Applications
- Installation and commissioning of ISDN Primary Rate Accesses
- Maintenance of ISDN PRA
- Installation, maintenance of PBXs
- Installation and maintenance of PBX private networks
- Monitoring and optimization of ISDN networks

During installation of primary 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 primary rate accesses, operators and end users need an 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 primary rate 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 in addition to the needs listed above.

Functions
- Terminal and Network simulation
- Test of services and BER test (G.821)
- Automatic and functional test of all ETSI supplementary services
- ISDN multiple calls
- 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
- V5.1/V5.2 protocol analysis
- 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.

For testing Primary Rate Accesses:
- Tests all the interfaces of an ISDN Primary 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
**TE (Terminal) Simulation mode**
This mode is used to replace a terminal and then to make up to 30 calls simultaneously, measure the bit error rate (BER) and test the services and supplementary services. The B channel availability and Multiple Calls tests quickly determine the access configuration. The WWG IBT-20 generates DTMF (touch tones 0 to 9, *, and #) and allows access to Keypad facilities, either while a call is established or during the call.

**Bit error rate test (G.821)**
The WWG IBT-20 tests the quality of transmission at an ISDN access in self-call mode or through end-to-end measurements.

**Test of services and teleservices**
The WWG IBT-20 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.

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**NT (Network) Simulation mode**
The NT simulation is used to simulate an ISDN network at the T$_1$ 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.).

**AutoTrack function**
The WWG IBT-20 takes user-defined criteria and automatically extracts a B channel to a V.11 interface for analysis by the WWG DA-5. This function works with voice or data calls and is very useful in datacoms, Internet and telecoms applications. See Pocket Guide No. 2, "ISDN PPP Troubleshooting".

**Test of supplementary services**
The WWG IBT-20 very simply allows users to 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-20 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 X.25 in the D and B channels**
The WWG IBT-20 tests the accessibility and performance of the X.25 service in the B and D channels (as per X.31, case A and B).
Real-time protocol analysis on PC
For particularly tricky maintenance problems, the WWG IBT-20 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.

Integrated protocol analysis function
The WWG IBT-20 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.

Private protocols
The WWG IBT-20 supports the CorNet-N®, CorNet-NQ® (registered trademarks 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.

V5.1 and V5.2 protocol analysis (option)
The WWG IBT-20 can analyze V5.1/V5.2 protocols either in real time or at a later date. The Windows™ PC Detailed Decoder software, which is available as an option for V5.1/V5.2 analysis, is used to save capture files to the PC’s hard disk or to perform long-term analysis in real time. Powerful filters ensure that errors at the access are detected quickly and easily.

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-20 (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.
Troubleshooting

Approach the problem from the right end!

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.

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.

Step three: Protocol Analysis

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.

WWG ISDNpartner

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.

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.

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.

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.

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).
Technical Specifications

WWG IBT-20

S/T (30B+D) Primary Rate Access

- Electrical characteristics: ... to ITU-T Rec. I.431, ETS 300, 011
- Connectors: RJ-45 (ISO 10173) and SUB-D (15-pin)
- Mode: high impedance, 120 Ω and 75 Ω
- Protocols: EDSS-1, Q.931, VN3/VN4/VN6, 1TR6, 1TR67, TPH 1856*, TN1R6, Q.SIG, EDSS-CH (SwissCom 3), CorNet-N/NO

* Registered trademark, Siemens AG Munich/Berlin

General specifications

- Power supply: NiCd cells or dry batteries
- Operating time: approx. 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: 0 to +50 °C
- Maximum operational range: -10 to +55 °C
- Storage and transport range: -40 to +70 °C
- Dimensions (w x h x d) in mm: ....105 x 60 x 200
- Weight of the basic instrument: ........ approx. 1 kg

Interface for extracting the D or B channel

- Selection: address, sub-address, channel, service, self-call, loop command
- Storage capacity: 10 telephone numbers
- Recall feature:....
- Callback function:
- ISDN multiple calls
- Generation of multiple calls: 30 calls
- Automatic call acceptance: 30 calls
- B-channel availability test
- DTMF generation: 0 to 9, *, #

