Enabling Australia's Field Technicians to build, troubleshoot and maintain better communications networks.

This reference material is provided by TMG Test Equipment, VIAVI's **only** Master Distributor for Contractors in Australia

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FREECALL 1800 680 680

WWG IBT-10/-10U

ISDN BRA S/T/U Tester

IMK-31 package

For testing Basic Rate Accesses:

- *Tests all the interfaces of an ISDN Basic Rate Access*

- *Full and fast commissioning of ISDN accesses using automatic testing functions*

- *Fully configurable so that only wanted tests are carried out*

- *Long battery autonomy allows the tester/ analyzer to be used all day in the field*

- *Updates by software download*

Applications
- **Installation and commissioning of ISDN Basic Rate Accesses**
- **Maintenance of ISDN BRA**
- **Installation, maintenance of PBXs**
- **Installation and maintenance of PBX private networks**
- **Monitoring and optimization of ISDN networks**

During **installation of basic rate accesses**, a number of tests have to be carried out to check access to the ISDN network, the availability of basic services and subsequent transmission quality.

When **commissioning basic rate accesses**, operators and end users need a quick, easy means of defining the X.25 service or supplementary services provided.

When **installing a PBX**, the basic services must be tested to check that the PBX was configured correctly prior to connection to the network.

Maintaining ISDN equipment or basic accesses requires an analyzer that can perform detailed decoding of the D-channel protocol in high-impedance mode. It is useful to perform exhaustive decoding and archive the test results, thus keeping track of detected problems.

For **private PBX networks**, it is also essential to test the private links used for interconnection.

Functions
- **Terminal and Network simulation**
- **Test of services and BER Test (G.821)**
- **Automatic and functional test of all ETSI supplementary services**
- **Test of X.25 in the D and B channels**
- **Master and Slave simulations on private PBX networks**
- **Integrated protocol analysis function**
- **Real-time protocol analysis on PC**
- **Protocol analysis at the U interface**
- **PC-based expert system to help with troubleshooting and proactive maintenance**

The basic version incorporates all the essential tests, such as BERT (bit error rate tests), test of services and of **all ETSI supplementary services** in automatic or functional mode. It also offers X.25 in the B and D-channels testing (as per ITU-T X.31) and an integrated tracer mode.

There are easily downloaded software options that:

- provide extremely powerful protocol analysis in high-impedance mode, with the option of detailed analysis on a PC, either in real time or at a later date,
- support the private protocols used in PBX networks,
- provide an **expert system for ISDN.**

WAVETEK WANDEL GOLTERMANN
Communications Test Solutions

TE (Terminal) Simulation mode

This mode is used to replace a terminal and then to make two calls (simultaneously), measure the bit error rate (BER) and test the services and supplementary services. The WWG IBT-10 generates DTMF (touch tones 0 to 9, * and #) and allows access to Keypad facilities, both while a call is established and during the call.
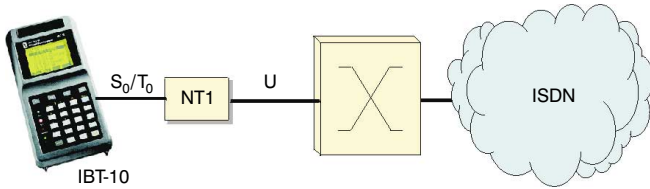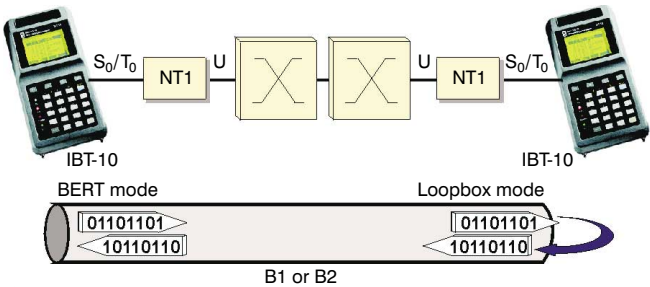
▲ Terminal Simulation mode (TE)

