



Streams Do Come True

Reflecting Windows Media

White Paper

Streaming Video over wide area networks can use a lot of bandwidth. For generalized streaming to consumers in their homes via the public Internet, the bandwidth issue belongs to the provider. The provider is concerned about how many viewers they can reach, and they assume that each viewer has their own independent connection to the public Internet.

The bandwidth bottleneck point tends to be at their end, and they must have the capacity to deliver the stream to the number of people they wish serve.

To illustrate bandwidth needs, consider the need to deliver a video that is encoded to stream at 500 Kbps:

Number of Viewers	Total Bandwidth
1	500 Kbps
2	1 Mbps
10	5 Mbps
100	50 Mbps
1,000	500 Mbps

While the service provider may have ample bandwidth to transmit a video to 1,000 independent viewers, receiving it in an enterprise is another matter. A business with 1,000 employees would require 500 Mbps of Internet access just for the viewing of the video stream via the service provider.

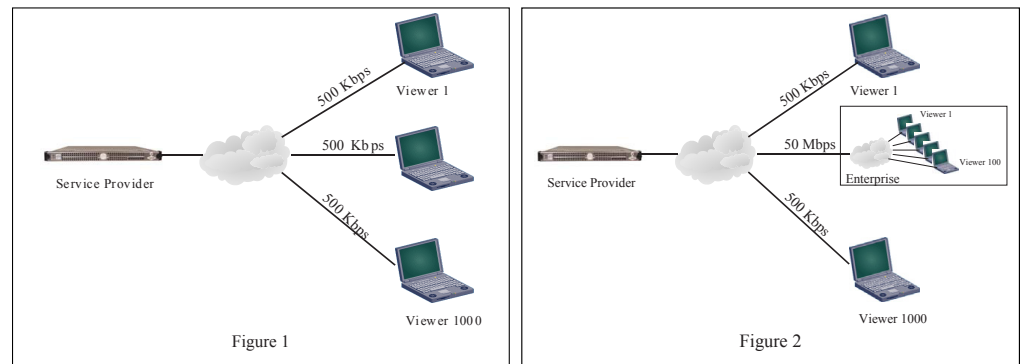
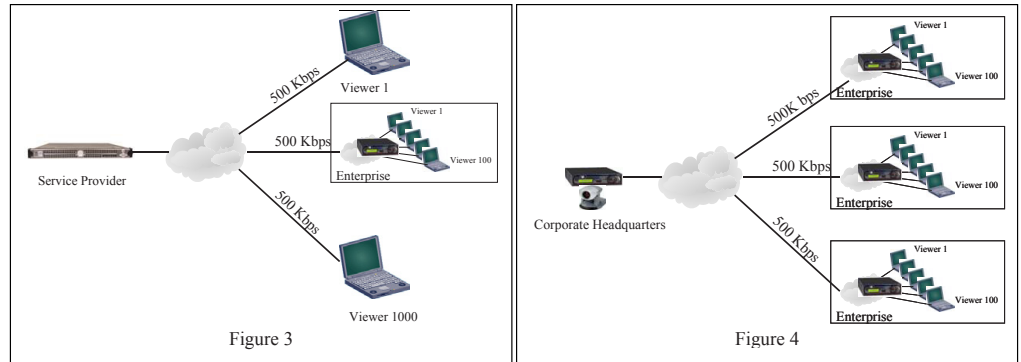


Figure 1 illustrates streaming video from a Service Provider to 1,000 viewers. Assuming each viewer has at least 500 Kbps of Internet access and the Service Provider can deliver 500 Mbps, all viewers have a good experience.

Figure 2 illustrates streaming video from a Service Provider to 1,100 viewers where 100 of the viewers are at their workplace computers. The enterprise would require 50 Mbps of Internet access to provide a good experience to all viewers.

