Coverage Measurement Solutions

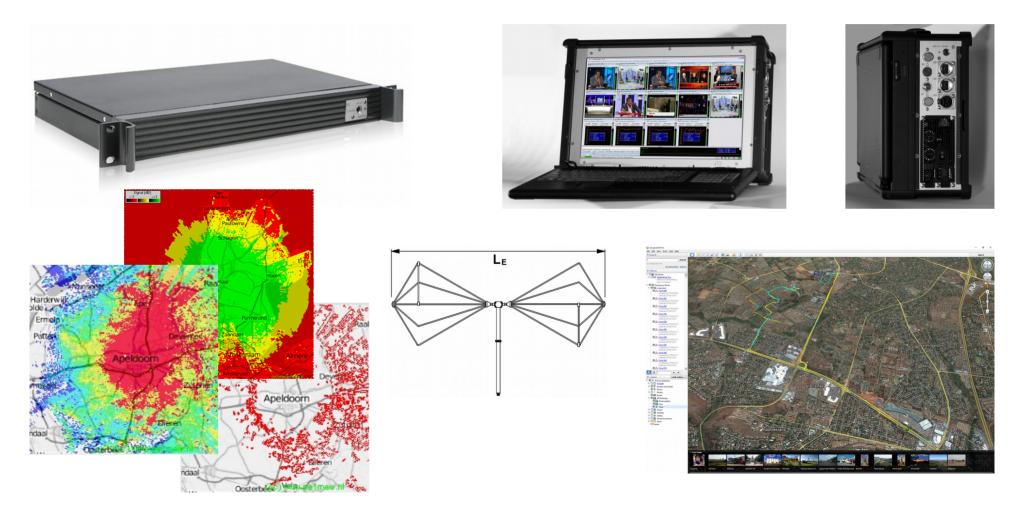
based on the Advanced Broadcast Components Ltd.

4T2 Portable or 4T2 Rack instrument platforms

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

4T2 Coverage Measurement Solutions presentation @2019 Advanced Broadcast Components slide 1 of 28

Coverage Measurement Solutions



Coverage Measurement Solutions

- Integrated systems, Hardware and Software from world renowned supplier
- More than 10 Years experience in Coverage Measurement Instruments
- Multi-channel coverage on map display with key performance parameter analysis
- Integrated GPS receiver communication module
- Antenna-Factor database for accurate field-strength evaluation
- Software application for map-retrieval for offline usage
- KML, KMZ export for post-processing of measurement data
- Transport Stream analysis available on all channels

4T2 Portable



- Windows[™] 64bit measurement platform
- robust aluminium housing
- portable 7.7 kg
- compact 40 x 30 x 15 cm
- six-core coffee lake CPU
- m.2 solid state drive
- high resolution 15.4" monitor
- full size keyboard
- 4k HDMI output
- stereo speakers

4T2 Portable

- 2 Gbit-LAN interfaces
 - UDP/RTP transport stream input
 - SNMP remote interface, instrument remote control
- DVB-T/T2
 - RF coverage measurements & Content Analysis
- 4 USB-3 interfaces
 - GPS Receiver (Navilock supplied)



4T2 Rack

- compact 19" x 1U x 250mm
- Windows[™] 64bit system platform
- six-core coffee lake CPU
- m.2 solid state drive
- 4k HDMI output



 Same interface configuration as 4T2-Portable instruments

4T2 Portable and Rack capabilities

- Multiple channel coverage analyser
- Integrated spectrum analyser
- DVB-T/T2 RF analyser with
 - Level, MER, EVM, bit errors
 - Constellation display, Impulse Response display
- 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-T2 MI analyser on ASI and on IP input

DVB-T2 specific RF measurements

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

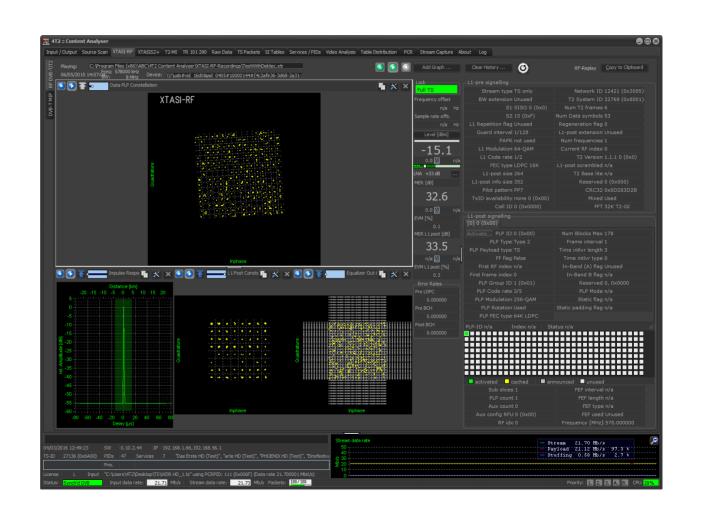
Level, MER, EVM,

BER before LDCP, and BCH

L1-pre, and L1-post decoded information

data logging and export

>42dB MER performance



Up to four simultaneous channels supported

Fully integrated GPS reception (Garmin, or Navilock devices)

Multiple Map format including OpenStreetMap

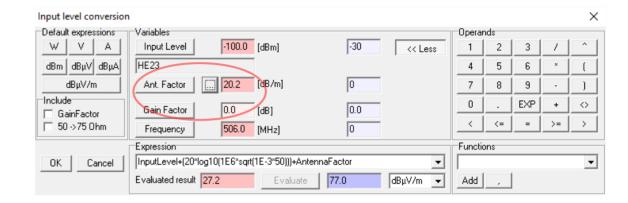
Level conversion with antenna factor entry