Bit error rate test (G.821)

The WWG IBT-10 tests the quality of transmission at an ISDN access in self-call mode or through end-to-end measurements.
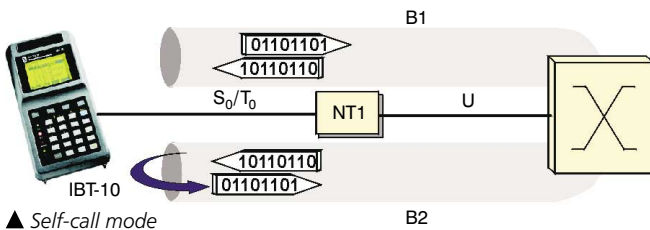
▲ Self-call mode

Bit errors can be inserted manually or automatically and the level of quality displayed at any time during the test.

▲ End-to-end measurement

Test of services and teleservices

The WWG IBT-10 tests the availability of the various services offered with ISDN: Bearer Capability, services and teleservices. A special mode allows the services associated with the protocol used to be tested automatically.
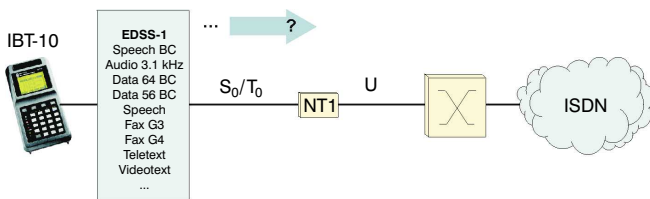
▲ Test of services

Dual Call function

The Dual Call function is used to generate two calls. Once the two calls have been set up, one channel can be used to test the bit error rate, while the other channel remains open for a call. The WWG IBT-10 automatically receives two calls.

NT (Network) Simulation mode

The NT simulation is used to simulate an ISDN network at the S/T interface prior to connecting the terminal to the network. This operating mode enables the user to use the tests and functions available in TE mode (call, automatic testing of services and teleservices, BER test, loopbox, etc.).
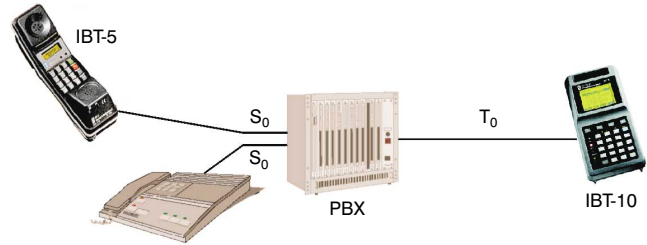
▲ Network Simulation mode (NT)

U interface

If the network termination is not present or is faulty, the integrated U interface (only available with the WWG IBT-10U) can be used to carry out all the tests needed to define the access by simulating the combination of an ISDN terminal (U/TE mode) or X.25 (U/X25D or U/X25B mode) and a network termination.

Test of supplementary services

The WWG IBT-10 very simply lets users perform a functional or automatic test to check for the presence of all the supplementary services on the access being tested. In automatic mode, the WWG IBT-10 results indicate availability, non-availability or the causes of error for each of the tested supplementary services.
See Pocket Guide No. 1, "ISDN Supplementary Services".
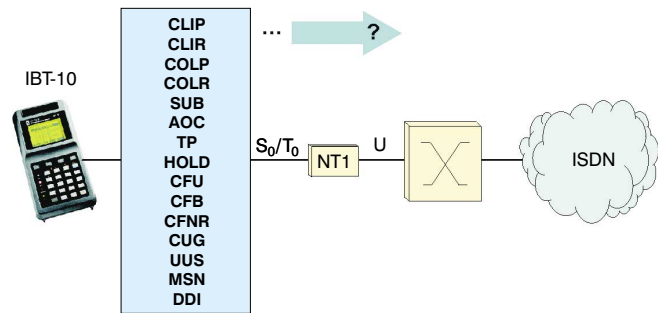
▲ Test of supplementary services

