DECT Protocol Testers TS1220 and PTW15

Coverage measurements in DECT networks

DECT (digital enhanced cordless telecommunication) has become established by now as a standard for a number of applications. In addition to the use for cordless telephones (residential application) this particularly applies to the field of WLL (wireless local loop). DECT Protocol Testers TS 1220 and PTW 15 (FIG 1) with new and enhanced modules provide optimum support for coverage measurements or for in-depth analysis in the case of faults.

Since liberalization of the telecommunication markets, the link over the last mile to the telephone subscriber has been the central theme of discussions. In addition to the classic cabled link, technologies for the wireless coverage of the last mile are coming onto the market. DECT is the clear market leader among these competitive technologies (FIG 2 in blue box).

FIG 1
DECT Signalling Test Unit PTW15 – tried and tested not only in laboratory but also in mobile applications

Decisive factors for DETC's position on the market are:

- the excellent speech quality (32 kbit adaptive differential pulse-code modulation),
- the great variety of reliable and favourably priced telephones,
- the open ETSI standard and
- the fact that DECT does not require frequency management due to DCS (dynamic channel selection).

Moreover, the high data rate specified by the DECT standard allows data transmission in addition to voice transmission. Full coverage is however essential for the DECT-based WLL application.

Enhanced channel occupancy monitor

Key information at a glance

This module implemented in the TS 1220 and PTW 15 test systems was enhanced by some new functions. It monitors the DECT air interface and displays activities and main parameters all in one (FIG 3).

The time display of physical channels also shows the bursts on the data path between fixed part (network operator) and portable part (customer). The assignment of a frequency to the physical channel is either freely selectable by software configuration (TS 1220) or by means of optional hardware modules (PTW 15). Each burst represents a data packet with 320 bits of information data (full slot, example in FIG 3: channel 6, timeslots 0 and 12). The

Photo 42 907

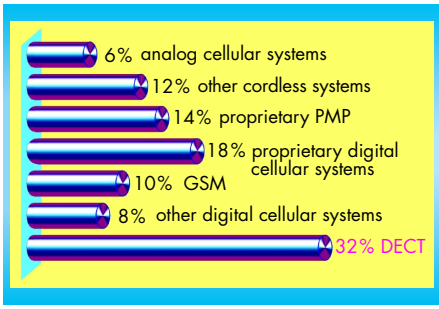

FIG 2
Different WLL technologies in comparison (source: DECT forum)

About DECT

DECT is used worldwide on the following frequencies:

Europe (and others):	1897.344 MHz to 1881.792 MHz	10 channels
China:	1902.528 MHz to 1918.080 MHz	10 channels
Latin America:	1912.896 MHz to 1928.448 MHz	10 channels

All other RF parameters such as modulation (GFSK), power (max. 24 dBm) and channel spacing (1.728 MHz) are identical

height of the burst is proportional to the field strength, which simplifies the determination of the transmission quality in a first approximation.

The DECT air interface can show the activities of different applications at the same time, eg when WLL and residential activities (cordless telephones) are performed within the receive range of the DECT test equipment. Since the DECT specification allows for non-synchronous activities, sliding collisions between the connections may occur. It is very important to detect such situations. With the aid of the channel occupancy monitor, the different activities can be displayed in different colours. For instance, FIG 3 shows

3 the reference activity,

8 activities synchronized to the reference (in the same network),

9 asynchronous activities, eg private telephones.

The right-hand window of the display provides detailed numerical information on the individual activities in database format. This information mainly includes channel and timeslot, receive level, sync state (reference, slot-synchronous, frame-synchronous, multiframe-synchronous, asynchronous), preamble (fixed or portable), identification codes and messages of broadcast channel Q (capabilities).

Statistical evaluation

The main display window of the channel occupancy monitor shown in FIG 3 illustrates an instant of the DECT interface (snapshot). Statistical evaluation of a great number of snapshots is however required for assessing the quality or analyzing a fault.

