Willtek

Data Sheet

8140
TETRA AirAnalzyer

Boosting wireless efficiency

Ensuring safe and reliable communication when you need it most

Mobile networks following the TETRA standard form 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.

These high requirements can be fulfilled with Willtek's 8140 TETRA AirAnalyzer, a unique and versatile tool to continuously analyse and maintain a TETRA network. It is also suited to examine issues during the introduction of new system technology and to perform interoperability tests in system development.

The TETRA AirAnalyzer is supported by a software package for the following tasks:

- Protocol analysis using message sequence charts (MSC) to display in detail the complex flow of communication in the signalling protocol between TETRA radio and base station
- Quality of Service analyser to chart issues within a radio cell over a given time period, including statistical evaluation
- Voice decoder monitoring and recording the ongoing voice communication in the network
- Measurement of channel and modulation parameters with the TETRA physical data analyser
- GPS-assisted radio coverage measurements
- TETRA scanner to survey spectrum utilisation
- Decoding of communication under static or dynamic air interface encryption

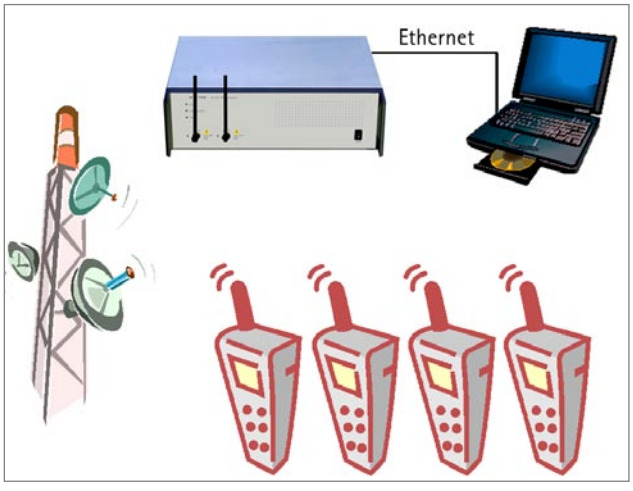

Figure 1: The analysis system comprises the 8140 TETRA AirAnalyzer connected to a PC.

Fast data capture, comprehensive analysis

Two powerful and highly sensitive measurement receivers form the heart of the 8140 TETRA AirAnalyzer. These receivers pick up the bidirectional communication between TETRA mobile stations and a base station. All time slots in the downlink and uplink of a selectable channel are analysed simultaneously.

The TETRA AirAnalyzer decodes the data received on the radio channel in real time and forwards them to a PC for further processing. Various PC applications can analyse the data under different aspects. The analysis can be performed either online or offline, using the data received and stored at a later date.

Packet data transmission can also be processed by the TETRA AirAnalyzer and are stored for further analysis with third-party applications like Wireshark or other IP packet sniffers.

Suspect faults in the message flow?

The TetraMSC application visualises 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 colour. With a click on the marked message, the application displays a detailed error description.

