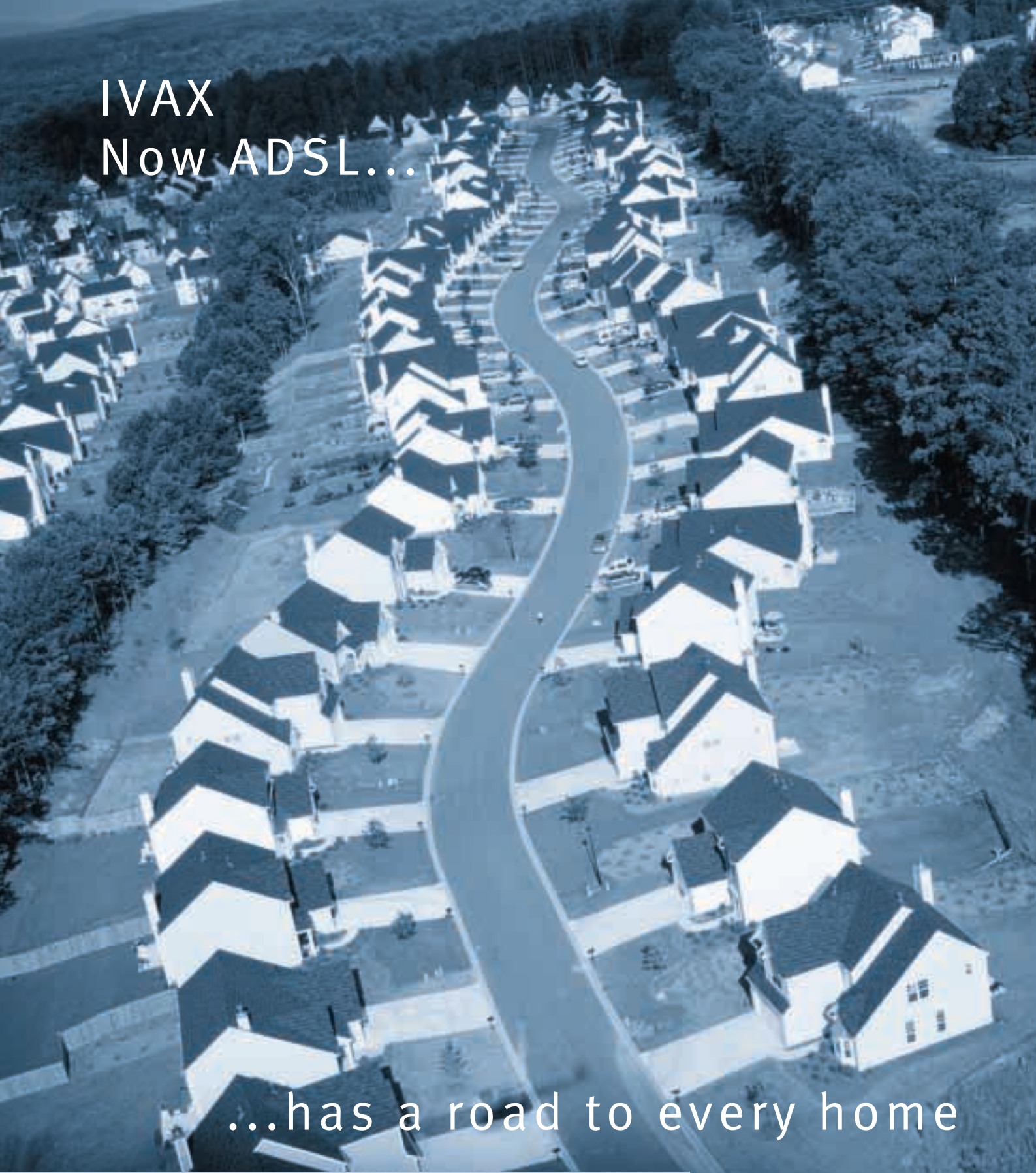


An aerial photograph of a suburban neighborhood. A winding road runs through the center of the image, flanked by rows of houses with dark roofs. The houses are arranged in a grid-like pattern, with the road curving through them. The surrounding area is filled with trees and greenery.