Test of X.25 in the D and B channels

The WWG IBT-10 tests the accessibility and performance of the X.25 service in the B and D channels (as per X.31, case A and B). The WWG IBT-10 establishes an X.25 link (by self-call or via a loopbox) and analyses the reception quality of one or more previously transmitted data packet(s) (packet generator). The test can be configured as required. This facility, combined with the detailed X.25 statistics (transmission/reception) for layer 2 (number of frames transmitted / rejected) and layer 3 (number of packets transmitted/received, speed), means that the entire X.25 service can be tested.
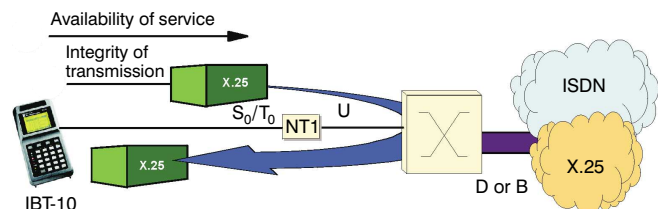
Integrated protocol analysis function

The WWG IBT-10 can be used to analyze the signaling on the D channel in high-impedance mode, making it an essential tool for maintenance purposes. The plain-text displays and filter functions greatly speed up the diagnosis.

A network termination 'swap-out' function (U/Smoni mode, only available with the WWG IBT-10U) is used to track down which part of the network, terminal or NT1 has caused the fault.
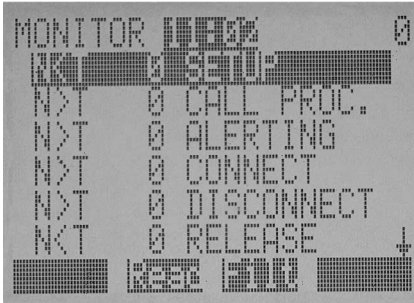

Real-time protocol analysis on PC

For particularly tricky maintenance problems, the WWG IBT-10 can be combined with the Windows™-based analysis software. This greatly increases the available diagnostic options by performing exhaustive decoding of the D-channel protocol. The data can also be stored on a PC in real time, allowing more in-depth analysis to be performed, which is particularly important when investigating random problems.
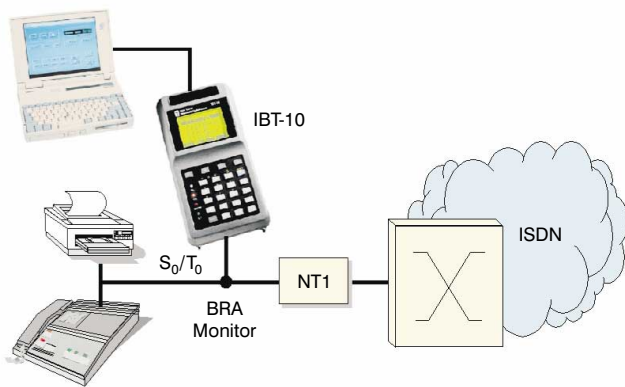
▲ PC-based real-time analysis of the D channel

Protocol analysis at the U interface

All the signaling on the D channel can be analyzed by connecting the WWG IBT-10 to the U interface - so it is not always necessary to travel to the customer's premises.
See also the WWG IUM-10 *datasheet and* Application Note 63.
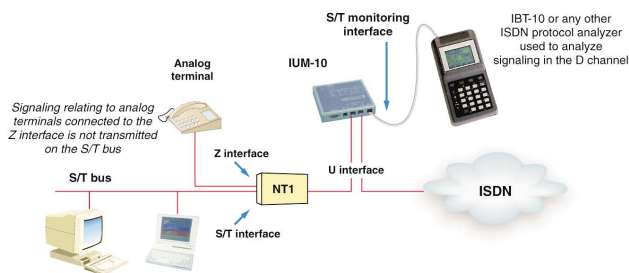

▲ Protocol analysis at the U interface in the case of NT1s providing analog accesses

Private protocols

The WWG IBT-10 supports the CorNet-N®, CorNet-NQ® (registered trademark of Siemens AG Munich/Berlin) and Q.SIG private protocols, and can thus be connected to private PBX networks in place of a PBX. This operating mode enables the user to use the tests and functions available in TE mode (call, automatic testing of services and teleservices, BER Test, loopbox, etc.) and the special features of this type of network: clock synchronization function and Master/Slave mode.

