

Administrator Guide for Thin Clients

HP Velocity

Version 3.1.0



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First Edition: August 2016

Document Part Number: 913550-001

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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.

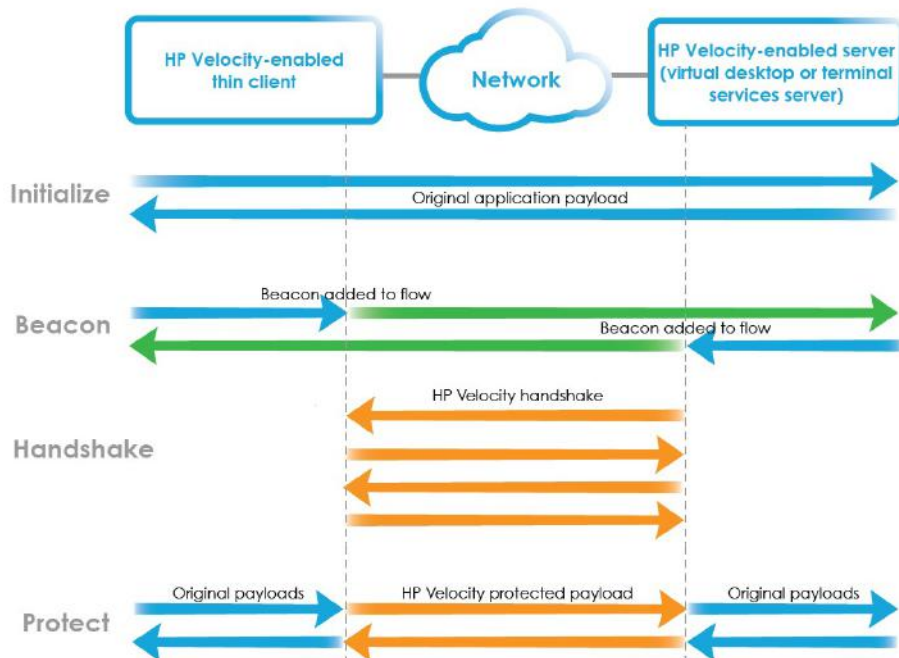
HP Velocity is a Quality of Service (QoS) software engine that integrates seamlessly and, when protecting application flows, enhances Quality of Experience (QoE) by managing packet loss, congestion, and the impact of network latency.

Establishing a connection

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

- Initialization
- Beacons
- Handshaking
- Protected state

Figure 1: Establishing a connection



Initialization

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

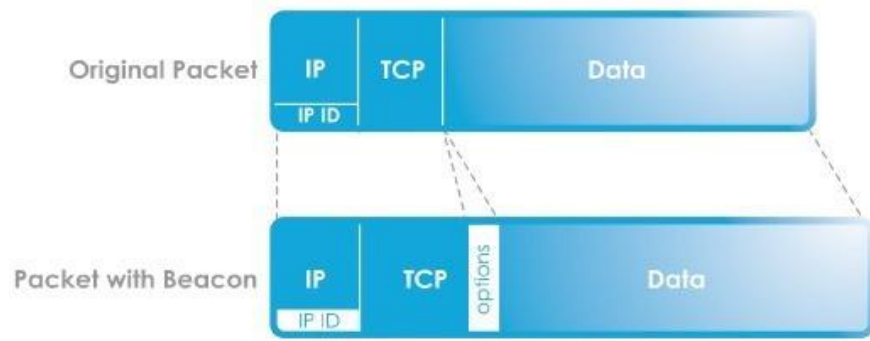
Beaconing

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 14](#).

Figure 2: Beaconing



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.

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

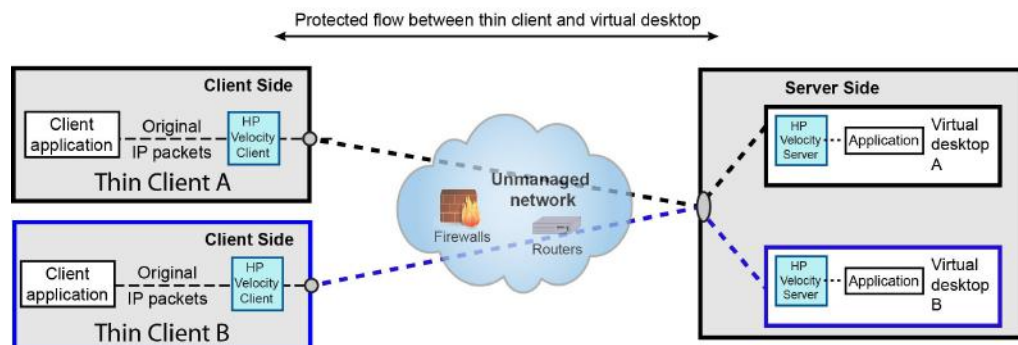
Note: HP Velocity Server Side is supported on Windows® operating systems only.

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

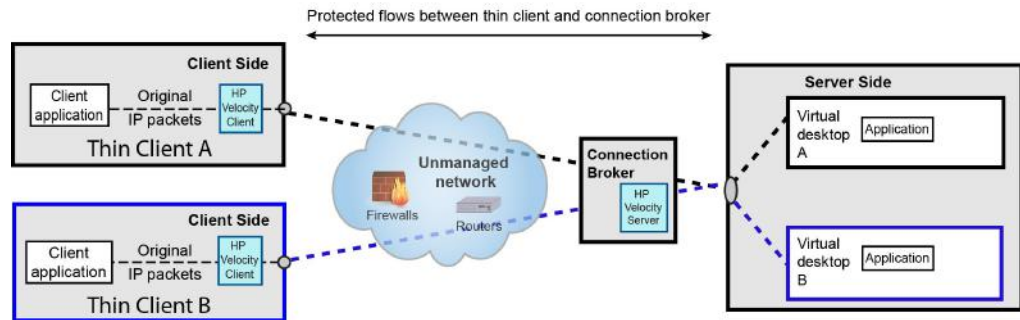


Proxied deployment

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.

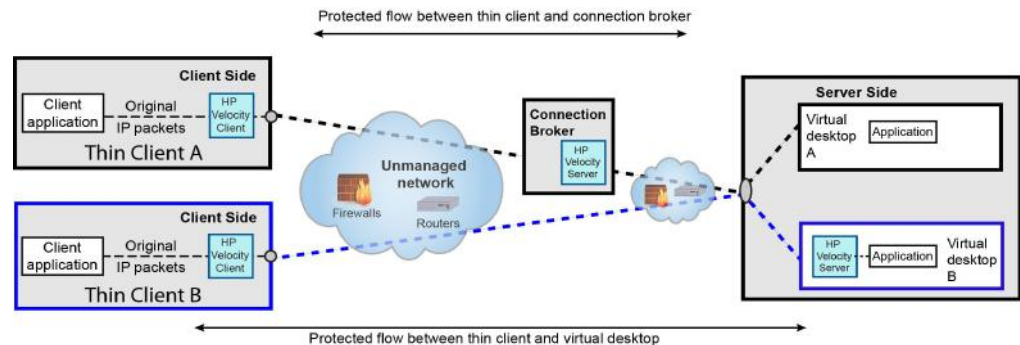
Direct-and-proxied deployment

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.

