Supporting Document PPP

Content

1 Technical Specification Access

1.1 Overview

On the access line xDSL, G.fast & 1000BX 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 “BBCS 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.

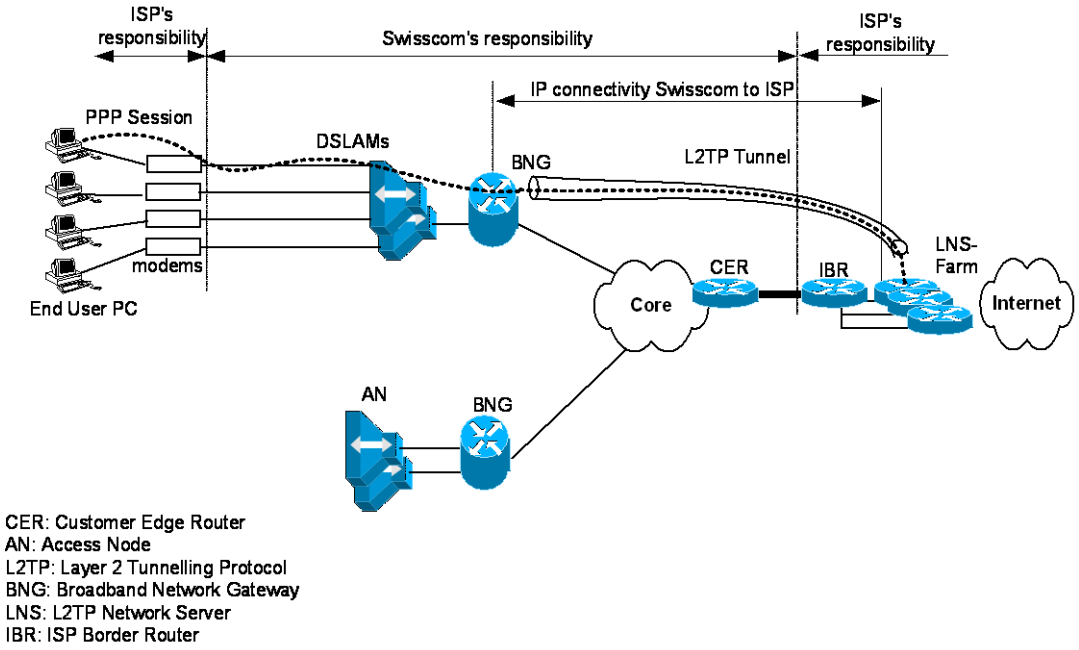

Figure 1: Network Diagram specifying Areas of Responsibility and Nomenclature

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 two routes per BNG (two loopback addresses):

- One for Flat subscribers.

For load balancing purposes, even and odd loopback addresses are distributed as equally as possible.

2.4 Static routes for PPP@ISP subscribers

If the ISP does not support BGP, the routes mentioned in Chapter 4.3 can be configured statically. To do this, the relevant addresses must be exchanged to ensure correct configuration on both sides. This option is only available for ISPs which do not have DHCP termination (PPP@ISP subscribers only).

2.5 Redundancy and load balancing between PoPs for @ISP subscribers

Upstream traffic (Swisscom -> ISP):

- The BNG loopback addresses for both the “Light” and 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 both the “Light” and 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.
- If the ISP uses an IGP (i.e. OSPF) between the PoPs, odd and even BNG loopback addresses are distributed equally in the various regions (as far as possible). The ISP may influence the IGP metric and therefore load balance based on odd and even.

For more information regarding redundancy for the traditional model (PPP@ISP) please refer to “Supporting Document LNS Configuration”.

2.6 Parallel L3 links for high bandwidth connections

If the service requires a bandwidth of more than 1 Gbps (or > 10 Gbps) parallel L3 links may be used (up to a maximum of 2 * 1Gbps or 3 *10Gbps, respectively). If more links are required then these will be implemented on a project basis. Destination based load balancing on parallel links is implemented in both traffic directions if BGP is used. Each link between CER and IBR transports its own eBGP session (maximum of 8). Load balancing is achieved using BGPs “maximum-paths n” feature; where n is the number of parallel L3 links.

In case of static routes the distribution has to be defined manually.

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 VDSL 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 the session is forwarded to the ISP’s LNS using L2TP attributes.

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

4 Sandbox

This feature is transparent for the ISPs. Any AAA customer request arriving with an incorrect Vline-id (phone number) or wrongly configured domain name, will either:

- Be redirected to a dedicated web page, or,
- Will receive a specific email explaining that a wrongly configured username in the CPE has been used, or there is a problem with the Vline-ID.

The Swisscom Sandbox Feature provides customers with a miss-configured CPE or Vline-ID with an L2TP connection to a limited service area (the sandbox), where they will receive directions for contacting support and resolving the problem. This feature will expedite the resolution of subscriber CPE configuration problems resulting in a better service for customers, less support effort required, and lower unnecessary RADIUS load.

5 Radius

5.1 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

Swisscom Radius sends an additional Swisscom VSA (vendor specific attribute) in the access request for the DHCP cases which can have the two possible values in order to identify the service type flat or light.

The new AVP that Swisscom RADIUS server will send to the ISPs in authorization and accounting request is defined below:CAN

Swisscom.attr Swisscom-ISP-Acct-Model 20	integer	(0,0,0)
Swisscom.value Swisscom-ISP-Acct-Model	FLAT	1
Swisscom.value Swisscom-ISP-Acct-Model	LIGHT	2

5.2 Swisscom RADIUS Server Authentication and Authorization

The following AVP can be optionally sent by the ISPs.

The Acct-Interim-Interval AVP determines how often ISP will receive accounting messages. The value to send should be an integer, this represents the number of seconds between each accounting records.

Interim accounting record forwarding can be enabled for Light and Flat users using different range of value. To disable this feature, the Acct-Interim-Interval AVP should be sent with a value set to zero.

Any invalid AVP will be discarded.

Any invalid AVP value for Acct-Interim-Interval will be replaced by the appropriate default value.