fjord-e-design

■ mobile communication engineering

E1001 TETRA AirAnalyzer

Power

Communication

Status

TETRA

AirAnalyzer

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TETRA is a digital mobile radio standard comparable to GSM which is mainly used in areas with service radio and trunked mobile radio. Typically it is used for ground radio services at airports, for fire department and police radio.

The **TETRA AirAnalyzer** (protocol analyzer) developed by fjord-e-design can be used to record, **display and analyze the complex course of the communication between TETRA mobile units and a TETRA base station.**

The TETRA AirAnalyzer monitors/analyzes simultaneously the complete up- and downlink of one TETRA carrier (free choice of carriers) including all time slots (8 at the same time). The receiving unit of the AirAnalyzer offers a very high sensitivity. In addition, the TETRA AirAnalyzer can be used to carry out RF measurements.

The TETRA AirAnalyzer hardware and software are available separately.

Typical areas of deployment:

· TETRA development
· Interoperability check (e.g. IOP-test)
· Verifying of security services
· Analysis of protocol and timing problems on the air interface

TETRA AirAnalyzer

TETRA Network
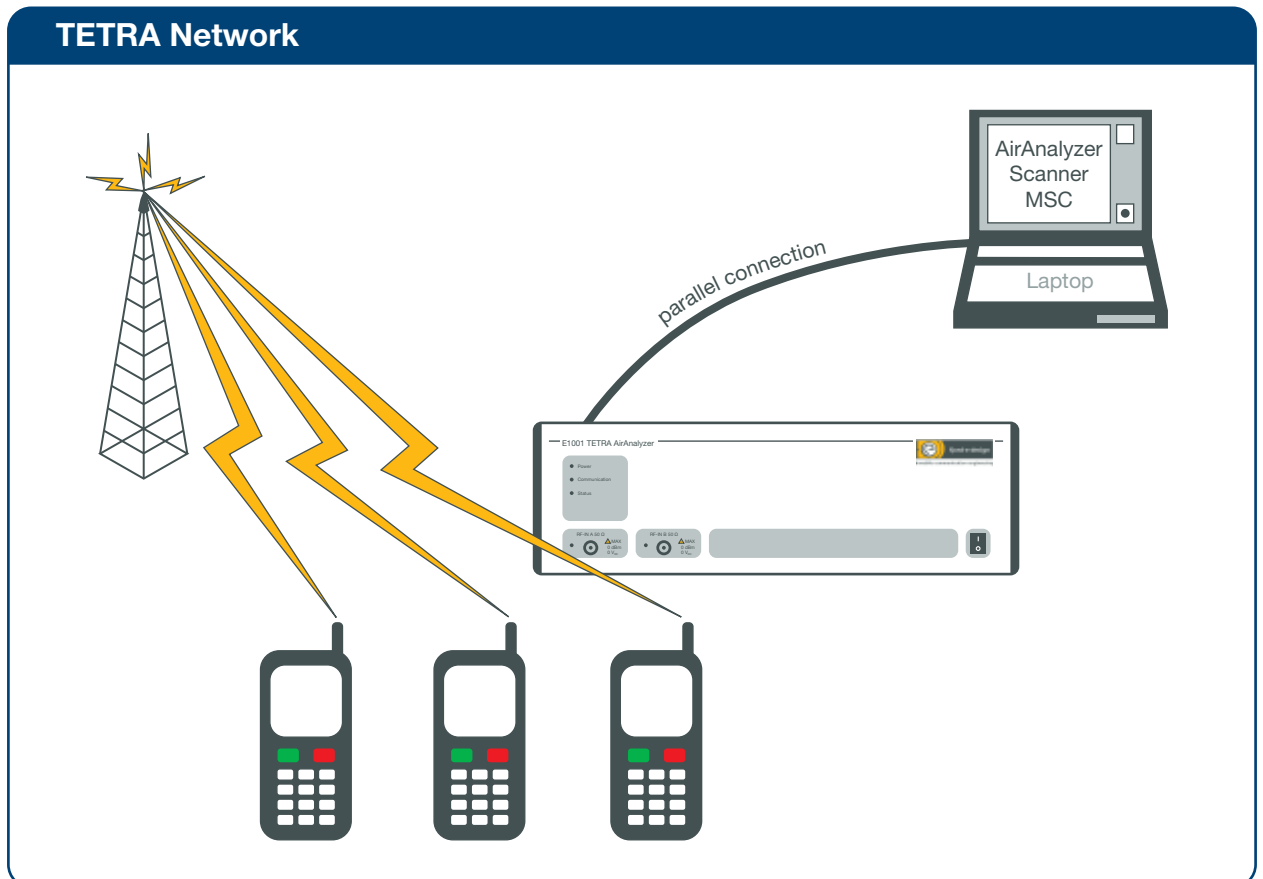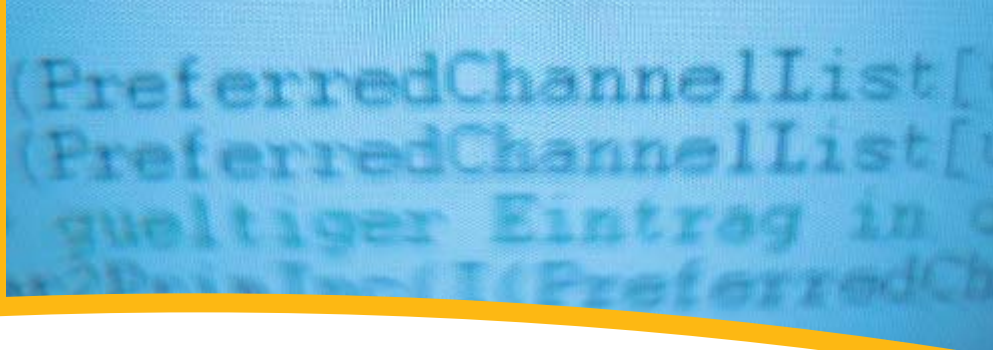
Protocol Analysis