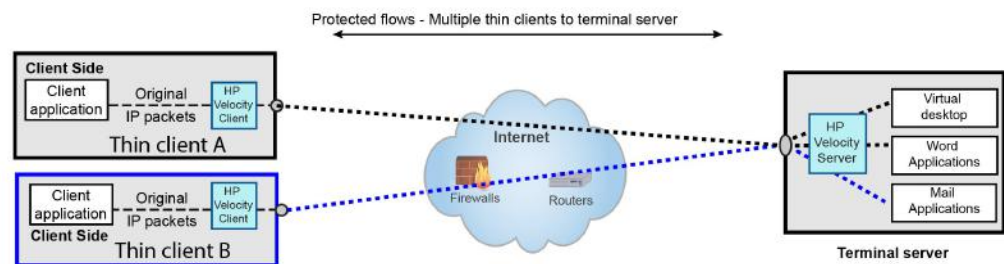
Figure 5: Example of a direct-and-proxied deployment



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

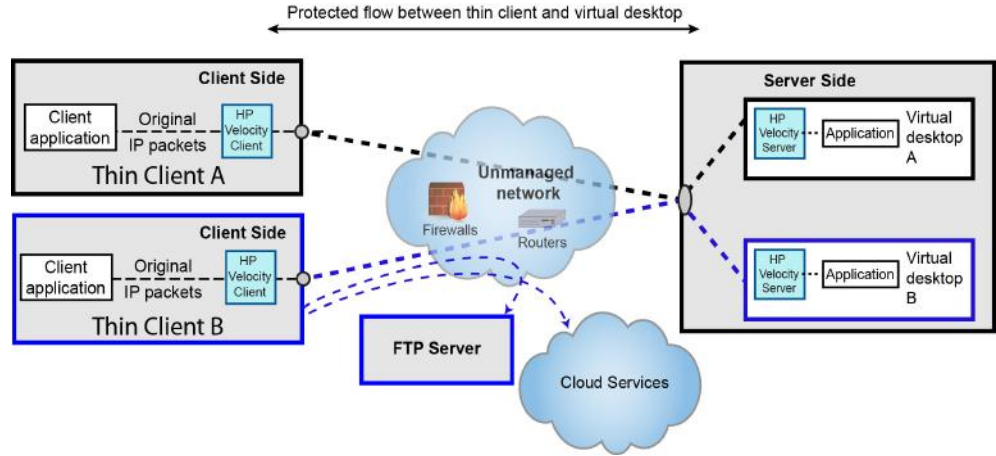


Single-sided or mixed deployment

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>.

HP Velocity Server Side system requirements

Table 1: HP Velocity Server Side system requirements

Component	Server operating system	Virtual desktop operating system
CPU	Any	Any
Memory	40 MB	3 MB
Disk space	10 MB	10 MB
Operating system	Windows Server 2016 Windows Server 2012 Windows Server 2008	Windows 10 Windows 8 Windows 7
Operating-system variants	32-bit and 64-bit	
Clients	HP thin clients	

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 Welcome to the HP Velocity Setup Wizard starts.
3. Click **Next**.
 - The License Agreement appears.
4. Read the end-user license agreement, select **I Agree**, and click **Next**.
 - Note:** Selecting **Cancel** ends the installation.
5. Navigate to the location to install HP Velocity to, or accept the default location.
6. Enable one of the following radio buttons:
 - **Everyone**—Installs HP Velocity for all user accounts and administrators
 - **Just Me**—Installs HP Velocity for only the current user account
7. Click **Next**.
 - The Confirm Installation screen appears.
8. Click **Next** to confirm the selections and 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 Installation Complete screen appears when the installation completes.
9. Click **Close**.
 - 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



Table 2: HP Velocity icon color codes

Icon color	Mode	Description
Green	Protect	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).
Blue	Protect	HP Velocity is enabled and ready to protect, but flows have not been established.
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

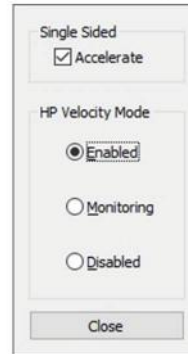
Note: Only users with administrator privileges can set the HP Velocity operational mode.

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



Mode selector on HP Velocity Thin Client



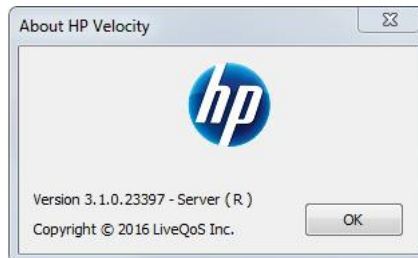
3. Click **Close**.

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**.

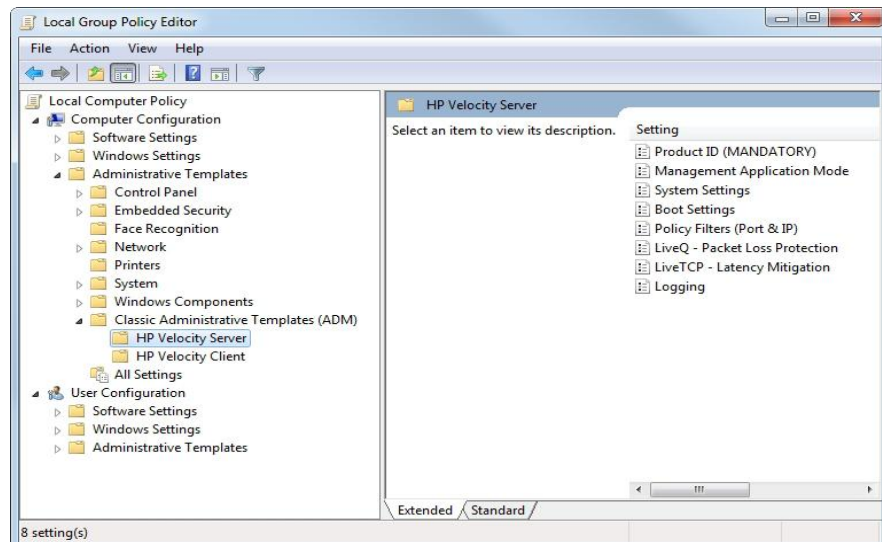
Configuring HP Velocity using the GPO

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 Product ID parameters.

Table 3: Product ID

Parameter	Options	Default
Product ID	<ul style="list-style-type: none"> Enabled Disabled 	<ul style="list-style-type: none"> Server Side: Enabled Thin Client: Enabled

Figure 9: HP Velocity Server Side administrative template—Product ID (MANDATORY)