Expert System: WWG ISDNpartner

The first generation of ISDN testers (which were designed for installing ISDN accesses) only provided basic simulation functions, which meant that the access had to be checked by an engineer. The second generation (designed for maintenance purposes) also integrated protocol analysis functions, again intended for use by specialists.

Now WWG ISDNpartner can be combined with the WWG IBT-10/-10U (any configuration) to create a **third** generation of testers, offering all users access to sophisticated troubleshooting and network monitoring functions.
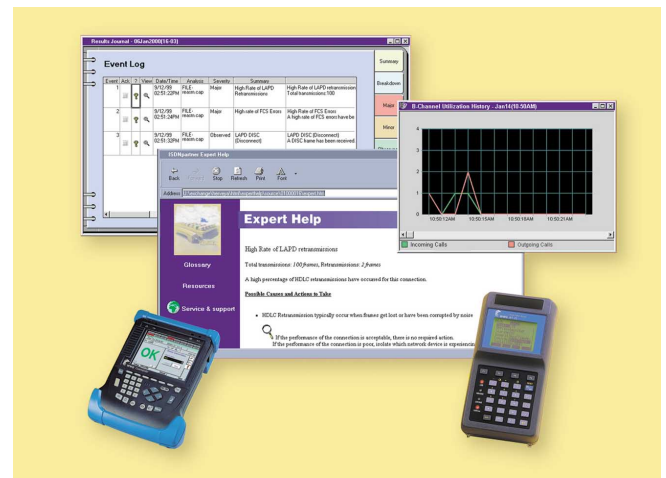
Today, ISDN systems appear to be rolled out ever faster, and there is just not enough time for installation and maintenance teams to be trained properly. Applications that use ISDN are also becoming increasingly complex, which means that a specialist almost inevitably has to be called out when a problem is detected on a line.

The WWG ISDNpartner expert system is the ideal tool for tackling this situation.

WWG ISDNpartner is an expert system that meets the needs of everyone involved in ISDN network and equipment maintenance - whatever their level of skill and experience. It also provides a complete overview of the network, making it much easier to prevent problems occurring in the first place (occurrence of transmission errors or failed connections over time, etc.), to optimize performance and control communications costs.

All the information is clearly written in language that can be understood by non-specialists.

With WWG ISDNpartner, users of Wavetek Wandel Goltermann's ISDN testers/analyzers (IBT, DA-5, DominoWAN ISDN, etc.) can benefit today from the diagnostic techniques of tomorrow - at a surprisingly low cost.

WWG ISDNpartner
Troubleshooting

Approach the problem from the right end!

Protocol Analysis for ISDN faults should only be used as a last resort (in fewer than 20% of cases), and then only if the initial usage checks identify that the problem is effectively located at the protocol level. A lot of time can be wasted if this basic principle is ignored and, worse still, the problem often remains unsolved. Lack of understanding and practical experience often causes non-experts to skip various steps and rush headlong into using an analyzer, wrongly thinking that it will work miracles. Wavetek Wandel Goltermann has created WWG ISDNpartner to help such non-specialists. It is an expert system that guides the user through the various troubleshooting phases, using exactly the same methodology as the best human experts. By carrying out analyses with WWG ISDNpartner, the user will gradually learn the necessary methods and knowledge, eventually becoming an expert in his or her own right, able to solve any type of problem in the minimum time.