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

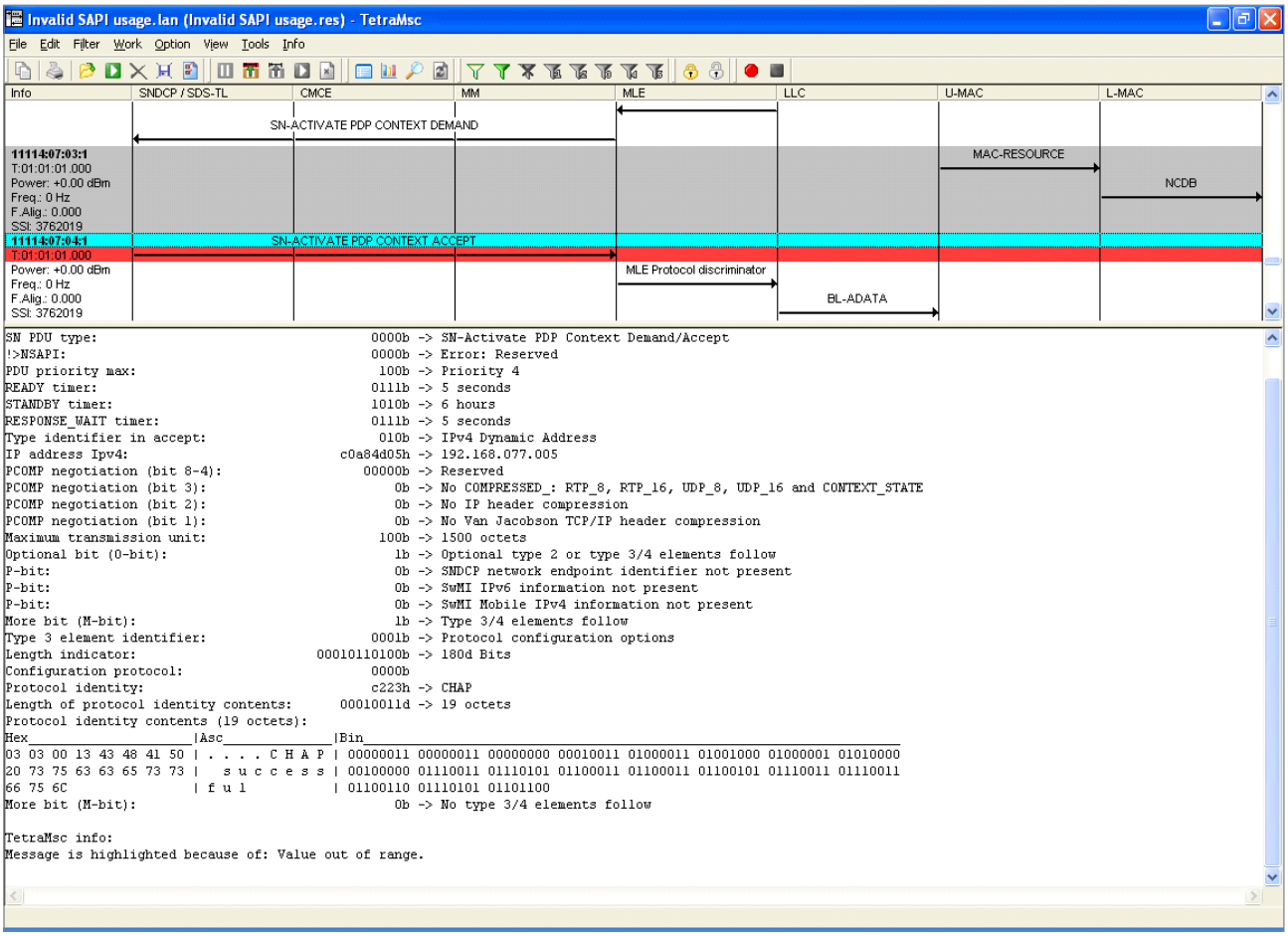

Figure 2: Invalid messages are clearly marked in the message sequence chart.

Analysing voice communication and voice quality

The 8140 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 Wavesound format for later analysis. The direction and time slot can be selected on a straightforward user interface.

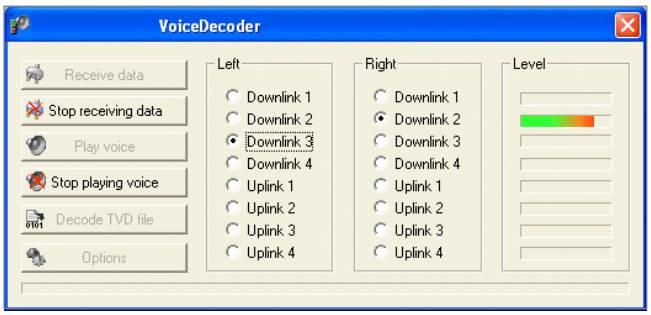

Figure 3: Voice play back and storage can be triggered once the direction and time slots have been selected.