IVAX
Now ADSL...

...has a road to every home

www.infineon.com



Never stop thinking.

IVAX

Chipset for Multi-Channel ADSL and POTS

Leveraging ADSL Mass Deployment

ADSL standards are fixed, services are ramping up, and the next phase is just taking off: Mass deployment. In 2002, 8 Million ADSL CO ports will be shipped worldwide, with over 30% growth rate for the following years.

This takes place by adding ADSL to existing POTS infrastructure with a broadband overlay concept. In this phase, service providers, system manufacturers, and chipset vendors obtain their return of investment, while a very broad base of end

IVAX Chipset fully integrates POTS and ADSL services on a single line card

- Enables ADSL Mass Deployment - Broadband access affordable for Everyone
- Eliminates POTS splitter, rewiring, truck rolls, test equipment
- POTS and „ADSL-ready“ Linecard installation: Simply turn on the service - remotely
- Integrated toolbox for advanced POTS and ADSL line testing - IVAX ADSL prequalification - your competitive advantage

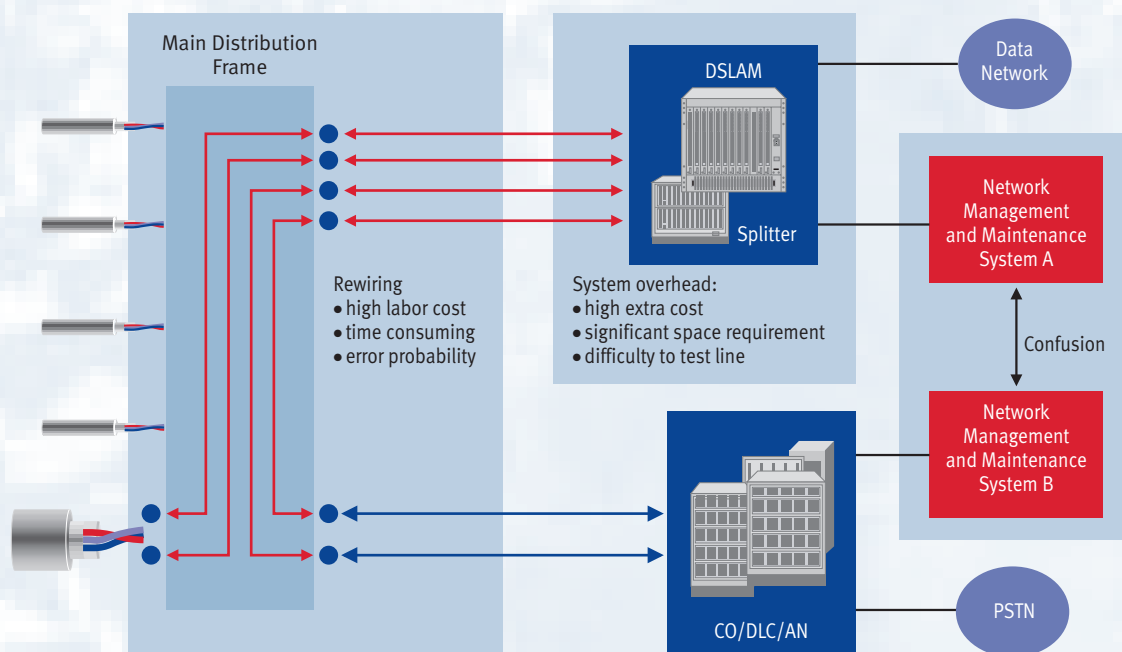


Figure 1 Hurdles for ADSL Mass Deployment

users get access to the services at a low price. Nevertheless, severe hurdles have to be overcome to facilitate mass deployment in today's system environment, cf. Figure 1. These difficulties can be solved by integrating base-band voice and ADSL functionality onto one single linecard, like indicated in Figure 2. Thus, two services can be