Comprehensive printing, and file-export features

| 💑 4T2 :: RF-Analyser - Coverage | only M | lode - | | | | | | | | | | | | - | s × |
|-----------------------------------|--------|----------|---------------------------------------|---|------------------------------|----------|------------|------------|-----------|------------|-----------|---------------------|--|---------------|------------|
| System (Coverage only) Cha | annel | Frequ | ency (MHz) BW | / [MHz] | Atten | uation | [dB] Sigr | al Input | SAW [MHz] | MPEG | Source | Site info, | SW 4.0 | 0.96.750 - 6. | 0.26.151 |
| DVB-T (HW Demod) 💌 🔗 | 25 | ▼ 506.00 | 0000 🔻 8 | - | ?{ | 0 | - aeri | al 💌 | auto 💌 | internal | HP 🔻 | | | | |
| X | Sett | ings Tal | ole Map | | | | | | | | | | | Date / Time | |
| Coverage 스 | | | | | | | | | | | | | -1 | 05/03/201 | 5 13:22:33 |
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| | | low | normal | · [] | 2K | • | 1/32 HP: | · LP: | | - I | • | · [| • | | oom 📘 |
| | 0 | 🔲 in use | · · · · · · · · · · · · · · · · · · · | | requency 738.0000 | <u> </u> | BW [MHz] | Active PLP | CSV file | e name | -Cal. / 1 | 'une status | | | |
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| WSW ESE | | Level | Spectrum 9 | SNR F | FT Mod | dulation | Guard Cod | e Rate | Alpha | Sync | BER b | V. BER a.V. F | PEF | | |
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| S | Ø | | ⊢System Ch | nannel Fi | requency | /[MHz] | BW [MHz] | Active PLP | CSV file | e name | | une status | | | |
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| low - | inter | nal - | | • | HP: | • | LP: • | · | | - | | unlocked | - | | |

Level conversion with antenna factor entry

Database of calibrated measurement antennas on file



| Antenna Factor | | | | × |
|-----------------|------------|--------|---|--------------|
| Component RE | 5 4590 | | | |
| Frequency [MHz] | Factor [df | 3/m] | ^ | |
| 350.000000 | 27.5300 | | | |
| 355.000000 | 27.8700 | | | |
| 360.000000 | 27.5200 | | | Delete all |
| 365.000000 | 27.0600 | | | D CICKO GILL |
| 370.000000 | 26.7600 | | | Delete line |
| 375.000000 | 26.6100 | | | |
| 380.000000 | 26.6600 | | | Insert line |
| 385.000000 | 26.6200 | | | [|
| 390.000000 | 26.8200 | | | Load |
| 395.000000 | 26.7300 | | | Save |
| 400.000000 | 26.2700 | | | Jave |
| 405.000000 | 26.0000 | | | Save As |
| 410.000000 | 25.8300 | | | |
| 415.000000 | 26.2100 | | | |
| 420.000000 | 26.6000 | | | |
| 425.000000 | 26.2500 | | ~ | |
| RE 459 | 0.ini | | | |
| | | Cancel | | Ok |

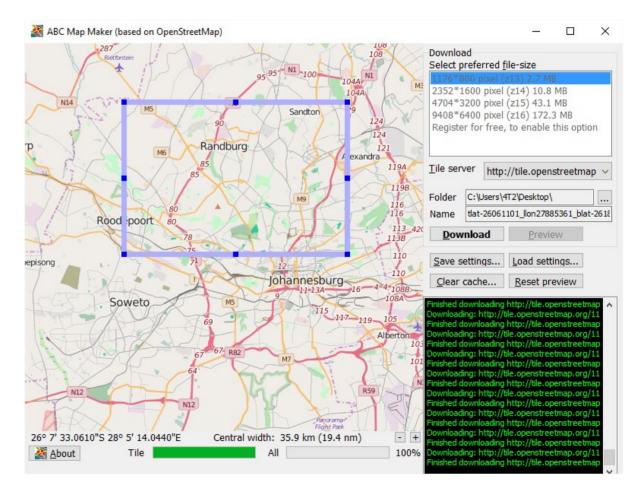
| Antenna Factor | | | × |
|-----------------|---------------|-------|-------------|
| Component HL | 40 | | |
| Frequency [MHz] | Factor [dB/m] | ^ | |
| 350.000000 | 26.7700 | | |
| 355.000000 | 27.1100 | | |
| 360.000000 | 26.7500 | | Delete all |
| 365.000000 | 26.2900 | | |
| 370.000000 | 25.9800 | | Delete line |
| 375.000000 | 25.8200 | | |
| 380.000000 | 25.8700 | | Insert line |
| 385.000000 | 25.8200 | | |
| 390.000000 | 26.0200 | | Load |
| 395.000000 | 25.9200 | | |
| 400.000000 | 25.4600 | | Save |
| 405.000000 | 25.1800 | | Save As |
| 410.000000 | 25.0100 | | |
| 415.000000 | 25.3800 | | |
| 420.000000 | 25.7600 | | |
| 425.000000 | 25.4100 | ~ | |
| Modified HL_040 |)_s_kabel.ini | | |
| | Ca | incel | Ok |

| Component H | L 023 A1 | |
|----------------|-----------------|-------------|
| Frequency [MHz |] Factor [dB/m] | |
| 100.000000 | 6.7000 | |
| 150.000000 | 10.1900 | |
| 200.000000 | 12.8800 | Delete all |
| 300.000000 | 16.6500 | |
| 400.000000 | 19.6300 | Delete line |
| 500.000000 | 21.800 | |
| 600.000000 | 23.4600 | Insert line |
| 700.000000 | 25.300 | |
| 800.000000 | 26.3900 | Load |
| 900.000000 | 27.650 | Save |
| 1000.000000 | 28.910 | Save |
| 1100.000000 | 30.180 | Save As |
| 1200.000000 | 31.2400 | |
| 1300.000000 | 32.2000 | |
| | | |
| | | |
| HL02 | 3A1.INI | |
| | Cancel | |

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Multiple Map formats including OpenStreetMap

Application to retrieve map-data for offline coverage visualisation provided (ABC Map Maker)



4T2 Coverage Measurement Solutions presentation @2019 Advanced Broadcast Components slide 11 of 28

