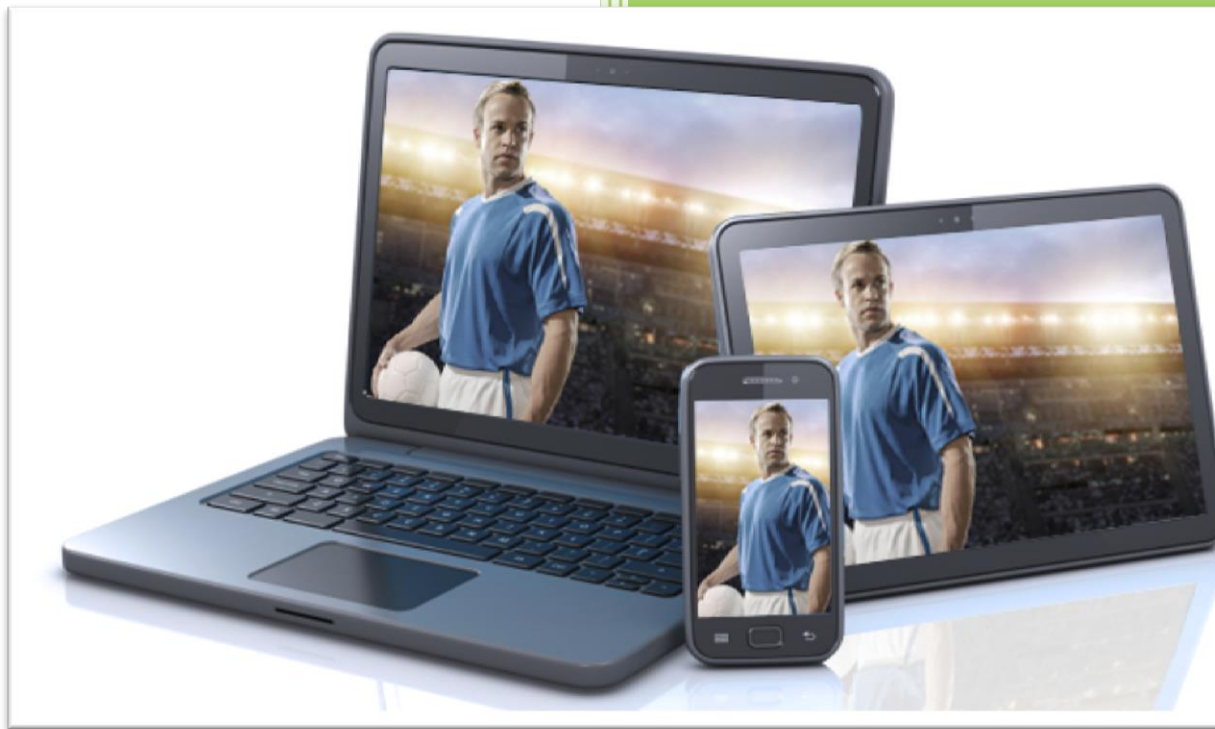




***Efficient and low cost Internet
backup to Primary Video lines***



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Chapter 1. Introduction

Transmitting video content over public Internet is growing. Broadcasters, network operators and content distributors are leveraging the benefits and cost savings offered by the public Internet. Accessibility to public IP networks is fast and easy. Adding new services or customers is easy. Long acknowledged as the lowest cost transport network for video streaming to the home, the public Internet has enabled services like YouTube, Flickr and others to offer direct video streaming to the home. However, streaming broadcast quality live video 24/7 over the Internet is an immense challenge. Riddled with inherent complexities such as packet loss, jitter fluctuation and general statistical behavior, the public Internet makes multicast quality live video streaming a serious challenge.

Premium services and customers will most likely require guarantying the highest level of quality 24/7; therefore, redundancy is necessary. This is often implemented by providing the same live video stream twice (primary and secondary) making each is going through a different paths. Current solutions use two private VPNs for this purpose. Each destination site received both VPNs, which allows for switching over to the secondary stream in the case of the primary fails.

The price tag for streaming live video over a private VPN is very high but for backup VPN is much higher as this VPN is 'not in use' 95% of the time. This paper will describe how using DVP products will lower the cost and will reduce the OPEX by providing a backup service over the public internet with same quality as premium SLA leased lines at a fraction of the cost.

Chapter 2. The DVP100 solution

The DVP100 will be the solution of choice to deliver HD quality live video over the public Internet. The DVP100 series utilizes VideoFlow's 3V technology to provide reliable and secured error and jitter-free multicast live video stream over the public Internet.