The following layers of the TETRA Voice+Data protocol are evaluated during the protocol analysis:

Subnet Dependent Convergence Protocol (SNDCP, packet data), with IP data export
Circuit Mode Control Entity (CMCE)
    - With Call Control (CC), Supplementary Services (SS, relevant parts) and Short Data Service (SDS)
Mobility Management (MM)
Mobile/Base Link Entity (MLE/BLE)
Logical Link Control (LLC)
Upper Medium Access Control (U-MAC)
Lower Medium Access Control (L-MAC)
Physical Layer

Protocol Filter

Fault tracing in communication protocols is usually quite difficult because of the quantity of the occurring messages. Only by adding powerful protocol filters it is possible to get the right perspective while tracing for faults. The TETRA AirAnalyzer (protocol analyzer) offers a bunch of useful filters.

Evaluation of the Protocol

The data captured by the Air Analyzer is stored as raw data on the hard disk of the computer. The raw data contains the demodulated bits of all time slots. The evaluation of the protocol offers the possibility to analyze, filter and display the recorded raw data.

Features

Filter settings

Raw data → Protocol analyzing → Protocol filter → View

Text file
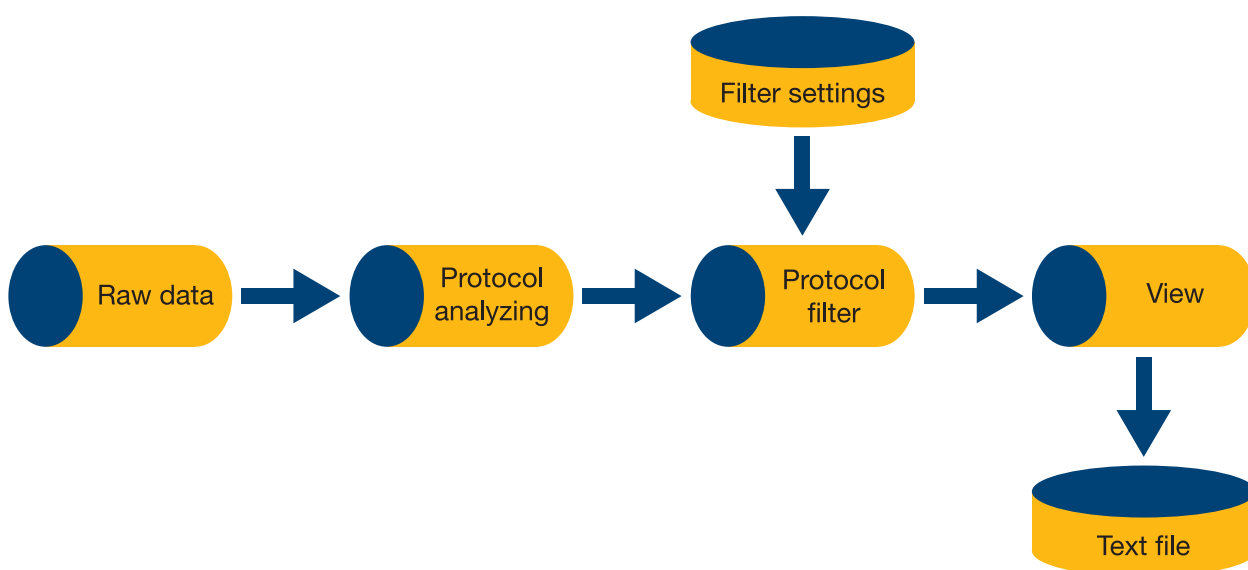
Message Sequence Chart (MSC)

