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**HP Velocity functional overview**

Real-time applications delivered over data networks can be compromised by packet loss and transmission latency. This results in stop-and-go behavior, loss of interactivity, and an overall reduction in the throughput of an application.

HP Velocity is a Quality of Service (QoS) software engine that integrates seamlessly and, when protecting application flows, enhances Quality of Experience (QoE) by managing packet loss, congestion, and the impact of network latency.

**Establishing a connection**

An HP Velocity-protected connection is established over four steps:

- **Initialization**
- **Beaconing**
- **Handshaking**
- **Protected state**

![Figure 1: Establishing a connection](image)

**Initialization**

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

**Beaconing**

After an HP Velocity-enabled endpoint detects that a bidirectional network path is available, it periodically and seamlessly modifies IP and TCP packet headers (which can contain option-based beacons) to advertise itself to other HP Velocity-enabled endpoints ([Figure 2 on page 2](#)).

After an HP Velocity-enabled endpoint processes enough beacons on a network flow to discover that another HP Velocity-enabled endpoint is at the other end, handshaking occurs.

**Note**: The use of TCP option-based beacons for TCP flows is a configurable system setting. For information, see [System settings on page 15](#).
Handshaking

An HP Velocity-enabled endpoint initiates a four-way handshaking procedure with another HP Velocity-enabled endpoint discovered during beaconing. When the handshake is completed, both HP Velocity-enabled endpoints enter the protected state.

Protected state

In the protected state, HP Velocity-enabled endpoints exchange information about current and trending network conditions. This information is used to intelligently activate and adjust HP Velocity network optimizers.

Single-sided acceleration

In single-sided acceleration mode, the HP Velocity-enabled thin clients can also accelerate TCP flows toward the HP Velocity-enabled server and any non HP Velocity-enabled devices accessible over the LAN or WAN.
**HP Velocity deployments for thin clients**

HP Velocity deployments vary based on the virtualization architecture in use. Use the following table to determine where to install HP Velocity Server Side.

<table>
<thead>
<tr>
<th>Virtualization architecture</th>
<th>Direct deployment on page 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP thin clients are directly connected to virtual desktops or applications.</td>
<td>Direct deployment on page 3</td>
</tr>
<tr>
<td>HP thin clients use a connection broker as a proxy to access virtual desktops or applications.</td>
<td>Proxied deployment on page 4</td>
</tr>
<tr>
<td>The virtualization environment supports both direct and proxied connections to virtual desktops and applications.</td>
<td>Direct-and-proxied deployment on page 4</td>
</tr>
<tr>
<td>HP thin clients connect to a terminal server.</td>
<td>Terminal-server deployment on page 4</td>
</tr>
<tr>
<td>HP thin clients connect to devices on the LAN/WAN that are not HP Velocity-enabled.</td>
<td>Single-sided or mixed deployment on page 5</td>
</tr>
</tbody>
</table>

**Note:** HP Velocity Server Side is supported on Windows® operating systems only.

**Direct deployment**

Virtualization architectures that allow HP thin clients to connect directly to virtual desktops must have HP Velocity Server Side installed on the virtual desktops. In this type of deployment, a connection broker does not act as a proxy.

In **Figure 3 on page 3**, thin clients A and B are directly connected to their respective virtual desktops A and B.

**Figure 3: Example of a direct deployment**

![Diagram of direct deployment](image)
Proxied deployment

In virtualization architectures that require HP thin clients to access virtual desktops via a proxy service provided by a connection broker, HP Velocity Server Side must be installed on the server hosting the connection broker.

In Figure 4 on page 4, thin clients A and B are connected to their respective virtual desktops via the connection broker, with HP Velocity-protected flows between the thin clients and the connection broker.

Figure 4: Example of a proxied deployment

Note: Additional configuration is not required after HP Velocity Server Side is installed as described above.

Direct-and-proxied deployment

Some virtualization architectures allow both direct and proxied access to virtual desktops. In this type of deployment, HP Velocity Server Side must be installed on the following:

- Virtual desktops that are accessed directly
- The server hosting the connection broker that provides a proxy service to access virtual desktops

In Figure 5 on page 4, thin client A connects to virtual desktop A through the connection broker, and thin client B connects to virtual desktop B directly.

Figure 5: Example of a direct-and-proxied deployment

Terminal-server deployment

In a terminal-server deployment, multiple HP thin clients are connected to a terminal server, such as one based on Windows Server® that is utilizing the Remote Desktop Services or Terminal Services feature (depending the Windows Server version). In this type of deployment, HP Velocity Server Side must be installed on the terminal server (Figure 6 on page 4).

Figure 6: Example of a terminal-server deployment
**Single-sided or mixed deployment**

In a single-sided deployment, where HP thin clients connect to devices on the LAN/WAN that are not HP Velocity-enabled, the thin clients can still accelerate TCP flows toward those devices.

The single-sided TCP-flow acceleration also applies in a mixed deployment (shown in Figure 7 on page 5), where HP thin clients can connect to non-HP Velocity-enabled devices on the LAN/WAN in addition to connecting a server or virtual desktop that is HP Velocity-enabled (via any of the deployment scenarios described previously).

**Figure 7: Example of a mixed deployment**
HP Velocity installation

This section provides information about installing HP Velocity Server Side and covers the following information:

- HP Velocity Server Side system requirements
- Installing HP Velocity Server Side

**Note:** HP Velocity is preinstalled on HP thin clients. Updates might be available as an add-on. For more information, go to [http://www.hp.com/go/velocity](http://www.hp.com/go/velocity).

### HP Velocity Server Side system requirements

<table>
<thead>
<tr>
<th>Component</th>
<th>Server operating system</th>
<th>Virtual desktop operating system</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>Any</td>
<td>Any</td>
</tr>
<tr>
<td>Memory</td>
<td>40 MB</td>
<td>3 MB</td>
</tr>
<tr>
<td>Disk space</td>
<td>10 MB</td>
<td>10 MB</td>
</tr>
<tr>
<td>Operating system</td>
<td>Windows Server 2016</td>
<td>Windows 10</td>
</tr>
<tr>
<td></td>
<td>Windows Server 2012</td>
<td>Windows 8</td>
</tr>
<tr>
<td></td>
<td>Windows Server 2008</td>
<td>Windows 7</td>
</tr>
<tr>
<td>Operating-system variants</td>
<td>32-bit and 64-bit</td>
<td></td>
</tr>
<tr>
<td>Clients</td>
<td>HP thin clients</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Memory requirements are proportional to the number of simultaneously protected flows supported by HP Velocity.

**Note:** HP Velocity Server Side is not supported on Linux® operating systems.
Installing HP Velocity Server Side

HP Velocity Server Side can be installed as a network driver on the following platforms:

- Virtual desktop
- Host operating system of Remote Desktop Services or Terminal Services (depending on the Windows Server version)
- Microsoft® Hyper-V Server

**Note:** During installation, HP Velocity resets the system’s network interfaces, briefly interrupting network connections. If HP Velocity is installed over a remote connection, network connectivity might be disrupted.

HP Remote Graphics Software (RGS) versions 6.0 and newer include HP Velocity as a built-in feature that is integrated into the HP RGS user interface on both the server side (RGS Sender) and client side (RGS Receiver). If you want to utilize HP Velocity solely for HP RGS, you do not need to install any standalone HP Velocity software components. For more information about using HP Velocity in HP RGS, see the User Guide for your version of HP RGS. HP RGS versions prior to 6.0 are not compatible with and do not include HP Velocity.

If you want to utilize HP Velocity for any of the other supported protocols, you must install HP Velocity Server Side as described in the following procedure. If RGS Sender version 6.x is already installed on the system when you attempt the installation, a message will display stating that another version of HP Velocity is already installed. To circumvent this, uninstall RGS Sender, install HP Velocity Server Side, and then reinstall RGS Sender. This is not required for RGS Sender versions 7.0 and newer.