The DVP100 series is client server architecture to overcome the statistical nature of the Internet cloud (packet loss, congestion, delay variation). The DVP100 Protector is located at the source of the live video stream while the DVP100 Sentinel is located at the destination.

The DVP100 Protector establishes a secured VPN tunnel to the DVP100 Sentinel over the public Internet. There is no need for additional device and/or service for establishing the tunnel connection.

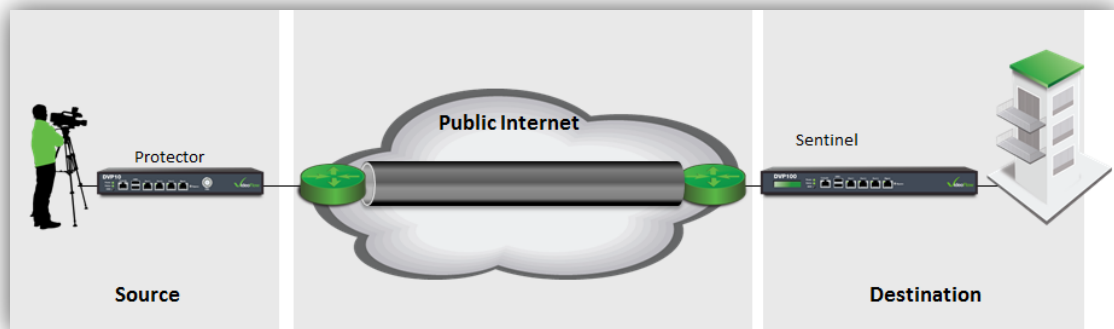


Figure 1: Creating VPN Tunnel over the Public Internet

With the DVP100 series, operators can offer replacing expensive backup VPNs with a much lower cost public internet VPN.

Using VideoFlow DVP100 for low-cost live video stream backup

The DVP100 series is the perfect choice for VPN backup replacement. All needed is to deploy the DVP100 Protector at the source, the DVP100 Sentinel at the destination, to connect both the Protector and Sentinel to a standard Internet connection, and to apply the security configuration. In case of a failure to the primary leased line, the stream will continue as normal through the public Internet with no difference in the video quality compared to the leased line.

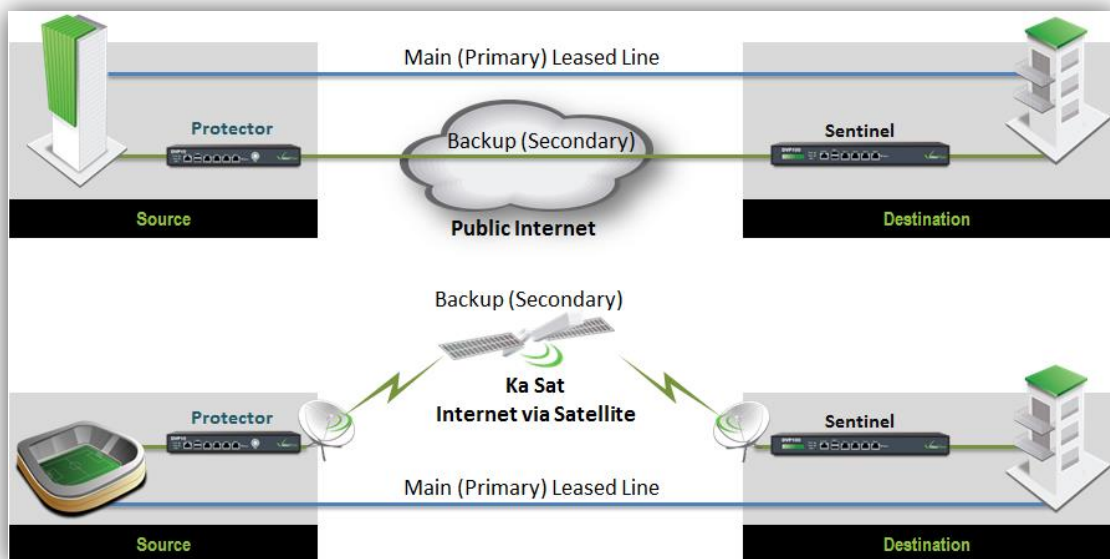


Figure 2: DVP as Backup for Leased Line

The DVP offers further enhancements making video transport more cost effective. The DVP will reduce the overhead bandwidth used in the primary leased line to a staggering low 5% hence saving bandwidth and SLA costs. Simply connect the Protector at the source and the Sentinel at the destination to the leased line.