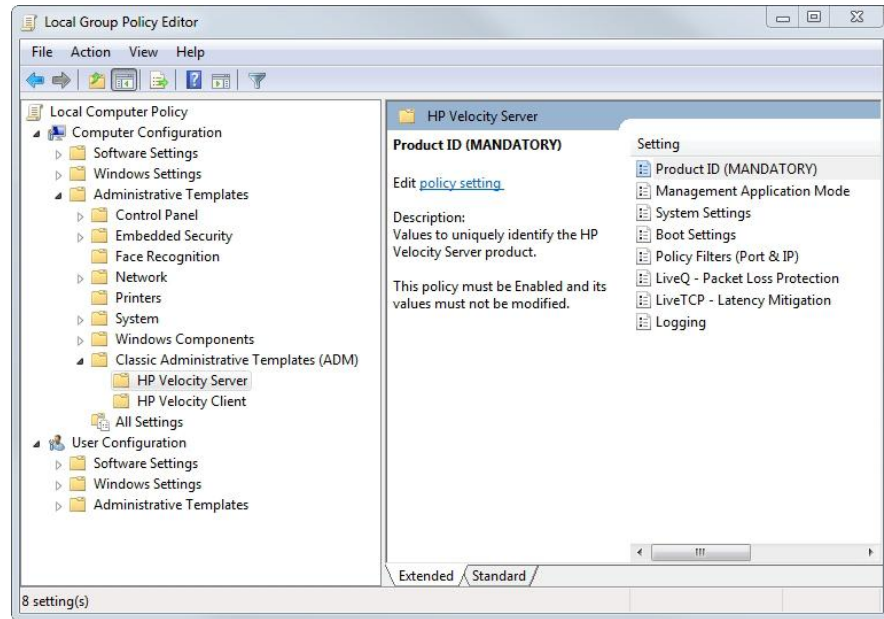
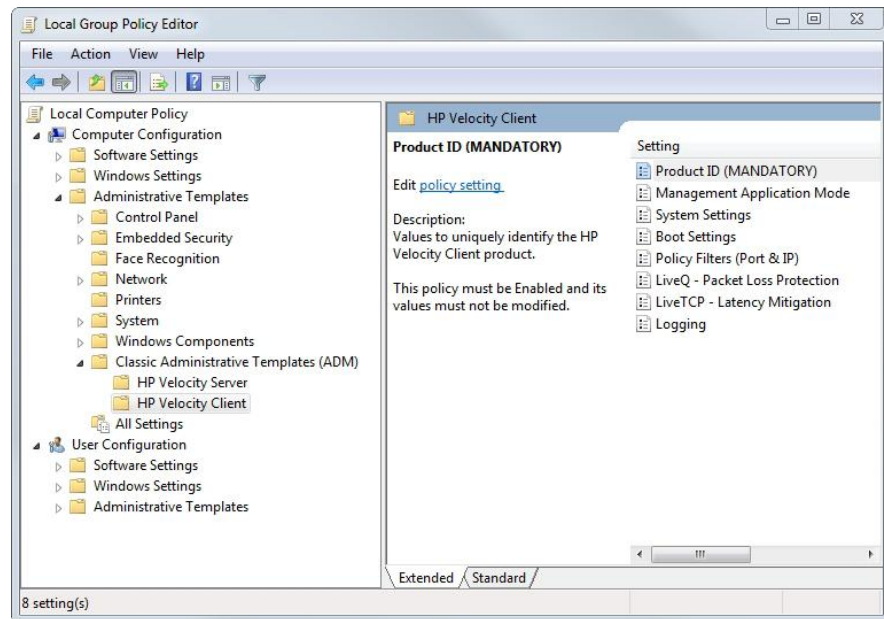


Figure 10: HP Velocity Thin Client administrative template—Product ID (MANDATORY)



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

Parameter	Options	Default
Advanced Management Application Mode	<ul style="list-style-type: none"> • Enabled • Disabled 	<ul style="list-style-type: none"> • Server Side: Enabled • Thin Client: Disabled

Figure 11: HP Velocity Server Side administrative template—Management Application Mode

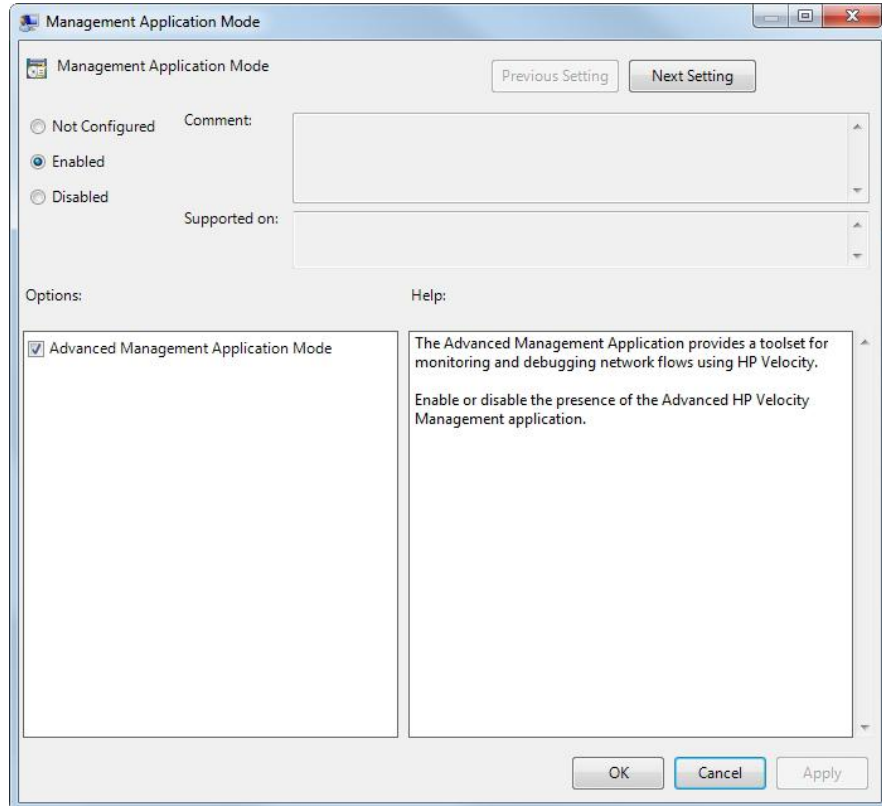
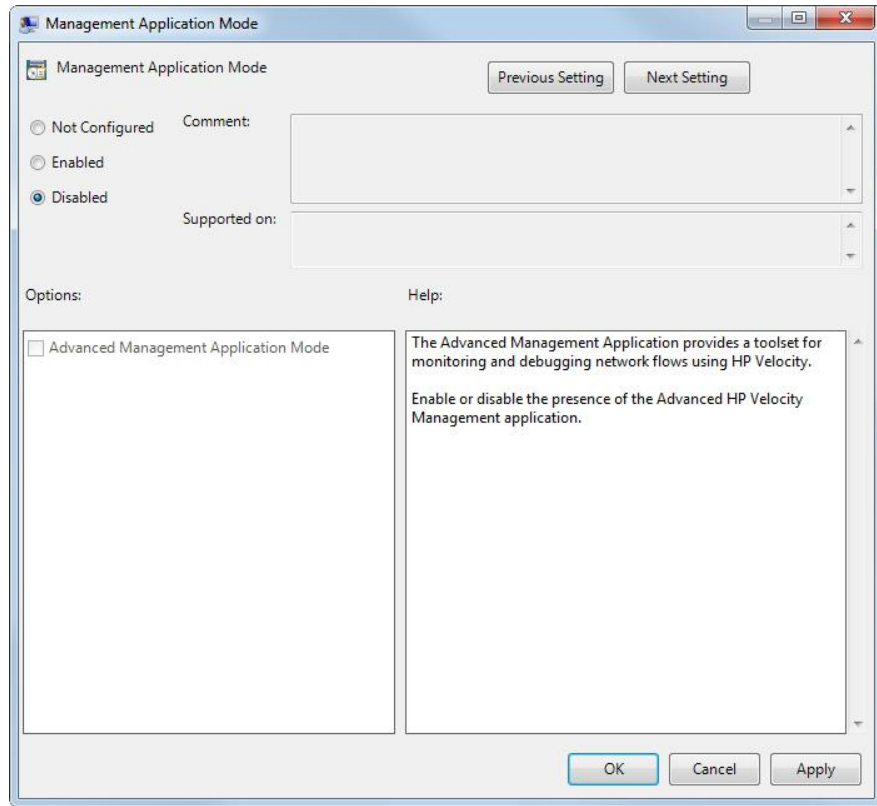


Figure 12: HP Velocity Thin Client administrative template—Management Application Mode



System settings

System settings ([Table 5 on page 14](#)) 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 18](#).
- **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

Parameter	Options	Default
Operational Mode	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • Enabled • Disabled 	Disabled

Parameter	Options	Default
LiveQ Mode	<ul style="list-style-type: none"> Enabled Disabled 	Enabled
LiveTCP Mode	<ul style="list-style-type: none"> Enabled Disabled 	Enabled
LiveWiFi - Prioritization	<ul style="list-style-type: none"> Enabled Disabled 	<ul style="list-style-type: none"> Server Side: Disabled Thin Client: Enabled
TCP Option Beacon (TCP Flows)	<ul style="list-style-type: none"> Enabled Disabled 	Enabled
TCP Telemetry Mode (TCP Flows)	<ul style="list-style-type: none"> Enabled Disabled 	<ul style="list-style-type: none"> 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.