1. Log on to the system where HP Velocity Server Side will be installed.
   **Note:** Only users with Windows administrator privileges can install HP Velocity Server Side.
2. Download the required installation package for the operating system and architecture, and start the installer.
   **Important:** See the Release Notes to ensure that the correct installation package is available and selected for installation.
   The License Agreement appears.
3. Read the end-user license agreement, and click **I Agree**.
   **Note:** Selecting **Cancel** ends the installation.
4. Navigate to the location to install HP Velocity to, or accept the default location.
5. Click **Next** to begin the installation.
   The following message might appear during the installation:
   **Do you want to allow the following program from an unknown publisher to make changes to your system?**
   If this message appears, select the option to allow the changes to take place.
   The Completing HP Velocity Setup screen appears when the installation is successful.
6. Click **Finish**.
   The HP Velocity icon appears on the taskbar (see **HP Velocity operational modes on page 8**).
**HP Velocity operation on Windows**

This section covers the following information:

- HP Velocity operational modes
- Setting the HP Velocity operational mode on Windows
- Identifying the HP Velocity version on Windows

For information about setting the HP Velocity operational mode and identifying the HP Velocity version on HP ThinPro, see Appendix: HP Velocity configuration on HP ThinPro on page 38.

**HP Velocity operational modes**

The HP Velocity icon appears in the notification area in a color that corresponds to the current HP Velocity operational mode (Table 2 on page 8).

**Figure 8: HP Velocity icon on Windows**

![Figure 8: HP Velocity icon on Windows](image_url)

**Table 2: HP Velocity icon color codes**

<table>
<thead>
<tr>
<th>Icon color</th>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Protect</td>
<td>HP Velocity is enabled and is protecting one or more flows between HP Velocity-enabled endpoints. In this mode, HP Velocity continuously monitors end-to-end network conditions to activate and adjust enabled HP Velocity optimizers (such as LiveQ packet loss protection, LiveWiFi, and LiveTCP latency mitigation).</td>
</tr>
<tr>
<td>Blue</td>
<td>Protect</td>
<td>HP Velocity is enabled and ready to protect, but flows have not been established.</td>
</tr>
</tbody>
</table>
| Orange     | Monitor | HP Velocity is profiling present and trending network conditions but will not apply enabled HP Velocity optimizers.  
**Note:** HP Velocity server-to-server flows are monitored only. |
| Gray       | Off    | HP Velocity is disabled.                                                      |

**Note:** On Windows platforms, positioning the cursor over the HP Velocity icon when HP Velocity is in Protect mode displays a tooltip indicating the number of active connections.
Setting the HP Velocity operational mode on Windows

Once set, the HP Velocity operational mode should be changed only at the following times:

- During troubleshooting (to set the operational mode to Off)
- After troubleshooting (to set the operational mode to Protect)
- To configure single-sided acceleration from thin clients
- When instructed by HP

**Note:** Only users with administrator privileges can set the HP Velocity operational mode.

1. Click the HP Velocity icon (see Figure 8 on page 8) on the taskbar.
2. On the **HP Velocity Mode** selector, select the radio button for the required operational mode.

   ![Mode selector on HP Velocity Server](image)

   ![Mode selector on HP Velocity Thin Client](image)

3. Click **Close**.

   The color of the HP Velocity icon changes to reflect the selected operational mode (see Table 2 on page 8).

Identifying the HP Velocity version on Windows

- Right-click the HP Velocity icon, and then click **About**.

  The About HP Velocity dialog box shows the HP Velocity version number, release number, product edition information (Server or Client), and license restriction mode [Restricted (R) or Unrestricted (U)].
HP Velocity configuration

HP Velocity is installed with a default configuration suitable for most deployments. This section provides information about using the HP Velocity policy engine to create a custom configuration on a supported Windows platform and covers the following information:

- HP Velocity policy engine
- HP Velocity configuration settings
- HP Velocity account privileges

For information about configuring HP Velocity on HP ThinPro, see Appendix: HP Velocity configuration on HP ThinPro on page 38.

Note: For information about accessing a report that describes the current configuration, see Generating the HP Velocity configuration report on page 30. For information about specifying configuration settings that apply only until a system restart, see HP Velocity management on page 24.

HP Velocity policy engine

The HP Velocity policy engine uses the Group Policy feature in Windows, which provides centralized management and configuration of users and computers in an Active Directory (AD) environment.

Group Policy settings are contained in a Group Policy object (GPO), which can be used to centrally manage and propagate new settings for HP Velocity over an entire AD domain. The GPO manages settings for both HP Velocity Server Side and HP Velocity Thin Client.

To create a GPO, use the Group Policy Management Console (GPMC), which is available for download at the Microsoft Download Center. After the GPO is created, add an HP Velocity administrative template to configure it (see Adding an HP Velocity administrative template to a GPO on page 10).

Each HP Velocity administrative template consists of policies that allow administrators to create a custom configuration for HP Velocity (see Configuring HP Velocity using the GPO on page 10). They also specify which registry keys are set when a custom configuration is created.

Adding an HP Velocity administrative template to a GPO

Note: The HP Velocity administrative template is included with the HP Velocity (Server Side or Thin Client) installation package available at http://www.hp.com/go/velocity.

1. Open the applicable Group Policy editor:
   - For local Group Policy administration, use gpedit.msc.
   - For domain Group Policy administration, use gpmc.msc and select the applicable GPO.
2. Click Computer Configuration.
3. Right-click Administrative Templates, and then click Add/Remove Templates.
4. Click Add.
5. Browse to and select a template file:
   - hp_velocity_configuration_SERVER_REL#.R#.adm
   - hp_velocity_configuration_TC_REL#.R#.adm
     where REL# is the software release number and R# is the revision number that matches the release number of the HP Velocity Server Side or HP Velocity Thin Client installation package.
     The HP Velocity administrative template is applied to the GPO.
6. Click Close.

Configuring HP Velocity using the GPO

Changes made to the default configuration using the GPO are applied immediately to HP Velocity endpoints on which the HP Velocity Management application is running. If the HP Velocity Management application is not running, changes are applied to those endpoints after a system reboot. For information about the HP Velocity Management application, see HP Velocity management on page 24.
Note: HP recommends that HP Velocity settings be changed on all systems in an organizational unit (OU). This ensures that all installations in the OU use the same settings.

Note: You must have administrator privileges to configure HP Velocity. For information, see HP Velocity account privileges on page 23.

1. Open the GPO in the applicable Group Policy editor (local or domain).
2. Click Computer Configuration > Administrative Templates.
3. Click Classic Administrative Templates (ADM), and click HP Velocity Server or HP Velocity Client.
4. In the Setting list, double-click a configuration setting.

5. Specify the parameters as required (see HP Velocity configuration settings on page 11), and click Apply.
6. Click Next Setting or Previous Setting to access the parameters for another configuration setting, or click Close to close the template.

HP Velocity configuration settings

The HP Velocity Server Side and HP Velocity Thin Client administrative templates provide access to configuration parameters for the following settings, which can be modified to create a custom configuration:

• Product ID
• Management Application Mode
• System settings
• Boot settings
• Policy filters (port & IP) settings
• LiveQ - Packet Loss Protection settings
• LiveTCP - Latency Mitigation settings
• Logging settings

Note: Administrators can use the HP Velocity Management application to temporarily modify configuration settings. For information, see HP Velocity management on page 24.
**Product ID**

The Product ID policy provides parameters (Product ID and Vendor ID) that uniquely identify an HP Velocity product (Server Side or Thin Client), ensuring that the correct administrative template file is used with the corresponding product.