Step one: Describing the problem with 'Expert Interview'

Expert Interview prompts the user to describe the problem by asking a series of questions in a language that can be understood by non-specialists. During the interview, WWG ISDNpartner suggests a number of checks to be carried out to discover the true nature of the problem. This first step may lead to a solution (i.e. suggested corrective action). Otherwise it will trigger an expert analysis, which is the second step of the process.
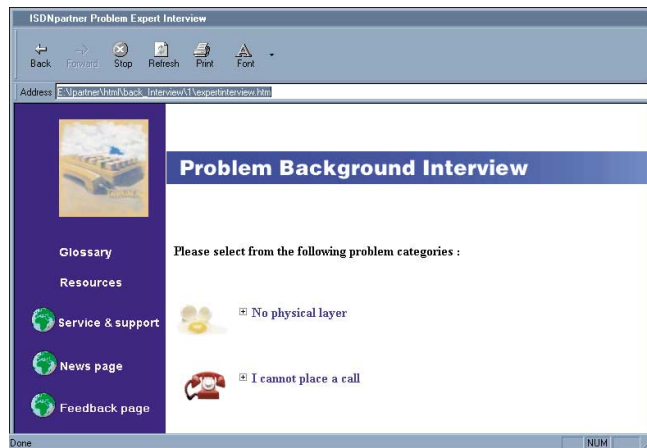

▲ Expert Interview in HTML page format

Expert Interview is also particularly useful as a decision-making tool for the hot-line support teams of network operators, equipment manufacturers or other service providers. It helps them to carry out first-level remote diagnosis and to choose the appropriate actions, e.g. whether to opt for remote maintenance or send an engineer to work on site.

Step two: Expert Analysis

The Expert Analysis takes place at the end of the interview, although it can also be started independently. During this analysis, WWG ISDNpartner searches for the signature of the major symptoms and reportable events inside the frames captured in real time or stored in a file.
The problem database that WWG ISDNpartner uses to carry out this investigation is the fruit of close collaboration with a number of ISDN experts. From this database, the software can diagnose most of the problems likely to occur in the field. This means that the expertise is not simply limited to testing whether the frame's content conforms to the standards.

Configuring the Expert Analysis

Configuration of the analysis is made extremely simple by the interactive and contextual dialog or 'Wizard'. This enables the user to select the source of the analysis (analyzer or file), set capture filters, if necessary, and specify information such as the user's name or the address of the site, which will be needed if the session is subsequently to be archived.
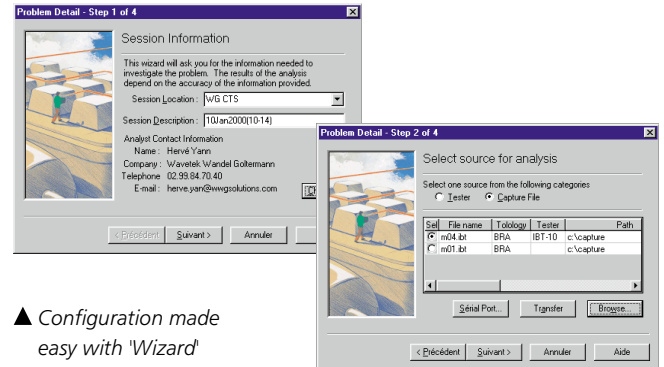

▲ Configuration made easy with 'Wizard'

