



Introduction to Virtual Access' High Availability Layer 2 Bonding Solution

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Introduction

The introduction of VoIP into the SME has created a need for high availability IP services where the need previously did not exist. Whilst for data services a fairly high availability is acceptable the same is not true for voice services; voice services must have very high availability for business use.

The use of redundant IP access links with alternative access routes is a common approach to increasing availability. However, where IP address translations are in use it is often the case that a change on access route will cause a break in the data flows and hence all VoIP calls will be lost as the route to the network changes. This is not acceptable in a business service.

In addition to the need for redundancy there is a need for increased upstream bandwidth over and above what is available on a single ADSL link today.

The need for both high availability and increased upstream bandwidth is leading to an increase in demand for bonded ADSL services.

The Virtual Access GW7000 series Service Managed Gateway (SMG) is a business class access router that includes two integrated ADSL2+ modems, supporting two ADSL links without any external equipment. This document shows how these two ADSL lines can be bonded to provide very high availability ADSL services.

Access network architecture

An outline of a typical access network architecture is shown in Figure 1.

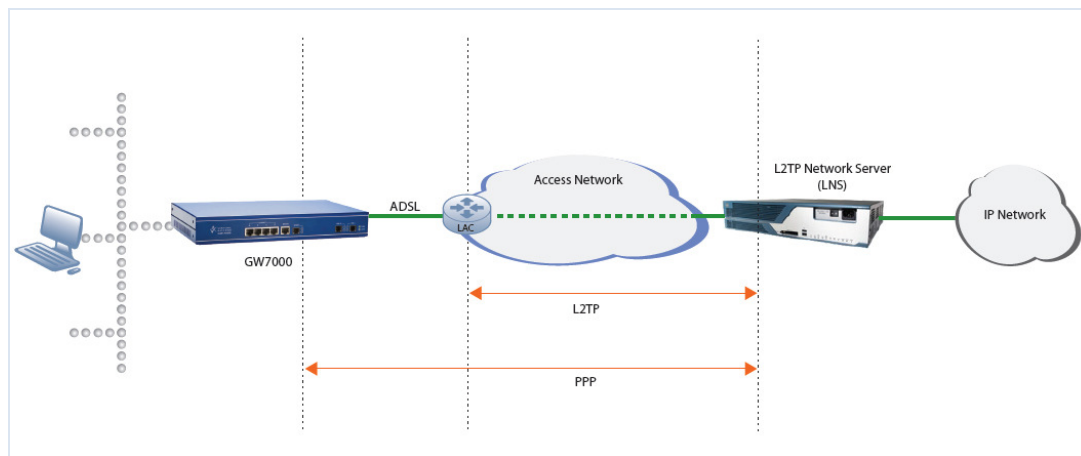


Figure 1: Standard access network architecture

Typically the PPP protocol used on the ADSL access link is encapsulated using Layer 2 Tunnelling Protocol (L2TP) and delivered by the access provider to the IP network service provider. The IP service provider terminates the L2TP using a L2TP Network Server (LNS).

Layer 2 bonding

Bonding of the two ADSL links is done using Multilink PPP, as shown in Figure 2.

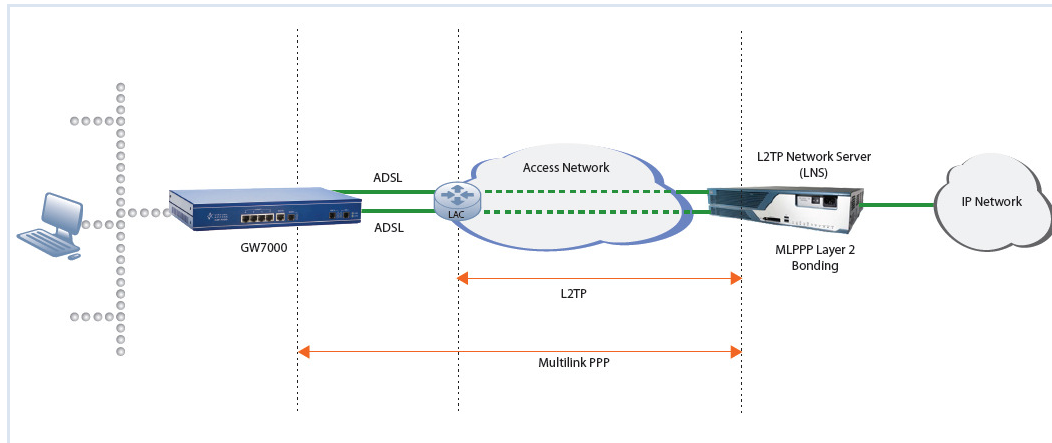


Figure 2: Multilinking access architecture

To support bonding the protocol on the access lines is now Multilink PPP. The Multilink protocol allows the two links to be bonded together into a single pipe. The MLPPP protocol runs between the SMGs and the LNS. No extra equipment is required as most LNS equipment will already support MLPPP bonding.