Observing the RF

The TETRA Physical Data Analyzer application complements the 8140 TETRA AirAnalyzer to give a powerful modulation analyser. Received data are stored with all details so that spectrum, received signal strength and modulation quality can be assessed at a later time. The analyser software visualises these physical layer measurements in a graphic display (see examples in Fig 4). Useful functions like the display of individual bursts, the rotation of the graph in the constellation display and I/Q modulation fulfil many desires of those analysing the physical layer in more detail.

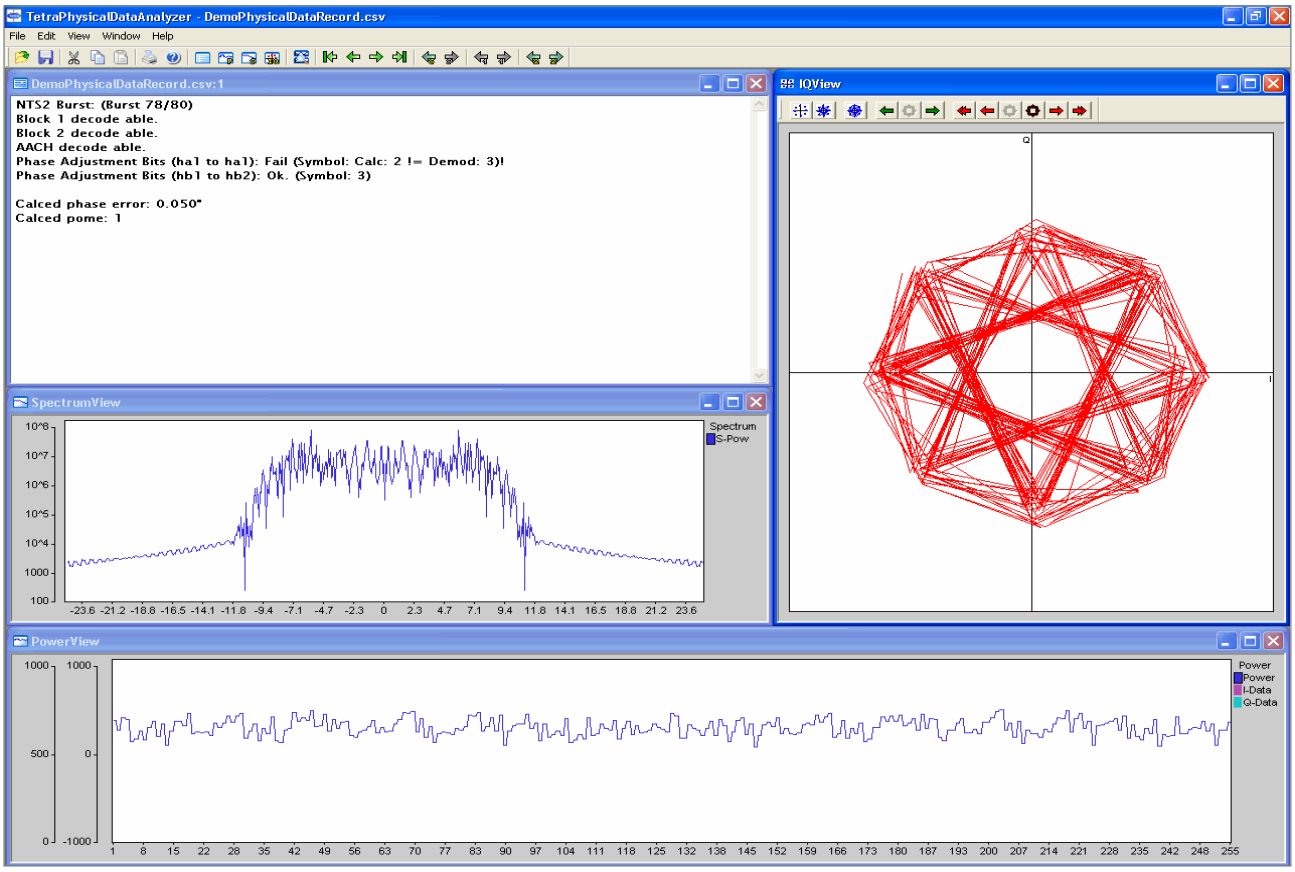

Figure 4: The TETRA Physical Data Analyzer provides deep insight into the RF characteristics.