Figure 13: HP Velocity Server Side administrative template—System Settings

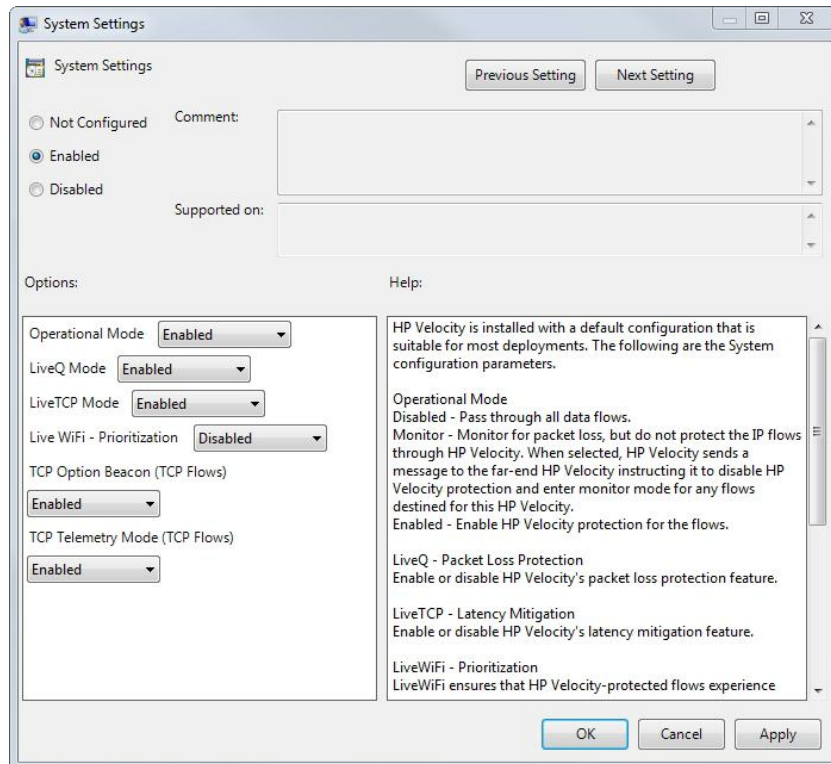
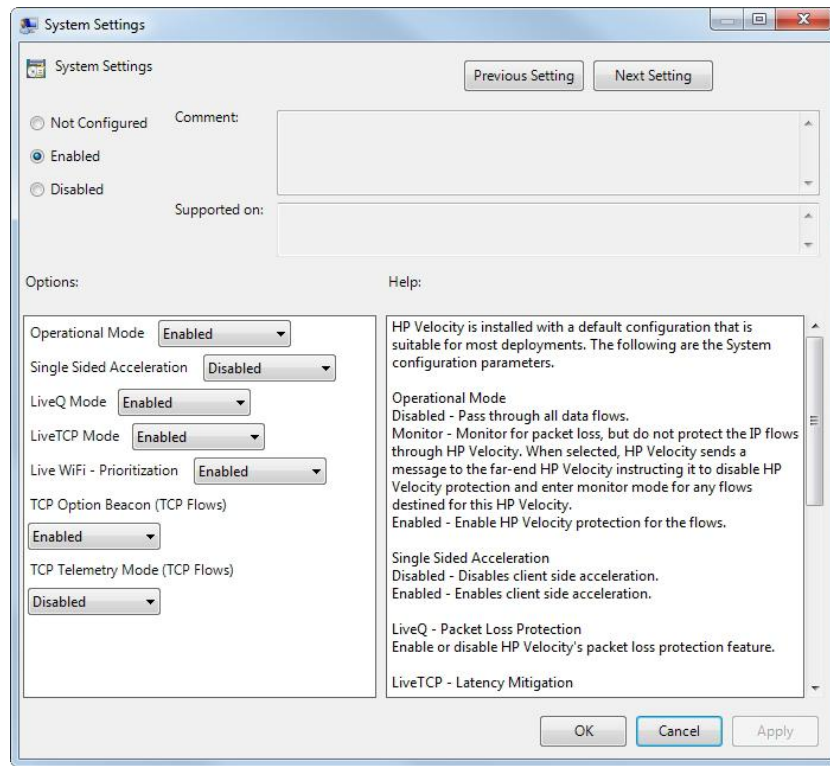


Figure 14: HP Velocity Thin Client administrative template—System Settings



Boot settings

Boot settings ([Table 6 on page 16](#)) specify the following parameters:

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

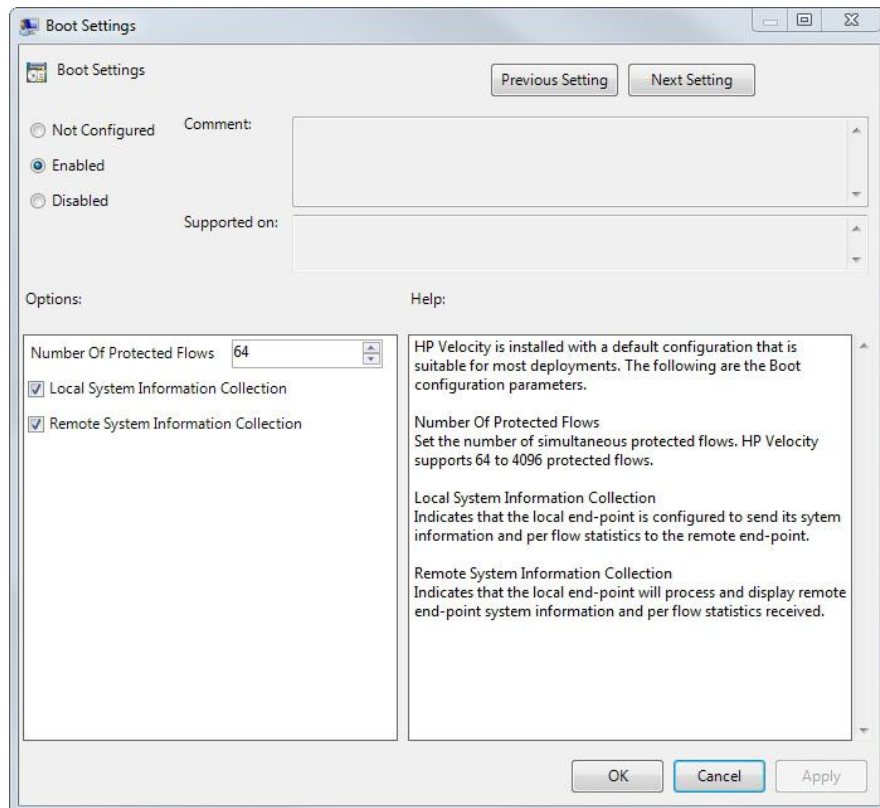
Note: When the default setting is changed, the system must be rebooted for the change to take effect.

