



Broadband technologies and improvements with Interference Cancellation (IFC)

f.i.t 24.06.2009



Agenda

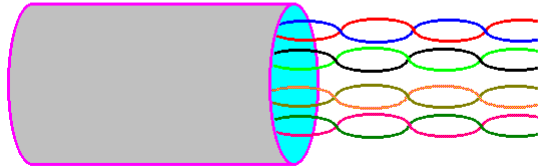
1. Einführung Broadband United
2. Neue DSL Produkte für Geschäftskunden
3. Probleme durch Nebensprechen
4. Anwendungen für Interference Cancellation
5. USPs
6. Produkte und Verfügbarkeiten



1. Introduction Broadband United

BroadU provides more bandwidth, higher reach and better stability over the standard twisted-pair telephone cable

- Multibillion meter cables for telephone applications are deployed in



Telecom Networks

Corporate Networks

In-house Networks

- The growing penetration of broadband access and higher bandwidth demand leads to an increasing problem of crosstalk and interference
- **BroadU's mission is to improve the electrical characteristics of existing copper line infrastructure through interference cancellation (IFC)**
- **BroadU's solutions enables a significant higher value of cable assets for DSL applications in the strong growing broadband market, especially when they are time- or quality critical, for VPNs, for ASPs and for "Software as Service"**



1. Introduction Broadband United

Highly committed shareholders with deep industry knowledge and large client network

Business

- Telecommunications
- Automation
- Utilities
- Corporate
- Company owner
- Companies with history of up to 67 years

Products

- Communications engineering
- Communications theory and simulation
- Chip design
- Product lifecycle
- Software
- Hardware
- Manufacturing

VIERLING

Telecom equipment
www.vierling.de

IK-T

Consulting
www.ik-t.de

iAd

Chip design
www.iad-de.com

IT

University
www.lnt.de/lit/



2. Neue Produkte für Geschäftskunden (Beispiel Arcor)

Arcor-Business DSL profi

Professioneller SDSL-Anschluss, flexible Volumen- oder Flatrate-Tarife und 24h-Kundenservice.

Bandbreite

2 Mbps Up-/Downstream

Tarifart

Volumentarif (99,- € mtl.)

99,- € mtl.

Vertragslaufzeit

36 Monate

Bereitstellungspreis 0,- €

Arcor – Business DSL profi

[Verfügbarkeit prüfen](#)

Maximale Performance für schnellste Internet-Verbindungen.

Gehen Sie bei der Internet-Performance Ihres Unternehmens keine Kompromisse ein. Mit Arcor-Business DSL profi profitieren Sie von maximalen Geschwindigkeiten, transparenten Tarifen und flexiblen Vertragslaufzeiten.

- Up- und Downstream mit bis zu 10Mbps
- Flexible Volumen- oder Flatrate-Tarife
- Flexible Vertragslaufzeiten von 12, 24 oder 36 Monaten
- 24-Stunden-Kundenservice (365 Tage im Jahr)
- Inklusive 4 oder 8 festen IP-Adressen
- Weitere Extras wie IP-Monitor, Quality of Service und Service Level classic express verfügbar

[Preisliste herunterladen](#)



2. Neue Produkte für Geschäftskunden (Beispiel Deutsche Telekom)

Erleben, was verbindet. T-Systems Geschäftskunden

Startseite Produkte & Lösungen Erfolgsgeschichten Wissen & Trends Vorteilsprogramm Partner

- :: Aktionsangebote
- :: Breitband & Internet
- :: Internetzugänge**
- :: DSL Business
- :: CompanyConnect**
- :: Komplettangebote
- :: Mobile Internetzugänge
- :: Sicherheit im Internet
- :: Domain Name Service
- :: Telefonie & VoIP
- :: Bürokommunikation
- :: Vernetzung & VPN
- :: Mobilität
- :: IT
- :: Produktfinder
- :: Online-Berater

