 65 74 7A gar der Übersetz
 - 105: 75 6E 67 73 2D 43 6F 6D 70 75 74 65 72 2C 4E FD ungs-Computer, NY
 - 106: 13 64 65 75 00 F7 20 75 6E 64 20 65 73 20 64 61 .deu.- und es da
 - 107: 75 65 72 74 20 67 65 72 61 75 6D 65 20 5A 65 69 uert geraume Zei
 - 108: 74 20 20 69 72 20 73 69 68 68 20 69 6E 65 t, bis sich zine
 - 109: 20 48 65 6D 75 6E 69 68 61 74 69 6F 6E 20 65 kommunikation e
 - 10A: 72 6D F6 67 6C 69 63 68 65 6E 20 6C 4E DF 74 2E rmöglichen läßt.
 - 10B: 20 44 6F 63 68 20 64 61 6E 6E 20 73 74 65 6C 6C Doch dann stell
 - 10C: 74 20 73 69 63 68 20 68 65 72 61 75 73 2C 20 64 t sich heraus, d
 - 10D: 61 DF 20 64 69 65 20 53 68 72 72 65 65 61 20 76 as die Skrreea v
 - 10E: 6F 65 20 65 69 65 6D 20 75 6E 74 65 72 64 72 on einem unterdr
 - 10F: FC 63 68 74 65 6E 20 50 6C 61 6E 65 74 65 6E 20 ückten Planeten

The interface also shows a search bar at the top with 'Find v' and a 'Case sensitive' checkbox. The bottom status bar displays: Status: sync DVB, Input data rate: 14.79 Mb/s, Stream data rate: 14.65 Mb/s, Packets: 187/188, TR101290: 1 2 3 A B, Alarms: R0 R1 R2 R3, CPU: 16%.

TS Packets (all inputs)

3rd generation expert function

Sophisticated packet filtering with multiple triggers and filter expression editor

Unique and powerful tool for finding problems in transmission chains and multiplexers

The screenshot displays the 4T2 Content Analyser x64 interface. The main window shows a list of TS Packets with columns for Number, Delta, PID, StartIndicator, and Arrival. The selected packet (Number 87) is expanded to show its PacketData in hexadecimal and ASCII. The interface includes a search bar at the top, a trigger control panel on the right, and a status bar at the bottom showing input and stream data rates.

Packet	Number	Delta	PID	StartIndicator	Arrival
0	n/a	n/a	161 (0x00A1)	Yes	2018-10-11, 10:59:57-995
1	92	5	161 (0x00A1)		2018-10-11, 10:59:57-995
2	98	6	161 (0x00A1)		2018-10-11, 10:59:57-995
3	103	5	161 (0x00A1)		2018-10-11, 10:59:58-006
4	109	6	161 (0x00A1)		2018-10-11, 10:59:58-006
5	113	4	161 (0x00A1)		2018-10-11, 10:59:58-006
6	116	3	161 (0x00A1)		2018-10-11, 10:59:58-006
7	121	5	161 (0x00A1)		2018-10-11, 10:59:58-006
8	125	4	161 (0x00A1)		2018-10-11, 10:59:58-006
9	128	3	161 (0x00A1)		2018-10-11, 10:59:58-006

Status: sync DVBS Input data rate: 14.62 Mb/s Stream data rate: 14.74 Mb/s Packets: 187/188

Log (all inputs)

Most comprehensive logging system with integrated find and sorting features

Automated logfile storage with integrated garbage collection

Easy logfile post-processing available on-the-fly using Windows tools

4T2 = Content Analyser x64 - app64 // Sky UK Ltd

Input / Output Source Scan T2-MI TR 101 290 Raw Data TS Packets SI Tables Services / PIDs Sky IEPG Video Analysis Table Distribution PCR About Log