offered from the same piece of equipment, be it a DLC, CO, DSLAM, or Access Network. All that needs to be done is installing Integrated Voice Data (IVD) linecards instead of pure POTS or ADSL linecards. If this IVD linecard and the POTS/ADSL loop connected to it can be tested and managed without additional hardware equipment, no additional efforts like truck rolls, rewiring, or installation of extra testing equipment is necessary, whereas lifeline POTS is supported. The resulting cost savings improve the business case for both system manufacturers and service providers. In addition, soft provisioning of ADSL is possible through pre-installation IVD linecards. In this case, the ADSL service simply can be activated by software. Infineon's IVD solution IVAX (Integrated Voice and ADSL Transceiver) puts POTS and ADSL into a single multichannel chipset. A conventional POTS splitter is avoided, POTS and ADSL are split in the digital domain and supplied separately to the backplane. Evolving VoATM scenarios can be supported by adding AAL2 voice processing on the linecard. This allows a cost-effective scenario with keeping one lifeline POTS channel in the base band and additional VoADSL channels.

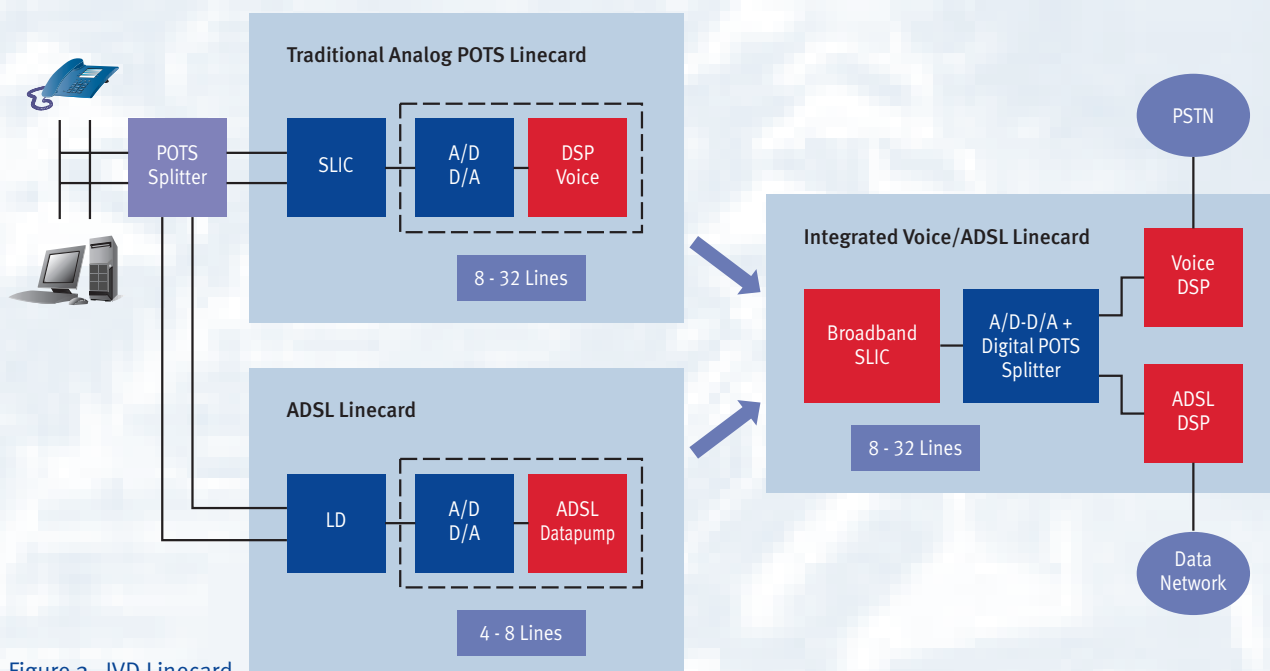


Figure 2 IVD Linecard

IVAX Chipset Features

IVAX is the Infineon solution for multirate IVD linecards. As indicated by Figure 3, IVAX chipset supports 8 POTS/ADSL channels. Multiples can be used to realize higher port numbers.