**Important:** Product ID is a mandatory policy that must be enabled to allow the use of an administrative template file.

**Note:** Do not modify the values of the Vendor ID and Product ID settings.

**Table 3: Product ID**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Options</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product ID</td>
<td>• Enabled</td>
<td>• Server Side: Enabled</td>
</tr>
<tr>
<td></td>
<td>• Disabled</td>
<td>• Thin Client: Enabled</td>
</tr>
<tr>
<td></td>
<td>• Not Configured</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 9: HP Velocity Server Side administrative template—Product ID (MANDATORY)**
Management Application Mode

The HP Velocity Management application provides a toolset for monitoring and debugging HP Velocity-protected flows, as well as the ability to temporarily override configuration settings.

Table 4: Management Application Mode settings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Options</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Management Application Mode</td>
<td>• Enabled</td>
<td>• Server Side: Enabled</td>
</tr>
<tr>
<td></td>
<td>• Disabled</td>
<td>• Thin Client: Disabled</td>
</tr>
</tbody>
</table>
Figure 11: HP Velocity Server Side administrative template—Management Application Mode

Figure 12: HP Velocity Thin Client administrative template—Management Application Mode
**System settings**

System settings (Table 5 on page 15) specify the following parameters:

- **Operational Mode**—Set the HP Velocity operational mode.
- **Single-sided Acceleration**—(HP Velocity Thin Client only) Provide client side TCP flow acceleration to a non HP Velocity endpoint.
- **LiveQ Mode**—Provide packet loss protection to application flows. For more information, see LiveQ - Packet Loss Protection settings on page 19.
- **LiveTCP Mode**—Provide latency mitigation to application flows. For more information, see LiveTCP - Latency Mitigation settings on page 20.
- **LiveWiFi - Prioritization**—Accelerate application flows by leveraging Wi-Fi multimedia standards to minimize latency and prioritize HP Velocity traffic. This ensures that HP Velocity-protected flows experience lower latency and jitter, and higher throughput.
- **TCP Option Beacon (TCP Flows)**—Use the TCP option beacon (0x0100000000000000) for TCP flows.
- **TCP Telemetry Mode (TCP Flows)**—Collect remote metrics for TCP flows.

**Table 5: System settings**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Options</th>
<th>Default</th>
</tr>
</thead>
</table>
| Operational Mode | • Enabled: Provide session establishment, session statistics, packet loss protection, Wi-Fi optimization, and latency mitigation.  
• Monitor: Continuously profile end-to-end network conditions over established flows. (HP Velocity network optimizers are not applied.)  
• Disabled: Pass all application flows transparently and do not perform any monitoring or optimization. | Enabled |
| Single Sided Acceleration (HP Velocity Thin Client only) | • Enabled  
• Disabled | Disabled |
| LiveQ Mode | • Enabled  
• Disabled | Enabled |
| LiveTCP Mode | • Enabled  
• Disabled | Enabled |
| LiveWiFi - Prioritization | • Enabled  
• Disabled | • Server Side: Disabled  
• Thin Client: Enabled |
| TCP Option Beacon (TCP Flows) | • Enabled  
• Disabled | Enabled |
| TCP Telemetry Mode (TCP Flows) | • Enabled  
• Disabled | • Server Side: Enabled  
• Thin Client: Disabled |

**Note:** When the TCP Option Beacon setting is enabled, HP Velocity adds up to 4 bytes of data to TCP headers. This is in compliance with RFC 791 and RFC 793. Some applications might not be compliant with RFC 791 or RFC 793, and as a result might not be able to process TCP option beacons. If this occurs, disabling the TCP Option Beacon setting should resolve the issue.
Boot settings

Boot settings (Table 6 on page 17) specify the following parameters:

- **Number of Protected Flows**—The number of simultaneously protected flows allowed.

**Note:** When the default setting is changed, the system must be rebooted for the change to take effect.
- **Local System Information Collection**—Allow the local endpoint to send its system information and per-flow statistics to the remote endpoint.

- **Remote System Information Collection**—Allow the local endpoint to process and display remote-endpoint system information and per-flow statistics received.

For more information, see Flow information on page 26.

### Table 6: Boot settings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Options</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Protected Flows</td>
<td>64 to 4096</td>
<td>1024</td>
</tr>
<tr>
<td>Local System Information Collection</td>
<td>• Enabled</td>
<td>Enabled</td>
</tr>
<tr>
<td></td>
<td>• Disabled</td>
<td></td>
</tr>
<tr>
<td>Remote System Information Collection</td>
<td>• Enabled</td>
<td>Enabled</td>
</tr>
<tr>
<td></td>
<td>• Disabled</td>
<td></td>
</tr>
</tbody>
</table>

### Figure 15: HP Velocity administrative template—Boot Settings

**Policy filters (port & IP) settings**

Global policy filters (Table 7 on page 18) allow administrators to filter and optimize application flows on the basis of port number, destination IP address, or both. When multiple policy filters are configured, they are evaluated in a predefined order.

The Policy Filters (Port & IP) settings specify the following parameters:

- **Blacklist IP**—The destination IP addresses of application flows that HP Velocity will not protect, but will instead pass on transparently.

- **Whitelist IP**—The destination IP addresses of application flows that HP Velocity will protect.

- **Blacklist Ports TCP/UDP**—The TCP/UDP port numbers whose application flows HP Velocity will not protect, but will instead pass on transparently.
• **Whitelist Ports TCP/UDP**—The TCP/UDP ports whose application flows HP Velocity will protect when the following criteria are met:
  - The destination IP address for the application flow is not specified in the Blacklist IP filter.
  - The destination IP address for the application flow is specified in the Whitelist IP filter.

**Important:** When the IP Whitelist filter is configured, HP Velocity will protect an application flow only if its destination IP address matches an address included in this filter.

**Note:** If the IP Whitelist filter includes subnet destination IP addresses, the IP Blacklist filter can be used to filter IP addresses in that subnet whose application flows HP Velocity will not protect.

**Table 7: Policy filters (port & IP) settings**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default</th>
<th>Evaluation order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blacklist IP</td>
<td>255.255.255.255/32</td>
<td>1</td>
</tr>
<tr>
<td>Whitelist IP</td>
<td>All IP addresses</td>
<td>2</td>
</tr>
<tr>
<td>Blacklist TCP/UDP Ports</td>
<td>TCP: 21 53 67-68 123 137-139 161 500 1194 2869 3702 4500 5355 5357 9100 17500</td>
<td></td>
</tr>
<tr>
<td></td>
<td>UDP: 21 53 67-68 123 137-139 161 500 546-547 631 1194 1900 2869 3702 4500 5353 5355 5357 9100 17500 42966</td>
<td></td>
</tr>
<tr>
<td>Whitelist TCP/UDP Ports</td>
<td>All ports</td>
<td>3</td>
</tr>
</tbody>
</table>

**Note:** Use the CIDR format for IP addresses. To enter multiple IP addresses or port numbers in a field, use a space-separated list; for example, 192.168.1.0/24 145.76.53.3/32 or 80 1750 1751.
LiveQ - Packet Loss Protection settings

LiveQ outputs the original number of input packets as well as extra packets containing redundancy information. The number of packets that are used to encode the redundant packets and the number of redundant packets generated varies based on current network-loss conditions and the configured Target Loss Rate. LiveQ - Packet Loss Protection is available for the UDP flows.

Target Loss Rate policy filters can be used to specify the IP addresses and ports of application flows to which a specific level of packet loss protection is applied.

LiveQ configuration settings (Table 8 on page 19 and Table 17 on page 20) specify the following parameters:

- **Target Loss Rate**—The Target Loss Rate (TLR) that HP Velocity will attempt to achieve for HP Velocity-protected flows.

