

# **Technical Specifications**

## **(MultiAnalyzer Software)**

Version 2021-12

**(C) 03/03/2022 femvenner GmbH**

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# 1 History

Date	Version	Author	Comment
2016-02-04	A9	GH	• Initial version
2016-04-24	A11	GH	• Update
2016-05-24	A12	GH	• Update
2016-09-22	A15	GH	• Update
2016-11-15	A16	GH	• Update
2017-04-10	A18	GH	• Update
2017-11-03	A20	GH	• Update
2018-04-18	A21	GH	• Update
2019-01-30	2018.12	GH	• Update
2019-08-09	A23	GH	• Update
2020-04-17	2019.12	GH	• Update
2021-03-22	2020.12	GH	• Update
2022-03-03	2021.12	GH	• Update

## 2 Specifications in brief

### 2.1 Hardware

Name	Description
<b>PC requirements</b>	
PC-Hardware (minimum)	Intel® Core™ i3(gen 10), 4GB Memory, 20 GB sufficient free space on hard-drive.
OS	Windows 10 (64-bit version, version 1809 or newer)
USB-ports	2.0 or 3.x (used for chip set device connections)
Ethernet	10/100/1000 Mbit/s (used for measurement device connection)
<b>Supported recording devices</b>	
TCCA TMW	Receiving per UDP data formatted according to TCCA <i>TTR 005-01, Vers. 1.0.0, June 2014</i> , DMR proprietary extension
RTL2832	USB connected RTL2832 chip set devices (also known as DVB-T receiver)
R&S EM100, R&S PR100	Rhode&Schwarz® EM100 or PR100 device (Ethernet connected) with remote control option according to <i>ANSI/VITA 49.0 VITA Radio Transport (VRT) Standard</i> .
R&S ESMD	Rhode&Schwarz® ESMD device (Ethernet connected) with remote control option according to <i>ANSI/VITA 49.0 VITA Radio Transport (VRT) Standard</i> . Support for DDC (digital down converter) and no DDC option.
AirSpy	USB connected AirSpy device (Use firmware 1.0.0-rc10 or higher)
MS2710xA	Anritsu MS2710xA spectrum analyser support
SKY-i7000	GEW SKY-i7000 spectrum analyser support.
RFE 7504 Surveillance Monitor	rfe-global 7504 Surveillance Monitor support.
RFE 7510 Cipher-Key & Surveillance Monitor	rfe-global 7510 Cipher-Key & Surveillance Monitor
Tektronix RSA306	Tektronix RSA306 support.
Ettus UHD	Ettus UHD driver support (tested with B210 and N210)
<b>Supported direction finding devices</b>	
R&S DDF550	Receive signalling and do the direction findings.
<b>Supported hardware decryption devices</b>	
MASDecryptor	Femvenner hardware for TETRA decryption. Supports TAA1, TEA1, TEA2, TEA3, TEA4

## 2.2 Protocol

Name	Description	
<b>Supported protocols</b>		
TETRA TMO	ETSI TS 100 392-2 V3.9.2 (2020-06)	Air Interface (AI)
	ETSI EN 300 392-7 V3.5.1 (2019-07)	Security
	ETSI TS 100 392-15 V1.5.1 (2011-02)	TETRA frequency bands, duplex spacings and channel numbering
	ETSI EN 300 395-2 V1.3.1 (2005-01)	TETRA codec
	ETSI TS 100 392-18-1 V1.7.2 (2018-01)	Location Information Protocol (LIP)
	ETSI EN 300 392-12-22 V1.4.1 (2015-02)	Dynamic Group Number Assignment (DGNA)
	TTR 001-17 V1.0.1 (2004-07) (+CR199_V1+CR286_V1)	Radio User Assignment (RUA)
	ETSI EN 300 394-1 V4.1.1 (2021-03)	MS Test T1
TETRA DMO	ETSI EN 300 396-3 V1.4.1 (2011-12)	Mobile Station to Mobile Station (MS-MS)
	ETSI EN 300 396-4 V1.4.1 (2011-12)	Type 1 repeater air interface
	ETSI EN 300 396-5 V1.3.1 (2011-12)	Gateway air interface
	ETSI EN 300 396-6 V1.6.1 (2016-11)	Security
DMR	ETSI TS 102 361-1 V2.5.1 (2017-10)	DMR Air Interface (AI) protocol
	ETSI TS 102 361-2 V2.4.1 (2017-10)	DMR voice and generic services and facilities
	ETSI TS 102 361-3 V1.3.1 (2017-10)	DMR data protocol
	ETSI TS 102 361-4 V1.11.1 (2021-01)	DMR trunking protocol