- **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

Parameter	Options	Default
Number of Protected Flows	64 to 4096	64
Local System Information Collection	<ul style="list-style-type: none"> • Enabled • Disabled 	Enabled
Remote System Information Collection	<ul style="list-style-type: none"> • Enabled • Disabled 	Enabled

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.

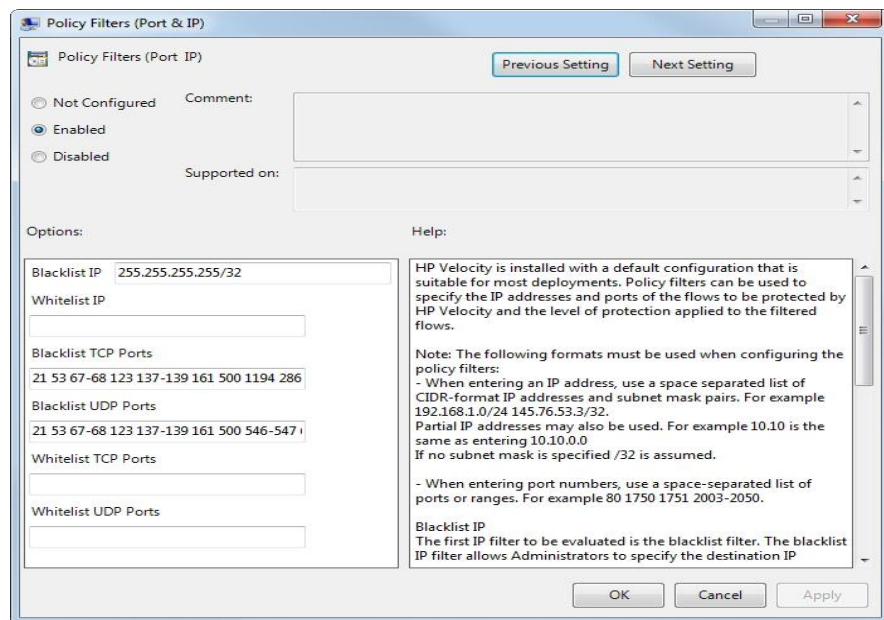
Note: If the IP Whitelist filter includes subnet destination IP addresses, the IP Blacklist filter can be used to filter IP addresses in that subnet whose application flows HP Velocity will not protect.

Table 7: Policy filters (port & IP) settings

Parameter	Default	Evaluation order
Blacklist IP	255.255.255.255/32	1
Whitelist IP	All IP addresses	2
Blacklist TCP/UDP Ports	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
Whitelist TCP/UDP Ports	All ports	3

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.

Figure 16: HP Velocity administrative template - Policy Filters (Port & IP)



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%.

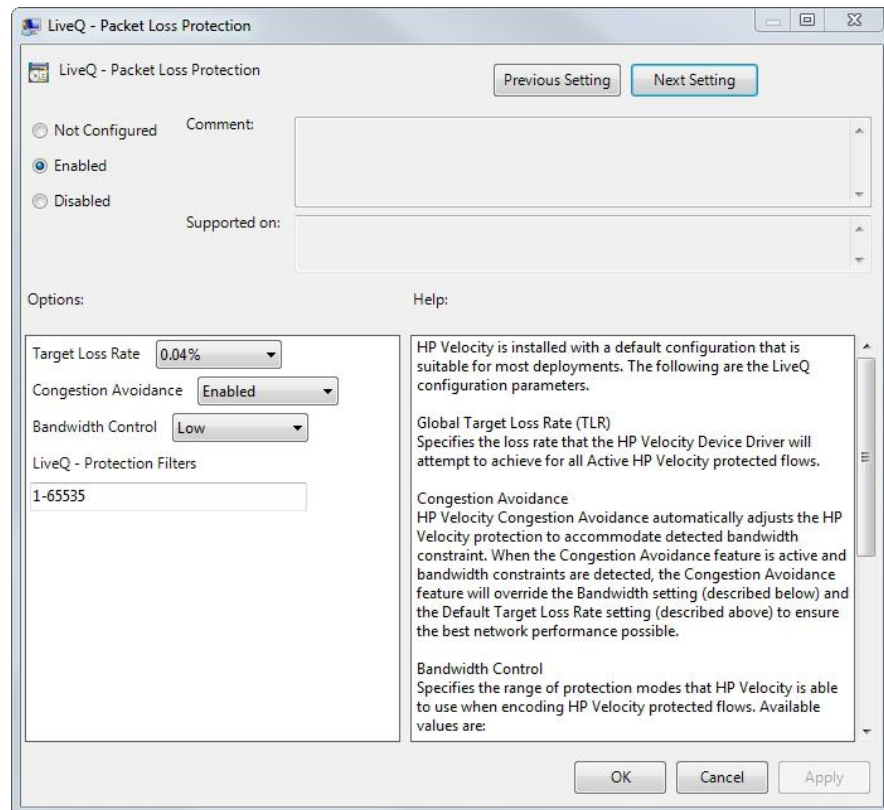
- **Congestion Avoidance**—Analyze network links to identify those with bandwidth constraints, and then automatically adjust packet-loss protection to accommodate the constraints.

- **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

Parameter	Options	Default
Target Loss Rate (TLR)	<ul style="list-style-type: none"> • 0.04% • 0.1% • 0.2% • 0.4% <p>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.</p>	0.04%
Congestion Avoidance	<ul style="list-style-type: none"> • Disabled • Enabled <p>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.</p>	Enabled
Bandwidth Control	<ul style="list-style-type: none"> • Low: Cap the estimated HP Velocity protection overhead at or below 27%. (Recommended for environments where bandwidth is very constrained.) • 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.) <p>Note: Higher encoding levels protect against greater network loss, but require more bandwidth.</p>	Default
Live Q - Protection Filters	1 to 65535	1 to 65535

Figure 17: HP Velocity administrative template—LiveQ - Packet Loss Protection



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.