Results Journal

Throughout the analysis, any events that are detected are classified by severity level in a 'Results journal'. This means that the user no longer has to wade through hundreds of frames all the relevant information is now kept centrally.
Clicking on an event calls up an additional level of detail:
- Statistics on the connection or equipment relating to that event,
- Dynamic expert help providing a complete diagnosis of the origin of the problem and suggesting a list of corrective actions,
- Decoding of the frames that caused the event.
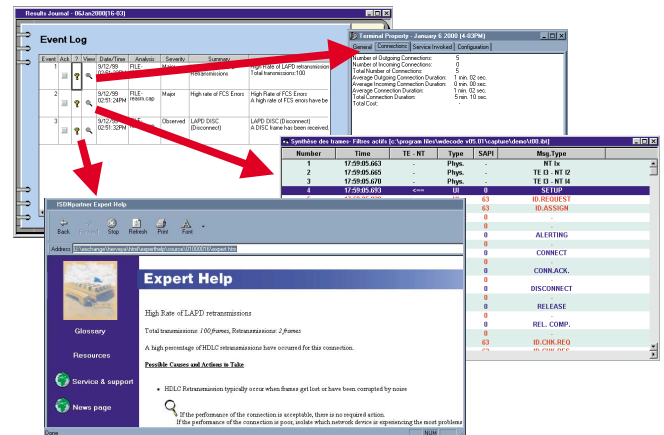
▲ Results journal for storing events centrally

Step three: Protocol Analysis

Given the complexity and diversity of ISDN, there are some faults that cannot be detected automatically. As the final level of support, WWG ISDNpartner performs exhaustive decoding of the frames, enabling a user who is familiar with ISDN signaling to solve even the most complex problems.
In such cases, WWG ISDNpartner has invaluable advantages over traditional packages:
- Option of saving all the information in a database, making it much easier for a more experienced colleague to subsequently analyze the data,
- Sophisticated mechanism for navigating through the trace, greatly increasing the effectiveness of expert users.

Sophisticated navigation through the trace

A connections log enables the frames relating to each call to be examined with a single mouse click. The user can also sort or filter these connections by a range of criteria, such as address, service or supplementary service used, status, start time, cost and duration, etc. This correlation between connection and trace, combined with the automatic filtering and sorting options, saves precious time, particularly with long traces or when analyzing on an ISDN primary rate access subject to heavy traffic.
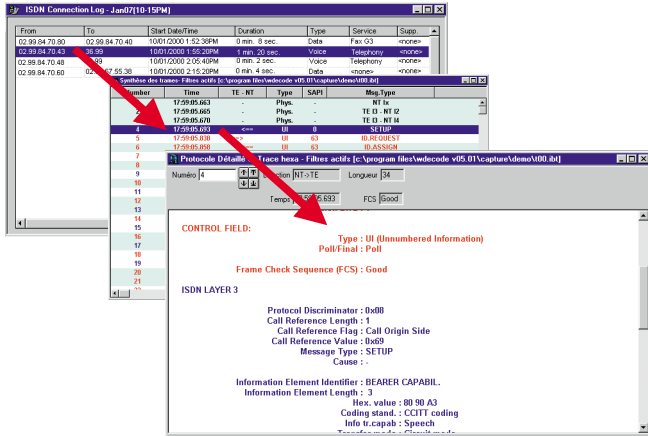
▲ *Navigating through the trace using the connections log*

Network monitoring

From the many logs, statistics and graphs, WWG ISDNpartner is able to provide an overall network picture. This is particularly suitable for proactive maintenance, optimizing performance and controlling telecommunications costs.

Proactive maintenance

Some problems can have disastrous consequences for a company, even if their symptoms are not immediately perceived by end-users. One typical example is the router that continuously establishes connections or keeps connections open permanently. WWG ISDNpartner is able to investigate such symptoms automatically and on an on-going basis, effectively preventing the faults from occurring in the first place.

The user can also program an application to be started when certain critical events occur, such as an email system designed to notify abnormal situations in real time.

Graphs showing the occurrence of transmission errors or failed connections over time are another highly effective tool for anticipating significant drops in service levels.

Optimizing performance

To optimize network performance, the user must be able to monitor B-channel usage, setup and release delays and error rates, etc. Summaries of all this information are available in both text and graph formats.