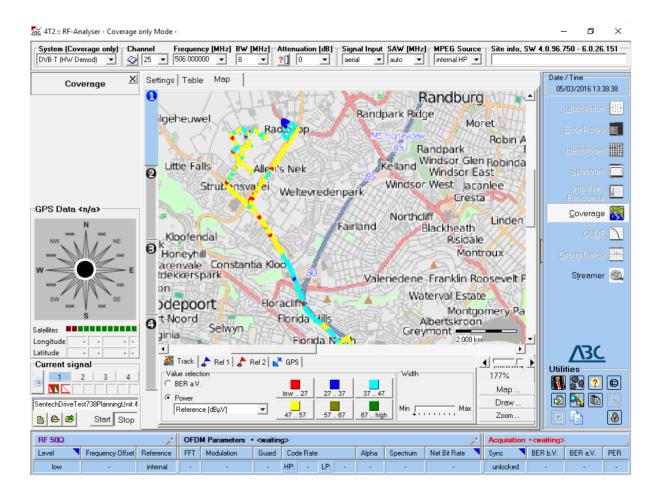
Up to four simultaneous channels supported

Fully integrated GPS reception (Garmin, or Navilock devices)

Multiple Map format including OpenStreetMap

Level conversion with antenna factor entry

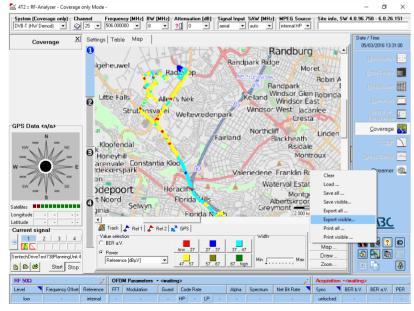
Comprehensive printing, and file-export features

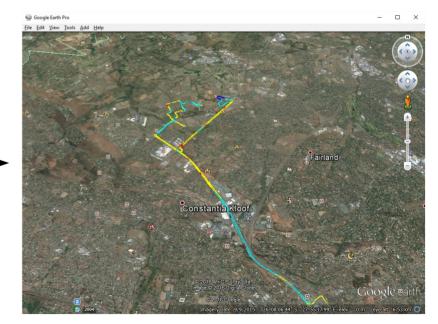


Multiple Map format including OpenStreetMap

Comprehensive printing, and file-export features

KML, KMZ export for post-processing of measurement data





Each received channel writes its own full GPSreferenced parameter set

Values include Level (fieldstrength), MER, bit errors

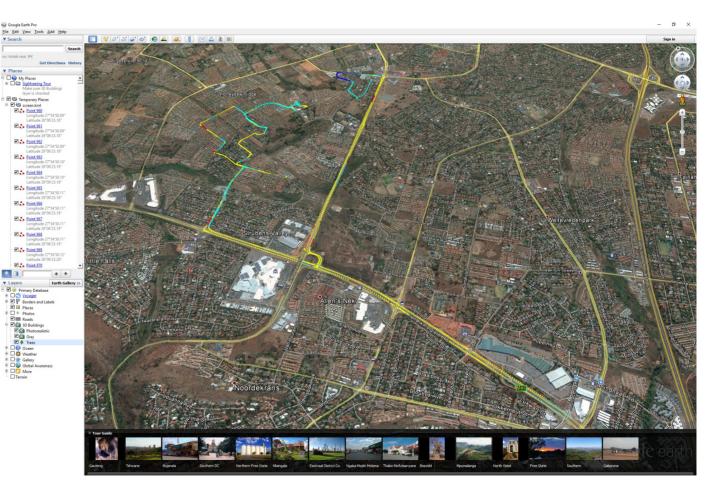
The comma separated file format exports seamlessly into Excel or OpenOffice