Finding TETRA carrier problems

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 optimised 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 utilisation of resources. With a GPS mouse connected to the computer, the 8140 TETRA AirAnalyzer can even be turned into a full featured drive test receiver with real-time storage of the current position.

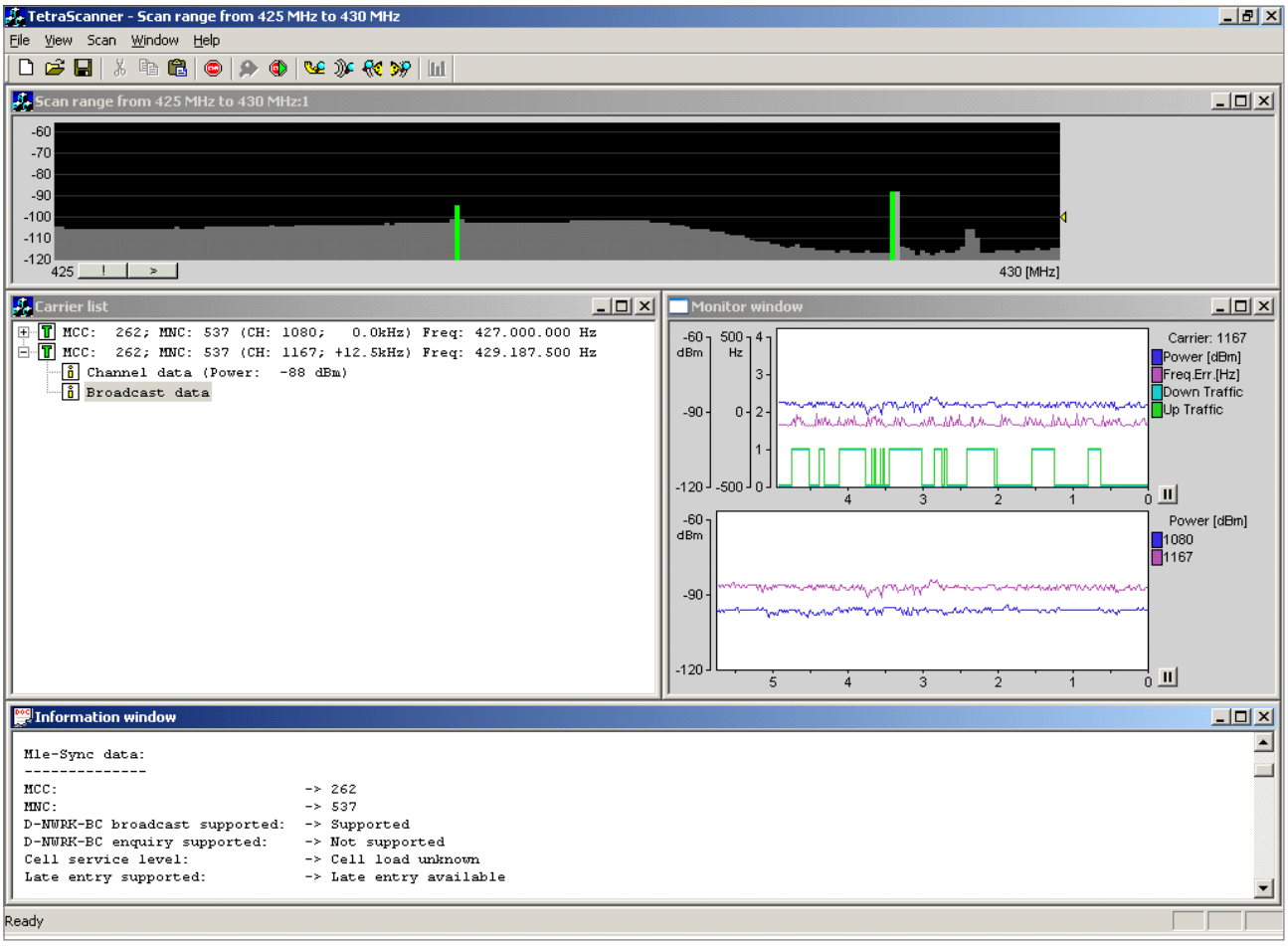

Figure 5: The TETRA Scanner application transforms the 8140 TETRA AirAnalyzer into a surveillance receiver.

Extending the range of possibilities with options

8165 TETRA QoS Analyzer

The optional 8165 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 are of importance. Call setup time, number of queued calls and associated wait time, call priorities and cell load 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.

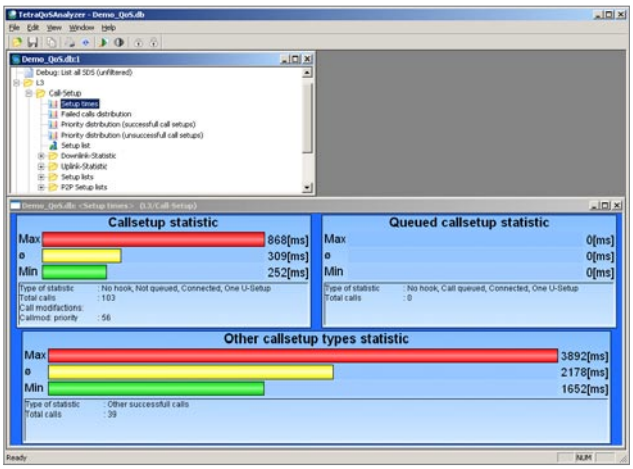

Figure 6: Network performance under real-life conditions can be evaluated with the 8165 TETRA QoS Analyzer.

8160 Static Air Interface Encryption Option, 8161 Static/Dynamic Air Interface Encryption Option

In organisations ensuring 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 8140 TETRA AirAnalyzer is ensured by the 8161 Static/Dynamic Air Interface Ecnryption Option. The encryption algorithm (TEA 1 through 4) and the encryption keys must be provided by the user.

8162 DMO Option