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

(ITU-T Blue Book)
- Test sequences for measuring the bit error rate
- Random pseudo-bit sequences: 2^1-1, 2^2-1, 2^3-1, 2^4-1
- Programmable 16-bit word
- Measurement time: 1 min, 5 min, 15 min,
- Incremental: 1 hour, programmable, infinite
- Measurement conforms to Rec. ITU-T Q.152
- G.821 evaluation: ES, SES, EFS, US, DM
- Error insertion:
- Automatic: 10^-3, 10^-4, 10^-5, 10^-6
- No protocol measurement (leased lines)
- Framed: 30x64 kbit/s, framed 31x64 kbit/s

Test of all ETSI supplementary services

- Functional and availability test (automatic).
- V5.1/V5.2 analysis

Transport

- Carrying bag for the WWG IBT-20 and its accessories (handset, battery charger, download and measuring cables and documentation)

General specifications

- Power supply: NiCd cells or dry batteries
- Operating time: approx. 6 hours
- Power supply from charger (LNT-1x) ......... yes
- Power supply from AC line (SNT-71) .............. yes
- Battery charging time: ................. 9 hours

Service options to add new functions to your

- Includes the basic instrument and all the software options, apart from the V5.1/V5.2 analysis' function and WWG ISDNpartner.
- Menu available in the following languages: English, French, German, Spanish, Italian and Dutch.

Expert System package ............ BN 7531/92.21

- Includes the PC-based expert system for the WWG IBT-20 and WWG ISDNpartner.

PC-based real-time analysis of the D channel

- Detailed decoding in real time of the D channel.

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
- Protocols: Tracer for the D channel (layers 1, 2 and 3)
- 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: 1 MB

Windows™ PC Detailed Decoder software

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

Ordering Information

WWG IBT-20 basic instrument: BN 7531/40

- Includes NiCd cells, carrying bag and all accessories (handset, cables, documentation, etc.)
- Software options to add new functions to your instrument.

V5.1/V5.2 protocol analysis package: BN 7531/92.23

- Includes the analysis option for the WWG IBT-20 and the Windows™ PC Detailed Decoder software

V5.1/V5.2 protocol analysis function: BN 7531/92.43

- Includes the PC-based expert system for the WWG IBT-20 and WWG ISDNpartner.

WWG ISDNpartner software: BN 7519/10

- Includes the basic instrument and all the software options, apart from the V5.1/V5.2 analysis' function and WWG ISDNpartner.
- Menu available in the following languages: English, French, German, Spanish, Italian and Dutch.

Ordering Information

WWW IBT-20 complete package: BN 7531/41

- Includes the basic instrument and all the software options, apart from the V5.1/V5.2 analysis’ function and WWG ISDNpartner.
- Menu available in the following languages: English, French, German, Spanish, Italian and Dutch.

Expert System package: BN 7531/92.21

- Includes the PC-based expert system for the WWG IBT-20 and WWG ISDNpartner.

Wavad Tek Wandel Golttermann Worldwide

Western Europe

- Arbachaltrasse 6
- D-72800 Enningen u.A.
- Germany
- Tel: +49 7121 86 2222
- Fax: +49 7121 86 1222

Eastern Europe/ Middle East/Africa

- Postfach 13
- Elisabethstrasse 36
- A-2500 Baden
- Austria
- Tel: +43 22 52 85 521 0
- Fax: +43 22 52 80 727

CIS

- 1st Neopalimovskiy per.
- 15/7 (4th floor)
- 119121 Moscow
- Russia
- Tel: + 7 095 248 2508
- Fax: + 7 095 248 4189

North America

- P.O. Box 13585
- 1030 Swabia Court
- Research Triangle Park
- NC 27709-3585
- USA
- Tel: + 1 919 941 5730
- Fax: + 1 919 941 5751

Latin America

- Av. Eng. Luis Carlos Berrini
- 936-8/9 Andar
- 04571-000 Sao Paulo, SP
- Brazil
- Tel: + 55 11 5503 3800
- Fax: + 55 11 5505 1598

Asia-Pacific

- P.O. Box 141
- South Melbourne,
- Victoria 3205
- Australia
- Tel: +61 39 690 6750
- Fax: +61 39 690 6750

Internet address

http://isdn.wwgsolutions.com

E-mail

isdn@wwgsolutions.com

Wavetek Wandel Golttermann Communications Test Solutions