  **Note:** TLR refers to the amount of packet loss that a thin-client application can tolerate while still delivering an acceptable QoE. The recommended TLR for thin-client applications is 0.04%.

- **Congestion Avoidance**—Analyze network links to identify those with bandwidth constraints, and then automatically adjust packet-loss protection to accommodate the constraints.

- **Bandwidth Control**—The encoding level applied to HP Velocity-protected flows. HP Velocity constantly monitors network loss and automatically applies the protection mode required to reduce network loss to the default TLR. The protection mode used at any given time depends on the real-time loss measured in the network.

- **LiveQ - Protection Filters**—The UDP ports to which LiveQ - Packet Loss Protection is applied. Use a space-separated list of ports or ranges; for example, 80 1750 1751 2003-2050.

### Table 8: LiveQ - Packet Loss Protection settings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Options</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Loss Rate (TLR)</td>
<td>• 0.04%</td>
<td>0.04%</td>
</tr>
<tr>
<td></td>
<td>• 0.1%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 0.2%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 0.4%</td>
<td></td>
</tr>
</tbody>
</table>

  **Note:** An aggressive TLR might not be achievable in high-loss networks. After modifying the TLR, refer to the Network Monitor graph (see Flow information on page 26) to verify whether the rate specified is being achieved.

| Congestion Avoidance   | • Disabled                        | Enabled       |
|                       | • Enabled                         |               |

  **Note:** When Congestion Avoidance is enabled and bandwidth constraints are detected, the Bandwidth Control and TLR settings are overridden to ensure the best network performance possible.

| Bandwidth Control      | • Low: Cap the estimated HP Velocity protection overhead at or below 27%. (Recommended for environments where bandwidth is very constrained.) | Default       |
|                       | • Medium: Cap the estimated HP Velocity protection overhead at or below 40%. (Recommended for environments where bandwidth is moderately constrained.) |               |
|                       | • Default: Maximize performance while minimizing the required bandwidth. (Recommended for environments where bandwidth is not constrained.) |               |

  **Note:** Higher encoding levels protect against greater network loss, but require more bandwidth.

| Live Q - Protection Filters | 1 to 65535 | 1 to 65535 |
LiveTCP - Latency Mitigation settings

As HP Velocity observes the network and detects packet loss, the LiveTCP congestion control algorithm dynamically adapts to changing network conditions, boosting QoE of TCP flows in high-latency networks.

LiveTCP configuration settings (Table 9 on page 20) specify the following parameters:

- **Latency Threshold (ms)**—Activate LiveTCP latency mitigation once the specified delay threshold (in milliseconds) is exceeded.

- **Congestion Control**—The level of congestion control required. LiveTCP adapts its algorithm to automatically provide congestion control that is optimized independently for each TCP flow (LAN, remote network, Wi-Fi) and the conditions in the network.

- **Acceleration Filters**—The port numbers that receive TCP flow acceleration is applied. Use a space-separated list of ports or ranges; for example, 80 1750 1751 2003-2050.

- **Persistent Filters**—The port numbers that receive TCP flow acceleration and maintain the connection information for reconnections. Use a space-separated list of ports or ranges; for example, 80 1750 1751 2003-2050.

**Table 9: LiveTCP - Latency Mitigation settings**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Options</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latency Threshold (ms)</td>
<td>0 to 2000</td>
<td>5</td>
</tr>
<tr>
<td>Congestion Control</td>
<td>- Standard: Handle the effects of a high-latency network&lt;br&gt;- TCP-Friendly: Use the standard TCP-like congestion control algorithm</td>
<td>Standard</td>
</tr>
<tr>
<td>Acceleration Filters</td>
<td>1 to 65535</td>
<td>1 to 65535</td>
</tr>
<tr>
<td>Persistent Filters</td>
<td>1 to 65535</td>
<td>3389 445</td>
</tr>
</tbody>
</table>
Logging settings

HP Velocity logs provide detailed network statistics per endpoint and per flow, facilitating diagnostics.

Logging settings (Table 10 on page 21) specify the following parameters:

- **Flow Logging**—Collect per-flow network statistics at the specified interval.
- **Flow Records**—Create a flow record when a flow is terminated. Each record provides detailed flow information, including system information.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Options</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Logging</td>
<td>• Disabled</td>
<td>Disabled</td>
</tr>
<tr>
<td></td>
<td>• Every 5 Seconds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Every Minute</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Every Five Minutes</td>
<td></td>
</tr>
<tr>
<td>Flow Records</td>
<td>• Disabled</td>
<td>Disabled</td>
</tr>
<tr>
<td></td>
<td>• Enabled</td>
<td></td>
</tr>
</tbody>
</table>
Figure 19: HP Velocity administrative template—Logging

Flow Logging: Disabled

Flow Logging

Flow Records

Used for diagnostics, HP Velocity logs provide detailed statistics on an endpoint, per flow and per flow record basis.

Flow Logging

Specify the flow logging time interval. Per flow network statistics include network loss rates, corrected loss rates, throughputs, latency, as well as other statistics listed in the log. Options are:

- Disabled
- Every 5 seconds
- Every minute
- Every 5 minutes

Flow Records

Captured when a flow is terminated, the flow record documents the details of the flow including system information.
**HP Velocity account privileges**

Table 11 on page 23 and Table 12 on page 23 describe the HP Velocity account privileges.

### Table 11: Administrator (Windows) and root user (HP ThinPro) account privileges

<table>
<thead>
<tr>
<th>Information</th>
<th>Read</th>
<th>Write</th>
<th>Export</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow information</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network monitoring graphs</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network statistics</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Configuration values</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

### Table 12: Non-administrator (Windows) and non-root user (HP ThinPro) account privileges

<table>
<thead>
<tr>
<th>Information</th>
<th>Read</th>
<th>Write</th>
<th>Export</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow information</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network monitoring graphs</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network statistics</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Configuration values</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**HP Velocity management**

The HP Velocity Management application is a Windows-based application that provides HP Velocity administrators with a toolset for monitoring and troubleshooting HP Velocity-protected flows, and for working with configuration parameters.

The HP Velocity Management application automatically starts on system startup and runs in the background. To access the application, right-click the HP Velocity notification icon, and click **Management**. To stop the HP Velocity Management application, right-click the HP Velocity notification icon, and click **Exit**. To restart it, expand the HP Velocity folder on the Windows Start menu, and click **HP Velocity Management Application**.

**Note:** Stopping the HP Velocity Management application does not affect the HP Velocity operational mode.

This section covers the following information:

- Network statistics
- Flow information
- Configuration settings

### Network statistics

HP Velocity collects real-time data on HP Velocity-protected flows and provides statistics on how the network is performing.

To access statistics (Table 13 on page 24), click the **Network Statistics** tab in the HP Velocity Management application to display the Statistics view.

**Figure 20: Statistics view**

**Note:** Statistics are accumulated in time-incremented bins (Total, 5 Seconds, 1 Minute, and 5 Minutes columns). The Total column represents the accumulated statistics since either the system was started or statistics were last cleared.