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| nem ji n/a | ongitude Latitude | 0 n/a | 0 0 n/a | n/a | n/a None | 39.6 | -67.4 locked n/a | n/a locked | 22.4 | 22.4 n/a | n/a | n/a | 13:10:43-3 |
| n/a | ő | 0 n/a | 0 0 n/a | -1 | | 39.6 | -67.4 locked n/a | 0 locked | 22.4 | 22.4 n/a | n/a | n/a | 13:10:44-3 |
| ı/a | Ö | 0 n/a | 0 0 n/a | -1 | -1 None | 39.6 | -67.4 locked n/a | 0 locked | 22.4 | 22.4 n/a | n/a | n/a | 13:10:45-2 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | | 39.6 | -67.4 locked n/a | 0 locked | 2.8 | 2.8 n/a | n/a | n/a | 13:10:46-2 |
| ı/a | 0 | 0 n/a | 0 0 n/a | -1 | | 40.6 | -66.4 locked n/a | 0 locked | 14.9 | 14.9 n/a | n/a | n/a | 13:10:47-2 |
| ı/a | 0 | 0 n/a | 0 0 n/a | -1 | | 40.6 | -66.4 locked n/a | 0 locked | 19.8 | 19.8 n/a | n/a | n/a | 13:10:48-2 |
| 1/a | 0 | 0 n/a | 0 0 n/a | -1 | | 40.8 | -66.2 locked n/a | 0 locked | 21.7 | 21.7 n/a | n/a | n/a | 13:10:49-2 |
| 1/a 1/a | 0 | 0 n/a 0 n/a | 0 0 n/a 0 0 n/a | -1 | | 39.1 39.5 | -67.9 locked n/a -67.5 locked n/a | 0 locked 0 locked | 22.5 | 22.5 n/a 22.8 n/a | n/a | n/a | 13:10:50-2 13:10:51-1 |
| 1/a 1/a | 0 | 0 n/a 0 n/a | 0 0 n/a | -1 | | 39.5 | -68 locked n/a | 0 locked | 18.1 | 18.1 n/a | n/a n/a | n/a n/a | 13:10:52-1 |
| /a /a | 0 | 0 n/a | 0 0 n/a | -1 | | 35.6 | -71.4 locked n/a | 0 locked | 20.3 | 20.3 n/a | n/a | n/a | 13:10:53-1 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | | 37.7 | -69.3 locked n/a | 0 locked | 20.5 | 21.5 n/a | n/a | n/a | 13:10:54-1 |
| 1/a | 0 | 0 n/a | 0 0 n/a | -1 | | 37.6 | -69.4 locked n/a | 0 locked | 22.5 | 22.5 n/a | n/a | n/a | 13:10:55-1 |
| ı/a | Ő | 0 n/a | 0 0 n/a | -1 | | 38.6 | -68.4 locked n/a | 0 locked | 22.8 | 22.8 n/a | n/a | n/a | 13:10:56-1 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | -1 None | 39 | -68 locked n/a | 0 locked | 22.9 | 22.9 n/a | n/a | n/a | 13:10:57-0 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | | 39.8 | -67.2 locked n/a | 0 locked | 23.7 | 23.7 n/a | n/a | n/a | 13:10:58-0 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | | 41.6 | -65.4 locked n/a | 0 locked | 24 | 24 n/a | n/a | n/a | 13:10:59-0 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | | 41.2 | -65.8 locked n/a | 0 locked | 24.1 | 24.1 n/a | n/a | n/a | 13:11:00-C |
| ı/a | 0 | 0 n/a | 0 0 n/a | -1 | | 40.9 | -66.1 locked n/a | 0 locked | 24.1 | 24.1 n/a | n/a | n/a | 13:11:01-0 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | | 41 | -66 locked n/a | 0 locked | 24.2 | 24.2 n/a | n/a | n/a | 13:11:02-0 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | | 40.8 | -66.2 locked n/a | 0 locked | 24.2 | 24.2 n/a | n/a | n/a | 13:11:02-9 |
| 1/a | 0 | 0 n/a | 0 0 n/a 0 0 n/a | -1 | | 41.7 40.8 | -65.3 locked n/a | 0 locked | 24.1 | 24.1 n/a | n/a | n/a | 13:11:03-9 |
| n/a n/a | 0 | 0 n/a 0 n/a | 0 0 n/a 0 0 n/a | | | 40.8 | -66.2 locked n/a -65.8 locked n/a | 0 locked 0 locked | 24.2 | 24.2 n/a 23.7 n/a | n/a n/a | n/a n/a | 13:11:04-9 13:11:05-9 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | | 39.1 | -67.9 locked n/a | 0 locked | 23.8 | 23.8 n/a | n/a | n/a | 13:11:06-9 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | | 41.6 | -65.4 locked n/a | 0 locked | 24.1 | 24.1 n/a | n/a | n/a | 13:11:07-9 |
| ı/a | ŏ | 0 n/a | 0 0 n/a | -1 | | 41 | -66 locked n/a | 0 locked | 24.1 | 24.1 n/a | n/a | n/a | 13:11:08-6 |
| n/a | Ö | 0 n/a | 0 0 n/a | -1 | | 40.3 | -66.7 locked n/a | 0 locked | 23.8 | 23.8 n/a | n/a | n/a | 13:11:09-8 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | -1 None | 39.9 | -67.1 locked n/a | 0 locked | 23.9 | 23.9 n/a | n/a | n/a | 13:11:10-8 |
| ı/a | 0 | 0 n/a | 0 0 n/a | -1 | -1 None | 40.5 | -66.5 locked n/a | 0 locked | 23.9 | 23.9 n/a | n/a | n/a | 13:11:11-8 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | -1 None | 40 | -67 locked n/a | 0 locked | 23.3 | 23.3 n/a | n/a | n/a | 13:11:12-8 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | | 39.1 | -67.9 locked n/a | 0 locked | 23.2 | 23.2 n/a | n/a | n/a | 13:11:13-8 |
| ı/a | 0 | 0 n/a | 0 0 n/a | -1 | | 38.6 | -68.4 locked n/a | 0 locked | 23 | 23 n/a | n/a | n/a | 13:11:14-7 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | | 37.9 | -69.1 locked n/a | 0 locked | 23.2 | 23.2 n/a | n/a | n/a | 13:11:15-7 |
| 1/a | 0 | 0 n/a | 0 0 n/a | -1 | | 39 | -68 locked n/a | 0 locked | 23.4 | 23.4 n/a | n/a | n/a | 13:11:16-7 |
| n/a | 0 | 0 n/a 0 n/a | 0 0 n/a 0 0 n/a | -1 | | 38.8 39.8 | -68.2 locked n/a -67.2 locked n/a | 0 locked 0 locked | 23.6 | 23.6 n/a 23.8 n/a | n/a n/a | n/a n/a | 13:11:17-7 13:11:18-7 |
| 1/a 1/a | 0 | 0 n/a 0 n/a | 0 0 n/a | -1 | | 39.8 | -67.2 locked n/a -68.1 locked n/a | 0 locked | 23.8 | 23.8 n/a 23.7 n/a | n/a n/a | | 13:11:18-7 |
| 1/a 1/a | 0 | 0 n/a 0 n/a | 0 0 n/a | | | 38.9 | -68 locked n/a | 0 locked | 23.7 | 23.6 n/a | n/a | n/a n/a | 13:11:20-6 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | | 39 | -68 locked n/a | 0 locked | 23.6 | 23.6 n/a | n/a | n/a | 13:11:21-€ |
| ı/a | ŏ | 0 n/a | 0 0 n/a | -1 | | 38.6 | -68.4 locked n/a | 0 locked | 23.4 | 23.4 n/a | n/a | n/a | 13:11:22-6 |
| n/a | Ő | 0 n/a | 0 0 n/a | -1 | | 37.9 | -69.1 locked n/a | 0 locked | 23.2 | 23.2 n/a | n/a | n/a | 13:11:23-6 |
| /a | 0 | 0 n/a | 0 0 n/a | -1 | | 39 | -68 locked n/a | 0 locked | 23.1 | 23.1 n/a | n/a | n/a | 13:11:24-6 |
| ı/a | Ö | 0 n/a | 0 0 n/a | -1 | | 37.9 | -69.1 locked n/a | 0 locked | 22.5 | 22.5 n/a | n/a | n/a | 13:11:25-5 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | | 36.8 | -70.2 locked n/a | 0 locked | 13 | 13 n/a | n/a | n/a | 13:11:26-5 |
| ı/a | 0 | 0 n/a | 0 0 n/a | -1 | | 37.6 | -69.4 locked n/a | 0 locked | 19.1 | 19.1 n/a | n/a | n/a | 13:11:27-5 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | | 38.9 | -68.1 locked n/a | 0 locked | 21.2 | 21.2 n/a | n/a | n/a | 13:11:28-5 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | | 38.5 | -68.5 locked n/a | 0 locked | 22.3 | 22.3 n/a | n/a | n/a | 13:11:29-5 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | | 37.9 | -69.1 locked n/a | 0 locked | 22.4 | 22.4 n/a | n/a | n/a | 13:11:30-5 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | | 37.4 | -69.6 locked n/a | 0 locked | 22.7 | 22.7 n/a | n/a | n/a | 13:11:31-4 |
| n/a | 0 | 0 n/a | 0 0 n/a | -1 | -1 None | 37.8 | -69.2 locked n/a | 0 locked | 22.9 | 22.9 n/a | n/a | n/a | 13:11:32-4 ~ |
| | | | | | | | | | | | | | > |