Most enterprises have far less than 50 Mbps of Internet access. Common Internet access capacity ranges from several hundred kilobits to a few megabits (DSL, T1/E1, T3, provisioned fiber, etc.). With bandwidth-constrained Internet access, the enterprise viewing experience is commonly very good for the first viewer, and as additional viewers "tune in", network access is overloaded and everyone's viewing experience degrades to unusable levels. Worse, vital business applications that depend on the network connection may slow to a crawl.



By simply placing a Reflector at the Enterprise, only one stream is received from the Service Provider, and an unlimited number of viewers in the Enterprise can view the stream with no additional impact on the Enterprise’s Internet access connection (Figure 3).

In the above discussion, the “Service Provider” is assumed to be a live or stored video source in Windows Media format represented as a Windows Media streaming URL¹. This includes virtually all 3rd party streaming service provider’s “CDN’s” (PowerStream, Limelight, Akamai, etc.), but equally importantly it includes an organization’s internal Enterprise video streaming system.

How can an organization with multiple remote locations reach all employees with live or stored video but without a massive and wildly expensive Wide Area Network upgrade? Figure 4 illustrates how a single VBrick appliance at Headquarters can broadcast live video to all employees throughout an organization. The VBrick at headquarters encodes the live video, distributes it locally via both multicast and unicast, and also delivers it to remote locations via a corporate VPN and/or via the public Internet.

VBrick Reflector

The VBrick reflector can be located in virtually any network, behind a firewall or not. When you give the VBrick the streaming URL (whether live or stored), it will act very much like a “player”, in that it requests the stream from the source. With the video stream now being received by the Reflector, the VBrick is ready to deliver it to local viewers.

The Reflector has several very important capabilities:

- The Reflector can deliver the video via multicast, meaning there is no limit on the number of viewers within the local network. The Reflector automatically announces the video to desktop players with the Program Name so viewers can instantly tune in².
- The Reflector can deliver the video to up to 200 local viewers via conventional unicast. If a viewer cannot receive multicast for any reason, the VBrick can exercise automatic “rollover” to deliver unicast to a viewer, thus ensuring high availability. Multiple Reflectors can be cascaded for increased capacity.
- The Reflector can redistribute the video via HTTP Push or Pull to additional downstream locations, allowing network designs that can reduce the bandwidth burden from the headquarters’ video source.
- The Reflector has additional bandwidth savings capability: the VBrick can be configured to only pull the stream from the source if there are one or more local viewers. For a live

¹ For example, <http://server/videoname>

² Patent-Pending VBrick feature



video, viewers simply “tune in” to the stream whenever they elect. For a stored video, the first unicast viewer causes the video to start (the Reflector requests the stored video stream and begins to reflect it), and additional viewers may tune in to the video “already in progress”. For local multicast, the VBrick Reflector assumes there is always at least one viewer, so the Reflector requests the stream and makes it available continuously. For example, if the Reflector is set to reflect a stored video via multicast in a branch office, that video plays from beginning to end over and over again. This capability is ideal for enterprise-wide “TV Channels” and for Digital Signage.

- The Reflector can authenticate and receive a HTTP “Push” from a VBrick appliance or from a Windows Media software encoder.

Automatic Configuration

Commonly, the VBrick Reflector sits inside a local network and behind a firewall. As a result, management and configuration can be a challenge. While all VBricks support multiple configuration options (integral web page management, telnet, craft port, SNMP, and custom SDK), VBrick appliances support Automatic Configuration. Using Automatic Configuration, the VBrick periodically polls a web server for current configuration information (see White Paper “Automatic Configuration”). Using manual or automatic configuration file generation tools, every VBrick in a network can be automatically remotely configured. For example, all Reflectors might distribute live video “CEO Address” at noon, and distribute “Company Training” at 1:00 PM, etc. This happens with the ultimate in simplicity.

Video Archive

The Reflector may have an optional internal hard disk for recording and playback of local video. This makes it possible for each Reflector in a branch office to immediately have a copy of a video event, rather than only recording the video centrally and subsequently distributing the video files to branch offices later.