Analyzing the results of measurements is very intuitive when using the MSC display. The TETRA protocol messages are displayed as arrows and clicking on one expands the content. By utilizing this display method the user can work with the best possible overview of the signalling process. Errors within the protocol are highlighted using colors. Extensive search options complete the set of functions for a perfect analysis.
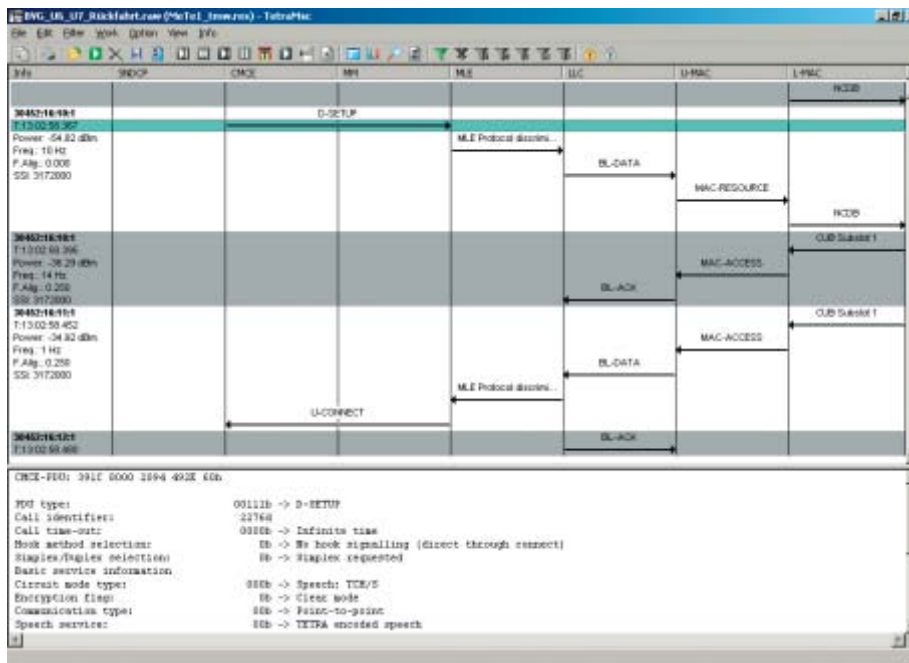

Subscriber Filter

An Air Trace can result in very large quantities of data which makes it difficult for a user to get a good over-view of the information. The subscriber filter allows users to display only data for selected terminal equip-ment and facilitates the analysis of the trace.