Comprehensive printing, and file-export features include KML/KMZ output

Coverage results can be overlapped using readily available tools, such as Google maps

The range of data to be exported is selected graphically in the Coverage-Analyser interface



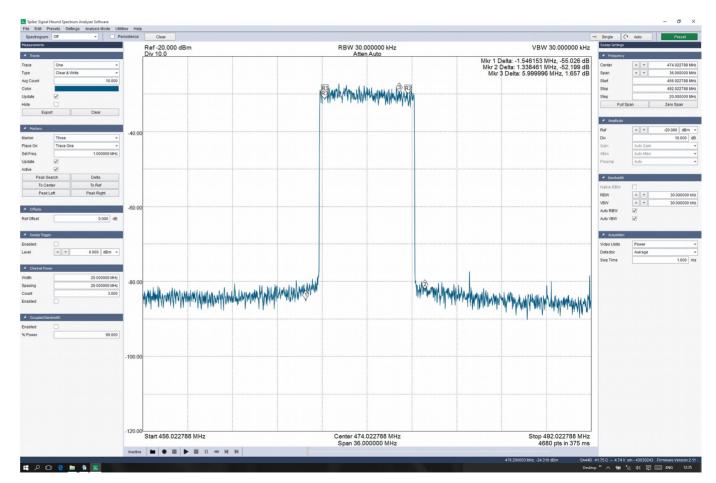
4T2 Portable and Rack Spectrum Analysis

The Spectrum Analyser sub-system provides stateof-the-art signal analysis, available independantly from the Coverage Analysis

Frequency range spans 100 kHz to 4.4 GHz

Average noise level is better than -158 dBm in typical applications

A typical dynamic range of 80 dB is achieved

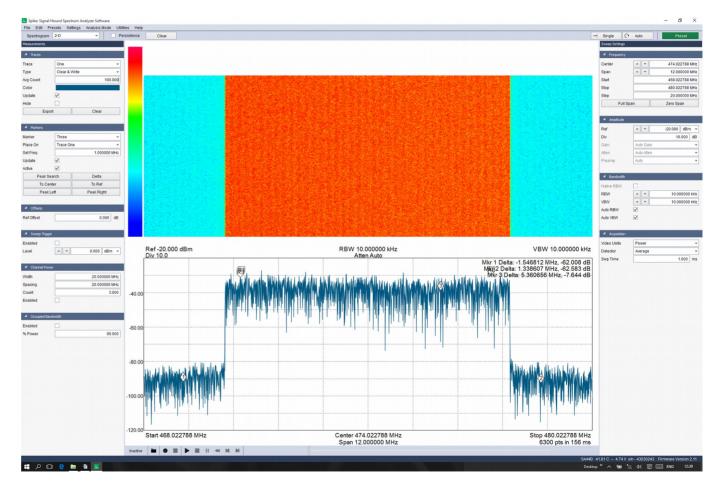


4T2 Portable and Rack Spectrum Analysis

Span can be adjusted for higher resolution and/or faster update rate.

2D spectrogram function is recommended for spurious pickup.

Shoulder distance and tilt linearity measurements available through deltamarker feature



4T2 Portable and Rack additional features

The following additional features are provided through the use of the

4T2 Content Analyser application

and are part of the standard feature set provided by

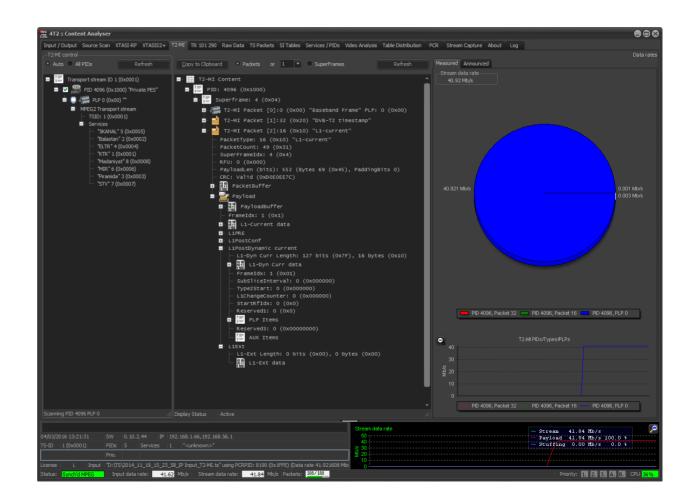
Advanced Broadcast Components

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



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 that make up a service are displayed