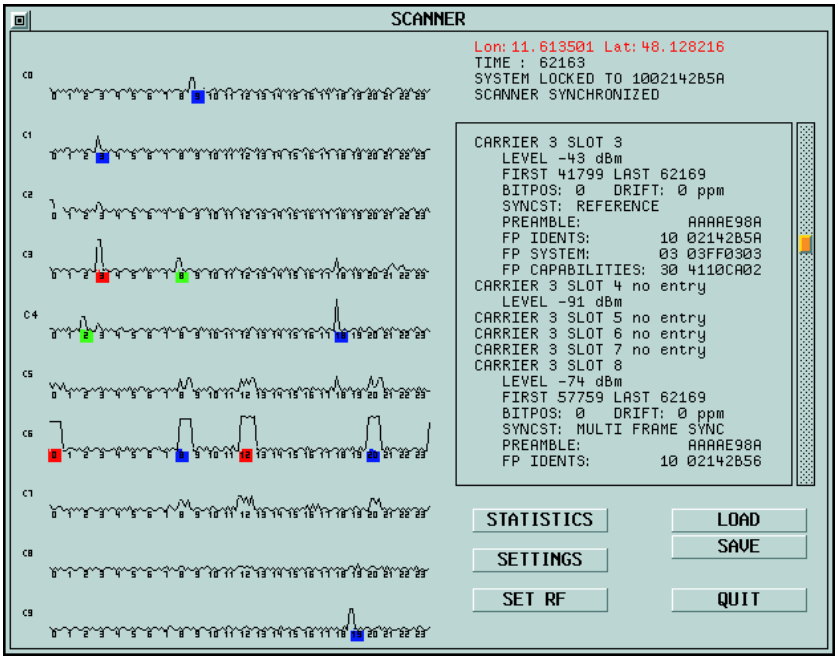

FIG 3 Channel occupancy monitor

For this purpose the module continually saves the database content in a file (a data record corresponds to a snapshot). The parameters to be stored can be selected from a table and may be complemented by superordinate units. This particularly applies to local coordinates obtained from a GPS receiver. If this receiver is equipped with a standardized NMEA (National Marine Electronics Association) interface, the coordinates can be directly read in and stored via an RS-232-C interface. FIG 4 shows the parameter selection window and the associated ASCII file. Export filters (eg to Microsoft EXCEL™) are also available.

New: the simulation module

Under certain circumstances passive monitoring is not sufficient for analyzing a scenario and the test system

needs to actively simulate one of the partners in the DECT network. The implementation of a GAP (generic access profile) compatible fixed part and portable part as a reference has always been a function of the two test systems. Many manufacturers of DECT terminals are no longer satisfied with just transmitting voice, they are working on the implementation of data transmission facilities (transparent ISDN channel). The data rate required by DECT for this application is provided by slot coupling (double slot). This technique with associated protocol support (advanced connection) is available as an option for Protocol Tester TS 1220 (FIG 5).

Protocol Testers TS 1220 and PTW 15 from Rohde & Schwarz are ready for future applications and of course also ideal for the development of such applications.

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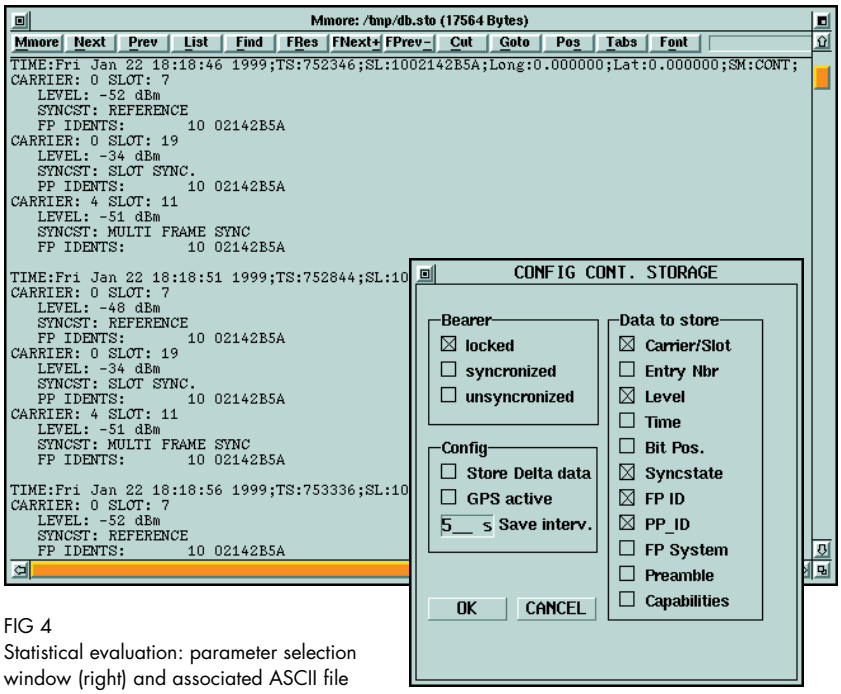