Breitband & Internet

Produkte & Lösungen > Breitband & Internet > Internetzugänge > CompanyConnect

Übersicht Details **Varianten** Neue Generation Info & Beratung

CompanyConnect

Vier Varianten – ganz nach Ihrem Bedarf

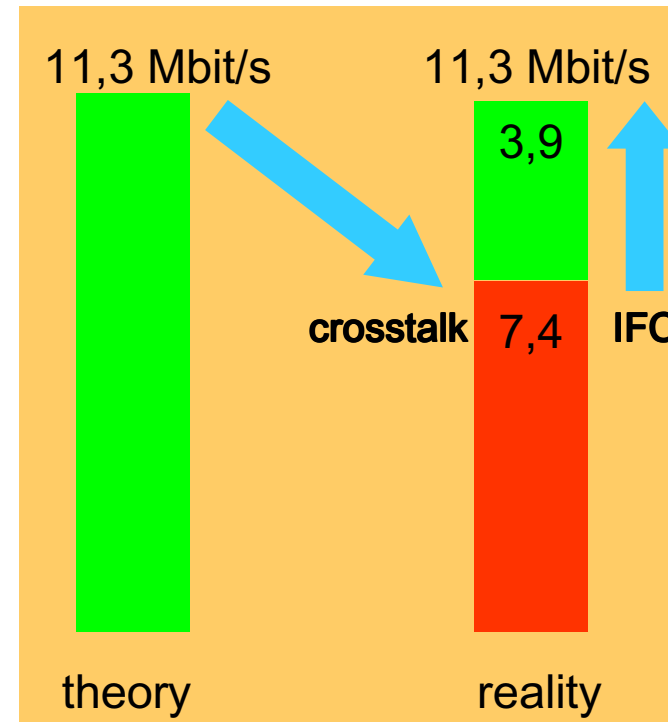
CompanyConnect 10M

Mit CompanyConnect 10M erzielen Sie Bandbreiten von bis zu 10 Mbit/s über Ihren Kupferanschluss. Sie starten bei 2,5 Mbit/s Übertragungsgeschwindigkeit und steigen bei Bedarf kostenfrei in höhere Bandbreitenstufen auf.



3. Practical impact of crosstalk on SHDSL lines

- 2 bonded SHDSL.bis lines can provide up to 11,3 Mbit/s (US/DS)
- Due to crosstalk, the theoretical maximum can't be realised
- Customer is unhappy because he wants 10 Mbit/s but gets only 7,4 Mbit/s (example)
- With Interference cancellation, crosstalk can be compensated; full bandwidth can be provided



Example: data taken from real life SHDSL.bis setup

3. Probleme durch Nebensprechen (Analogie zur Akustik)

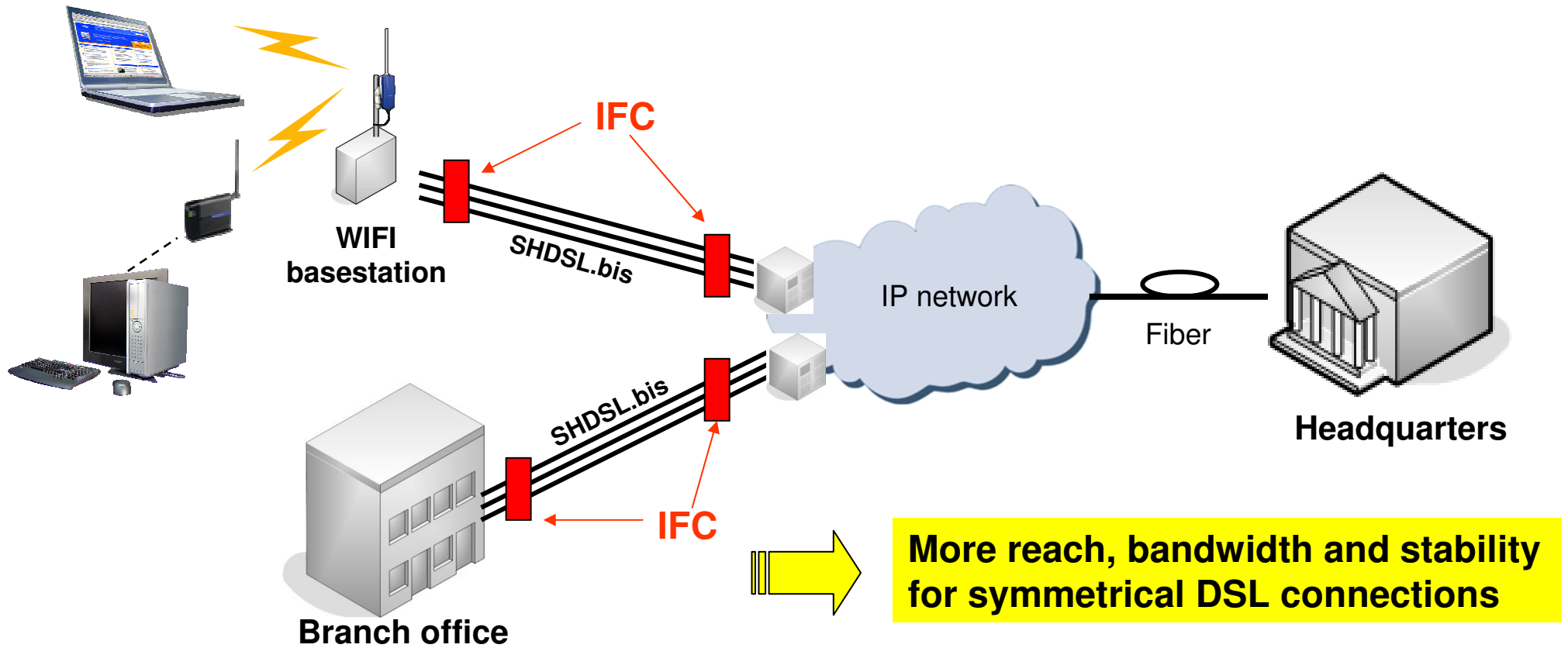


- Störungen durch Nebensprechen auch bekannt aus der Akustik
- Kompensationsverfahren:
 - Mikrofon nimmt Störungen/Geräusche auf
 - In den Kopfhörer wird ein gegenphasiger Schall eingespeist, der die Störung kompensiert