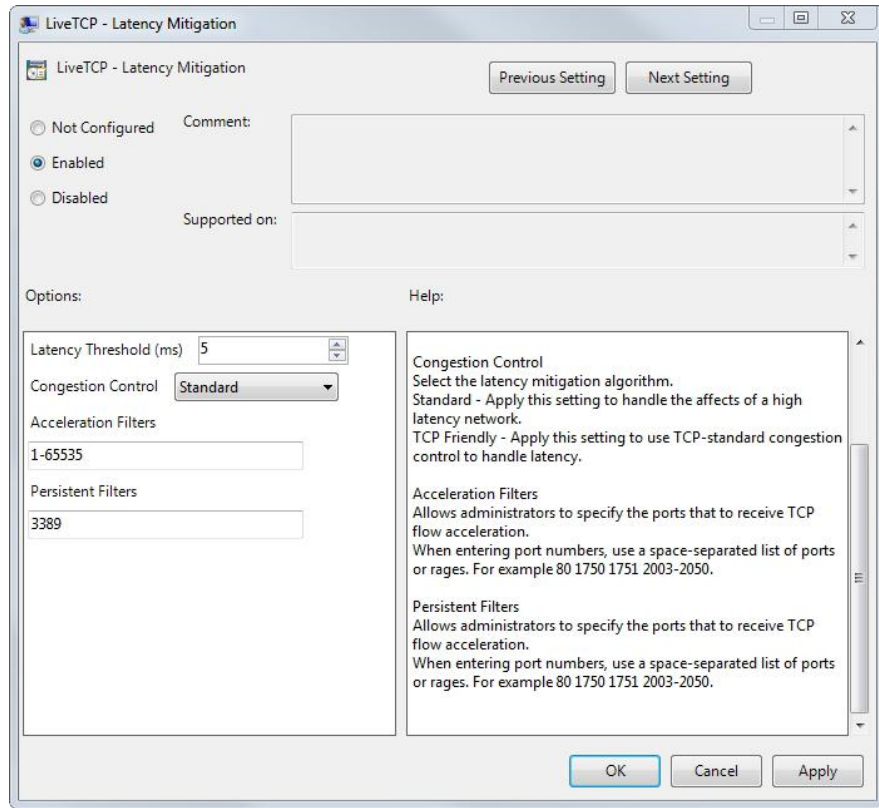
LiveTCP configuration settings ([Table 9 on page 20](#)) specify the following parameters:

- **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

Parameter	Options	Default
Latency Threshold (ms)	0 to 2000	5
Congestion Control	<ul style="list-style-type: none"> • Standard: Handle the effects of a high-latency network • TCP-Friendly: Use the standard TCP-like congestion control algorithm 	Standard
Acceleration Filters	1 to 65535	1 to 65535
Persistent Filters	1 to 65535	3389

Figure 18: HP Velocity administrative template—LiveTCP - Latency Mitigation



Logging settings

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

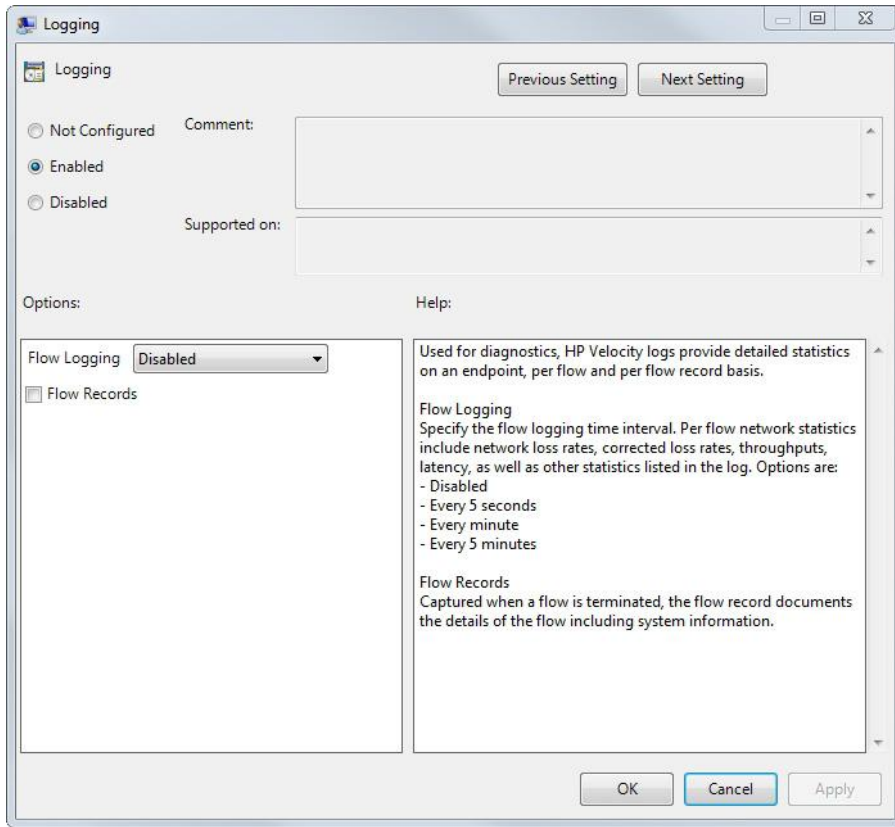
Logging settings ([Table 10 on page 21](#)) specify the following parameters:

- **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 10: Logging settings

Setting	Options	Default
Flow Logging	<ul style="list-style-type: none"> • Disabled • Every 5 Seconds • Every Minute • Every Five Minutes 	Disabled
Flow Records	<ul style="list-style-type: none"> • Disabled • Enabled 	Disabled

Figure 19: HP Velocity administrative template—Logging



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

Information	Read	Write	Export
Flow information	X		
Network monitoring graphs	X		
Network statistics	X	X	X
Configuration values	X	X	X

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

Information	Read	Write	Export
Flow information	X		
Network monitoring graphs	X		
Network statistics	X		X
Configuration values	X		X

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:

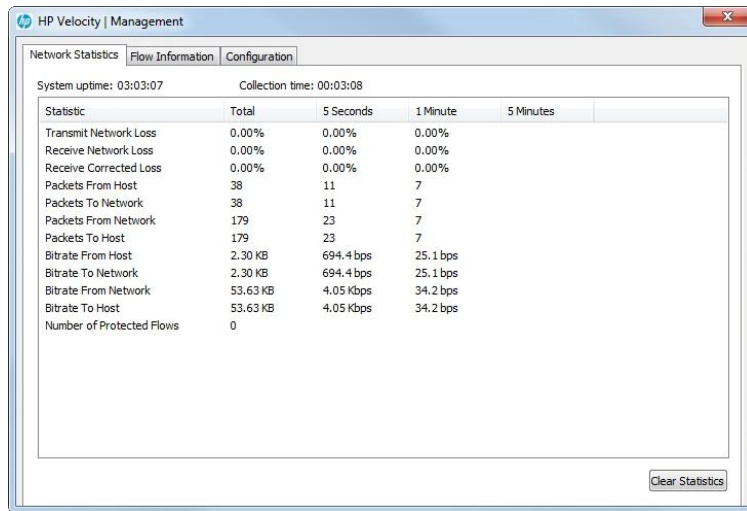
- [Network statistics](#)
- [Flow information](#)
- [Configuration settings](#)

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

Statistic	Description
Transmit Network Loss	The actual transmitted network loss measured by HP Velocity.
Receive Network Loss	The actual received packet loss rate measured by HP Velocity.
Receive Corrected Loss	The received packet loss rate after correction by HP Velocity.
Packets From Host	Number of IP packets received by HP Velocity from the application on the local host.
Packets To Network	Number of IP packets sent by HP Velocity on the network toward the remote host.

Statistic	Description
Packets From Network	Number of IP packets received by HP Velocity from the remote host.
Packets To Host	Number of IP packets sent by HP Velocity to the application on the local host.
Bitrate From Host	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.
Bitrate To Network	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.
Bitrate From Network	Bytes of IP data received by HP Velocity from the remote host; in Kb/s for intervals or KB/MB for cumulative total.
Bitrate To Host	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.
Number of Protected Flows	Number of currently active, unique, and protected application flows detected by HP Velocity at an endpoint.