## 2.3 Software

Name	Description
<b>Main software components:</b>	
Record	<ul style="list-style-type: none"> <li>• Control records: Start/Stop, Saving file</li> <li>• Supported: TETRA-TMO, TETRA-DMO, DMR</li> <li>• Change gain</li> <li>• Monitor MER rate</li> <li>• Monitor frequency adjustments</li> <li>• Monitor channel spectrum</li> <li>• Search and find TETRA-TMO+TETRA-DMO+DMR carrier in spectrum</li> <li>• AIE keyserver</li> </ul>
MSC	<ul style="list-style-type: none"> <li>• Present protocol in message sequence charts.</li> <li>• Supported: TETRA-TMO, TETRA-DMO, DMR.</li> <li>• Bit precise analysis of elements.</li> <li>• Highlighted protocol violation.</li> <li>• Show encrypted data.</li> <li>• Translate subscriber numbers to names.</li> <li>• Synchronizes the display of the current MSCs with the time of another.</li> <li>• Copies a selected part using the Splitter.</li> <li>• Support for external user-defined protocol analysis.</li> <li>• Export MSC as ASCII text to clipboard.</li> </ul>
QoS	<p>View protocol data using graphs, lists and statistic:</p> <ul style="list-style-type: none"> <li>• Supported: TETRA-TMO, TETRA-DMO, DMR</li> <li>• Downlink/Uplink load MCCH, SCCH1, SCCH2, SCCH3 as time chart</li> <li>• Downlink/Uplink load MCCH, SCCH1, SCCH2, SCCH3 as pie chart</li> <li>• User defined message views (time, pie, list and summary).</li> <li>• User defined list and summary can sorted from or to.</li> <li>• User defined list can filtered for subscriber that was/are present in cell</li> <li>• List top traffic sources, including identification of subscriber</li> <li>• TCH load on traffic channel</li> <li>• TCH load as time chart</li> <li>• TCH load as call list</li> <li>• TCH load as pie chart (slot usage, over all and occurred)</li> <li>• TCH as summary with histogram view of call length.</li> <li>• TCH Erlang C pie charts (measured call length and user defined)</li> <li>• TCH defined calls (black- or white-list calls)</li> <li>• Cell change as time chart (itemised coloured by type and status)</li> <li>• Cell change as subscriber (itemised by duration time, type and status)</li> <li>• Cell change duration histogram (“all” and “call restoration”)</li> <li>• Cell change top subscriber (itemised by number, type and status)</li> <li>• Highlight subscriber and events</li> <li>• Search for subscriber and events</li> <li>• Show encrypted data</li> <li>• Translate subscriber numbers to names</li> <li>• View selected events and subscriber highlighted in time diagrams</li> <li>• Simulation of not received uplink data</li> <li>• Support for external user-defined protocol analysis</li> </ul>

Name	Description
	<ul style="list-style-type: none"> <li>• Python Interface for alerting and extracting data.</li> </ul>
QoS-Server	<p>Analyse and stream high level QoS data to clients.</p> <ul style="list-style-type: none"> <li>• Supported: TETRA-TMO, TETRA-DMO, DMR</li> <li>• Support unicast or multicast streaming.</li> <li>• Support IPv4 or IPv6.</li> <li>• Share QoS groups settings to clients.</li> <li>• To save bandwidth the compressing is used.</li> </ul>
Name	Description
<b>Main software components:</b>	
NetworkViewer	<p>Shows the cell relationships graphically. Analyses and indicates incompatibilities.</p> <ul style="list-style-type: none"> <li>• Supported: TETRA-TMO.</li> <li>• Supported GPS NMEA receiver.</li> <li>• View neighbours as abstract view.</li> <li>• View neighbours as geographic view.</li> <li>• View current position (with GPS receiver)</li> <li>• Import infrastructure exported data.</li> <li>• Imported air-interface recorded data (MultiAnalyzer recorded files).</li> <li>• Import map overlays.</li> <li>• Plugin DLL support.</li> </ul>
Splitter	<p>Split recorded files into parts.</p> <ul style="list-style-type: none"> <li>• Supported: TETRA-TMO, TETRA-DMO, DMR, GSM.</li> <li>• Optionally adapt internal timestamp to network time (TETRA-TMO, DMR).</li> </ul> <p>Merge parts of a records into one file:</p> <ul style="list-style-type: none"> <li>• Supported: TETRA-TMO, TETRA-DMO, DMR, GSM.</li> <li>• Warnings for gaps or duplicate data sets.</li> <li>• Auto distinguish between different recordings.</li> </ul>
MASDecryptor	<p>Service tool for hardware decryption support.</p> <ul style="list-style-type: none"> <li>• Supported: Femvenner hardware MASDecryptor.</li> <li>• Handle firmware updates.</li> <li>• Set valid working period.</li> <li>• Set/Change password for changing working periods.</li> <li>• Set IP address.</li> </ul>
DirectionFinder	<p>Indicates the direction of signalling.</p> <ul style="list-style-type: none"> <li>• Enhanced PC-Hardware (minimum): Intel® Core™ i7(gen 10)</li> <li>• Supports R&amp;S DDF 550 and R&amp;S EM100(as duplex device).</li> <li>• Support locating TETRA and GSM signalling.</li> <li>• TETRA: Filter for SSI, Speech or Time-Slot.</li> <li>• GSM: Filter for Time-Slot.</li> <li>• Show reception power by slot.</li> <li>• Show spectrum (channel and wideband).</li> <li>• Support R&amp;S MapView (local or remote PC).</li> <li>• Saving the recorded data as MAF files (can be displayed simultaneously by MSC and QoS).</li> <li>• Load and display directional findings of the recorded MAF files.</li> </ul>