SOURCE: KPN (PTT Telecom, KPN Research)
author: Rob van den Brink

CONTACT R.F.M. van den Brink
KPN Research,
PO Box 421
2260 AK Leidschendam
The Netherlands
tel: +31 70 3325389
fax: +31 70 3326477
email: R.F.M.vandenBrink@research.kpn.com

TITLE **ADSL/2 - The position of the Dutch operator on ADSL**

STATUS For information and discussion.

ABSTRACT This contribution presents the position of the Dutch operator regarding the revision of the current ADSL technical report. It supports the adoption of ISDN, Rate Adaptive systems, simplifications in favor of ATM, and the adoption of CAP. Further we propose not to repair the current ADSL report, but to use the current VDSL report as a starting point for long-range (3-5km) single-pair xDSL systems.

The ADSL technical report has been completed during the last September meeting. The large number of proposals for a second issue on ADSL indicates that the match between the current ADSL report and European requirements should be improved. We recommend further improvement of ETSI reports on long range (3-5km) single-pair xDSL systems. The purpose of this contribution is to communicate our expectation on this issue, and to discuss some requirements that enable a seamless implementation of xDSL in the access network.

1. ISDN and ADSL

The current ADSL technical report does not support a separate ISDN window in the baseband of the ADSL spectrum. The number of ISDN customers in the Netherlands is growing rapidly. This means that an increasing number of customers, that rely on ISDN services, cannot simultaneously be provided with ADSL-services.
We think that the use of a POTS/ISDN splitter, similarly to the VDSL solution, is the best and cheapest way to provide both ADSL and ISDN. The splitter should meet at least the following requirements:

- In the case of a power down failure at the customer side, the (passive or active) POTS/ISDN splitter must pass all POTS/ISDN signals, and may block ADSL signals. This requirement preserves the life-line services of POTS and ISDN.
- The bandwidth of the splitter should meet the VDSL requirements, when splitter and modem are not combined in the same cabinet. This requirement will reduce the costs when an ADSL link will be upgraded to a VDSL link.

Based on simulations, we expect less than 10% decrease of ADSL range performance, when the ADSL spectrum is shifted to create a baseband window for ISDN. Based on this assumption, we recommend the combination of ISDN and ADSL

KPN recommends that the successor of the ADSL technical report allows options for transportation of ISDN in the base band below ADSL signals, provided that they reduce the range with less than 10%.

2. ATM and ADSL

KPN expects that a significant part of the ADSL market will be the consumer market. Fast Internet Access will probably be the killer application. This means that a low-cost solution to Internet Access is an important factor for the success of ADSL.
KPN feels that ATM flexibility for ADSL transmission can be an advantage. It is to be expected that the use of a single ATM TC layer, in stead of two, avoids the need for multiplexing and demultiplexing, and that it simplifies the implementation of ATM in ADSL links. We support ATM simplifications to ADSL, under the assumption that the inclusion of ATM does not prevent low-cost solutions to Internet Access.

KPN recommends that the successor of the ADSL technical report allows options that simplify the implementation of ATM within ADSL, provided that this does not exclude low-cost versions of ADSL.

3. Linecodes and modulation principles

The use of ADSL is not prohibited to one application only (e.g. Internet Access), but will grow to offer several at different locations at the customer side. (Internet to one room, and video to another room). This aspect makes that KPN intents to install ADSL in a central entry point at the customer side (probably at the point where the twisted pair cable enters the building). From an operator point of view, it is likely to have a clear distinction between the operator side and the customer network, and the interface between these two should be stable and robust.
Contrary to the ANSI point of view, KPN thinks that an interface somewhere in the middle of a very long twisted pair cable is *not* a stable and robust interface. Minor changes to the wiring system at the customer side can have a dramatic impact for the performance of an ADSL link. Therefore KPN expects that an interface with their customers, as shown in figure 1b, is better manageble.
As a result, there is no need to standardize in detail what signals will flow through the twisted pair cables. Both DMT as CAP are acceptable modulation schemes for KPN, as long as their spectrum is 'nice'. A 'nice' spectrum means that the spectral interference from ADSL to existing and future systems is kept as low as possible. The price/performance ratio will eventually guide our preference.

KPN recommends that the successor of the ADSL technical report will include DMT, as well as CAP, provided that they meet well defined power and spectral requirements. KPN prefers networks, in which both modems are managed by the network operator.

