



HIGH AVAILABILITY FOR BUSINESS-CRITICAL PROCESSES WITH VIPRINET

EXECUTIVE SUMMARY

In order to be successful, companies today need more bandwidth with higher reliability than ever. Whether in retail or wholesale trade, whether for corporate data exchange or highly secure payment systems, whether for connecting large company sites with one another or for integrating home offices: Doing business has become unthinkable without the Internet. However, failures of individual lines or congestion of mobile networks of large service providers occur far too often, even though offers for business customers with acceptable service levels already are extremely expensive. In these cases, Viprinet WAN bonding technology provides remedy. Viprinet allows bonding and thus summing up all available connections – be they landline or mobile – into one virtual high-speed connection, which is almost always available. In addition, you can rely on sophisticated redundancy systems for all Viprinet devices involved in your connectivity solution Viprinet devices.

INTRODUCTION

Nowadays, a highly available connection is a prerequisite for all enterprises in order to work effectively. Meanwhile, almost all business processes expect an availability of almost one hundred percent in order to run an automated merchandise management system, electronic point of sale systems, corporate communication, enterprise resource planning systems (ERP), payment systems, connect their branch offices or home offices to the IT infrastructure of the head office, or simply use the daily email or telephone communication via VoIP among customers, partners, and suppliers.

However, the reliability of today's networks isn't satisfactory at all. There's no exception to rule that leased lines still cause a downtime of 5–7 days every year. The situation isn't any better with MPLS-based services: On the one hand, there are offers from business ISPs promising an availability of more than 97 percent; on the other hand, these are uneconomical for many SMEs as they are usually associated with huge cost.

The same applies to mobile networks which, even though they are mainly used in downstream direction due to them being a shared medium, are often too overloaded to be taken into account as a real alternative to landlines. In everyday business life, such downtimes may cause considerable costs. A US study carried out by the Ponemon Institute in 2012 revealed that the average downtime totals to US\$ 336,000 per hour.

This is why many enterprises deal with the following question: How do I ensure the connection for my branch offices, my data center, or my mobile nodes to be highly available?

CAUSES

As far as the failure of a connection is concerned, a number of causes may be named such as:

- line failures,
- defective hardware of the routers,
- defective hardware of a board inside the routers, or
- power outages.

1. Line Failures or Line Restrictions

Line failures happen all the time: A digger destroys the copper or glass fiber connection; the switchboard of an Internet provider encounters a problem; a problem occurs at an Internet provider's backbone; or, owed to its physical features, the bandwidth of a line is low or suffers from high packet loss right from the start. Almost all of the aforementioned scenarios can be excluded by connecting the branch office using DSL, cable, and 4G of different Internet providers – only by that can the expected high availability be realized. If a landline connection turns out to be defective, the traffic may be re-routed across other networks such as mobile phone networks, WiFi, or even a satellite-based connection.

For using different connections in parallel, there are several technical means of implementation such as regular IP routing, load balancing or WAN bonding.

Regular routings only actively use one line for a transmission at a time. Any other back-up lines will only be operated in the event of a default, i.e. if the router realizes that the line is technically defective and is therefore unable to contact the opposite side. That's why back-up lines will only be operated whenever such events occur, and this means that there are huge running costs to be borne for back-up lines and bandwidths that are both only rarely used.

Load balancing takes a different approach: Different applications are being transmitted via parallel connections. However, in the event of a connection failing, all user-sessions will be interrupted that have been routed via this current link. In such event, any traffic must be transferred via another connection and the line must be re-established. As the output IP address is changed as well, the accessed server will first of all reject the enquiry for security reasons. As a result, the user will have to log on again, for instance when doing online banking, and start the task from scratch. This serious disadvantage of load balancing is even more striking with HTTPS/SSH/CITRIX/VoIP sessions. As far as down- and uploads are concerned, only the bandwidth of the already used connection is available – there is no accumulation of the available bandwidths.

WAN bonding as implemented by Viprinet works differently: Here, several WAN links from different Internet providers and via different transmission media are combined to one single connection

that is available for all applications within the network. From all kinds of implementations, this technology offers the most advantages:

- The bandwidths of all connections will be combined to one total available bandwidth that is available for all applications. This is, for instance, very advantageous for video conferences, back-ups, file transfers, downloads, and for Content Delivery. In addition, the bandwidth may be increased upwards step by step independently from an individual Internet provider.
- The Viprinet auto-tuning algorithms do not only measure the available bandwidth, but also if packets got lost. This may result in Viprinet's sending packets that might possibly get lost twice or even several times for security reasons.
- The failure of one or several lines will go unnoticed by a single application or by its user as long as there is enough bandwidth available for the remaining connections.
- Based on the respective profiles for parameters such as bandwidth, latency, and quality, single applications (e.g. VoIP) may be routed via the best connections at a time. Thus, it is easily possible to route the base load via a relatively stable DSL or cable connection, and to use the expensive and quite often too overloaded mobile links only in order to compensate peak loads. This ensures controllable costs while using any advantages that go along with bonding at the same time.

