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Internet Access; V5.2 controlled Internet access in the Access Network (AN), phase 1; Part 1: Interface Specification

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Technical Report

Internet Access; V5.2 controlled Internet access in the Access Network (AN), phase 1; Part 1: Interface Specification

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Services and Protocol for Advanced Networks (SPAN).

Introduction

Telephone calls to the Internet differ greatly from normal telephone calls; in particular, the holding time is much longer than for voice or fax calls. Therefore traffic models as used for normal telephone service are not applicable for Internet calls. With an increasing amount of traffic to the Internet the classic PSTN/ISDN designed with traffic models based on different rules lack the necessary performance. The present document describes a method of extending the V5.2 interface to allow decoupling of the telephone traffic to the Internet already in the AN or to bypass the LE; the Internet traffic is routed directly from the AN to the Access Server (AS) under control of the LE. Whether the AS offers direct access to the Internet or transports the user data to an ISP which is the gateway to the Internet is not relevant to the present document.

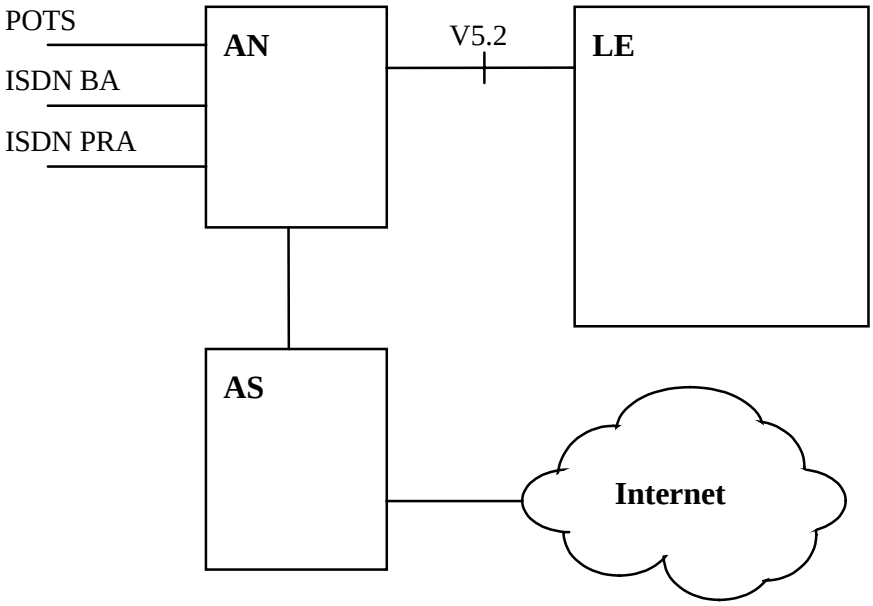

Figure 1: Internet access via AN and AS

The reason for decoupling Internet traffic is that the users allocate bandwidth for the whole time they are online although much less bandwidth is really needed due to the bursty nature of the packet data which is exchanged between user and the ISP (Internet). The basic idea for decoupling the Internet traffic in the AN is that the circuit-switched traffic be taken from the PSTN/ISDN and enter the better suited packet data world as soon as possible. In this scenario the AS, which is probably (but does not have to be) physically located quite close to the AN has the task of terminating the analogue modem traffic and sending the user data to the target ISP using IP protocol. The actual functionality of the AS is not seen to be part of the ETSI work item for V5.2 extension; nevertheless the following tasks can be seen as possible functions of the AS:

- transforming the user data from circuit-switched traffic to packet-oriented traffic;
- forwarding the user data to the addressed ISP, possibly using IP protocols and a tunnelling protocol, e.g. L2TP, to separate the IP addresses of the ISP and the transporting network;
- other packet mode transport from AS to ISP is possible;
- offering direct access to the Internet; in this case, the operator of the AS is an ISP.

Comparable solutions with a decoupling of Internet traffic behind the ingress switch are already available on the market. A solution with a decoupling in the AN would save additional equipment, i.e. interfaces between AN and LE, and switching capacity in the ingress switch. To make such a solution work, efficient use of equipment (i.e. interfaces between AN and AS) would need to be made.

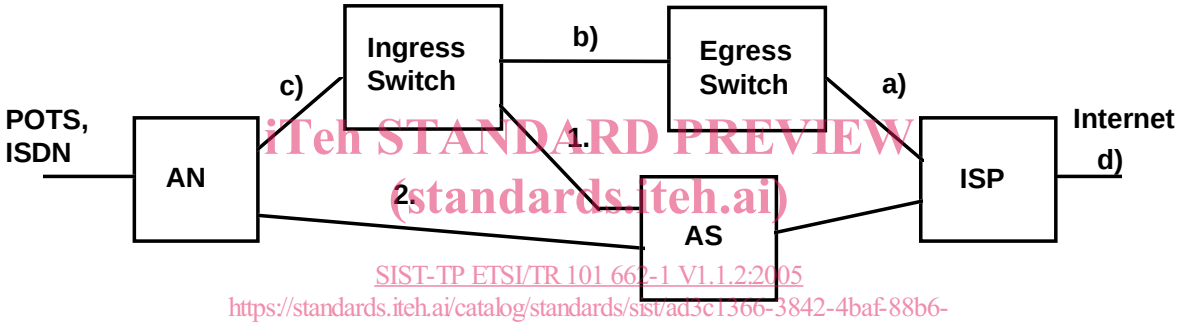

Figure 2: Connection from user to ISP

Figure 2 shows different possibilities of connecting a user with an ISP. Today, the user data reaches the ISP via the ingress switch and maybe an egress switch using a circuit-switched connection, path c), b) and a). Blocking (or at least excessive use of bandwidth) can occur in the PSTN/ISDN network in different places:

a) on the egress of the switch the ISP is connected to. Due to the extremely high traffic on ISP lines, the egress switch has to be designed to be able to carry the traffic;

b) on trunk lines between switches;

c) on the V5.2 interface between the AN and the ingress switch.