**Table 13: Statistics**

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmit Network Loss</td>
<td>The actual transmitted network loss measured by HP Velocity.</td>
</tr>
<tr>
<td>Receive Network Loss</td>
<td>The actual received packet loss rate measured by HP Velocity.</td>
</tr>
<tr>
<td>Receive Corrected Loss</td>
<td>The received packet loss rate after correction by HP Velocity.</td>
</tr>
<tr>
<td>Packets From Host</td>
<td>Number of IP packets received by HP Velocity from the application on the local host.</td>
</tr>
<tr>
<td>Packets To Network</td>
<td>Number of IP packets sent by HP Velocity on the network toward the remote host.</td>
</tr>
<tr>
<td>Statistic</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Packets From Network</td>
<td>Number of IP packets received by HP Velocity from the remote host.</td>
</tr>
<tr>
<td>Packets To Host</td>
<td>Number of IP packets sent by HP Velocity to the application on the local host.</td>
</tr>
<tr>
<td>Bitrate From Host</td>
<td>Bytes of IP data received by HP Velocity from the application on the local host; in Kb/s for intervals or KB/MB for cumulative total.</td>
</tr>
<tr>
<td>Bitrate To Network</td>
<td>Bytes of IP data sent by HP Velocity on the network toward the remote host; in Kb/s for intervals or KB/MB for cumulative total.</td>
</tr>
<tr>
<td>Bitrate From Network</td>
<td>Bytes of IP data received by HP Velocity from the remote host; in Kb/s for intervals or KB/MB for cumulative total.</td>
</tr>
<tr>
<td>Bitrate To Host</td>
<td>Bytes of IP data sent by HP Velocity to the application on the local host; in Kb/s for intervals or KB/MB for cumulative total</td>
</tr>
<tr>
<td>Number of Protected Flows</td>
<td>Number of currently active, unique, and protected application flows detected by HP Velocity at an endpoint.</td>
</tr>
</tbody>
</table>

**Network Statistics operation**

**Table 14: Network Statistics operation**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear Statistics</td>
<td>Reset statistic counts and collection time to zero.</td>
</tr>
</tbody>
</table>

**Note:** When this operation is performed, the throughput data on the Network Monitor graph drops momentarily.
Flow information

HP Velocity facilitates end-to-end monitoring of network flows and the associated systems by collecting and reporting information on protected endpoints and individual protected flows. HP Velocity also provides endpoint and per-flow data on latency (see Latency and throughput data on page 27), as well as information about local and remote systems.

To view flow information, click the Flow Information tab in the HP Velocity Management application. The Flow Information tab shows data for protected endpoint parameters (Table 15 on page 26) and protected flow parameters (Table 16 on page 26). For information about working with flow information, see Flow Information operations on page 28.

Figure 21: Flow Information tab

Table 15: Protected Endpoints information

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote Host</td>
<td>The IP address of the remote host.</td>
</tr>
<tr>
<td>Product</td>
<td>The product name as defined in the System BIOS.</td>
</tr>
<tr>
<td>CPU Usage</td>
<td>The percentage of CPU in use.</td>
</tr>
<tr>
<td>Memory Usage</td>
<td>The percentage of memory in use.</td>
</tr>
<tr>
<td>Link</td>
<td>The type of network link in use.</td>
</tr>
</tbody>
</table>

Table 16: Protected Flows information

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote IP</td>
<td>The remote IP address for the protected flow.</td>
</tr>
<tr>
<td>Remote Port</td>
<td>The remote TCP or UDP port number for the protected flow. If the port number is a well-known protocol, the protocol name also appears.</td>
</tr>
<tr>
<td>Local IP</td>
<td>The local IP address for the protected flow.</td>
</tr>
<tr>
<td>Local Port</td>
<td>The local TCP or UDP port number for the protected flow. If the port number is a well-known protocol, the protocol name also appears.</td>
</tr>
<tr>
<td>Protocol</td>
<td>The protocol (such as TCP or UDP) used by the protected flow.</td>
</tr>
</tbody>
</table>
To view information (OS Description, Vendor Name, Product Name, etc.) about local and remote systems (Figure 22 on page 27), click either the Local or Remote button on the Flow Information tab.

**Figure 22: Local System Information dialog**

![Local System Information dialog](image)

**Latency and throughput data**

The Flow Information tab also provides graphs that represent Local Rx throughput, Remote Rx throughput, and plotting latency for an application flow.

To view a graph, double-click a protected flow in the Flow Information tab.
Flow Information operations

Table 17: Flow Information operations

<table>
<thead>
<tr>
<th>Operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logging Interval</td>
<td>Set the interval at which flow information is saved to the log file:</td>
</tr>
<tr>
<td></td>
<td>• Disabled (no logging)</td>
</tr>
<tr>
<td></td>
<td>• Every 5 Seconds</td>
</tr>
<tr>
<td></td>
<td>• Every Minute</td>
</tr>
<tr>
<td></td>
<td>• Every 5 Minutes</td>
</tr>
<tr>
<td>Save Log Snapshot</td>
<td>Save the current 5-second, 1-minute, and 5-minute interval flow information to a file.</td>
</tr>
<tr>
<td>Flow Records</td>
<td>Enable or disable flow-records collection.</td>
</tr>
<tr>
<td>Save Flow Record</td>
<td>Export the flow-records log to a CSV file.</td>
</tr>
</tbody>
</table>
Configuration settings

HP Velocity Management application provides access to current configuration settings (see HP Velocity configuration settings on page 11), which users can export to a configuration report. Administrators can also use HP Velocity Management application to temporarily modify configuration settings.

To access a configuration dialog, click the Configuration tab in the HP Velocity Management application, and then click a setting in the navigation tree.

**Note:** Management Application Mode settings and Logging settings are accessible only via the HP Velocity administrative template. Boot settings can be viewed with the HP Velocity Management application, but cannot be modified.

![Figure 24: HP Velocity Server Side - System Settings dialog](image)

**Note:** A system reboot automatically restores all configuration settings modified using the HP Velocity Management application to either the system default values or, if applicable, custom configuration values (see HP Velocity configuration on page 10).

This section covers the following information:

- Restoring default configuration settings
- Generating the HP Velocity configuration report
**Restoring default configuration settings**

To restore default configuration settings, click the **Configuration** tab in the HP Velocity Management application, and then click **General** in the navigation tree. In the General view, click **Reset Configuration To Factory Defaults**, and then click **Yes** to confirm the reset.

**Figure 25: Restore default configuration**

![Configuration tab in HP Velocity Management application](image)

**Note:** When group policies are in effect, the system configuration reset is overridden at the next system restart.

**Generating the HP Velocity configuration report**

To generate a configuration report, click the **Configuration** tab in the HP Velocity Management application, and then click **General** in the navigation tree. In the General view, click **Export Current Configuration To File**.

A detailed configuration report (Table 18 on page 31) is automatically generated and opened in a text editor (such as Windows Notepad) so that it can be saved locally.

**Figure 26: HP Velocity configuration report**

![Configuration report in Notepad](image)
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driver Configuration</td>
<td>Current configuration and internal driver settings of HP Velocity.</td>
</tr>
<tr>
<td>Local System Metrics</td>
<td>Statistics on host system performance.</td>
</tr>
<tr>
<td>OS Information</td>
<td>Operating system type, configuration, and performance information for the system on which HP Velocity is installed.</td>
</tr>
<tr>
<td>Registry Keys</td>
<td>Registry key values configured by the HP Velocity policy engine.</td>
</tr>
<tr>
<td>Statistics</td>
<td>Snapshot of current network statistics.</td>
</tr>
<tr>
<td>Protected Flows</td>
<td>List of currently protected flows.</td>
</tr>
<tr>
<td>Monitored Flows</td>
<td>List of currently monitored flows.</td>
</tr>
</tbody>
</table>
FAQs

All HP Velocity application flows are blocked

HP Velocity uses the IP ID value 0x0DF4 and the TCP option 0x0100000000000000 in TCP headers. Intrusion Detection Systems (IDS) and firewall systems might require configuration to support HP Velocity-enabled traffic so that devices do not block it. See your device documentation to configure these settings.

Traffic between HP Velocity servers is only monitored

In bookended deployments, HP Velocity protects only the flows between HP thin clients and HP Velocity-enabled servers where HP Velocity Sender Side is installed on a terminal server or directly on virtual desktops. HP Velocity only monitors the flows of server-to-server connections.

