

# Supporting Document PPP

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## 1 Technical Specification Access

### 1.1 Overview

On the access line xDSL, G.fast, 1000BX & XGS-PON technology is used. Please refer to the Handbuch Technik for more detailed information.

### 1.2 Upstream Policing for PPP@ISP

In the upstream direction, all traffic is policed to the bandwidth bought by the customer (the “BCS Internet Best-Effort up” traffic rate).

### 1.3 Supported Protocols

Swisscom differentiates ATM based protocols and Ethernet based (PPPoE) protocols. ATM based protocols, such as PPPoA is only offered on ADSL access lines.

Ethernet based access lines (using PPPoE) offers a standard MTU of 1492 bytes. With setting the “max payload tag” an MTU of 1500 bytes will be available.

ATM based access lines (ADSL) receives a MTU of 1500 bytes with PPPoA and 1492 bytes with PPPoE. Swisscom supports only one PPP session at the same time from one CPE.

At layer 2, the following protocol is used: **RFC 2661**, Layer Two Tunnelling Protocol "L2TP"

### 1.4 PPPoA

PPPoA is only available with access on ADSL lines. This protocol stack requires a special encapsulation according to RFC 2364 (only LLC will be supported by Swisscom).

### 1.5 PPPoE

The use of PPPoE requires a special encapsulation (RFC 2516) using LLC/SNAP.

## 2 Technical Specification Connectivity (PPP@ISP)

### 2.1 Introduction

PPP sessions are carried within an L2TP tunnel which uses the Internet Protocol. IP connectivity between the ISP and Swisscom must be established. Figure 2 shows a diagram of network elements traversed on the path from the end user to the ISP. The figure also shows the extent of Swisscom's responsibility and the elements under the responsibility of the ISP.

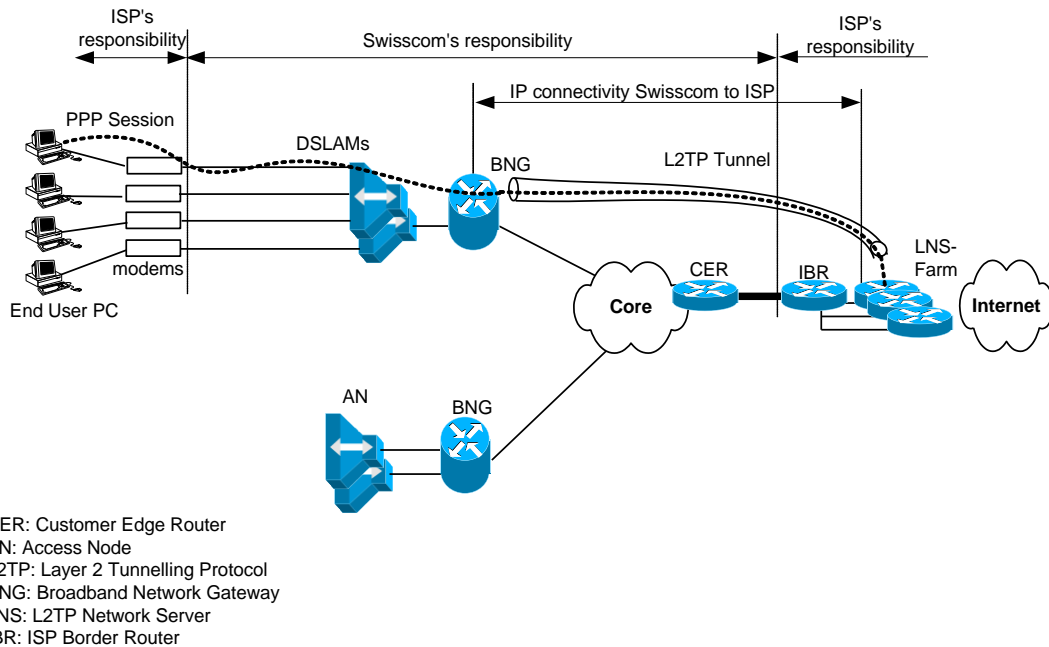


Figure 1: Network Diagram specifying Areas of Responsibility and Nomenclature

## 2.2 Subscriber and Service classes

The subscriber classes for PPP@ISP are:

- Flat@ISP: Subscribers with traditional termination model with flat based billing. @ISP subscribers receive packets delivered via L2TP in the best effort class only.

## 2.3 BGP routes for PPP@ISP subscribers

For the L2TP upstream traffic (from the subscriber to the ISP) the LNS addresses must be propagated to the Swisscom Autonomous System (AS 65501).

For the L2TP downstream traffic (to subscriber) the ISP gets **one** route per BNG for Flat subscribers.

## 2.4 Redundancy and load balancing between PoPs for @ISP subscribers

Upstream traffic (Swisscom -> ISP):

- The BNG loopback addresses for the "Flat" subscribers are announced via both connectivity links. In case of a link failure dynamic routing will preserve connectivity to the BNGs.
- For the upstream L2TP traffic, the LNS loopback addresses of the ISP can be announced via both connectivity links to the Swisscom AS. The ISP may influence the selected path using AS path prepend.
- Since the LNSs are selected in a round-robin fashion for session setup, load balancing is achieved automatically if the LNSs are distributed over both PoPs. In the event of a failure, these addresses would disappear and a different LNS is selected by the BNG (new login of subscriber is required).

Downstream traffic (ISP -> Swisscom):

- The BNG loopback addresses for the “Flat” subscribers are announced via both connectivity links. In case of a link failure dynamic routing will preserve connectivity to the BNGs.
- If the ISP uses iBGP between the ISP PoPs, eBGP is preferred over iBGP. All LNSs assigned to one IBR connect to the associated link.

## 2.5 Parallel L3 links for high bandwidth connections

If the service requires a bandwidth of more than 10 Gbps (or > 100 Gbps) parallel L3 links may be used (up to a maximum of 3 \*10Gbps or x\*100Gps, respectively). **Bundle interfaces are used.**

## 3 Identifying subscribers

### 3.1 Responsibilities

The ISP is responsible for AAA identification, and Swisscom forwards the PPP session based upon domain-based routing.

### 3.2 PPP

As already defined, both PPPoE and PPPoA are supported with the ADSL technology. The xDSL technology only supports the PPPoE protocol.

During the authentication phase, the CHAP-challenge is sent to both the subscriber and the ISP. The subscriber responds with the CHAP Password and Username which are then forwarded to the ISP.

For PPP@ISP only one PPPoX session is forwarded to the ISP's LNS within an L2TP tunnel.

## 4 Radius

### 4.1 Subscriber Identification

The service subscriber is identified to the ISP using the User-Name AVP (attribute value pairs) with the following values

**username@realm.ch for PPP over xDSL, G.fast and 1000BX**