Target Applications:

- Central Office (CO)
- Digital Loop Carrier (DLC), Remote Terminals (RT)
- Access Networks
- Multi-Service Access Platforms (MSAP)

System Features:

- Chip-set splits voice - and ADSL-band digitally
- Mixed ADSL-lite / ADSL operation for all channels
- Handling of all BORSCHT functions for the POTS line
- All memory on-chip; no external memory required
- Software upgradeable
- IVAX-S/x available with heat slug-down, i.e. no heat sinks required

- Minimum power dissipation ($\leq 1W$ @ 16 dBm on-hook)

ADSL Features & Standards

- ITU-T G.992.1 (G.dmt), Annexes A, B (incl. double upstream), C, F, G
- Overlapped and non-overlapping spectrum modes
- ITU-T G.992.2 (G.lite), Annexes A, B, C
- ITU-T G.994.1 (G.hs)
- ANSI T1.413 Issue 2
- ETSI ETR 328 (test noise and test loops)
- Measurements according to ITU-T G.996.1 (G.test)

Interfaces

- UTOPIA level 2 interface, 16 bit / 50 MHz
- Parallel host interface for connection to control entities
- IOM-2 or PCM-interface for PCM highways

POTS Features

- Supports all relevant standards such as ITU Q.552 Z-interface, LSSGR TR57/TR507 and DTAG recommendations

- Programmable digital filters for country specific settings like
 - impedance matching
 - transhybrid balancing
 - frequency response
 - gain
- Fully programmable DC characteristics
- Programmable teletax injection and filtering
- Polarity reversal (programmable soft and hard)
- Integrated ringing generation with zero crossing injection
- Internal ring signal injection up to 85 V_{rms}
- No degradation of data performance during ringing signal injection
- Off-hook detection with programmable thresholds
- Ground start and loop start possible
- Advanced test capabilities for enhanced circuit, board and subscriber line testing
- Integrated DCXO
- Data transmission subsystems



Two essential characteristics for highest efficiency are board space and power dissipation. The splitterless IVD approach of IVAX leads to minimized space, enabling high port density. In addition, sophisticated power features lead to minimized power consumption: On-hook power dissipation of the complete chipset stays below 1 W @ 16 dBm line power.