Protected flows are not established

Virtualization architectures that require HP thin clients to access virtual desktops via a proxy service provided by a connection broker must have HP Velocity installed on the server hosting the connection broker. This ensures that protected flows are established for connections to a virtual desktop where HP Velocity is installed. For information, see HP Velocity deployments for thin clients on page 3.
Decision trees

This section provides decision trees for troubleshooting the following issues:

- VDI connectivity issue
- Non-VDI connectivity issue
- HP Velocity-protected flows not established
- Quality of Experience: Packet-loss issue
- Quality of Experience: Latency issue

VDI connectivity issue
Non-VDI connectivity issue

Non-VDI connectivity issue

Unable to connect

Still unable to connect

Connectivity restored

Protected flow not created

Protected flow created

Re-enable HP Velocity, and try another HP Velocity-accelerated protocol.

Connection successful

Add the source IP address to blacklist, or add port to transparent filter. Try connecting again.

Unable to connect

Unsolved!

Re-enable HP Velocity, and try another HP Velocity-accelerated protocol.

Connection successful

Call HP support, or open a ticket.

It is not an HP Velocity issue. Enable HP Velocity.

Unable to connect

Check the original traffic path for a security server or firewall.

Still unable to connect

Reboot the thin client, and try to connect again.

Protected flow created

Connection successful

Call HP support, or open a ticket.

Check the original traffic path for a security server or firewall.

• Re-enable HP Velocity, and try to connect again.
• If the connection attempt fails, disable HP Velocity to restore connectivity.
• Call HP support, or open a ticket.
HP Velocity-protected flows not established

HP Velocity protected flows not established

Is HP Velocity set to Protect mode on both (bookended) endpoints, or is the thin client set to Single Sided Acceleration mode?

Yes

Set both (bookended) endpoints to Protect mode, or set the thin client to Single Sided Acceleration mode.

No

Does another thin client create protected flows?

Yes

• Re-install HP Velocity.
• If possible, replace the thin client.

No

Are other protocols being protected?

Yes

• Check the traffic paths for a security server or firewall.
• Call HP support, or open a ticket.

No

Are protected bookended flows to another server being created, or are single-sided accelerated flows being created?

Yes

Is it a valid HP Velocity deployment?

Yes

Make the necessary changes to the topology or configuration.

No

No

Is the issue with a VDI protocol?

Yes

No

Call HP support, or open a ticket.

Call HP support, or open a ticket.

• If possible, reboot the server side.
• Check the traffic paths for a security server or firewall that could be blocking traffic.
• Disable HP Velocity on the thin client.
• Call HP support, or open a ticket.
Quality of Experience: Packet-loss issue

Verify the topology to determine which device is at the far end of the HP Velocity-protected flow.

Is the protected flow to the expected destination?

Are HP Velocity protected flows being created?

Follow the HP Velocity Protected Flows not Established decision tree.

Only monitored flows are being created

Is the monitored flow going to the expected destination?

HP Velocity helps when there is network loss.
- Check the thin client and server system resources (CPU, RAM, etc).
- The quality issue could be due to either low bandwidth on the link or high latency.

Is there network loss?

Does corrected loss show improvement?

Is corrected loss close to the specified TLR or 0%?

Check for available bandwidth. HP Velocity requires additional bandwidth to provide redundancy.

HP Velocity is working and improving the network quality.
- Look for other causes such as insufficient CPU or memory.
- The quality issues could be due to low bandwidth on the link or high latency.

The application may require even higher network quality.

Verify the topology to determine which device is at the far end of the HP Velocity flow.
Quality of Experience: Latency issue

Latency issue
- Are HP Velocity-protected flows being created?
  - Yes
  - Follow the HP Velocity Protected Flows not Established decision tree.
  - No
- Follow the Quality of Experience: Packet Loss decision tree.

- Does the endpoint have high latency?
  - Yes
  - Is LiveTCP enabled on the endpoint?
    - No
      - Install the latest version of HP Velocity.
      - Enable LiveTCP.
    - Yes
      - Call HP support, or open a ticket.
  - No

- Does the Management Application show a protected LiveTCP flow?
  - Yes
    - Only inspected flows are shown
  - No
    - Configure a lower latency threshold.

- Does the endpoint have latency greater than the configured latency threshold?
  - Yes
    - Call HP support, or open a ticket.
  - No
Appendix: HP Velocity configuration on HP ThinPro

HP Velocity provides a default configuration suitable for most deployments. It also provides a configuration interface (/proc) that enables users with root privileges to temporarily modify configuration settings and query status on HP ThinPro.

The /proc/net/hp-velocity/ file provides access to the following parameter files:

- config/about
- config/commit
- config/general/factorydefault
- config/liveq
- config/livetcp
- config/system/boot
- config/system/policy
- config/system/settings
- flowinfo/flows
- stats

Changing the value of a configuration parameter

**Note:** The /proc/net/hp-velocity/ file is a virtual file used to configure and display the current HP Velocity configuration in an easy-to-read format. The file cannot be modified using standard text editors.

**Note:** After a system restart, modifications written to the /proc interface are not retained. Original configuration settings are restored.

1. Log in to HP ThinPro as an administrator.
2. Access the /proc/net/hp-velocity/ file to be modified.
3. Write a new line to the file in the same format as the line being modified. For example, to change the line
   `<parameter> = <value_1> <value_2> <value_3>`, enter `<parameter> = <newvalue_1> <newvalue_2> <newvalue_3>`.
4. Use the `echo` command and a `>` symbol to redirect the new value to the file. For example, `echo OperationalMode=Enabled > /proc/net/hp-velocity/config/system/settings`.
5. Query the commit file to validate the uncommitted configuration changes. For example, `cat /proc/net/hp-velocity/config/commit`.
6. Apply the uncommitted parameters to the system by applying on the commit file. For example, `echo commit > /proc/net/hp-velocity/config/commit`.

**config/about**

**Description**

The /proc/net/hp-velocity/config/about file provides the HP Velocity version number, release number, and product edition information; for example, `Version: 3.1.0r23849 [Server]`.

**Read / Write**

- Read Only
config/commit

Description
The /proc/net/hp-velocity/config/commit file provides the ability to validate the uncommitted configuration changes to the system and to apply the changes to the system.

Read / Write
- Read: Enter the following to verify the uncommitted changes:
  `cat /proc/net/hp-velocity/config/commit`
- Write: Enter the following to apply the configuration changes:
  `echo commit > /proc/net/hp-velocity/config/commit`

config/general/factorydefault

Description
The /proc/net/hp-velocity/config/general/factorydefault file provides the ability to reset the system to its default configuration.

Read / Write
- Write: Enter the following to reset the system to its default configuration:
  `echo factorydefault > /proc/net/hp-velocity/config/general/factorydefault`

config/liveq

Description
LiveQ outputs the original number of input packets as well as extra packets containing redundancy information. The number of packets that are used to encode the redundant packets and the number of redundant packets generated varies based on current network-loss conditions and the configured Target Loss Rate. LiveQ packet loss protection is available for UDP flows.

Target Loss Rate policy filters can be used to specify the IP addresses and ports of application flows to which a specific level of packet loss protection is applied.

The /proc/net/hp-velocity/config/liveq file provides the configuration parameters (Table 19 on page 40) to customize the packet loss protection settings. The following parameters are supported:

- TargetLossRate: The Target Loss Rate (TLR) that HP Velocity will attempt to achieve for HP Velocity-protected flows.
  Note: TLR refers to the amount of packet loss that a thin-client application can tolerate while still delivering an acceptable QoE. The recommended TLR for thin-client applications is 0.04%.
- CongestionAvoidance: Analyze network links to identify those with bandwidth constraints, and then automatically adjust packet-loss protection to accommodate the constraints.
- BandwidthControl: The encoding level applied to HP Velocity-protected flows. HP Velocity constantly monitors network loss and automatically applies the protection mode required to reduce network loss to the default TLR. The protection mode used at any given time depends on the real-time loss measured in the network.
- ProtectionFilters: The ports to which LiveQ - Packet Loss Protection is applied. Use a space-separated list of ports or ranges; for example, 80 1750 1751 2003-2050.