In case of need for several backup links, the DVP offers a very cost effective solution by deploying multiple DVP links over the public Internet. The cost savings is substantial as there is no price tag attached for using multiple VPNs. The DVP being a point of convergence offer this service with no need for either external networking device or a service from the IP transit provider. Moreover, implementing multiple backup links with leased lines means multiplying the cost of bandwidth overhead and the cost of premium SLA by the number of the backup links. In this case, the cost

savings introduced by the DVP due to much lower bandwidth overhead and lower cost SLA is considerably lower compared to lease line implementation. Furthermore, the DVP offers maximum flexibility to provide backup when needed with no cost attached to changes or modifications leveraging the public Internet.

Chapter 3. VideoFlow 3V Technology

The VideoFlow innovative DVP product line provides an innovative state-of-the-art solution for streaming over the public Internet. The DVP technology is a Client Server architecture optimized for video streaming over the public Internet. VideoFlow's DVP products provide seamless solution comprised of the following technologies:

- VPN tunnel to stream multicast
- VideoFlow Error Correction (VFEC) for recovering 100% of packet loss
- VideoFlow Adaptive Buffering (VFAB) compensating for packet jitter

The DVP is capable of creating a VPN tunnel between the Server (Protector) and the Client (Sentinel). The VPN tunnel enables multicast streaming across the public Internet. Since the VPN is created by the DVP, there is no need for additional network equipment or special services offered by the Internet Service Provider (ISP). This reduces both capital expenses and operating expenses. In contrast to other existing VPN solutions, VideoFlow's DVP will protect the quality of the video stream by applying VFEC and VFAB technologies. VideoFlow's VPN can run numerous streams in parallel over the public Internet making it a perfect solution for multicast users. Network equipment will not block video streams passing through the VPN tunnel. The Protector is able to create several VPN tunnels to different Sentinels enabling point to multipoint connections.

VideoFlow's innovative packet recovery technology guarantees 100% protection against packet loss using a robust algorithms suite that is transparent to the original transmitter and receivers, offloading the original sender for better scalability. VideoFlow uses patent-pending, state-of-the-art VideoFlow error correction (VFEC), a unique on-demand packet recovery technique. VideoFlow's patented packet recovery has multiple layers of protection techniques, all designed with a single goal, which is to recover lost packets using minimum bandwidth.

VideoFlow DVP product line offers a built in configurable buffering capacity ranging from 10ms-2000ms for each stream. The Buffer size design handles bursty traffic on one hand and lack of traffic on the other. The DVP can use the buffered video to play out jitter-free video despite high jitter figures, which characterize the public Internet.

In addition, VideoFlow's DVP guarantees reliability by invoking auto-box redundancy. The auto box-redundancy scheme is comprised of two identical sets of Protector and Sentinel. One set is active while the other remains "hot" in standby mode. If the active set fails, the hot standby kicks in without missing a beat to offer the ultimate content protection.

Furthermore, the DVP uses a standard RTCP channel for bidirectional communication between the server and its clients. This solution protects both unicast and multicast video content against single and bursty packet loss.

VideoFlow's DVP is the only solution that both delivers and protects multicast video over the public Internet, which is a major advantage for distributors. VideoFlow's 3V technology enable operators to deploy assured service using less bandwidth to stream video, thereby, reducing the cost of network elements like routers for opening VPNs and eliminating the need to use expensive ISP provided premium services like their VPNs.

Chapter 4. The Economy of Quality Video

The key to selecting any solution is a sound business case. While savings vary from deployment to deployment, the potential return on investment can be summarized as follows:

- Reduce Network Costs by using the Internet

The Internet is being hailed as the next great thing in video streaming. While it does have drawbacks, such as random and unforeseen packet loss, the cost of using the Internet is much lower than other B2B solutions. VideoFlow's DVP enables multicast video streams over the public Internet with VPN, guaranteeing 100% protection against packet loss with VFEC and protection against excessive jitter with VFAB. All three technologies have been optimized to require the lowest possible bandwidth overhead while enabling the highest possible video quality.

- Reduce OPEX and CAPEX

VideoFlow's DVP product line enables all types of distributors to use the public Internet as a viable transport for broadcast quality video 24/7 at a fraction of the cost of today's solutions. VideoFlow's VPN, VFEC, and VFAB integrated 3V technologies eliminate the need to add redundant network equipment and does not require customers to lease premium services like VPN from their ISP.

Chapter 5. Conclusion

Broadcasters, network operators and content distributors can considerably lower backup lines costs by using VideoFlow's DVP solution over the public Internet. VideoFlow offers a simple, cost-effective solution that enables delivering quality, jitter-free video streaming over the public Internet. The VideoFlow DVP solution reduces expenses by reducing bandwidth overhead expenses and by eliminating the need for expensive VPN services and high-end network equipment for implementing backup links.