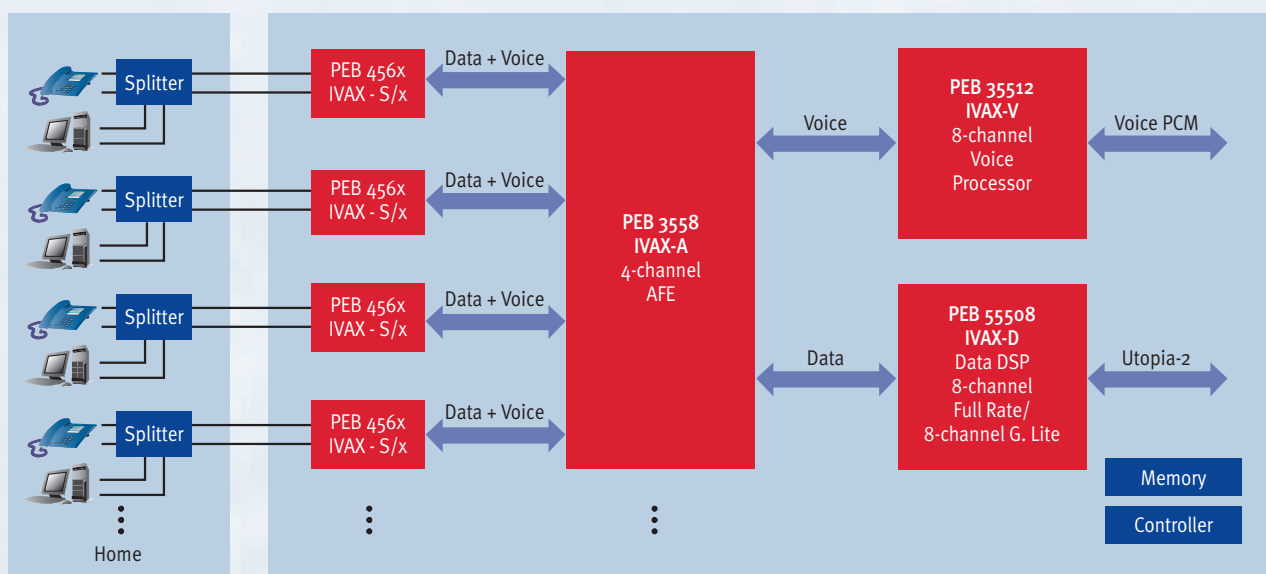


Figure 3 8 channel linecard with IVAX

POTS line testing and ADSL Loop Qualification with IVAX

Currently, loop testing for POTS and ADSL is performed by expensive test equipment, isolating the subscriber line during testing. However, this does not work well to proactively and periodically test the line to gather data during the lifecycle of the POTS and ADSL services, i.e. from pre-qualification to provisioning, service and bundle management.

The Infineon way, instead:

- Using IVAX Integrated Testing and Diagnosis Functions (ITDF)
- Dr.DSL™ Firmware for analysis of the ADSL loop.

ITDF is a toolbox implemented in IVAX for both POTS line and board measurements. Any additional hardware like metallic test access (MTA), including testing relays, are not necessary. In comparison to traditional testing methods, all these tests can be done in parallel which reduces the total test time for several 1000 lines to a few minutes. Due to this extremely short test time, it is possible

to perform periodic test access on the subscriber loop. This enables the test cycle per line to be increased dramatically. If required, lines can be tested as often as once every few minutes. Line failures can be detected much earlier which results in much higher network availability and far fewer customer complaints. Using the benefits of ITDF gives network operators a tremendous advantage compared to their competitors who are still using only traditional line testing.

Following parameters can be measured by ITDF:

- Loop resistance to localize short circuits
- Isolation measurements with boosted battery mode to detect leakage currents and line quality
- Ringer capacitance
- Line capacitance
- Foreign currents

Besides POTS testing, the IVAX IVD approach also provides a toolbox for analysing the ADSL loop, like ITDF without any additional testing hardware and circuitry.

This toolbox is Dr.DSL™, which is part of the IVAX on-chip data pump firmware.

Figure 4 shows the configuration. Dr.DSL addresses the complete ADSL service supplying process: For pre-qualification of the potential ADSL loop, Dr.DSL runs in

a single-ended configuration on the CO linecard, i.e. no modem is connected on ATU-R side and no technician has to be dispatched to the customer's home. In this phase

- Loop length
- Expected data rates
- Crosstalk disturbers

can be identified and shown on Network Management System level as plain-language results for non-technical staff.