Read / Write
- Read: Enter the following to query the configuration parameters:
  `cat /proc/net/hp-velocity/config/liveq`
- Write: Any single value using a string with the format `<parameter> = <value>`.
## /config/liveq parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>TargetLossRate</td>
<td>0.4 = 0.4%</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>0.2 = 0.2%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.1 = 0.1%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.04 = 0.04%</td>
<td></td>
</tr>
<tr>
<td>CongestionAvoidance</td>
<td>Enabled</td>
<td>Enabled</td>
</tr>
<tr>
<td></td>
<td>Disabled</td>
<td></td>
</tr>
<tr>
<td>BandwidthControl</td>
<td>Default</td>
<td>Default</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td>ProtectionFilters</td>
<td>Any UDP ports</td>
<td>1 to 65535</td>
</tr>
</tbody>
</table>

### Description

As HP Velocity observes the network and detects packet loss, the LiveTCP congestion control algorithm dynamically adapts to changing network conditions, boosting QoE in high-latency networks.

The `/proc/net/hp-velocity/config/liveq` file provides the configuration parameters to customize the acceleration settings. The following parameters are supported:

- **LatencyThreshold**: Activate LiveTCP latency mitigation once the specified delay threshold (in milliseconds) is exceeded.
- **CongestionControl**: The level of congestion control required. LiveTCP adapts its algorithm to automatically provide congestion control that is optimized independently for each TCP flow (LAN, remote network, Wi-Fi) and the conditions in the network.
- **AccelerationFilters**: The port numbers that receive TCP flow acceleration is applied. Use a space-separated list of ports or ranges; for example, 80 1750 1751 2003-2050.
- **PersistentFilters**: The port numbers that receive TCP flow acceleration and maintain the connection information for reconnections. Use a space-separated list of ports or ranges; for example, 80 1750 1751 2003-2050.

### Read / Write

- **Read**: Enter the following to query the configuration parameters:

  ```
  cat /proc/net/hp-velocity/config/liveq
  ```

- **Write**: Any single value using a string with the format `<parameter> = <value>`.

## /config/livetcp parameters

### Table 20: /config/livetcp parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>LatencyThreshold</td>
<td>0 to 2000 ms (duration)</td>
<td>5 ms</td>
</tr>
<tr>
<td>CongestionControl</td>
<td>Standard</td>
<td>Standard</td>
</tr>
<tr>
<td></td>
<td>TcpFriendly</td>
<td></td>
</tr>
<tr>
<td>AccelerationFilters</td>
<td>Any TCP ports</td>
<td>1 to 65535</td>
</tr>
<tr>
<td>PersistentFilters</td>
<td>Any TCP ports</td>
<td>3389 445</td>
</tr>
</tbody>
</table>

### Description

The `/proc/net/hp-velocity/config/livetcp` file provides the configuration parameters to customize the acceleration settings. The following parameters are supported:

- **TargetLossRate**: Activates LiveTCP latency mitigation once the specified delay threshold in milliseconds is exceeded.
- **CongestionAvoidance**: The level of congestion control required. LiveTCP adapts its algorithm to automatically provide congestion control that is optimized independently for each TCP flow (LAN, remote network, Wi-Fi) and the conditions in the network.
- **BandwidthControl**: The level of bandwidth control required. LiveTCP adapts its algorithm to automatically provide bandwidth control that is optimized independently for each TCP flow (LAN, remote network, Wi-Fi) and the conditions in the network.
- **ProtectionFilters**: The port numbers that receive TCP flow acceleration are applied. Use a space-separated list of ports or ranges; for example, 80 1750 1751 2003-2050.
- **AccelerationFilters**: The port numbers that receive TCP flow acceleration and maintain the connection information for reconnections. Use a space-separated list of ports or ranges; for example, 80 1750 1751 2003-2050.

### Read / Write

- **Read**: Enter the following to query the configuration parameters:

  ```
  cat /proc/net/hp-velocity/config/livetcp
  ```

- **Write**: Any single value using a string with the format `<parameter> = <value>`.
config/system/boot

Description

The `/proc/net/hp-velocity/config/system/boot` file specifies the following parameters (Table 21 on page 41):

- ProtectedFlows: The number of simultaneously protected flows allowed.

**Note:** If the default Protected Flows setting is changed, the system must be rebooted for the change to take effect.

- `localSystemInformationCollection`: Allow the local endpoint to send its system information and per-flow statistics to the remote endpoint.
- `remoteSystemInformationCollection`: Allow the local endpoint to process and display remote endpoint system information and per-flow statistics received.

**Read / Write**

- Read: Enter the following to query the configuration parameters:
  
  ```
  cat /proc/net/hp-velocity/config/system/boot
  ```

**Parameters**

Table 21: `/config/boot` parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Values</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>ProtectedFlows</td>
<td>64 to 4096</td>
<td>2048</td>
</tr>
<tr>
<td><code>localSystemInformationCollection</code></td>
<td>• Enabled</td>
<td>Enabled</td>
</tr>
<tr>
<td></td>
<td>• Disabled</td>
<td></td>
</tr>
<tr>
<td><code>remoteSystemInformationCollection</code></td>
<td>• Enabled</td>
<td>Enabled</td>
</tr>
<tr>
<td></td>
<td>• Disabled</td>
<td></td>
</tr>
</tbody>
</table>
**config/system/policy**

**Description**

Global policy filters allow administrators to filter and optimize application flows on the basis of port number, destination IP address, or both. When multiple policy filters are configured, they are evaluated in a predefined order.

The `/proc/net/hp-velocity/config/system/policy` file specifies the following global port and IP parameters (Table 22 on page 42):

- **BlacklistIpAddresses**: The destination IP addresses of application flows that HP Velocity will not protect, but will instead pass on transparently.
- **WhitelistIpAddresses**: The destination IP addresses of application flows that HP Velocity will protect.
- **BlacklistTcpPorts, BlacklistUdpPorts**: The TCP/UDP port numbers whose application flows HP Velocity will not protect, but will instead pass on transparently.
- **WhitelistTcpPorts, WhitelistUdpPorts**: The TCP/UDP ports whose application flows HP Velocity will protect when the following criteria are met:
  - The destination IP address for the application flow is not included in the IP Blacklist filter (`blackIpAddressFilters`).
  - The destination IP address for the application flow is included in IP Whitelist filter (`whiteIpAddressFilters`).

**Important**: When the Whitelist IP filter is configured, HP Velocity will protect an application flow only if its destination IP address matches an address included in this filter.

**Note**: If the Whitelist filter includes subnet destination IP addresses, the IP Blacklist filter can be used to filter IP addresses in that subnet whose application flows HP Velocity will not protect.

**Read / Write**

- **Read**: Enter the following to query the configuration parameters:
  
  ```
  cat /proc/net/hp-velocity/config/system/policy
  ```

- **Write**: Any single value using a string with the format `<parameter> = <value>`.