Bonding at the link layer avoids the complexity of having two layers of IP addresses to deal with as each bundle of links looks to be a single link to the IP layer. It is also very efficient in bandwidth utilisation as the bonding protocol overhead is very low.

Two access service providers

The availability of the service can be enhanced by using two access service providers, as shown in figure 3.

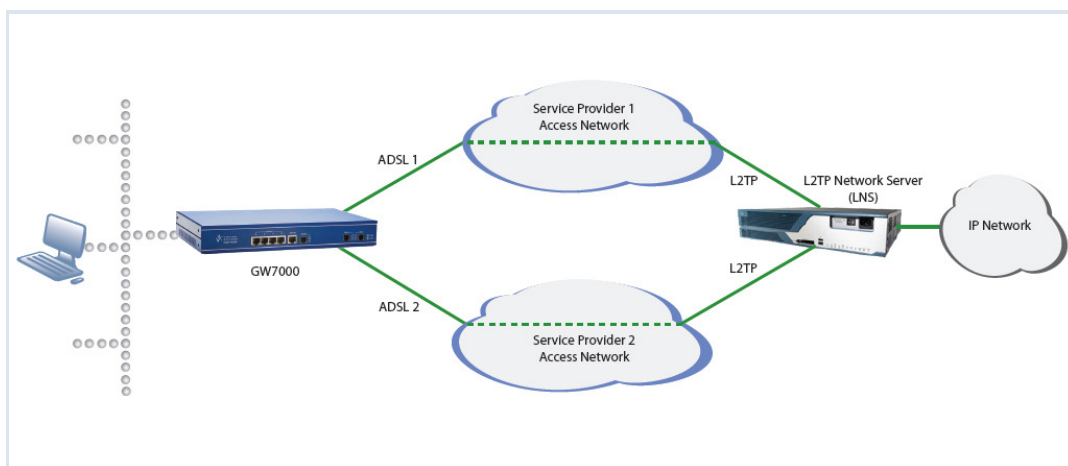


Figure 3: Using two access service providers for increased availability

This architecture will provide continued service in the case where there is a fault in the DSLAM or the access concentrator and it can provide extremely high availability.

Bonding four lines with router redundancy

The architecture provides the ability to support up to four access lines using two SMGs, as shown in figure 4.

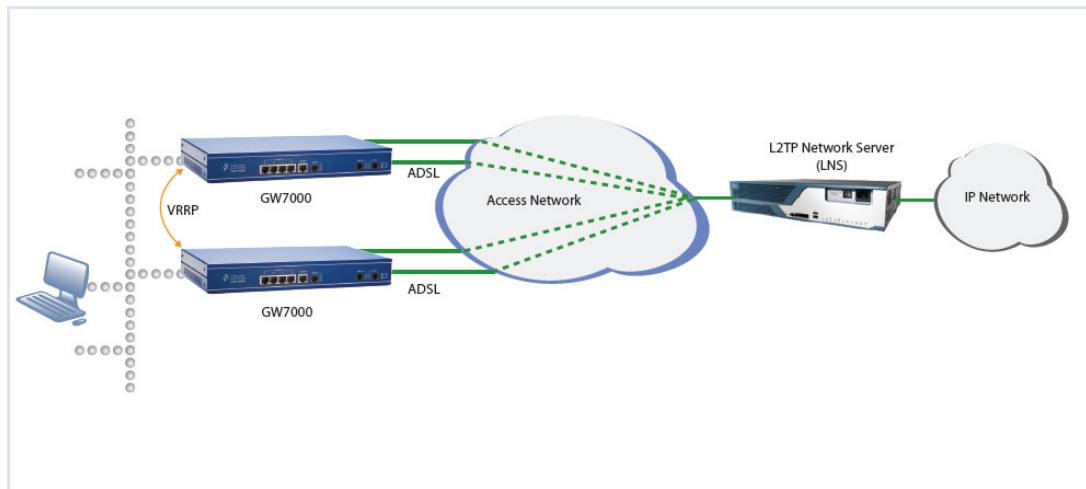


Figure 4: Bundle up to four access links using two access routers

In addition to the bundling of multiple access links, the architecture provides full router redundancy. This provides for the case where the main router on the network has a fault or is disconnected from the network. In this circumstance the other SMG will become the master router. Virtual Router Redundancy Protocol (VRRP) is used between the routers to determine which router is master. The VRRP master is the router that provides the gateway service on the LAN.

Benefits

The architecture provides the following benefits:

- Fully redundant architecture provides very high availability
- Bundling of multiple DSL access links provides high bandwidth
- Very low bandwidth overhead using layer 2 techniques
- Healing of network faults within five seconds, without loss of data flows or VoIP calls
- No additional equipment required
- No additional network hops to bonding servers
- No additional layers of IP addressing required, reducing system complexity