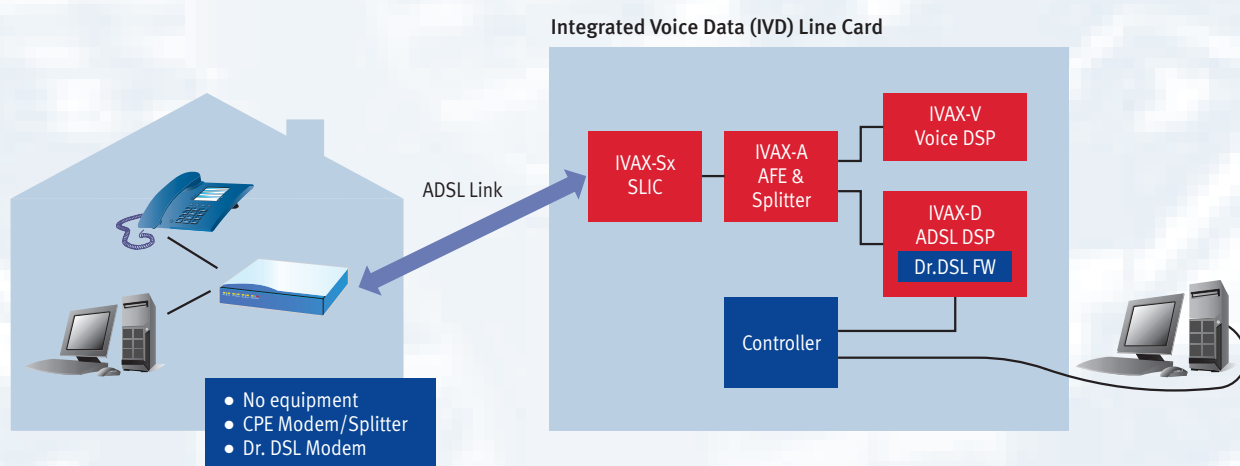


Figure 4 Dr.DSL in an ADSL environment with IVD linecard

Once a ADSL compliant modem has been installed and the service is provisioned, more accurate measurements are possible, including identification of load coils and bridge taps. Expensive truck rolls to the end user can be avoided by these remote measurements.

Finally, Dr.DSL capabilities can be used for service maintenance and monitoring in a two-ended configuration with active ADSL. In this phase, the Network Management System can be kept up to date with latest loop and maintenance information, either proactively triggered or automatized.

INFINEON TECHNOLOGIES CORPORATE SALES OFFICES WORLDWIDE –PARTLY REPRESENTED BY SIEMENS AG

A

Infineon Technologies Villach AG
Vertrieb
Opengasse 20B/3/31
A-1040 Wien
☎ (+43) 1-5 87-70 70 0
Fax (+43) 1-5 87-70 70 20 0

AUS

Siemens Ltd.
885 Mountain Highway
Bayswater, Victoria 3153
☎ (+61) 3-97 21 21 11
Fax (+61) 3-97 21 72 75

BR

Infineon Technologies
South America Ltda.
Semicondutores
Avenida Eduardo Roberto Daher 1135,
Centro
06850-970 Itapeceira da Serra-SP
☎ (+55) 11-79 48-74 77
Fax (+55) 11-79 48-74 88

CDN

Infineon Technologies Corporation
320 March Road, Suite 604
Kanada, Ontario K2K 2E2
☎ (+1) 613-5 91 63 86
Fax (+1) 613-5 91 63 89

CH

Infineon Technologies AG
vertreten durch Siemens Schweiz AG
Freilagerstrasse 40
CH-8047 Zürich
☎ (+41) 1-4 95 44 11
Fax (+41) 1-4 95 54 63

D

Infineon Technologies AG
Völklinger Str. 2
D-40219 Düsseldorf
☎ (+49) 2 11-3 99 29 30
Fax (+49) 2 11-3 99 14 81

Infineon Technologies AG
Werner-von-Siemens-Platz 1
D-30880 Laatzen (Hannover)
☎ (+49) 5 11-8 77 22 22
Fax (+49) 5 11-8 77 15 20

Infineon Technologies AG
Von-der-Tann-Straße 30
D-90439 Nürnberg
☎ (+49) 9 11-6 54 76 99
Fax (+49) 9 11-6 54 76 24

Infineon Technologies AG
Weissacher Straße 11
D-70499 Stuttgart
☎ (+49) 7 11-137 33 14
Fax (+49) 7 11-137 24 48