Optimizing telecommunications costs

Optimizing telecommunications costs requires control over connection times, durations and costs, destinations, etc. With its logs and statistics and a whole range of events dedicated to controlling connections, WWG ISDNpartner is the ideal tool for any company that wishes to minimize its telecommunications bills.
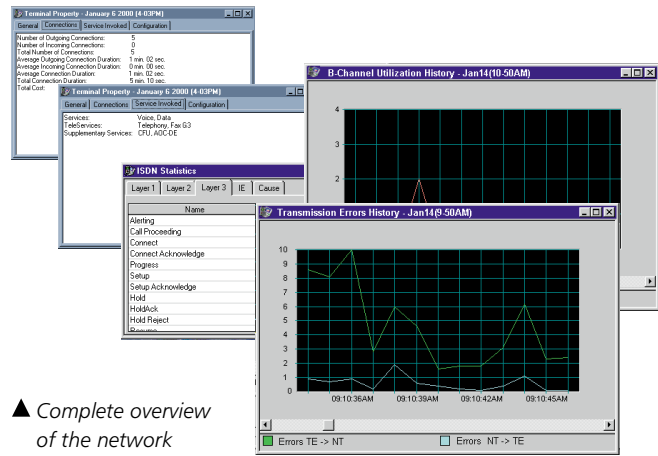

▲ *Complete overview of the network*

Flexible and future-proof software

Configuration of events and detection thresholds

WWG ISDNpartner enables the most demanding users to change the parameters of detected events in order to:

- adapt the expert system's behavior to the characteristics of the network (by tuning thresholds),
- place the emphasis on detecting specific faults (by modifying the severity level of certain events),
- provide a wider range of diagnoses and suggested solutions,
- trigger specific actions when certain events occur by starting an application, recording the event, stopping the analysis, etc.
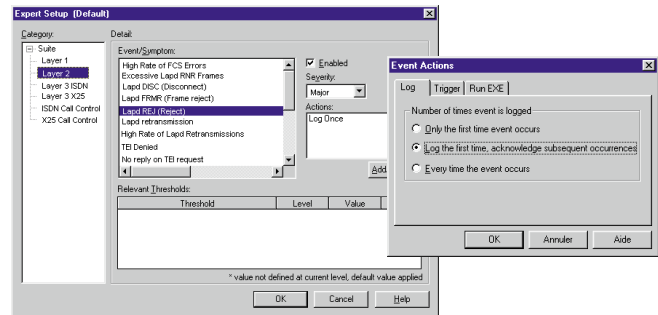
▲ *Programming events and thresholds*

Enhancing the Interview

The user can edit the Interview HTML pages as required, or add new dialogs in order to incorporate his own experience and analysis methods.

Programming the user interface

The logs can also be customized (choice and order of the various fields). This enables the user to design dashboards to suit the task at hand, a process made much easier by the predefined profiles: troubleshooting, performance optimizing, etc.

Data library and dedicated website

WWG ISDNpartner's Web interface enables the user - without exiting the software - to navigate through the technical data library on the installation CD-ROM and on the WWG ISDNpartner Internet site:
http://isdnpartner-online.wwgsolutions.com
On the website, the user can send messages (wish-list of features, new events) and download software updates free of charge (apart from major new functionalities).

WWG IBT-10/-10U

CE

S₀/T₀ (2B+D) Basic Rate Access

Electrical characteristics ......to ITU-T Rec. I.430, ... ETS 300 012
Connectors .... TAE 8+4, RJ-45
Mode .... high impedance, 100 Ω
Protocols .... EDSS-1, Q.931, VN3/VN4/VN6, ...1TR67, TPH 1962*, TN1R6, CorNet-T/TS®*, ... ATT*, N-ISDN*, NTT*, DMS-100 (Funct)*, SwissNet 2*, EDSS-CH (SwissNet 3),Telenokia, ... 1TR6, Televerket, Q.SIG, CorNet-N/-NQ®
® Registered trademark, Siemens AG Munich/Berlin
* TE Simulation mode only

U interface

Connector RJ-11
Layer 1 specifications ..to ANSI, ITU-T and ETSI
Line code 4B3T, 2B1Q
Supply voltage test by LED

