Data Sheet

VIAVI
8150
TETRA AirAnalyzer

The 8150 RF AirAnalyzer is a poweful protocol analyzer for recording, displaying, and analyzing the complex communication process at the air interface in TETRA systems.

Mobile networks following the TETRA standard for a basis for successful operation in the police and emergency services, airports, railways, and for many other professional users. These user groups demand reliable and safe network operation at best possible radio coverage. For this purpose, the RF AirAnalyzer is the perfect measuring instrument to analyze existing mobile radio networks in detail. Extensive functions allow users to quickly and easily obtain detailed results. The measurement data processed and visualized via your own laptop. The user-friendly software design and the versatile search and filter methods ensure effective working.

Versatile Application Options

- Quality analysis of the air interface and services, such as MCCH call loads and call statistics
- Analyzing the voice communication quality
- Performing interoperability checks
- Securing the critical communications through resource monitoring
- Locating carrier and interference problems
- Investigating problems during the introduction of new system technologies
- Mobile radio coverage measurements
- Analyzing and maintaining a PMR network
- Verifying security feature

Overview of the Technology

The 8150 AirAnalyzer receives data from the air interface of the network to be examined. The received data are decoded in real-time and transferred to a computer for storage purposes.

With the help of different analysis software, the data can be simultaneously or at a later time, without a direct connection to the measuring instrument.

Extensive analysis options

Two powerful and highly sensitive measurement receivers form the heart of the 8150 TETRA AirAnalyzer. These receivers pick up the bi-directional communication between TETRA mobile stations and base stations. The highly sensitive receivers enable the simultaneously analysis of the complete uplinks and downlinks (all timeslots) of up to two carriers.

The TETRA AirAnalyzer decodes the data received on the radio channel in real time and forwards them to a PC for further processing. The recorded data are stored as raw data on the hard disk of the computer. To evaluate the protocol, the raw data can be analyzed, filtered, and displayed via various PC applications, either online or offline.

Message Sequence Chart (MSC)

The TETRA MSC application visualizes the signalling messages received over the air interface in a clear and concise way. Thanks to the structured layout, users can easily identify which message is transmitted on what protocol layer. The messages are individually tagged with a time stamp and the relevant RF parameters, such as frame number, frequency offset, and signal strength. Signalling messages not conforming to TETRA standard EN 300 392 are marked with a different color. With a click on the marked message, the application displays a detailed error description.

A number of filter functions ease fault tracing because the user can reduce the messages displayed to those which are of interest in the case at hand.

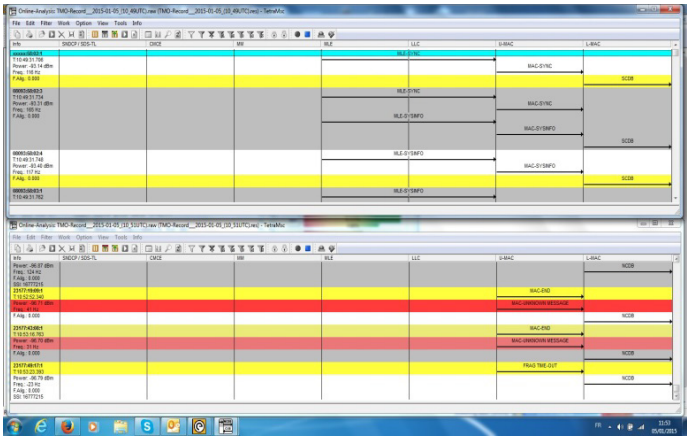

Figure 1. Simultaneous Two Channels MSC Charts with Invalid Messages Color Marked

Voice Decoder

The 8150 TETRA AirAnalyzer and its associated PC software can output and store voice data received over the air interface, enabling users to evaluate the voice quality and to observe communications over the network. With the voice decoder function, users can monitor speech on two time slots and record it in Wave sound format for later analysis. The direction and time slot can be selected on a straight forward user interface.

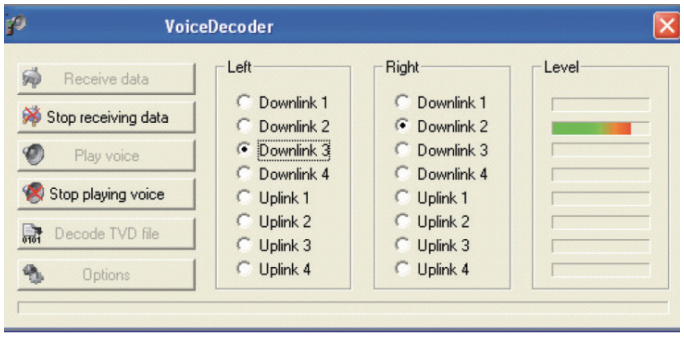

Figure 2. Voice Playback and Storage Can be Triggered Once the Direction and Time Slots Have Been Selected

TETRA Scanner

The TETRA scanner searches for TETRA carriers in a user-defined frequency range. In addition to the available TETRA channels, the broadcast parameters are displayed for each carrier with a main control channel. This feature helps to easily identify network configuration problems. The channels available can be monitored because the usage of time slots for traffic (TCH) is displayed and permanently updated. Associated measurement values, such as received signal strength or frequency error, are shown in a diagram.

