| TITLE | **Problems with ISDN after inserting ADSL splitters** | |
|---|---|---|
| PROJECTS | ADSL (splitters), SpM (line sharing) | |
| AUTHORS: | Bert van Leerdam | |
| CONTACT: | Rob F. M. van den Brink, | tel +31 70 4462389 |
| | KPN Research | fax: +31 70 4463477 |
| | P.O. Box 421 | e-mail: R.F.M.vandenBrink@kpn.com |
| | 2260 AK  Leidschendam | ***the above numbers and e-mail address are*** |
| | The Netherlands | ***changed since 9 feb 2001!*** |
| STATUS | For discussion and decision | |

ABSTRACT    This TD reports over problems experienced with the ISDN service after inserting splitters for "ADSL over ISDN" on existing ISDN lines. Both, splitters and ISDN line equipment (LT and NT1), are expected to be compliant with European standards, however an interworking problem is observed. The result is that the NT1 will not start-up.

## 1.  Introduction

Recently some problems with ISDN were experienced after inserting "ADSL over ISDN" splitters in existing ISDN lines, which worked well before.
Both, splitters and ISDN line equipment (LT and NT1), are expected to be compliant with European standards, however it is observed that in several cases they will not interwork.

## 2.  Description of the observed problem

In some occasions preparing an ISDN line for ADSL over ISDN (for "non line sharing" and  "line sharing") results in problems after inserting splitters. As a result the ISDN NT1 will not start-up.
A considerable percentage of the installed NT1s is from the type that is sensitive to the problem.

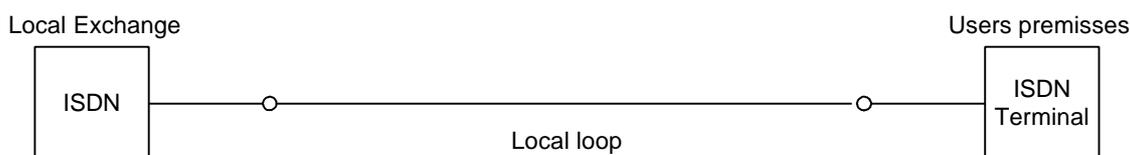An ISDN line without and with splitters is depicted in figure 1 and 2.
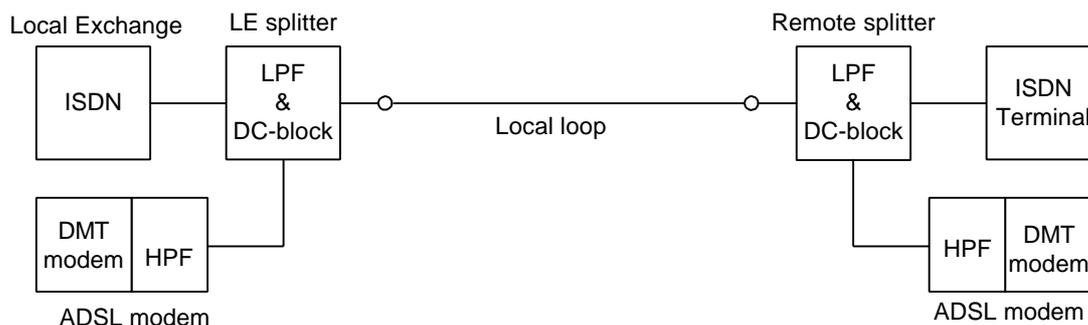


**Figure 1:   ISDN line**



**Figure 2:  ISDN line with splitters (and ADSL modems)**

The following aspects are identified in relation to the problem**:**
1. there is a first generation NT1 at the users premises (2B1Q line-coding),
2. the length of the local loop is between about 500 and 1000 meters (a somewhat wider range for the length is also possible; by the tests, the length of the cable was increased in steps of 500 meters),
3. with a loop length of 0 (zero) meters, there seems to be no problem,
4. with loops of 1500 meters or longer, there seems to be no problem as well,
5. the problem appears with and without ADSL equipment connected,
6. sometimes the problem appears already after inserting only one splitter in the line,
7. the appearance of the problem is also influenced by the type and version of the LT1 in the local exchange.

Today the problem is not fully investigated.

For the moment, the problems are solved by installing a new type NT1 at the users premises.

The cause of the problem could be that the splitters may be not transparent enough for this first generation NT1, or the NT1 is not able to accommodate the new properties of the loop, caused by the splitter(s). The splitters, which were installed, are optimised for impedances of 135 $\Omega$ and 150 $\Omega$.

Although these days only a small part of the lines is involved, it can be relatively costly for the operator to solve the problem. With a growing number of ADSL connections, the problem will become more urgent.
Beside that it can give more complications and discussions about responsibilities and costs in case of line sharing, when the ISDN and ADSL service are provided by different operators.

If the problem appears after inserting splitters, the ISDN line is out off service until:
1. the splitters are (temporary) removed from the line (until the NT1 is replaced), or
2. the NT1 at the users premises is replaced by a new type.

Appearance of the problem could be quit disturbing for the user.


## 3.   Proposed for decision is:

1. to put text into the ETSI ADSL standard (see proposed text below), describing that there could be an interworking problem for the ISDN service, using splitters conform the requirements in this ADSL standard,

   **Proposed text, for inclusion in the ETSI ADSL standard:**
   "It has been reported that some first generation ISDN NT1s may give interworking problems after inserting "ADSL over ISDN" splitters which are conform to the current requirements in this document (splitters optimised for impedances of 135 $\Omega$ and 150 $\Omega$). This subject is for further study.

2. to study solutions how to deal with this problem in case of line sharing and include the results of this study in the ETSI Spectral Management standard part 2.