Bandwidth is wasted because the data is transported circuit-switched up to the ISP. Better use of the bandwidth is made if the AS, located as close as possible to the user, transforms the datastream into the packet mode and transports it then to the ISP. A connection of the AS to the ingress switch (path 1) is already available on the market and can also be used for users connected via a V5.2 interface. The scope of the present document is the direct connection of the AS to the AN (path 2) and therefore, the saving of bandwidth in the ingress switch.

1 Scope

The present document describes scenarios whereby Internet traffic could bypass the local exchange by being routed in the Access Network directly to the Internet access services.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] ITU-T Recommendation E.164 (1997): "The international public telecommunication numbering plan".

[2] Bellcore: GR-303-CORE Issue 2: "IDLC Generic Requirements, Objectives, and Interface", December 1998; associated: Issues List Report: GR-303-ILR Issue 2A, December 1998.

[3] ETS 300 347-1: "Signalling Protocols and Switching (SPS); V interfaces at the digital Local Exchange (LE); V5.2 interface for the support of Access Network (AN); Part 1: V5.2 interface specification" (also ITU-T Recommendation G.964).

3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AN	Access Network
AS	Access Server
BCC	Bearer Channel Connection
CPE	Customer Premises Equipment
DSP	Digital Signal Processor
IAC	Internet Access Control
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ISDN-BA	ISDN Basic Access
ISDN-PRA	ISDN Primary Rate Access
ISDN-PRI	ISDN Primary Rate Interface
ISP	Internet Service provider
LE	Local Exchange
LL	Leased Lines
L2TP	Layer 2 Tunnelling Protocol
NAS	Network Access Server
POTS	Plain Old Telephone Service
PSTN	Public Switched Telephony Network
RAS	Remote Access Server
VoIP	Voice over IP
VPN	Virtual Private Networking

4 Basic functionality of the LE Bypass mechanism

When an end customer, whose line is terminated on an AN with the Internet Bypass feature, goes off-hook, dial tone is provided by the ingress LE via the V5.2 interface just as it is done today. If the customer (or CPE) dials the destination E.164 address of a contracted ISP, the LE will re-route the Bearer channel from the V5.2 interface to the AS, so that the end-customer has a direct bearer channel connection to the AS and the resource on the V5.2 interface is freed. The signalling path from the end customer to the LE is still kept active as long as the call is ongoing. As the LE knows about this re-routed call, billing and usual call processing (e.g. call waiting, call forwarding) are still possible.

New signalling has to be introduced for communication from LE to the AS port, as this is the b-leg of the call; signalling with the AS is necessary to inform the LE about the AS accepting the call (begin of charging) and a possible release of the call by the AS.

Although Internet traffic is mentioned to be rerouted in the present document, it shall not be excluded to use the Internet Bypass functionality to e.g. reroute voice traffic to an AS which serves as a VoIP Gateway.

5 Progress of standardization work

At the outset, it was intended that the standardization should start with a simple first phase without signalling from the LE towards the AS interface. A second phase was planned for the introduction of a signalling protocol. The simple first phase was abandoned after realising that, without a signalling protocol, proper billing in the LE for re-routed calls would not be possible. It was agreed that signalling between LE and AN at the AS interface is a necessity from the start. At the time of writing, the details of this signalling remain undetermined, as does the definition of the interface between AN and AS. Another open item is whether the AS port is located on the subscriber or network side of the AN. The open items are discussed in more detail below.

5.1 First results

The following basic requirements have been identified:

- "The aim of the activity is to bypass the LE".
- The V5 standard is to provide connection capabilities in the AN such that Internet traffic is directly connected from the user to the AS.
- The capability should not impact on existing services; service as seen by the user should be as for the non-bypass case.
- The capability is to be available to PSTN (POTS), ISDN-BA and ISDN-PRA users.
- The solution is to be generic, with no knowledge in the LE about the services other than to handle the connection; LE does not interact with the contents of the bearer channel.
- The "Always On/Dynamic ISDN" service is not to be affected by the Internet Bypass capability.
- The AN will not have any subscriber provisioning data that belongs to the LE, only connection data.
- The solution should be simple; minimum complexity; easily manageable (particularly provisioning); minimum development and deployment costs.
- Support of current AN architectures which (can) handle V5.2; (as a good objective) AN equipment which is currently being deployed or under development should be (software) upgradable to support Internet Bypass.
- The solution for Internet Bypass is to allow for correct (i.e. accurate/reliable) billing.
- The subscriber is not to notice any difference whether the connection to the RAS goes via the Internet Bypass function or not; nor should there be any difference between a direct connection which uses V5 and the Internet Bypass function.