This tool offers an easy way to check the results of network planning in real life, so that the network can be optimized if necessary. The current network status in regard to quality and quantity can be evaluated, so the tool can be used to find the best possible utilization of resources. With a GPS device connected to the computer, the 8150 TETRA AirAnalyzer can even be turned into a full featured drive test receiver with real-time storage of the current position.

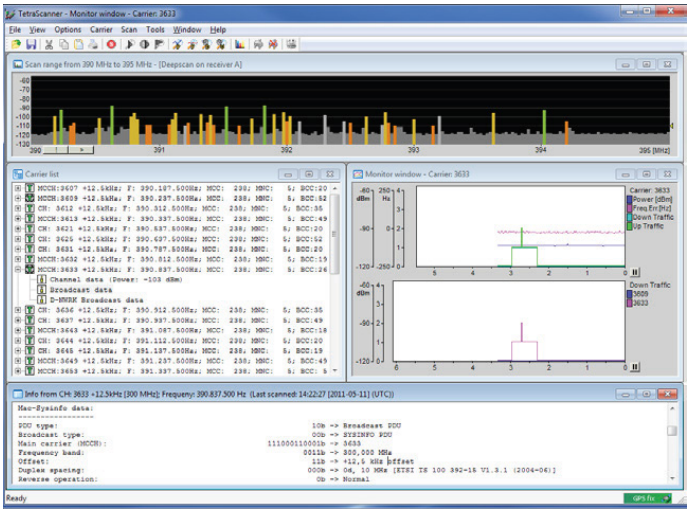

Figure 3. The TETRA Scanner Application Provides an Overview on Spectrum Occupation, Load and Traffic

Flexible Expansion

In addition to the standard functions, the analysis software can be expanded with a large number of functions. A selection of these very helpful functions is listed below.

TETRA QoS Analyzer

The optional TETRA QoS Analyzer application provides an easy way to evaluate the quality of service; the results of the QoS parameters are displayed graphically for easier interpretation. In the TETRA AirAnalyzer, quality of service means more than just radio coverage: to ensure that the TETRA network for safety-critical operations can perform the required service, more data is of importance. Call setup time, number of queued calls are important parameters to describe the network quality. Emergency services have high demands on these parameters for safely performing their tasks.

In order to ease the evaluation of the quality of service in a fast and comfortable way, the results are displayed easily readable, either in graphical or tabular format.

Expansion Option

It represents the utilization as well as the use of the channels by the current groups or group calls. It allows the user to recognize resource utilization problems at an early stage and remedy them.

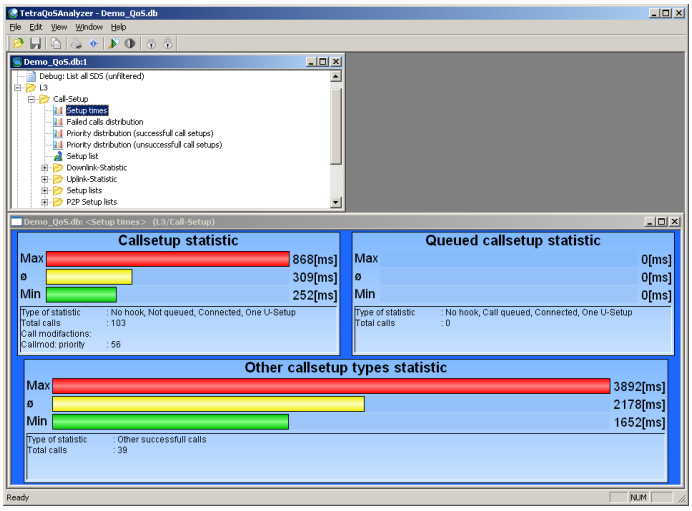

Figure 4. Network Performance Under Real-life Conditions can be Evaluated with the TETRA QoS Analyzer

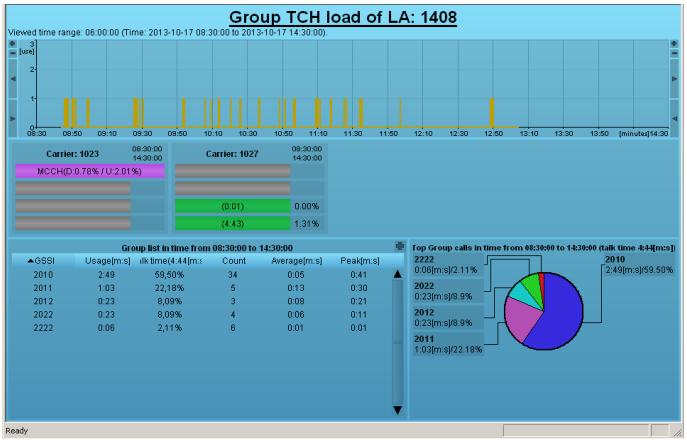

Figure 5. Expansion Option Showing Group TCH Load of LA

Static / Dynamic Air Interface Encryption Option

In organizations ensuring the public safety and security, voice calls, and data transmission over the TETRA network are confidential by nature and therefore protected by air interface encryption. In these types of networks, the functionality of the 8150 TETRA AirAnalzyer is ensured by the static / dynamic air interface encryption option.