**Parameters**

**Table 22: /config/policy parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default</th>
<th>Evaluation order</th>
</tr>
</thead>
<tbody>
<tr>
<td>BlacklistIpAddresses</td>
<td>255.255.255.255/32</td>
<td>1</td>
</tr>
<tr>
<td>WhitelistIpAddresses</td>
<td>All IP addresses</td>
<td>2</td>
</tr>
<tr>
<td>WhitelistTcpPorts, WhitelistUdpPorts</td>
<td>All ports</td>
<td>3</td>
</tr>
</tbody>
</table>
| BlacklistTcpPorts, BlacklistUdpPorts | TCP: 21 53 67-68 123 137-139 161 500 1194 2869 3702 4500 5355 5357 9100 17500  
                                           UDP: 21 53 67-68 123 137-139 161 500 546-547 631 1194 1900 2869 3702 4500 5353 5355 5357 9100 17500 42966 |
|                               |                                             | 4                |

**Note**: Use the CIDR format for IP addresses. To enter multiple IP addresses or port numbers, use a space-separated list; for example, 192.168.1.0/24 145.76.53.3/32 or 80 1750 1751.
**config/system/settings**

**Description**

The `/proc/net/hp-velocity/config/system/settings` file specifies the following parameters:

- **OperationalMode**: Set the operational mode of HP Velocity.
- **LiveQ-PacketLossProtection**: Provide packet loss protection to UDP application flows.
- **LiveTCP-LatencyMitigation**: Provide latency mitigation to TCP application flows.
- **LiveWifi-Prioritization**: Accelerate application flows by leveraging Wi-Fi multimedia standards to minimize latency and prioritize HP Velocity traffic. This ensures that HP Velocity-protected flows experience lower latency and jitter, and higher throughput.
- **TCPOptionBeacon**: Use the TCP option beacon (0x0100000000000000) for TCP flows.
- **TCPTelemetry**: Collect remote metrics for TCP flows.
- **SingleSidedAccelerate**: (HP Velocity Thin Client only) Provide client-side acceleration.

**Read / Write**

- **Read**: Use the following command to query the configuration parameters:
  
  ```bash
cat /proc/net/hp-velocity/config/system/settings
  ```

- **Write**: Any single value using a string with the format `<parameter> = <value>`.

**Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Values</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>OperationalMode</td>
<td>Enabled</td>
<td>Enabled</td>
</tr>
<tr>
<td></td>
<td>Disabled</td>
<td></td>
</tr>
<tr>
<td>LiveQ-PacketLossProtection</td>
<td>Enabled</td>
<td>Enabled</td>
</tr>
<tr>
<td></td>
<td>Disabled</td>
<td></td>
</tr>
<tr>
<td>LiveTCP-LatencyMitigation</td>
<td>Enabled</td>
<td>Enabled</td>
</tr>
<tr>
<td></td>
<td>Disabled</td>
<td></td>
</tr>
<tr>
<td>LiveWifi-Prioritization</td>
<td>Enabled</td>
<td>Enabled</td>
</tr>
<tr>
<td></td>
<td>Disabled</td>
<td></td>
</tr>
<tr>
<td>TCPOptionBeacon</td>
<td>Enabled</td>
<td>Enabled</td>
</tr>
<tr>
<td></td>
<td>Disabled</td>
<td></td>
</tr>
<tr>
<td>TCPTelemetry</td>
<td>Enabled</td>
<td>Disabled</td>
</tr>
<tr>
<td></td>
<td>Disabled</td>
<td></td>
</tr>
<tr>
<td>SingleSidedAccelerate</td>
<td>Enabled</td>
<td>Disabled</td>
</tr>
<tr>
<td></td>
<td>Disabled</td>
<td></td>
</tr>
</tbody>
</table>

**Note**: When the TCP option beacon (TCPOptionBeacon) setting is enabled, HP Velocity adds up to 4 bytes of data to TCP headers. This is in compliance with RFC 791 and RFC 793. Some applications might not be compliant with RFC 791 or RFC 793, and as a result might not be able to process TCP option beacons. If this occurs, disabling the TCP option beacon setting should resolve the issue.
flowinfo/flows

Description

The `/proc/net/hp-velocity/flowinfo/flows` file provides the ability to retrieve the flow information and specifies the following parameters:

- **RemoteIP**: The remote IP address for the protected flow.
- **RemotePort**: The remote TCP or UDP port number for the protected flow. If the port number is a well-known protocol, the protocol name also appears.
- **LocalIP**: The local IP address for the protected flow.
- **LocalPort**: The local TCP or UDP port number for the protected flow. If the port number is a well-known protocol, the protocol name also appears.
- **Protocol**: The protocol (such as TCP or UDP) used by the protected flow.
- **IPQ**: Indicates the current IPQ state for a flow.
  - `L`: Local flow, a single-sided acceleration from the local end point.
  - `P`: Peered flow between two HP Velocity-enabled endpoints without a control channel.
  - `C`: Connected flow between two HP Velocity enabled endpoints with a control channel to exchange telemetry information.
  - `U`: Unidentified state
- **LiveTCP**: The LiveTCP feature status.
  - `Enabled`: LiveTCP is accelerating the flow.
  - `Monitoring`: LiveTCP is enabled for the flow, but it is in monitoring to satisfy the correct network conditions to start acceleration.
  - `Disabled`: LiveTCP is disabled for this flow.
  - `N/A`: LiveTCP is not applicable for this flow.
- **LiveQ**: LiveQ feature status.
  - `Enabled`: Packet loss protection is enabled for the flow.
  - `Disabled`: Packet loss protection is disabled for the flow.
  - `N/A`: Packet loss protection is not applicable for this flow.
- **TLR**: The TLR that HP Velocity will attempt to achieve for the protected flow.
- **Encoding**: The encoding level applied to the protected flow.

Read / Write

- **Read**: Enter the following to query the flow details:
  
  ```
  cat /proc/net/hp-velocity/flowinfo/flows
  ```
**stats**

**Description**

The `/proc/net/hp-velocity/stats` file provides the ability to retrieve the global statistics information.

**Read / Write**

- Read: Enter the following to query the statistics details:
  
  `cat /proc/net/hp-velocity/stats`

**Parameters**

**Table 24: /stats**

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmitted Network Loss</td>
<td>The actual transmitted network loss measured by HP Velocity.</td>
</tr>
<tr>
<td>Received Network Loss</td>
<td>The actual received packet loss rate measured by HP Velocity.</td>
</tr>
<tr>
<td>Received Corrected Loss</td>
<td>The received packet loss rate after correction by HP Velocity.</td>
</tr>
<tr>
<td>Packets from Host</td>
<td>Number of IP packets received by HP Velocity from the application on the local host.</td>
</tr>
<tr>
<td>Packets to Network</td>
<td>Number of IP packets sent by HP Velocity on the network toward the remote host.</td>
</tr>
<tr>
<td>Packets from Network</td>
<td>Number of IP packets received by HP Velocity from the remote host.</td>
</tr>
<tr>
<td>Packets to Host</td>
<td>Number of IP packets sent by HP Velocity to the application on the local host.</td>
</tr>
<tr>
<td>Bitrate from Host</td>
<td>Bytes of IP data received by HP Velocity from the application on the local host; in Kb/s for intervals or KB/MB for cumulative total.</td>
</tr>
<tr>
<td>Bitrate to Network</td>
<td>Bytes of IP data sent by HP Velocity on the network toward the remote host; in Kb/s for intervals or KB/MB for cumulative total.</td>
</tr>
<tr>
<td>Bitrate from Network</td>
<td>Bytes of IP data received by HP Velocity from the remote host; in Kb/s for intervals or KB/MB for cumulative total.</td>
</tr>
<tr>
<td>Bitrate to Host</td>
<td>Bytes of IP data sent by HP Velocity to the application on the local host; in Kb/s for intervals or KB/MB for cumulative total.</td>
</tr>
<tr>
<td>Number of Protected Flows</td>
<td>Number of currently active, unique, and protected application flows detected by HP Velocity at an endpoint.</td>
</tr>
</tbody>
</table>