Emergency Situations and Priority Alert

With a Reflector at key locations (i.e. in Government at Fire Departments, Police Departments, etc., at all corporate locations, at all schools in a district or county) the VBrick Priority Alert / Emergency Broadcasting system can reach vast scale. The Priority Alert system is a program that sits in the Windows system tray and pops up live or stored video under control of a designated authority. The Reflector fully supports this capability by ensuring the priority video is available to everyone in the target network and without unusual bandwidth constraints.

Security

The VBrick appliances are rugged, very reliable, and provide multi-level password mechanisms. The URL that a Reflector pulls can only be set through authenticated access, and the Reflector “Push” has additional authentication.

Reflector Compatibility

The VBrick Reflector is compatible with the Windows Media ecosystem, including VBrick appliances, Windows Media Servers, Windows Media software encoders, Windows Media Players, Set Top Boxes, and Windows Media hosting service providers³. Of course, the Reflector can also be a component of the VBrick E-IPTV (EtherneTV) video system.

³There are limitations to compatibility. For example, .asx reference files support the http ref url only, and the “mms” protocol is supported only through rollover to http. Be sure to read the VBrick documentation.



Redirection

Using the Reflector, each location would normally use the Reflector's video URL for viewing rather than the original "source" URL. In a large corporate network, it may be desired that all employees have one web page to view the video stream but configure it so that the video URL is redirected to their local Reflected source. This can be easily accomplished via server-side redirect scripts. In essence, your server simply delivers web page "A" to viewers that come from network "A", web page "B" to viewer that come from network "B", etc. Example software to do this is freely available on www.videolive.com and elsewhere.

Delay

The VBrick Reflector introduces very little delay. As a result, the VBrick low delay Windows Media capability (available in the VBrick Soft Top Box software) can be used for video-only applications.

VBrick Reflector vs. Windows Media Server

A Windows Media Server can certainly be used as a Reflector ("Publishing Point"), and this is the preferred solution and for high capacity video on demand, and for multiple "Publishing Points". However, a VBrick Reflector is a superior solution for simplicity, for rugged reliability, and when automated remote configuration is needed. Deploying multiple Windows Media Servers at branch offices may be like using your oven to toast bread: it will do the job but it is obviously overkill for the needed task.

A VBrick Reflector can be overnight express delivered to a remote location, a clerk can plug it in, and that location will immediately have the Reflector "on the air". It will certainly challenge a clerk to setup any server.

There may also be power, noise, and physical issues. A server will require keyboard, mouse, monitor, and a "server room" environment; A VBrick Reflector is a small, self-contained appliance that can be tucked away virtually anywhere (e.g. under someone's desk, in a wiring closet).

And there is cost. A VBrick appliance costs less than a full Windows Media Server when you add up the minimum required hardware plus the cost of the software.

As video networks become more ubiquitous, the right answer will depend on what you want to do, and it would be common practice to deploy both. VBrick Windows Media Appliances for encoding, a Windows Media Server at headquarters (or via a 3rd party host), and VBrick Reflectors at branch offices is an excellent combination.

Example Use Cases

There are perhaps thousands of industry-specific use case examples where bandwidth-savings Reflectors make it possible to distribute video. Here are a few:

- A major retailer wishes to conduct monthly company-wide webcasts to all 100 locations where employees can view the webcast on their desktops. A VBrick appliance sends one video stream from the CEO's office to a 3rd party Windows server, using 300 Kbps of outbound Internet access bandwidth. A Reflector at each of the 100 locations "pulls" the video stream from the 3rd party service provider and distributes it to all desktops.
- A community has 10 schools in a district, and they wish to distribute live local television and special events to all schools so that educators can show the video in classrooms. At one location, the live TV is received off-the-air and presented to a VBrick appliance via an inexpensive "VCR/TV Tuner". The VBrick appliance delivers that video locally and also



distributes it to the other 9 schools. At each of the other 9 schools, a VBrick Reflector receives it and distributes it to all classrooms. For special events, another VBrick appliance is the source and all Reflectors receive the video from it.