Copy to Clipboard BBFRAME Find v OMD: Logfile folder Explorer: Logfile folder

Group	Log-Level	Group	SubGroup	Date and Time	Class Name	Instance	Message
Program	Debug	Program	0	2018-10-11, 11:22:20-464	TT2MIPacketCollector	N11	PID 1024 (0x0400): Rest of T2-MI Packet too short! (2 mgs suppressed)
	Warning	Program	0	2018-10-11, 11:22:20-463	TTSPESCollector	N11	PID 1024 (0x0400): Discontinuity detected while collecting PES Packet (1 mgs suppressed)
	Warning	Program	0	2018-10-11, 11:22:00-392	TTSPESCollector	0x00000000006E9520	PID 1024 (0x0400): Discontinuity detected while collecting PES Packet
	Debug	Program	0	2018-10-11, 11:22:00-391	TT2MIPacketCollector	0x000000000049E760	PID 1024 (0x0400): Rest of T2-MI Packet too short!
	Warning	Program	0	2018-10-11, 11:21:30-583	TFormTSAnalyserMain	0x000000000070BAE40	NewVideoAnalyserFrame added
	Message	Program	0	2018-10-11, 11:21:30-469	TFormTSAnalyserMain	0x000000000070BAE40	TransportStreamID 900 (0x0384)
	Message	Program	0	2018-10-11, 11:21:30-201	TTSF11eReaderThread	0x000000000330BF90	Data processing slow! 0 events suppressed
	Message	Program	0	2018-10-11, 11:21:30-200	TTSF11eReaderThread	0x000000000330BF90	Execute: Synced to 188 byte packets
	Message	Program	0	2018-10-11, 11:21:30-161	TTSF11eInput	0x0000000000A3DE180	Try to activate file reader "C:\Users\4T2\TS\Romania\Romania_T2MI_4t2bmp.ts"
	Warning	Program	0	2018-10-11, 11:21:30-160	TFormTSAnalyserMain	0x000000000070BAE40	failed to execute TFormTSAnalyserMain.TSAnalyserReset (500ms) after step 9999
	Message	Program	0	2018-10-11, 11:21:29-672	TFormTSAnalyserMain	0x000000000070BAE40	TryEnter TFormTSAnalyserMain.TSAnalyserReset, FResetCS.TryEnter(500ms)
	Message	Program	0	2018-10-11, 11:21:28-679	TTSF11eInput	0x0000000000A3DC200	Try to stop file reader "C:\Users\4T2\TS\Germany\Berlin_CH_44.ts"
	Message	Program	0	2018-10-11, 11:21:30-229	TTSAAnalyser	0x0000000000B90680	First synchronization (0 packets discarded during synchronization)
	Message	Program	0	2018-10-11, 11:18:09-009	TFormTSAnalyserMain	0x000000000070BAE40	CPU usage: 18.0%
	Message	Program	0	2018-10-11, 11:18:09-008	TFormTSAnalyserMain	0x000000000070BAE40	Memory usage: all 615.0MB, allocated 374.5MB, overhead 22.7MB
	Warning	Program	0	2018-10-11, 11:18:03-327	TTSPESCollector	N11	PID 307 (0X0133): Discontinuity detected while collecting PES Packet (1 mgs suppressed)
	Warning	Program	0	2018-10-11, 11:18:03-326	TTSPESCollector	N11	PID 162 (0X00A2): Discontinuity detected while collecting PES Packet (1 mgs suppressed)
	Warning	Program	0	2018-10-11, 11:18:03-325	TTSPESCollector	N11	PID 306 (0X0132): Discontinuity detected while collecting PES Packet (1 mgs suppressed)
	Warning	Program	0	2018-10-11, 11:17:38-063	TTSPESCollector	0x0000000000E4EC080	PID 391 (0X0187): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:17:38-060	TTSPESCollector	0x0000000000E4EC080	PID 231 (0X00E7): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:17:38-057	TTSPESCollector	0x0000000000E4EC030	PID 386 (0X0182): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:17:38-055	TTSPESCollector	0x0000000000E4E6F00	PID 226 (0X00E2): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:17:38-054	TTSPESCollector	0x0000000000E4EB680	PID 311 (0X0137): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:17:38-052	TTSPESCollector	0x0000000000E4E6C40	PID 167 (0X00A7): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:17:38-051	TTSPESCollector	0x0000000000E4EB600	PID 306 (0X0132): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:17:38-049	TTSPESCollector	0x0000000000E4E6930	PID 162 (0X00A2): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:17:38-048	