Data rate logging allows to pick-up statistical multiplexer limitations

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| 200 (0x00C\$) 0.1 % 0.015 Mb/s PMap PMT 20 (0x00C\$) 0.000049 10 (0x00049) 10 (0x0049) | | 0.0 % 0.003 Mb/s Service: 4163 (0x1043) | | |
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| 201 (0x00C9) 6.6 % 1.600 Mb/s Service: 4287 (0x108F) * Stream data rate - Stream 24.13 Mb/s | | | | 100 (0x0064) 101 (0x0065) 102 (0x0066) 105 (0x0069) |
| - Stream 24.13 HD/S | ₩ 🗹 🛄 201 (0x00C9) | 6.6 % 1.600 Mb/s Service: 4287 (0x10BF) | | |
| | | | Stream data rate | - Stream 24.13 Hb/s |
| 4163 (0x1043) PIDs 105 Services 22 'BBC CME', 'BBC THREE', 'BBC NEWS', 'BBC Red Button', 'B 20 | | | 50 | - Payload 23.28 Mb/s 96.5 % |

MultiViewer (all inputs)

Video/audio of all services in transport stream (H.262, H.264, and H.265) (AC3, AAC)

Audio bar-graphs with history

Black/freeze detection

Moving video or thumbnails

Industry standard codec interface



TR 101 290 (all inputs)

Evaluation of transport stream following TR 101 290 1st, 2nd, 3rd priority

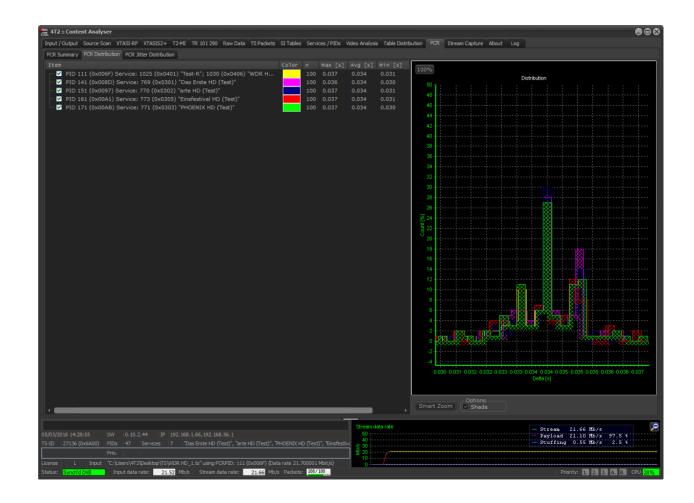
Groups, or individual error measurements can be activated / deactivated

| 4T2 :: Content Analyser | | | | | |
|-------------------------------|---|------------|----------------------|--|---|
| Toput / Output Source Scan YT | TAST DE YTASIS24 T2-MT TR 101 290 | Daw Data | TS Dackate ST Tablee | Services / PIDs Video Analysis Table Distribution PCR Stream Capture About Log | |
| | | | Time of Last E | | |
| | | # Errors | | Error Message | |
| | irst priority | | | | |
| | | | 04/03/2016 13:11:05 | | |
| | ync byte error | | 0 100/2010 10.11.00 | | |
| | AT_error_2 | | | | |
| | | 90 | 04/03/2016 13:11:11 | PID 1410 (0x0582): Incorrect Packet Order Pos 552775460 (expected 9 received 5) | |
| | MT error 2 | | 0 100/2010 10:11:11 | | |
| | ID_error | | | | |
| | econd priority | | | | |
| | ransport_error | | | | |
| | RC error | | | | |
| | | 2021 | 04/03/2016 13:11:24 | PID 301 (0x012D): Time interval between two consecutive PCR values more than 40.0 ms (actual 49.7 ms) | |
| | | 2003 | 04/03/2016 13:11:24 | PID 301 (0x012D): Time interval between two consecutive PCR values more than 40.0 ms (actual 49.7 ms) | |
| | | 18 | 04/03/2016 13:11:09 | PID 101 (0x0065): The difference between two consecutive PCR values (PCRi+1 - PCRi) (actual 880245587448 - 881 | 868104146) is outside the range of 0100.0 ms (act |
| | | 18 | 04/03/2016 13:11:09 | PID 101 (0x0065): PCR accuracy of selected programme is not within ±5E-007 (actual -60.1 s) | |
| | | 16 | 04/03/2016 13:11:22 | PID 505 (0x01F9): PTS repetition period more than 0.700 s (actual 0.744 s) | |
| | AT error | | | | |
| | hird priority | | | | |
| | IT error | | | | |
| | IT actual error | | | | |
| 🗹 💷 3.1.b N | IT other error | | | | |
| | I_repetition_error | | | | |
| | uffer error | | | | |
| - 🗹 💷 3.4.a U | - Inreferenced PID | | | | |
| 🗹 💷 3.5 SI | DT error | | | | |
| - 🗹 💷 3.5.a SI | DT_actual_error | | | | |
| 🗹 💷 3.5.b SI | DT other error | | | | |
| - 🗹 💷 3.6 EI | IT_error | | | | |
| 🗹 🛄 3.6.a El | | | | | |
| - 🗹 💷 3.6.b EI | IT_other_error | | | | |
| 🗹 💷 3.6.c EI | IT_PF_error | | | | |
| 🗹 💷 3.7 RS | ST_error | | | | |
| 🗹 💷 3.8 ΤΓ | DT_error | | | | |
| 🗹 💷 3.9 Er | mpty_buffer_error | | | | |
| 🗹 💷 3.10 De | ata_delay_error | | | | |
| - 🗖 🖬 A.1 🛛 Pa | acket_header_inconsistent | | | | |
| 🖆 🗖 📖 в 🛛 т та | 2-MI errors | | | | |
| 🛱 🛄 8.2 Т | | | | | |
| - 🗖 🖬 B.2.1 T | 2MI_packet_type_error | | | | |
| 🗖 🖬 B.2.2 T | 2MI_packet_payload_error | | | | |
| - 🗖 🖬 B.2.3 Ti | 2MI_packet_count_error | | | | |
| - 🗖 🛄 B.2.4 Ti | 2MI_CRC_error | | | | |
| - 🔲 🛄 B.2.5 T | 2MI_payload_error | | | | |
| | | | | | · · |
| | | | | | |
| | | | | Stream data rate | — Stream 24.14 Mb/s |
| | 0.10.2.44 IP 192.168.1.66,192.1 | | | | - Payload 23.24 Mb/s 96.3 % - Stuffing 0.90 Mb/s 3.7 % |
| | 105 Services 22 "BBC ONE", "Bi | | | | - scarring 0.50 mb/s 3.7 % |
| | 2.3.a PID 901 (0x0385): Time interval b | | | 10 | |
| | S\BBC Mux SD Stream 7 9 13 - 1 minute Cap | | | | |
| Status: Synch'd DVB Inp | out data rate: 24.15 Mb/s Stream | data rate: | 24.14 MD/s Packets: | 100/100 | Priority: 1. 2. 3. A. B. CPU 82% |