Note: the encryption algorithm (TEA 1 through 4) and the encryption keys must be provided by the user.

IQ Analyzer (Physical Data Analyzer)

The IQ Analyzer option measures all the relevant IQ data of a base station (e.g. the spectrum of the carrier, Peak, C/I, and RMS vector errors as well as the Constellation Display of the base station) and represents them in graphical form.

DMO Option

One of the strengths of the TETRA standard is the possibility to communicate between two radios in Direct Mode Option (DMO), without the need to be attached to a radio network. With the DMO option, the TETRA AirAnalyzer also analyzes DMO and DMO gateway signalling messages.

AirAnalyzer Coverage Test Software Option

The Coverage Test Software together with the ESRI ArcGIS Software enables linking the measurements of the signal output and different error rates with GPS position data of the own location. The positions of radio stations can also be displayed. The representation of the measurements is done in real-time. The data provides information about the values of signal output, frequency errors as well as best server of several channels in the downlink.

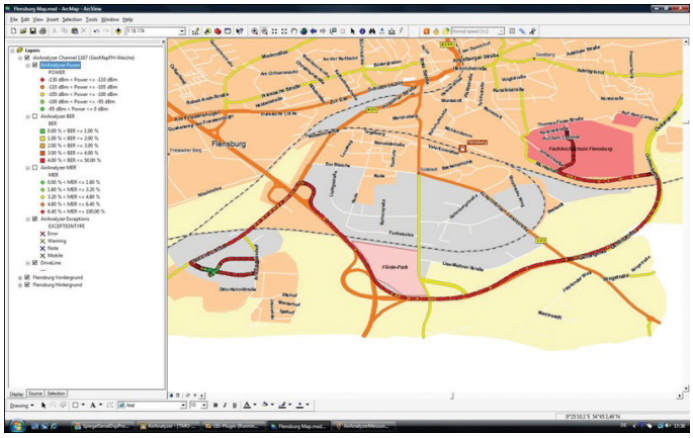

Figure 6. With the Coverage Test Option and ESRI ArcGIS, the 8150 Becomes a Powerful Drive Test Receiver

TETRA AirAnalyzer Office Software

The application software for the TETRA AirAnalyzer is protected with a USB dongle. In order to be able to use the applications on a second PC for offline analysis of captured data, the TETRA AirAnalyzer office software can be used with exactly the same functionality and options as the first license. The additional software license comes on a separate USB dongle.

Specifications

The published accuracies are determined in accordance with GUM (Guide to the Expression of Uncertainty in measurement) and EA (European Cooperation of Accreditation) application document EA4 / 02: "Expressions of the Uncertainty of Measurements in Calibraton".

Receiver	
Number of Receivers	2
Frequency Range	100 MHz to 1000 MHz
Connection	Two N-type sockets
Bandwidth	10 MHz (each receiver)
Dynamic	>80 dB
Sensitivity	RSSI <-124 dBm BER <-118 dBm (-120 dBm typ)
IFDR (at -45 dBm)	-75 dBc
Input Impedance	50 W
Input VSWR	<1.5 (typ)
Reference Frequency Uncertainty	<10-7
Max Input Power	+30 dBm (high power path) typical
General Data	
Casing	19" rack-mount model, 3 HU
Temperature Range	0° C to +50° C
Voltage Supply	100 V - 240 V AC, 47 - 63 Hz
Power Consumption	<60 W
Weight	<5.5 kg
Data Connection	Ethernet, USB, RS233, Digital I/O

Ordering Information

Versions and Options

Order Number	Description
RAA-8150	8150 RF AirAnalyzer Measurement Equipment
RAA-TETRA	TETRA Basic Software
RAA-Opt-DMO	Software Option DMO Support
RAA-Opt-IQ	Software Option IQ Measurement
RAA-Opt-QOS	Software Option Quality of Service
RAA-Opt-GEO2	Software Option Geomap without ArcGIS
RAA-Opt-AIE	Software Option Air Interface Encryption
RAA-Opt-QOS-Ext	Software Option QOS Extension
RAA-Opt-GEO1	Software Option Geomap with ArcGIS
RAA-Opt-Scan	Software Option Scanner Analyzer
RAA-Opt-Office1	Additional Software License with AIE
RAA-Opt-Office2	ESRI ArcGIS Single Use License
RAA-Opt-Office3	Additional Software License without AIE

Accessories

RAA-Opt-DC1	DC Option 12 V
RAA-Opt-DC2	DC Option 24 V
RAA-Opt-Case	Trolley Case

Warranties and Calibration

RAA-Opt-Warranty	Factory Warranty Extension
RAA-Opt-Cal	Calibration
RAA-Opt-Care	Care Plan

Training

RAA-Training1	Training

VIAVI Solutions

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