2. Hardware Malfunction of Routers or Remote Stations

A simple failure of a router may bring down the system. In order to have a highly reliable network infrastructure, individual redundant hardware equipment is indispensable. The hardware used should be able to replace a failed device without interruption of the current operations. This is not only the case with the remote stations in a data center, but also with the local user's routers. For instance, several Viprinet Multichannel VPN Hubs in a data center may be combined to form a redundancy group. This means that whenever a hub fails for technical reasons, another one takes over its tasks and configurations. The hubs may even be located in geographically different data centers in order to further increase reliability: As long as a layer-2 connection exists between the hubs, even acts of god, natural disasters, sabotage, or the like could not do any harm to an ongoing data transmission.

The same applies for Viprinet Multichannel VPN Routers. Here, a function called Node Stacking allows combining different routers. During standard operation, one of these routers assumes the role of the master, and the remaining integrated routers each assume the role of a slave. If the master router fails, a specific slave will take over the master routers' configuration and functions. Node Stacking offers the big advantage that the modules of the second device may be actively included in the bonding; thus, the available bandwidth can be further increased. If the master fails, this will only have an impact on the modules' bandwidth of the failed master. The router defined as slave will immediately step in and take over the tasks of the master.

3. Hardware Malfunction of a Module

The Viprinet WAN bonding may compensate the failure of a module and along with it the failure of a WAN connection quite easily either by using other connections of the same router or by using the connections of the other routers that are clustered via Node Stacking.

The prerequisite for a virtual reliable line is a virtual private network, in brief VPN. This VPN is required to use a unique Internet protocol which enables the bonding of several WAN connections to one single IP address in the first place. This single IP address can then be used for routing public as well as private IP networks from the hub in the data center to the router in the branch office. Only this way will a user at his host be in a position to use the Internet independently from his respective physical lines and the attached IP addresses.

With Viprinet WAN bonding, a user appears for external hosts to only be using a single IP address while he actually uses several media for his Internet connection. If a user would, for instance, make a transfer via online banking and one of his WAN connections failed, nothing would change for the bank's server. As far as the bank is concerned, the user would still have the same IP address that he used for the login into the online banking account. Therefore, the user session remains intact even if a WAN connection fails – only the total bandwidth available to the user decreases. The same applies for VoIP telephone connections.

4. Power Outage

Power outages on routers and hubs may be compensated by redundant hardware being connected to different electric circuits. If one circuit fails, the second router and the second hub can take over.

VERSATILE APPLICATIONS

Today, organizations that must be able to rely on a one hundred percent availability use Viprinet, e.g. law enforcement personnel, ambulances, and radio stations.

Previously, police stations had to rely on the availability of mobile phone networks right at the place of operation. Unfortunately, no provider is able to cover one hundred percent of a region. With Viprinet, it is possible to bond the mobile phone networks of different providers and to make use of the sum of all available lines and of all bandwidths.

In rural areas, ambulances use Viprinet and HD video conferencing systems to consult specialists at their hospitals already at the place of operation. Here, Viprinet offers high availability and bandwidth via mobile networks in vehicles too.

In the past, live broadcast radio interviews required redundant leased lines. With Viprinet, broadcasting stations now use the flexibility and redundancy concepts of Viprinet to offer a very flexible, cost-efficient, and, above all, mobile solution by bonding links of several 3G providers. Well-known international broadcasting stations use Viprinet for connecting their broadcast units and SNGs, for mobile transmissions from ships, busses, and cabs, and for reporters doing street interviews.

CONCLUSION

With Viprinet, you may expect highest availability for your connections: In addition to the already known redundancy concepts, the Viprinet principle enables the bonding of WAN connections using different kinds of access technology, latency-based routing, and redundancy by double transmission of packets via parallel connections as well as virtual connections extending across several devices (Node Stacking). This sets Viprinet apart from all other manufacturers as far as availability and bandwidth are concerned.

Don't hold off contacting us any longer if you wish to learn more about Viprinet and our redundancy concepts.