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HP Velocity is a Quality of Service (QoS) system that improves overall Quality of Experience (QoE) for real-time network applications.

Streaming real-time applications over data networks will often suffer from packet loss and transmission latency; this results in stop-and-go behavior, loss of interactivity, and an overall reduction of an application’s throughput. Ultimately, application users are likely to find themselves dissatisfied with the experience.

HP Velocity easily integrates with existing systems to improve a streaming application’s QoE by addressing the underlying problems found in today’s networks: packet loss, transmission latency, and jitter.

Automatic discovery, session establishment, and session management are performed by HP Velocity-enabled endpoints.

HP Velocity continuously monitors end-to-end network conditions to select the most appropriate data delivery mechanism. Packet loss is automatically reduced and transmission latency is minimized, thereby improving an application’s QoE and throughput.

**NOTE:** HP Velocity only accelerates streams between HP thin clients and HP Velocity-enabled virtual desktops or terminal services servers.
## Benefits of HP Velocity

<table>
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<tr>
<th>Benefit</th>
<th>Description</th>
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<tr>
<td><strong>Adaptive network analysis</strong></td>
<td>HP Velocity continuously monitors end-to-end network conditions for individual data streams, providing adaptive optimizations and data stream acceleration.</td>
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<tr>
<td><strong>Packet loss protection</strong></td>
<td>HP Velocity protects against packet loss, which is key to improving an application's QoE. Even in small amounts, packet loss will reduce application throughput, degrade or halt streaming applications, and introduce lag for interactive applications.</td>
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<tr>
<td><strong>Congestion detection</strong></td>
<td>HP Velocity automatically detects network congestion and adjusts the amount of redundancy, thus maximizing QoE over data networks.</td>
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<tr>
<td><strong>WiFi acceleration</strong></td>
<td>HP Velocity automatically reduces latency and transmission times for wireless networks and minimizes protocol overhead, resulting in improved QoE for WiFi applications.</td>
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<tr>
<td><strong>Seamless integration</strong></td>
<td>HP Velocity is a transparent, “plug and play” solution, which provides QoE benefits to all applications and users.</td>
</tr>
<tr>
<td><strong>Lightweight</strong></td>
<td>HP Velocity is delivered as a lightweight implementation, which achieves QoE benefits while keeping system resource utilization to a minimum.</td>
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HP Velocity components

The HP Velocity solution consists of three key components (depicted in Figure 1) which form an integrated system dedicated to improving the overall QoE.

Figure 1. HP Velocity components

Link Profiler

The Link Profiler profiles the network link between HP Velocity-enabled endpoints. It identifies the type of network connectivity (wired or wireless) and measures key network metrics (packet loss, latency, bandwidth constraints). The Link Profiler continually updates the QoS Controller on current network conditions.

QoS Controller

The QoS Controller uses the current and trending network conditions provided by the Link Profiler to intelligently activate and tune the Optimizers.

Optimizers

HP Velocity supports three types of optimizers that contribute to QoE:

1. Network Optimizers address end-to-end issues such as packet loss. HP Velocity protects application streams from network loss by automatically adapting the amount of added redundancy.

2. Link Optimizers address access issues such as WiFi congestion. HP Velocity accelerates application streams by leveraging WiFi multimedia standards to minimize latency and prioritizing HP Velocity data streams.

3. Protocol Optimizers address protocol-specific issues with network impairments. HP Velocity optimizes bandwidth utilization by minimizing TCP overhead on half-duplex links (including WiFi).
Operational modes

HP Velocity offers three modes of operation — Active mode, Monitor mode, and Disabled mode.

**Active mode**

Active mode is the default and recommended mode of operation. In this mode HP Velocity provides session establishment, session statistics, packet loss protection, and transmission latency optimization.

**Monitor mode**

In Monitor mode HP Velocity is continuously profiling the end-to-end network conditions over established sessions. This mode is useful when acquiring baseline network characteristics.

**Disabled mode**

In Disabled mode HP Velocity passes all network data streams transparently and does not perform any monitoring and optimization.
Establishing an HP Velocity connection

The process of forming an HP Velocity-accelerated connection can be described as a set of four steps, as shown in Figure 2.

Figure 2. Establishing a connection

Initialization

HP Velocity-enabled endpoints start streaming data transparently. During the initialization phase, no optimizations are performed.

Beaconing

Once an HP Velocity-enabled endpoint detects that a bidirectional network path is available, it will periodically modify IP headers (non-destructively) to advertise itself to other HP Velocity-enabled endpoints. This process is called beaconing.

Reception of a beacon indicates that a remote HP Velocity-enabled endpoint exists. During the beaconing phase, no optimizations are performed.

Handshaking

An HP Velocity-enabled endpoint will initiate a three-way handshaking procedure with a discovered HP Velocity-enabled endpoint. Once the three-way handshake is complete, both HP Velocity-enabled endpoints enter into the accelerated state.

Accelerated state

The accelerated state allows HP Velocity-enabled endpoints to exchange current and trending network conditions. These are then used to intelligently activate and tune various optimizers.
Packet loss protection

Segmentation encoding

HP Velocity protects against network loss by applying mathematical transformations to IP packets. Given a single packet as an input, the HP Velocity transformation will output one or more segments. Each segment will logically represent a portion of the input packet and may carry additional information, such as redundancy data.

The number of logical segments that are used to represent the original packet will vary based on current network loss conditions. Figure 3 below shows a packet being transformed and sent over the network as three distinct segments.

Figure 3. HP Velocity transformation of a packet

Target loss rate

Streaming applications may tolerate a small amount of packet loss in a graceful manner. HP Velocity is configurable in terms of how aggressive it is when protecting against packet loss.

The HP Velocity Target Loss Rate (TLR) parameter allows network administrators to specify the point at which additional protection is no longer required, in terms of the corrected network loss.

The default and recommended value for the TLR is 0.04%, which is appropriate for VDI applications.

Encoding modes

The encoding mode determines the number of logical data segments that are generated based on the original packet. The encoding mode also determines if HP Velocity will create a redundant segment.

During a session's lifetime, HP Velocity automatically adapts a session's encoding mode according to the configured TLR and to the session's current network conditions.

The relationship between corrected loss and network loss, for a uniform packet distribution and for the given encoding modes, is shown in Figure 4.
Figure 4. Packet loss recovery rates by encoding level

Figure 5 below demonstrates the encoding mode selected by HP Velocity, given a configured TLR of 0.04% versus network loss.

Figure 5. Corrected loss for TLR of 0.04%
Summary

HP Velocity’s patented technology is exclusively available on HP thin clients. It provides a seamless, integrated QoE solution for both managed and unmanaged networks. This enables organizations to gain valuable insight into their thin client data streams, offload more expensive infrastructures (such as MPLS networks) to lower cost networks, and achieve maximum performance regardless of network conditions.

The major benefits HP Velocity provides for HP thin clients are:

- End-to-end visibility of thin client data streams
- In-depth monitoring and reporting
- Packet loss protection
- WiFi acceleration
- Support for all VDI protocols including RGS, PCoIP, RDP, and ICA

HP Velocity accelerates data streams between HP thin clients and HP Velocity-enabled servers including terminal services and virtual desktops hosted by VMware, Citrix, and Microsoft hypervisors. To obtain the HP Velocity server side components and associated documentation, visit [http://www.hp.com/support](http://www.hp.com/support). Select the country/region from the map and then select **Product Support & Troubleshooting**. Type the thin client model in the field (e.g. t610, t510, t410, etc.) and select **SEARCH**. The server side components can be downloaded.