Infineon Technologies AG
Halbleiter Distribution
Richard-Strauss-Straße 76
D-81679 München
☎ (+49) 89-92 21 40 86
Fax (+49) 89-92 21 20 71

DK

Siemens A/S
Borupvang 3
DK-2750 Ballerup
☎ (+45) 44 77-44 77
Fax (+45) 44 77-40 17

E

Siemens S.A.
Dpto. Componentes
Ronda de Europa, 5
E-28760 Tres Cantos-Madrid
☎ (+34) 91-5 14 71 51
Fax (+34) 91-5 14 70 13

F

Infineon Technologies France,
39/47, Bd. Ornano
F-93527 Saint-Denis CEDEX 2
☎ (+33) 1-49 22 31 00
Fax (+33) 1-49 22 28 01

FIN

Infineon Technologies Nordic OY
P.O.Box 60
FIN-02601 Espoo (Helsinki)
☎ (+3 58) 10-5 11 51 51
Fax (+3 58) 10-5 11 24 95

GB

Infineon Technologies
Siemens House
Oldbury
GB-Bracknell, Berkshire
RG 12 8FZ
☎ (+44) 13 44-39 66 18
Fax (+44) 13 44-39 66 32

H

Simacomp Kft.
Lajos u. 103
H-1036 Budapest
☎ (+36) 1-4 57 16 90
Fax (+36) 1-4 57 16 92

HK

Infineon Technologies
Hong Kong Ltd.
Suite 302, Level 3,
Festival Walk,
80 Tat Chee Avenue,
Yam Yat Tsuen,
Kowloon Tong
Hong Kong
☎ (+8 52) 28 32 05 00
Fax (+8 52) 28 27 97 62

I

Infineon Technologies Italia
Via Vipiteno 4
I-20127 Milano
☎ (+39) 02-66 76 -1
Fax (+39) 02-66 76 43 95

IND

Siemens Ltd.
Components Division
No. 84 Keonics Electronic City
Hosur Road
Bangalore 561229
☎ (+91) 80-8 52 11 22
Fax (+91) 80-8 52 11 80

Siemens Ltd.
CMP Div, 5th Floor
4A Ring Road, IP Estate
New Delhi 110 002
☎ (+91) 11-3 3199 12
Fax (+91) 11-3 3196 04

IND

Siemens Ltd.
CMP Div, 4th Floor
130, Pandurang Budhkar Marg,
Worli
Mumbai 400 018
☎ (+91) 22-4 96 21 99
Fax (+91) 22-4 96 22 01

IRL

Siemens Ltd.
Electronic Components Division
8, Raglan Road
IRL-Dublin 4
☎ (+3 53) 1-2 16 23 42
Fax (+3 53) 1-2 16 23 49

IL

Nisko Ltd.
2A, Habarzel St.
P.O. Box 58151
61580 Tel Aviv – Israel
☎ (+9 72) 3-7 65 73 00
Fax (+9 72) 3-7 65 73 33

J

Infineon Technologies Japan K.K.
Takanawa Park Tower 9F
3-20-14, Higashi-Gotanda,
Shinagawa-ku,
141-0022, Tokyo
☎ (+81) 3-54 49 67 37
Fax (+81) 3-54 49 67 38

MAL

Infineon Technologies AG
Sdn Bhd
Bayan Lepas Free Industrial Zone 1
11900 Penang
☎ (+60) 4-6 44 99 75
Fax (+60) 4-6 41 48 72

N

Siemens Components
Scandinavia
Østre Aker vei 24
Postboks 10, Veitvet
N-0518 Oslo
☎ (+47) 22-63 30 00
Fax (+47) 22-68 49 13
Email: scs@components.siemens.se

NL

Infineon Technologies Holding B.V.
Sales Division Benelux
Rotterdam Building (11th floor)
Aert van Nesstraat 45
NL-3012 CA Rotterdam
☎ (+31) 10-2 13 44 08
Fax (+31) 10-2 13 39 66
Email: benelux_info@infineon.com