4. Application: IFC for corporate customers

Home offices / Campus areas





4. Application: IFC for corporate customers

Business Case elements

- Additional revenue thanks to additional bandwidth
 - E.g. 990,- € for 10/10 Mbit/s service instead of 690,- € for 6,8/6,8 Mbit/s (**300 €/month** more revenue)
- Cost for additional unbundled local loop (as alternative to IFC)
 - E.g. 10,50 €/month plus 50 €/year for handling (**176 €/year**) per additional line
- Additional unbundled local loop not available
 - Loss of customer or reduced revenue
- Operations issue due to instability
 - 1 – 2 issues per year with cost of 200 €/case (up to **400 €/year**)
- Gain new customers
 - Up to 40% bigger geographical reach
- Improved customer satisfaction
 - **unpayable**



4. Application: Current focus of IFC

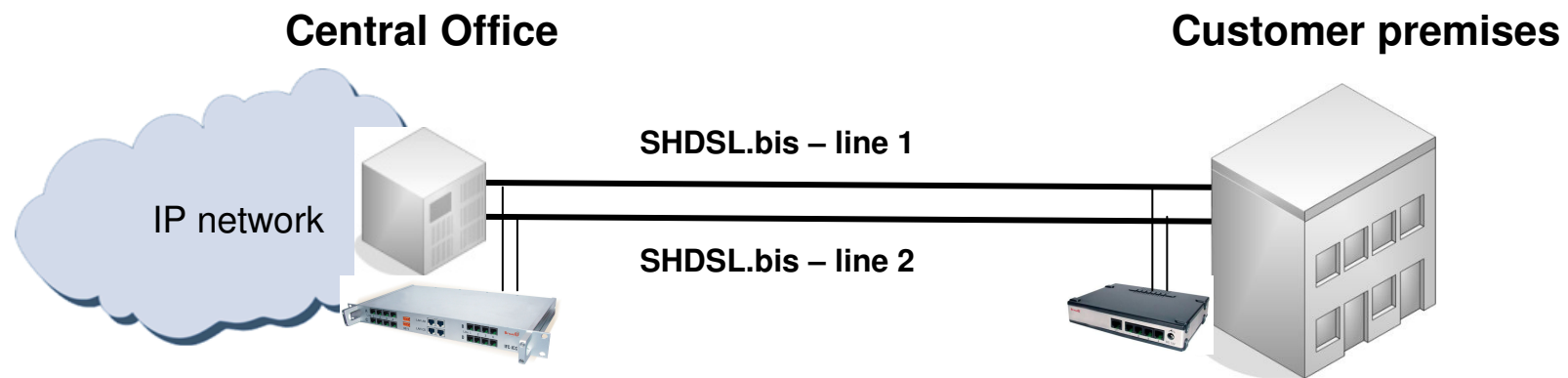
Typical symmetrical DSL services and applications

- The first release of the Interference Cancellation Product, i.e. IFC Interconnect can improve the following DSL based products:
 - HDSL (all variants)
 - SDSL (all variants)
 - SHDSL (up to 2,3 Mbit/s)
 - SHDSL 2,3 Mbit/s bonded (commercial products are typically up to 9,2 Mbit/s)
 - eSDSL/SHDSL.bis (up to 5,7 Mbit/s)
 - eSDSL/SHDSL.bis bonded (commercial products are typically n x 5 Mbit/s)
- Applications which are often based on SHDSL
 - DSLAM backhauling
 - Mobile backhauling
 - Ethernet in the first mile (EFM)
 - Pseudo wire

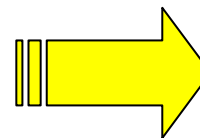


4. Applications: Actual implementation of IFC

Example: customer ordered a 10 Mbit/s symmetrical service on 2 lines



Usually technician goes onsite to do the installation





5. USPs

Short ROI and significant customer benefits

Improvement of the electrical characteristics of existing copper cable infrastructure through interference cancellation in order to:

- Increase possible bandwidth (50 %)
 - Increase geographical reach (40 %)
 - Increase cable utilisation (40 %)
 - Expand broadband services to all kind of copper cable networks
-
- Reduce churn
 - Improve transmission quality and reliability -> reduce service cost
 - Support new applications and new revenue streams
 - Short ROI (< 12 month)

Who ever uses cables is our customer, because we provide solutions which significantly increase the cable network value



6. Products and availability

IFC Interconnect (FPGA/ASIC)

- Engineering samples available
- Field tests starting in August
- Mass rollout starting in October
- Optimised use with business customer applications (e.g. SHDSL, SHDSL.bis, etc.)
- 2 variants for CPE and CO side
 - 48 V power supply and 4 x 4 compensation channels on CO side
 - 230V/12 V power adaptor and 1 x 4 compensation channels on CPE side
- Management interface (IP)
 - Integration based on SNMP





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