Serial interface ....mini-DIN
Handset interface RJ-9
Screen display .... 8 lines x 21 characters
Keypad .... 24 keys
PC upload / download

Transport

Carrying bag for the WWG IBT-10 and its accessories (handset, battery charger, download and measuring cables and documentation)

General specifications

Power supply .... NiCd cells or dry batteries
Operating time from NiCd cells
  at the S/T interface in TE and monitoring
  modes .... > 24 hours
  at the S/T interface in NT mode
.... approx. 10 hours
  at the U interface .... > 6 hours
Power supply from charger (LNT-1x) .... yes
Power supply from AC line (SNT-71) .... yes
Battery charging time .... 9 hours

Permitted ambient temperature
Operational range .... 0 to +50 ºC
Maximum operational range .... -10 to +55 ºC
Storage and transport range ....-40 to +70 ºC

Dimensions (w x h x d) in mm .....105 x 60 x 200

Weight of the basic instrument ...... approx. 1 kg

Test functions

Telephone Function (TE and NT Simulation)

Selection .... address, sub-address, channel, ... service, self-call, loop command
Memory .... 10 telephone numbers
Recall feature
ISDN multiple calls
Callback function
Automatic call acceptance ....2 calls
DTMF generation .... 0 to 9, *, #

Bit error rate test (BERT) in TE, NT Simulation and high-impedance modes

(ITU-T Blue Book)
Test sequences for measuring the bit error rate
Pseudo-random bit sequences .... 2^4-1, 2^6-1, ... 2^9-1, 2^{11}-1, 2^{15}-1 (inverted, non-inverted)
Programmable 16-bit word
Measurement time ....1 min, 15 min, ... programmable, infinite
Measurement ..... conforms to ITU-T Rec. O.152
G.821 evaluation .... ES, SES, EFS, US, DM
Error insertion .... manual, ...automatic (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}, 10^{-2})
No protocol measurement
(leased lines).. B1, B2, D

Test of all ETSI supplementary services

Functional test and availability test (automatic).

Test of services

Bearer Capability
HLC/LLC (high-layer / low-layer compatibility)
Built-in and/or user-defined
All types of Bearer Capability and teleservices

Test of X.25 in the D and B channels (as per Rec. X.31, case A and B)

X.25 call set-up (SAPI = 16)
Verification of transmission integrity
Transmission: lost packets, errors
Layer 2 and 3 statistics

Protocol analysis, tracer for TE, NT Simulation and X.25

Analysis: layers 1, 2 and 3
Indication of transmission direction
Filtering... layer, SAPI, TEI, CR, frame length, RR

Storage of results

Storage capacity ....up to 100 files
Capacity .... 380 kB

Windows™ PC Detailed Decoder software

Detailed decoding of trace and monitoring files.
Test results can be downloaded to a PC.

PC-based real-time analysis of the D channel

PC-based detailed decoding in real time of signaling in the D channel.

Ordering Information

Basic instrument:

WWG IBT-10 .... BN 7510/40
WWG IBT-10U (2B1Q) .... BN 7530/40
WWG IBT-10U (4B3T) .... BN 7532/40
Includes NiCd cells, carrying bag and all accessories (handset, cables, documentation, etc.)
Software options to add new functions to your instrument.
Expert System package .... **BN 7510/92.21**
Includes the PC-based Expert System for the WWG IBT-10/-10U and WWG ISDNpartner.

Complete packages:

WWG IBT-10 .... BN 7510/41
WWG IBT-10U (2B1Q) .... BN 7530/41
WWG IBT-10U (4B3T) .... BN 7532/41
Includes the basic instrument and all the software options, apart from WWG ISDNpartner.
Menu available in the following languages:
English, French, German, Spanish, Italian and Dutch.

WWG ISDNpartner software .... **BN 7519/10**

**WAVETEK
WANDEL
GOLTERMANN**
Communications Test Solutions

ISO 9001
Certificate No 20462
Wandel & Goltermann CTS