- A corporation wishes to display live and stored video on large screen TV monitors throughout a multi-location enterprise network for digital signage. The video is shown at major hallway intersections, lobbies, common areas, etc. Reflectors are located at all locations and the video is sourced from one location and pushed to the reflectors. A schedule is established and the Reflectors automatically switch to different video sources as the schedule dictates (For example, live "news" channels during the day, selected training video at 1:00 PM, live "CEO Address" at noon, etc.)
- An organization wishes to conduct live video broadcasting from remote locations back to the home office and allow multiple viewers in the home office to tune in. A VBrick Reflector is located in the home office and located in the "DMZ" (i.e. it has both an "outside" public Internet address, and an "inside" private address via NAT). The remote location, from behind a firewall, sends live video to the Reflector. The Reflector makes the live video available to all viewers in the home office LAN, and it records the video for later on-demand viewing.
- A government department or agency needs to improve situational awareness and recognizes that nothing is better than having everyone involved being able to actually see what is going on in real time. A VBrick appliance provides the live video source from virtually anywhere on earth (via wired Internet, wireless Internet, cellular data service, VSAT, BGAN Immarsat, microwave, or other means). The VBrick transmits the live situation audio/video to a Reflector located at headquarters. The Reflector "pushes" the received video to up to 25 additional reflectors at other departments or agencies, or alternately the other Reflectors "pull" the video from the headquarters Reflector. At each Reflector location, there may be any number of viewers of the live video. Any of the Reflectors may also "push" the video to a local or 3rd party hosted server for scaleable delivery to the public Internet. Within seconds, a very large community of situational awareness video is established, and the live video is viewed on desktops, TV monitors, wireless laptops, and mobile cell phones. To the extent desired, any or all video may be encrypted to any security level via TACLANE or other bulk encryption devices.
- A major public Internet video event is available "online", such as the launch of a Space Shuttle, live video from an exotic location, the monitoring of animal behavior, etc. The nature of an organization causes that video to be interesting to many employees, and as they all "tune in", the IT department notices excessive load on the network leading to the possible failure of vital business services. The IT department configures a VBrick Reflector with the popular live video URL and sends an announcement to all employees that the live video is now available locally and configures their network to disallow direct employee access to the popular Internet video feed. Employees may now view the live video with higher quality and the IT department is satisfied with wide area network bandwidth usage.
- A video production company is charged with producing and broadcasting a live video about the merger of two large corporations. The client wants to ensure that all employees of both companies, at all locations, can view the event. A Reflector is shipped to all locations with the "Autoconfiguration" enabled. Each Reflector is received and plugged into that location's network by virtually anyone. At the time of the event, all Reflectors are instructed to "pull" the live video from a VBrick appliance at the source, and the live video is available at all locations.
- A streaming video service provider receives many complaints that the service is poor at



an enterprise location. It is discovered that the reason is because the enterprise does not have sufficient public Internet access bandwidth to support the desired number of viewers. The streaming service provider leases a VBrick Reflector to the enterprise as part of the monthly service, and manages the Reflector behavior via Autoconfiguration. At the client's request, the Service Provider can now cause any live or stored video to be available to the client within one minute.

Streams Do Come True

The VBrick Reflector is a breakthrough in streaming simplicity, solving difficult bandwidth issues with the reliable elegance of a dedicated set-and-forget appliance.



About VBrick Systems, Inc.

VBrick is the leader in Enterprise IP Video solutions, with over 6,000 corporate, education and government customers and 60,000 installations worldwide. VBrick solutions work over standard IP networks and the Internet to deliver rich media communications that connect people everywhere – from employees and customers, to partners and shareholders. Our comprehensive product suite and end-to-end solutions are used in a wide range of live and on-demand applications including meeting and event broadcasts, distance learning, digital signage, TV distribution, video surveillance, and Web-based marketing campaigns. Headquartered in Wallingford, CT, VBrick's products and services are available through industry-leading value-added resellers.

For more information, visit www.vbrick.com