FIG 4
Statistical evaluation: parameter selection window (right) and associated ASCII file

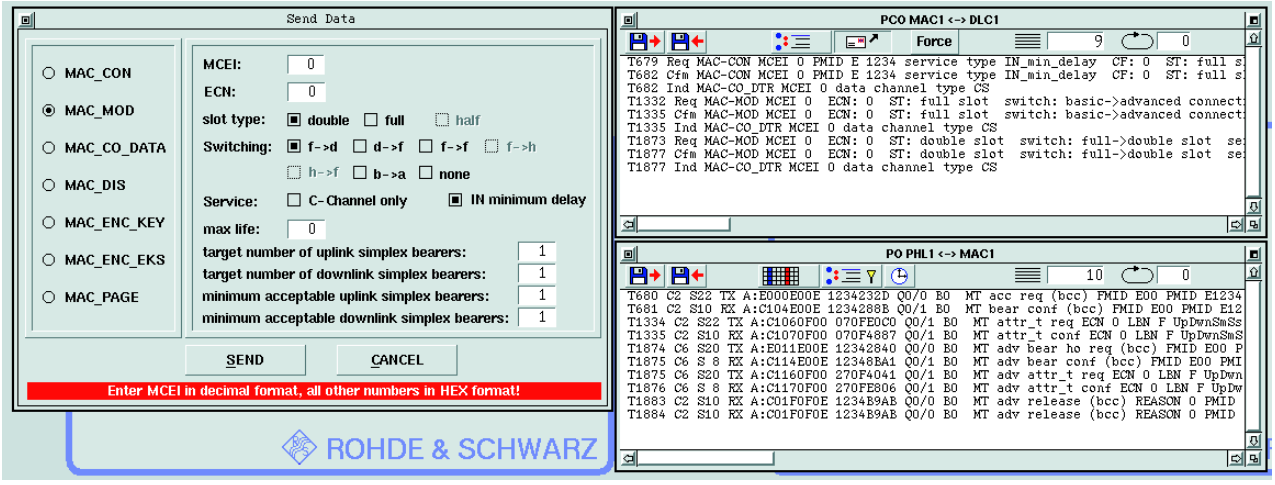

FIG 5 Protocol Tester TS1220 also analyzes double-slot connections with the aid of the associated protocol support (advanced connection)

Condensed data for channel occupancy (TS1220)

	TS 1220	PTW 15
Scans/s	>12	>3
Resolution (time)	<10 µs	<14 µs
Resolution (level)	<1 dB	<1 dB
Level range	–30 to –100 dBm	0 to –93 dBm

Database export to Microsoft EXCEL™

Condensed data for data services (TS1220)

Double slot	implemented
Advanced connection	implemented
LU7 protocol	implemented

The open platform concept supports the above-mentioned services

Reader service card 162/03

REFERENCES

[1] Gloger, M.; Riedel, P.: DECT Protocol Tester TS1220 – Type-approval measurements on DECT fixed parts (FP) and portable parts (PP) to TBR 22. News from Rohde & Schwarz (1995) No. 148, pp 9 – 11

[2] Jauch, H.; Riedel, P.: DECT Signalling Test Unit PTW15 – Support in installation and maintenance of DECT networks. News from Rohde & Schwarz (1997) No. 155, pp 4 – 5