NZ

Siemens Auckland
300 Great South Road
Greenland
Auckland
☎ (+64) 9-5 20 30 33
Fax (+64) 9-5 20 15 56

P

Siemens S.A.
an Componentes Electronicos
R. Irmaos Siemens, 1
Alfragide
P-2720-093 Amadora
☎ (+351) 1-4 17 85 90
Fax (+351) 1-4 17 80 83

PK

Siemens Pakistan Engineering
Co. Ltd.
PO Box 1129, Islamabad 44000
23 West Jinnah Ave
Islamabad
☎ (+92) 51-21 22 00
Fax (+92) 51-21 16 10

PL

Siemens SP. z.o.o.
ul. Zupnicza 11
PL-03-821 Warszawa
☎ (+48) 22-8 70 91 50
Fax (+48) 22-8 70 91 59

RC

Infineon Technologies
Asia Pacific Pte. Ltd.
Taiwan Branch
10F, No. 136 Nan King East Road
Section 23, Taipei
☎ (+8 86) 2-27 73 66 06
Fax (+8 86) 2-27 71 20 76

ROK

Siemens Ltd.
Asia Tower, 10th Floor
726 Yeoksam-dong, Kang-nam Ku
CPO Box 3001
Seoul 135-080
☎ (+82) 2-5 27 77 00
Fax (+82) 2-5 27 77 79

RUS

INTECH electronics
ul. Smolnaya, 24/1203
RUS-125 445 Moskva
☎ (+7) 0 95-4 51 97 37
Fax (+7) 0 95-4 51 86 08
Email: ml-intec@aha.ru

N

Infineon Technologies Nordic AB
Box 46
S-164 93 Kista
☎ (+46) 8-7 03 59 00
Fax (+46) 8-7 03 59 01

SGP

Infineon Technologies Asia
Pacific, Pte. Ltd.
168 Kallang Way
Singapore 349 253
☎ (+65) 8 40 06 10
Fax (+65) 7 42 62 39

USA

Infineon Technologies Corporation
1730 North First Street
San Jose, CA 95112
☎ (+1) 4 08-5 01 60 00
Fax (+1) 4 08-5 01 24 24

USA

Siemens Components, Inc.
Optoelectronics Division
19000 Homestead Road
Cupertino, CA 95014
☎ (+1) 4 08-2 57 79 10
Fax (+1) 4 08-7 25 34 39

VRC

Infineon Technologies
Hong Kong Ltd.
Beijing Office
Room 2106, Building A
Vantone New World Plaza
No. 2 Fu Cheng Men Wai Da Jie
100037 Beijing
☎ (+86) 10-68 57 90-06, -07
Fax (+86) 10-68 57 90 08

Infineon Technologies
Hong Kong Ltd.
Chengdu Office
Room 1411, Jinyang Mansion
58 Tidu Street
Chengdu,
Sichuan Province 610 016
☎ (+86) 28-6 61 54 46 / 79 51
Fax (+86) 28-6 61 01 59

Infineon Technologies
Hong Kong Ltd.
Shanghai Office
Room 1101, Lucky Target Square
No. 500 Chengdu Road North
Shanghai 200003
☎ (+86) 21-63 61 26 18 / 19
Fax (+86) 21-63 61 11 67

Infineon Technologies
Hong Kong Ltd.
Shenzhen Office
Room 1502, Block A
Tian An International Building
Renim South Road
Shenzhen 518 005
☎ (+86) 7 55-2 28 91 04
Fax (+86) 7 55-2 28 02 17

ZA

Siemens Ltd. Components
Linbro Business Park
1 Electron Street
Frankenwald Ext. 2
Sandton 2146
Gauteng
South Africa
☎ (+27) 11-6 52-20 00 or 27 19
Fax (+27) 11-6 52-25 73 or 26 14
Email: solutions@siemens.co.za