PCR (all inputs)

Powerful menu for finding PCR related problems from

Jitter, Drift, and Timestamping

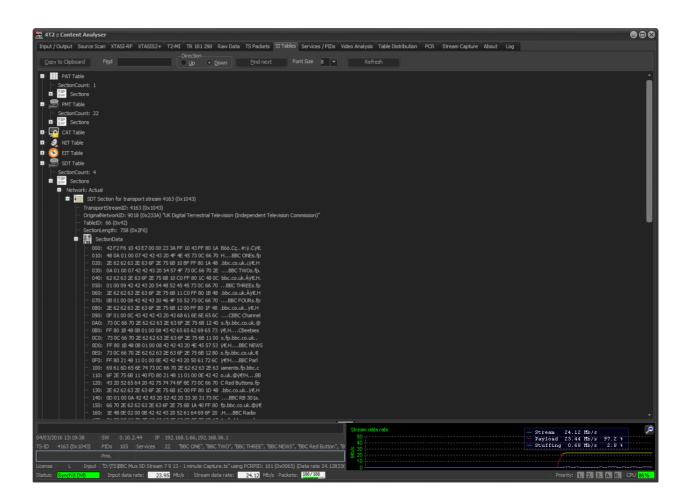


SI tables (all inputs)

Display of the services information with comprehensive interpreter

detailed export functions

find function



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

| 4T2 :: Content Analyser | | | | | | | |
|--|------------------|-----------------------|--------------------------|------------------------|--|------------|---|
| Input / Output Source Scan XTASI-RF XTASIS2+ T2-MI TR 101 290 Raw Data TS Page | kets SI Tables | Services / PIDs | Video Analysis | Table Distribution PCR | Stream Capture About Log | | |
| Copy to Clipboard Find Direction Find | next | | | | | | |
| | | | | | | | |
| Packet | | | | | | | Trigger control Single Multi Start |
| ∎- merets a. o | | | 16 (0x010) | | 2016-03-04, 13:12:39-227 | â | Packet display |
| | 32531 | | 16 (0x010) 16 (0x010) | | 2016-03-04, 13:12:39-227 | | Maximum amount 400 |
| 2 | | | | | | | |
| B 3 | | | | | | | |
| | 32571 32591 | 30 20 | 16 (0x010) 16 (0x010) | | 2016-03-04, 13:12:39-228 2016-03-04, 13:12:39-228 | | Trigger setup |
| 6 | 112783 | 80192 | 16 (0x010) | | 2016-03-04, 13:12:44-224 | | Name |
| 7 | | | | | | | |
| | 112802 112804 | | 16 (0x010) 16 (0x010) | | 2016-03-04, 13:12:44-224 2016-03-04, 13:12:44-224 | | PID gate |
| | 112804 | | 16 (0X010) 16 (0X010) | | 2016-03-04, 13:12:44-224 2016-03-04, 13:12:44-224 | | Block Pass |
| 11 | | | | | | | 16 Inv |
| PacketData | | | | | | | _Smart packet trigger / filter |
| General | | | | | | | Active Edit |
| ■- Header ■- ■ PayLoad | | | | | | | |
| | | | | | | | File |
| - 10: 74 68 7F 25 0A 47 42 52 65 6E 67 47 45 6E 67 6C th | | | | | | | Load Save Save as |
| 20: 61 6E 64 01 85 53 6F 75 74 68 01 0F 8A 53 6F 75 an | | | | | | | guice Bave as |
| 30: 74 68 20 45 61 73 74 01 17 7F 0A 09 47 42 52 FA th | | | | | | | |
| 40: 01 0F FA 01 17 4A 0C 10 43 23 3A 11 40 09 04 00 50: 01 5A 00 4A 0C 10 4C 23 3A 11 40 09 04 00 01 5A .Z | | | | | | | |
| - 60: 00 4A 0C 40 83 23 3A 44 40 09 04 00 01 5A 00 7F .J | | | | | | | |
| 70: 98 08 FF 65 6E 67 4E 65 74 77 6F 72 6B 20 63 68 >. | | | | | | | |
| | | | | | | | |
| 90: 6E 38 20 65 6E 68 61 6E 63 65 64 20 6E 65 74 77 n; A0: 6F 72 6B 20 63 6F 6E 66 69 67 75 72 61 74 69 6F or | | | | | | | |
| | | | | | | | |
| 12 | | | | | | | |
| PacketData | | | | | | | |
| General Berteader | | | | | | | |
| PayLoad | | | | | | | |
| | | | | | | | |
| - 10: 6F 72 6B 20 63 68 61 6E 67 65 20 6E 6F 74 69 66 or | | | | | | | |
| - 20: 69 63 61 74 69 6F 6E 3B 20 65 6E 68 61 6E 63 65 1c | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| - 60: 01 10 BF 01 10 C0 01 11 C0 01 12 00 01 12 40 01 | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| - A0: 5A 0B 02 F7 E3 40 1F 81 03 FF FF FF FF 7F 07 09 Z. | | | | | | | |
| | | | | | | | |
| 5tart 2016-03-04, 13:12:37-174 Trigger 2016-03-04, 13:12:39-231 | 192978 Stop | 3 2016-03-04, 13:1 | 16 (0x010) | | 2016-03-04, 13:12:49-238 | | |
| Start 2016-03-04, 13:12:37-174 Trigger 2016-03-04, 13:12:39-231 | | 2016-03-04, 13:1 | 5:00-100 | | | | |
| L | | | Stream data | | | | 24.01 Mb/s |
| 04/03/2016 13:13:11 SW 0.10.2.44 IP 192.168.1.66,192.168.56.1 | | | 50 40 | | | | 23.05 115/s 96.0 % 4 0.95 115/s 4.0 % |
| TS-ID 4163 (0x1043) PIDs 105 Services 22 "BBC ONE", "BBC TWO", "BBC THRE | | | | | | - stuffing | 0.55 ////// |
| 04/03/2016 13:13:11 Prio. 2.3.a PID 1802 (0x070A): Time interval between two consec | | | 10 | | | | |
| License L Input "D:\TS\BBC Mux SD Stream 7 9 13 - 1 minute Capture.ts" using PCRPI | | | 3336 <u>0 ime</u> r | | | | |
| Status: Synch'd DVB Input data rate: 24.14 Mb/s Stream data rate: 24.01 | mb/s Packets | 1007 100 | | | | | riority: 1. 2. 3. A. B. CPU 81% |