One of the strengths of the TETRA standard is the possibility to communicate between two radios in Direct Mode (DMO), without the need to be attached to a radio network. With the 8162 DMO Option, the TETRA AirAnalyzer also analyses DMO and DMO Gateway signalling messages.

8164 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 8164 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 ac-cordance with GUM (Guide to the Expression of Uncertainty in Measure-ment) and EA (European Co-operation for Accreditation) ap-plication document EA4/02: ''Expressions of the Uncertainty of Measurements in Calibration''.

Receiver

Frequency range	360 to 460 MHz
Connection	two N-type sockets
Input impedance	50 Ω
Input VSWR	< 1.5 (typ.)
Reference frequency uncertainty	$< 10^{-7}$
Max. input power	0 dBm
Typical sensitivity	< –106 dBm dynamic < –115 dBm static

General data

Casing	19'' rack-mount model, 3 HU
Temperature range	0°C to +50°C
Voltage supply	Wide AC input range with power factor correction 95 V to 250 V
Power consumption	< 60 W
Weight	< 15 kg
Data connection	100 Base-T Ethernet, RJ-45

Ordering information

8140 TETRA AirAnalyzer	M 860 546
8160 Static Air Interface Encryption	M 860 544
8161 Static/Dynamic Air Interface Encryption	M 860 561
8162 DMO Option	M 860 545
8164 AirAnalyzer Office Software	M 860 547
8165 TETRA QoS Analyzer	M 860 562
8171 DC Power Supply (12 – 18 V)	M 860 541
8172 DC Power Supply (18 – 36 V)	M 860 542
8173 DC Power Supply (36 – 72 V)	M 860 543

Visit **www.willtek.com/tetra** for more information on Willtek's TETRA products!

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