Network Statistics operation

Table 14: Network Statistics operation

Operation	Description
Clear Statistics	Reset statistic counts and collection time to zero. 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

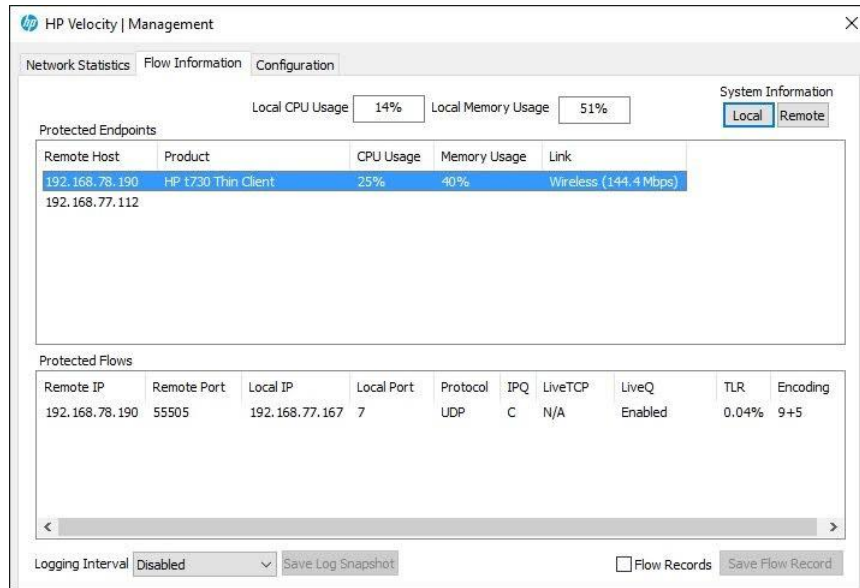


Table 15: Protected Endpoints information

Parameter	Description
Remote Host	The IP address of the remote host.
Product	The product name as defined in the System BIOS.
CPU Usage	The percentage of CPU in use.
Memory Usage	The percentage of memory in use.
Link	The type of network link in use.

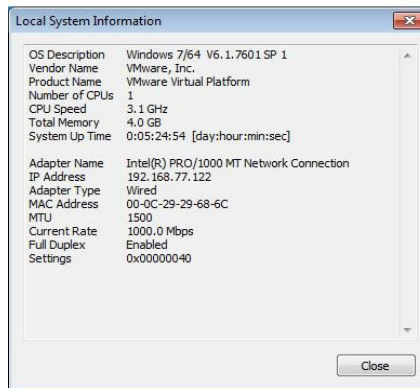
Table 16: Protected Flows information

Parameter	Description
Remote IP	The remote IP address for the protected flow.
Remote Port	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.
Local IP	The local IP address for the protected flow.
Local Port	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.

Parameter	Description
IPQ	<p>Indicates the current IPQ state for a flow:</p> <ul style="list-style-type: none"> 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	<p>The LiveTCP feature status.</p> <ul style="list-style-type: none"> 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. <p>Note: For HP Velocity Thin Client, Protect indicates that the client has requested that the server protect the application flow.</p>
LiveQ	<p>The LiveQ feature status:</p> <ul style="list-style-type: none"> 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.

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

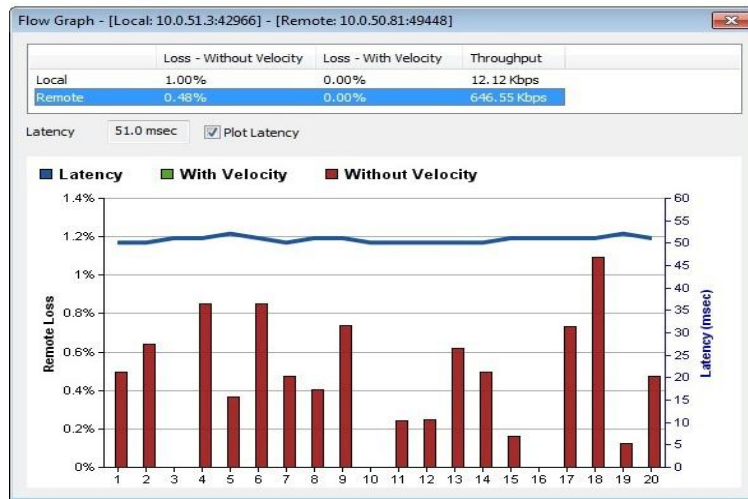


Latency and throughput data

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.

Figure 23: Latency graph for a protected flow



Flow Information operations

Table 17: Flow Information operations

Operation	Description
Logging Interval	Set the interval at which flow information is saved to the log file: <ul style="list-style-type: none"> • Disabled (no logging) • Every 5 Seconds • Every Minute • Every 5 Minutes
Save Log Snapshot	Save the current 5-second, 1-minute, and 5-minute interval flow information to a file.
Flow Records	Enable or disable flow-records collection.
Save Flow Record	Export the flow-records log to a CSV file.

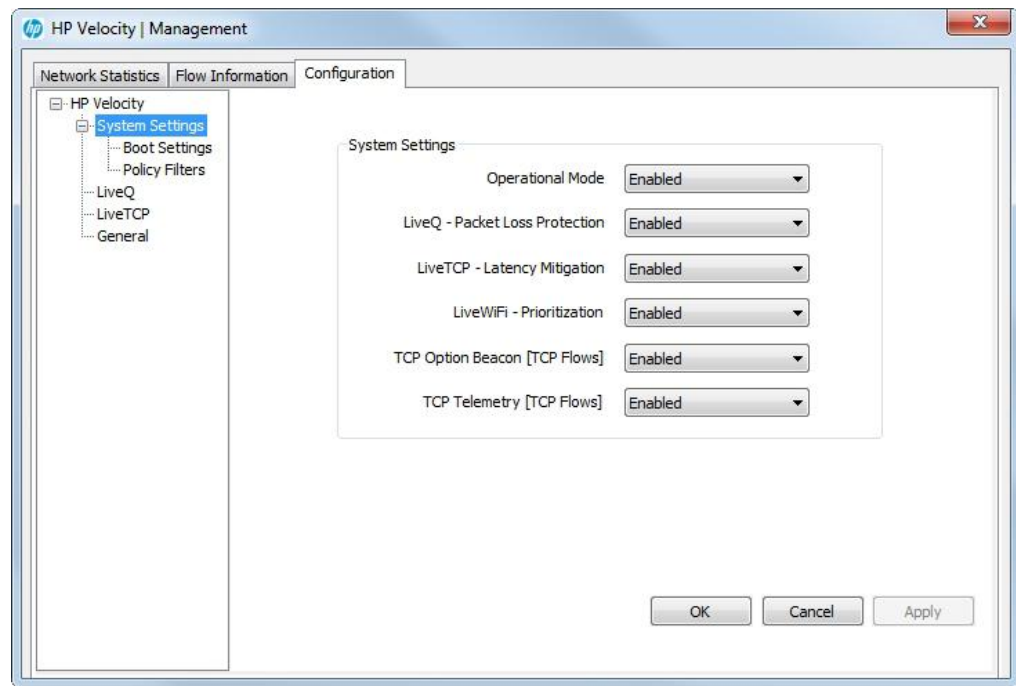
Configuration settings

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: System Settings dialog



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](#)).