Log (all inputs)

Most comprehensive logging system

with integrated find and sorting options

Automated logfile storage with integrated garbage collection

| 2 :: Content Analys | ser | | | | | | | • |
|---------------------|--------------------|----------------|-----------|--|------------------------------------|--------------------------|--|------------------------------|
| /Output Source So | can XTASI-R | F XTASIS2 | + T2-MI | TR 101 290 Raw Data TS P | ackets SI Tables Service: | s / PIDs Video Ar | alysis Table Distribution PCR Stream Capture About Log | |
| y to Clipboard | | | | Direction Up • Down Ei | id next 📎 | * 🗉 🗉 | Explorer: Logfile folder CMD: Logfile folder | |
| p / Sub-Gr | | | | Date and Time | ClassName | Instance | Message | |
| | | | | 2016-03-04, 13:13:32-824 | TTSPESCollector TTSPESCollector | 0x15DC00C0 | PID 101 (0x0065): Discontinuity detected while collecting PES Packet | |
| | | | | 2016-03-04, 13:13:32-819 | TTSPESCollector | 0x0A949340 | PID 601 (0x0259): Discontinuity detected while collecting PES Packet | |
| | Warning Warning | Progr Progr | | 2016-03-04, 13:13:32-811 2016-03-04, 13:13:32-806 | TTSPESCollector | 0x0DBB17B0 0x0A949100 | PID 901 (0x0385): Discontinuity detected while collecting PES Packet PID 501 (0x01F5): Discontinuity detected while collecting PES Packet | |
| | | | | 2016-03-04, 13:13:32-806 | TISPESCOLECTOR | 0X0A949100 | PID SUI (0X01+5): Discontinuity detected while collecting PES Packet | |
| Error | Error | | | | | | | |
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| Warning | Warning | | | | | | | |
| | | | | | | | | |
| Error | Error | | | | | | | |
| | | | | | | | | |
| 1040 | | | 1040 | | | | | |
| Message | Message Message | | 1040 | 2016-03-04, 13:13:53-050 | TTSAnalycer | | 1.4 Continuity_count_error clear 2 Events suppressed (3 mgs suppres | |
| | Message | | 1040 | 2016-03-04, 13:13:53-009 | TTSAnalyser | | 1.4 Continuity_count_error clear (35 mgs suppressed) | |
| | Message | | 1040 | 2016-03-04, 13:13:52-957 | TTSAnalyser | NI | 1.4 Continuity_count_error clear 4 Events suppressed (1 mgs suppres | |
| | Message | | 1040 | 2016-03-04, 13:13:33-057 | TTSAnalyser | 0x0857E460 | 1.4 Continuity_count_error dear 2 Events suppressed | |
| | Message | | 1040 | 2016-03-04, 13:13:32-989 | TTSAnalyser | 0x0857E460 | 1.4 Continuity count error dear | |
| | Message | | 1040 | 2016-03-04, 13:13:32-976 | TTSAnalyser | 0x0857E460 | 1.4 Continuity_count_error clear 6 Events suppressed | |
| | Message | | 1040 | 2016-03-04, 13:13:32-947 | TTSAnalyser | 0x0857E460 | 1.4 Continuity_count_error dear 4 Events suppressed | |
| | Message | | | 2016-03-04, 13:13:32-910 | TTSAnalyser | 0x0857E460 | 1.4 Continuity count error dear 13 Events suppressed | |
| Error | | | | | | | | |
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| | | | | | | _ | | |
| | | | | | | Stre | eam data rate | - Stream 23.85 Mb/s |
| | | | | 3.1.66,192.168.56.1 | | | 0 | - Payload 23.01 Mb/s 96.5 % |
| 4163 (0x1043) | | | | BC ONE", "BBC TWO", "BBC THR | | Button", "B | ō | |
| 016 13:14:19 | | | | Time interval between two conse | | 1 | 0 | |
| | | | | | | ≥ 24.12833€ | <u>0</u> | |
| Synch'd DVB | Toout dat | a rater 1 | 24.16 Mb/ | s Stream data rate: 24.9 | 8 Mb/s Parkets: 166/166 | 3 | | Priority: 1. 2. 3. A. B. CPU |

further benefits

- chassis refined over more than one decade with respect to robustness and durability
- based on industry-standard hardware: Mini-itx, ATX, m.2 SSD, DDR-4, USB-3, Gbe
- Windows[™] 64bit 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

4T2 Coverage Measurement Solutions presentation @2019 Advanced Broadcast Components slide 28 of 28