TTSPESCollector	0x0000000000E4EB7C0	PID 307 (0X0133): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:17:38-047	TTSPESCollector	0x0000000000E4E6750	PID 161 (0X00A1): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:17:38-046	TTSPESCollector	0x0000000000E4E6F80	PID 225 (0X00E1): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:17:38-045	TTSPESCollector	0x0000000000E4E6D60	PID 305 (0X0131): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:17:38-044	TTSPESCollector	0x0000000000E4EBFE0	PID 385 (0X0181): Discontinuity detected while collecting PES Packet
	Message	Program	0	2018-10-11, 11:17:33-043	TTSF11eReaderThread	0x0000000000CCD6020	File read restarted from beginning (loop)
	Warning	Program	0	2018-10-11, 11:17:11-225	TTSPESCollector	0x0000000000E4EC080	PID 391 (0X0187): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:13:29-822	TTSPESCollector	N11	PID 307 (0X0133): Discontinuity detected while collecting PES Packet (1 mgs suppressed)
	Warning	Program	0	2018-10-11, 11:13:29-821	TTSPESCollector	N11	PID 162 (0X00A2): Discontinuity detected while collecting PES Packet (1 mgs suppressed)
	Warning	Program	0	2018-10-11, 11:13:29-820	TTSPESCollector	N11	PID 306 (0X0132): Discontinuity detected while collecting PES Packet (1 mgs suppressed)
	Warning	Program	0	2018-10-11, 11:12:53-643	TTSPESCollector	0x0000000000E4EC080	PID 391 (0X0187): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:12:53-640	TTSPESCollector	0x0000000000E4E6F50	PID 231 (0X00E7): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:12:53-635	TTSPESCollector	0x0000000000E4EC030	PID 386 (0X0182): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:12:53-633	TTSPESCollector	0x0000000000E4E6F00	PID 226 (0X00E2): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:12:53-632	TTSPESCollector	0x0000000000E4EB680	PID 311 (0X0137): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:12:53-629	TTSPESCollector	0x0000000000E4E6C40	PID 167 (0X00A7): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:12:53-627	TTSPESCollector	0x0000000000E4EB600	PID 306 (0X0132): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:12:53-625	TTSPESCollector	0x0000000000E4E6930	PID 162 (0X00A2): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:12:53-623	TTSPESCollector	0x0000000000E4EB7C0	PID 307 (0X0133): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:12:53-622	TTSPESCollector	0x0000000000E4E6750	PID 161 (0X00A1): Discontinuity detected while collecting PES Packet
	Warning	Program	0	2018-10-11, 11:12:53-621	TTSPESCollector	0x0000000000E4E6F80	PID 225 (0X00E1): Discontinuity detected while collecting PES Packet

11/10/2018 11:23:58 SW 0.10.6.55 IP 127.0.0.1
TS-ID 900 (0x0384) PIDs 4 Services 1 "unknowns"
License HP Input [C:\Users\4T2\TS\Romania\Romania_T2MI_4t2bmp.ts] using PCRID: 8191 (0x1FFF) (data rate 20.300000 Mbit/s) (run time 0.00 seconds)

Status: **sync MPEG** Input data rate: **20.15** Mb/s Stream data rate: **20.31** Mb/s Packets: **188/188** TR101290: 1 2 3 A. B. Alarm: R0 R1 R2 R3 CPU **12%**

further benefits

- chassis refined over more than one decade with respect to robustness and durability
- based on industry-standard hardware: Mini-itx, ATX, m.2e or SATA-III, USB3, hdmi
- Windows™ system, supporting any standard application software
- all measurements performed simultaneously
- unlimited storage of measurement reports on either SSD, or USB memory stick
- remote control or sharing of the 4T2 equipment in LAN or WAN environments



further information available at
www.4T2.eu

Advanced Broadcast Components
Frankfurterstrasse 21
64720 Michelstadt
www.4T2.eu