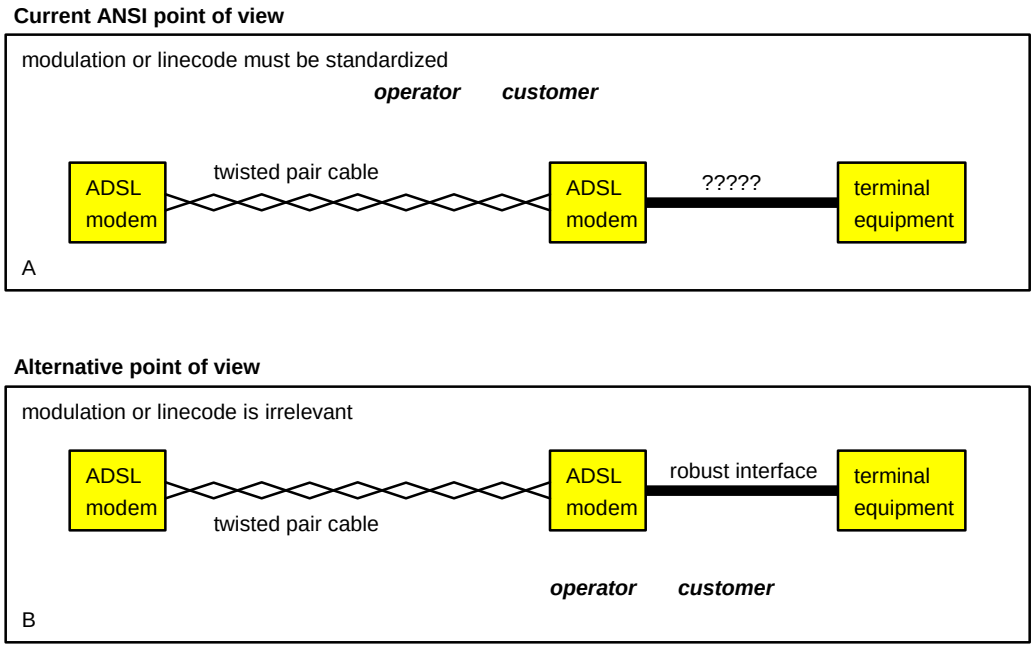

Figure 1. *The inclusion of both ADSL modems in the network of an operator, results in a clear and robust separation between operator and customer. This point of view differs from ANSI (and the current ADSL report) and makes the choice of any linecode or modulation scheme irrelevant. KPN expects that this alternative results in ADSL links that are better manageble, and prefers networks in which both modems are managed by the network operator.*

4. Rate Adaptive ADSL

The exploitation of the full range of ADSL systems is not feasible in an operational environment. An operator will never know if *this* line is the worst case line of his network. In practice, wide safety margins are required to avoid unreliable links. Transmission systems that are adaptive, with respect to

the actual signal to noise ratio, enable a significant better exploitation of the available bandwidth of the network. We identify two different classes of 'rate adaptive':

- ADSL modems that are adaptive only at startup time.
- ADSL modems that are continuously (or frequently) adaptive.

The first class has some advantages to 'fixed rate' ADSL solutions, but they lack the ability to deal with interference levels that varies with the time. This class of modems are available today, but not adopted in the current ADSL technical report. The second class of adaptive ADSL modems seems to be the ultimate solution for exploiting twisted-pair access networks. We foresee some problems, that should be solved, to make Rate Adaptive modems good candidates for our network. They include:

- Rate adaptation results in variable throughput, which is acceptable for data services, but might be unacceptable for video services.
- Rate adaptation tends to unstable systems, in which the 'fittest' modem will 'survive'. Some type of synchronization is required to prevent that modems that awake first can claim the full bandwidth, while modems that awake later must be satisfied with lower bitrates. The operator must be provided with means to fix the maximum bitrate of a modem, and the protocols should control the actual bitrate to treat all modems equally.

Assuming that these issues can be solved, and that there performance will be stable, we support the idea [*] of adopting rate adaptive ADSL systems.

KPN recommends that the successor of the ADSL technical report will include rate adaptive systems, and encourage the development of systems that are continuously adaptive. If these systems have proven stable, the maximum bitrate should be operator-adjustable, and the actual bitrate should be controlled equally by the protocol.

5. Improve ADSL or start a new issue based on the VDSL report?

A clear functional distinction between ADSL and VDSL is lacking, but many technical specifications in the current ADSL report, differ from the VDSL specs. This is because the VDSL report has started from scratch, to serve a good average of European requirements, while the ADSL report is an annex to an ANSI report that serves American requirements. As a result, the current ADSL report does not fit well in a seamless evolution from the current situation to networks that rely on VDSL. This is illustrated by several proposals to increase the ADSL bitrate (into the VDSL range), and to support ISDN on ADSL in a way that has been adopted within VDSL.

The main interest of operators is to provide services that are demanding higher and higher bandwidths. xDSL is just a vehicle to provide that service by a copper or hybrid fiber-copper network. Compatibility with the past and a seamless evolution in bitrate are essential issues for operators. Therefore KPN recommends not to repair the current ADSL report, but to start from the current VDSL report to develop long-range (3-5km) single-pair xDSL systems. It means that ETSI leaves ADSL as it is now: an annex to an ANSI report that meets American requirements. Further, this means that ETSI should share ideas with ANSI but set the European interests at first. We recommend to choose one of the following options:

- to expand the current VDSL report for 'low-bitrates' to serve long-range (3-5km) links.
- to start a complete new report on this topic, having a name that is significantly different from ADSL

In conclusion:

KPN recommends that the ADSL technical report will not be repaired or upgraded. It is more efficient to expand the VDSL report with long range capabilities (3-5km);