Graphic presentation
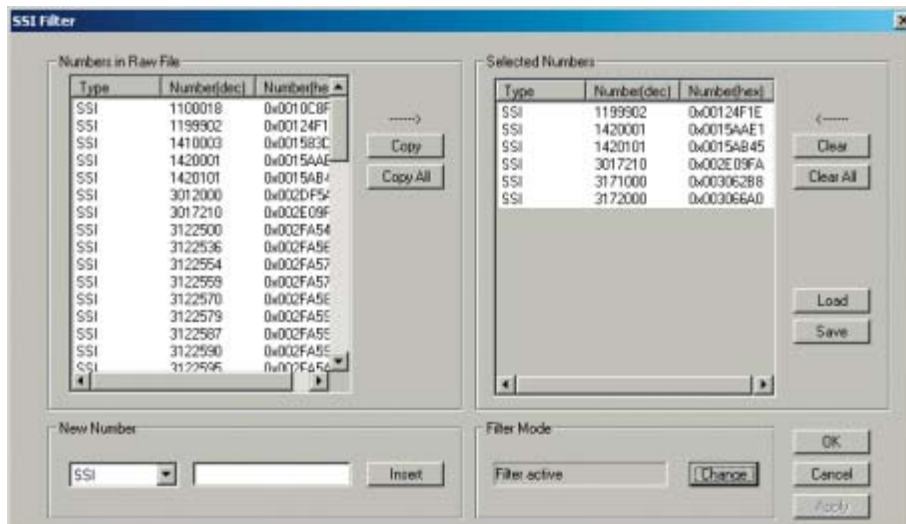
Voice Decoder

The quality of speech is one of the most important characteristics of a mobile system. Intelligibility and recognition of speech have to fulfill high standards in modern mobile systems. To ensure high quality the TETRA AirAnalyzer includes the Voice Decoder, which offers the possibility to monitor the quality of speech in real time. The data is saved in WAV format for further analysis.
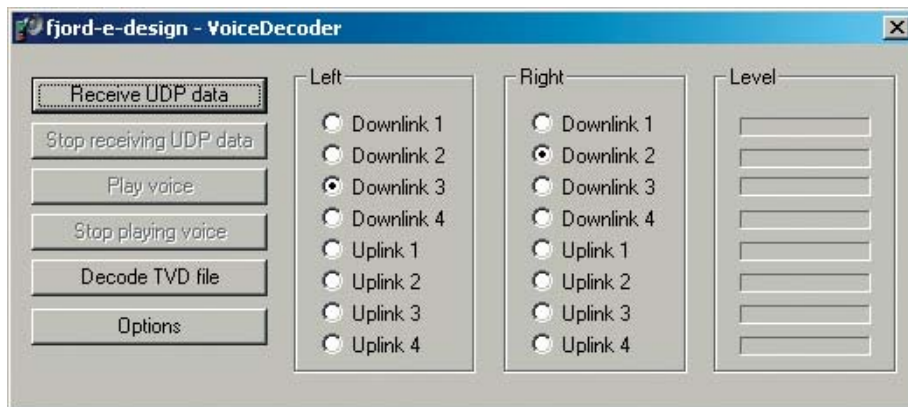
TETRA Scanner

The TETRA Scanner searches for TETRA carriers in a frequency range which can be selected according to the requirements. In addition to the available TETRA carriers the broadcast parameter is displayed. This is an easy way to find network configuration problems. The available channels can be monitored permanently, e.g. the current usage of timeslots for traffic (TCH) is displayed. The resulting measurement values like received power or frequency errors are depicted in a diagram. This tool offers an easy way to check the network planning and to optimize/correct it if necessary. The evaluation of the current network status in regard to quality and quantity is supported and the tool can be used for the best possible utilization of resources.

Quality measurement
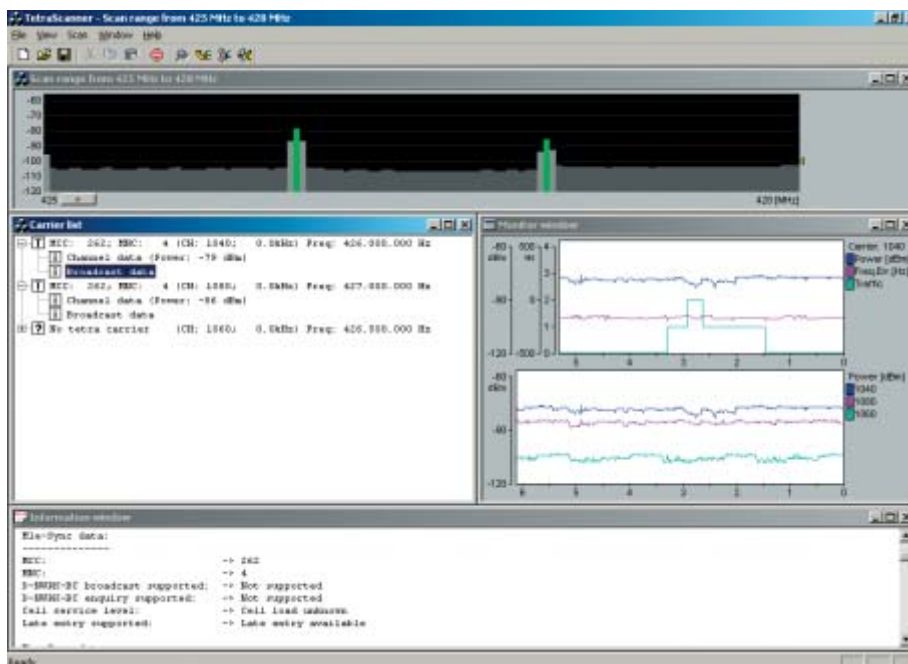
Basic equipment

Casing	19'' rack-mount model 3 HE
Temperature range	0°C ... +50°C
Voltage supply	Wide AC input range with Power Factor Correction 95 V - 250 V
Power consumption	< 60 W
Receiver	
Frequency range	360 MHz - 460 MHz
Connection	two N sockets
Max. input power	0 dBm
Typical sensitivity	< -106 dBm dynamic < -115 dBm static
Data connection	parallel port (25-pin sub-D plug)
Weight	< 15 kg

Basic software

Online analysis of live captured data
MSC and text display (message sequence charts)
Adaptive subscriber filter (SSI filter)
Support for external data input (e.g. BS/MS data stream)
Extensive protocol filter for each TETRA layer
SNDCP support (according to EN 300 392-2)
TETRA Scanner
Voice Decoder
Microsoft Windows® 2000, XP, 98 support

Equipment options

DC Input

Input voltage	12 V - 18 V or 18 V - 36 V or 36 V - 72 V

Software options

Static AI encryption (security class 2)	(according to EN 300 392-7)
Dynamic AI encryption (security class 3)	(according to EN 300 392-7)
DMO support	(according to ETS 300 396-3/10)

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