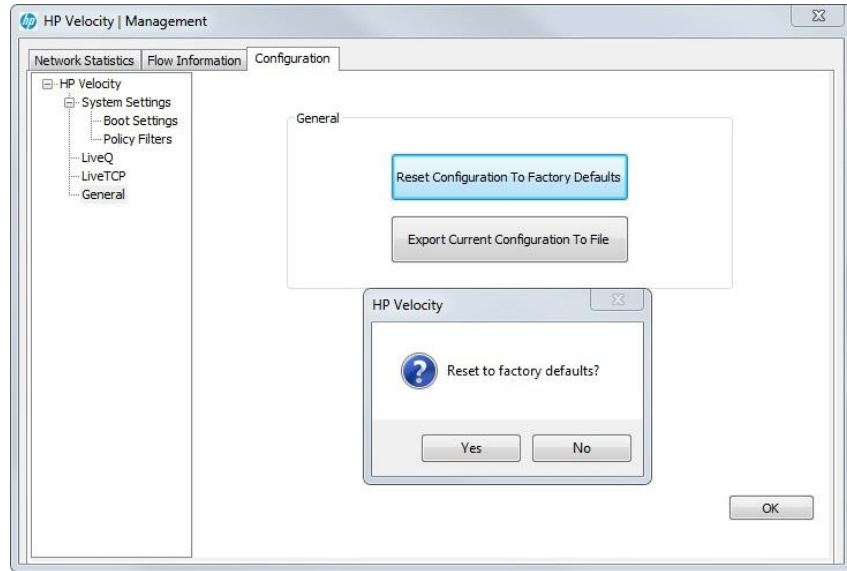
This section covers the following information:

- [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



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

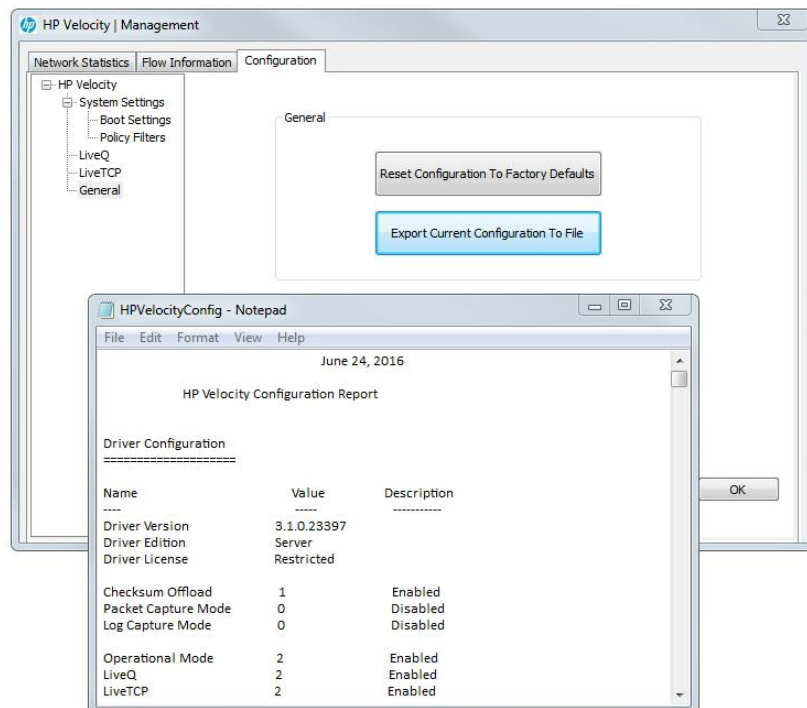


Table 18: Configuration report parameters

Parameter	Description
Driver Configuration	Current configuration and internal driver settings of HP Velocity.
Local System Metrics	Statistics on host system performance.
OS Information	Operating system type, configuration, and performance information for the system on which HP Velocity is installed.
Registry Keys	Registry key values configured by the HP Velocity policy engine.
Statistics	Snapshot of current network statistics.
Protected Flows	List of currently protected flows.
Monitored Flows	List of currently monitored flows.

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

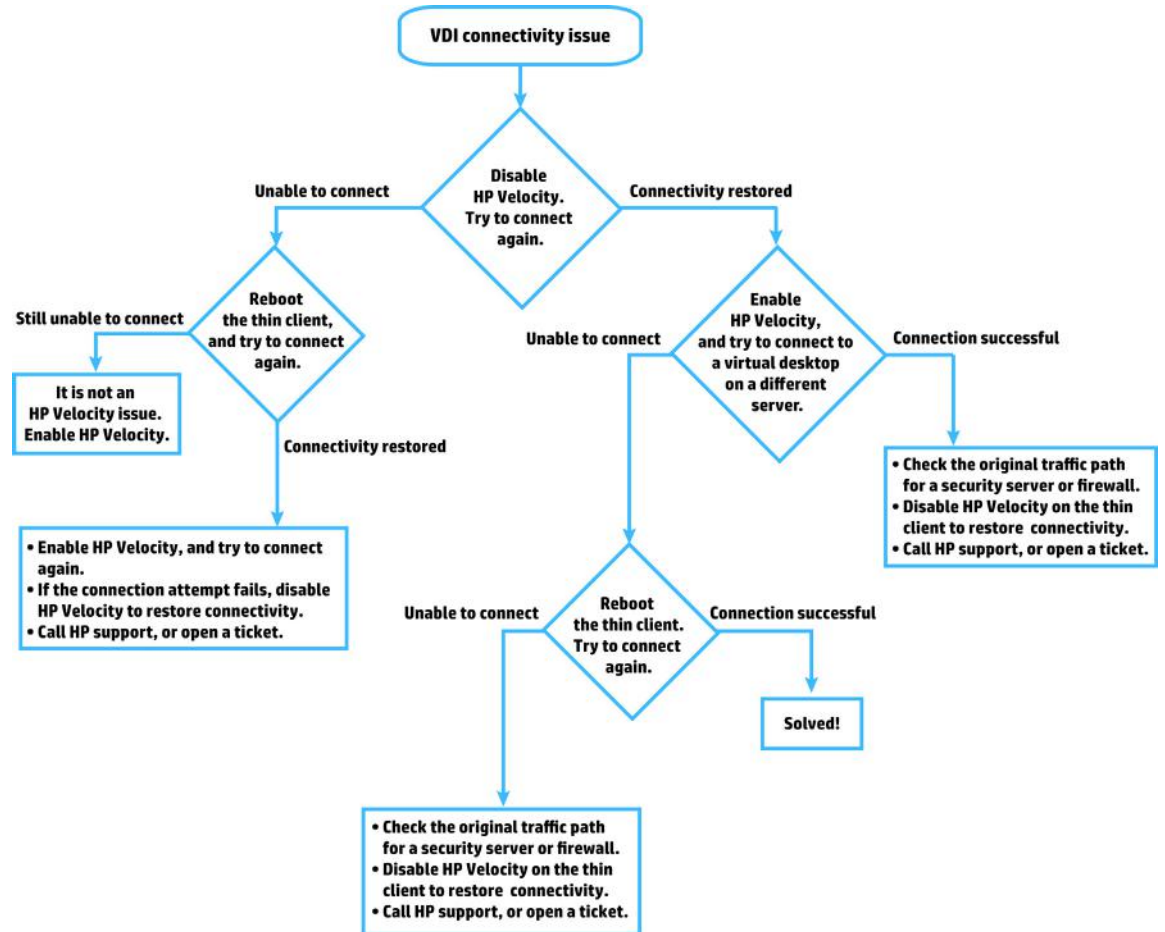
Virtualization architectures that require HP thin clients to access virtual desktops via a proxy service provided by a connection broker must have HP Velocity installed on the server hosting the connection broker. This ensures that protected flows are established for connections to a virtual desktop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

Decision trees

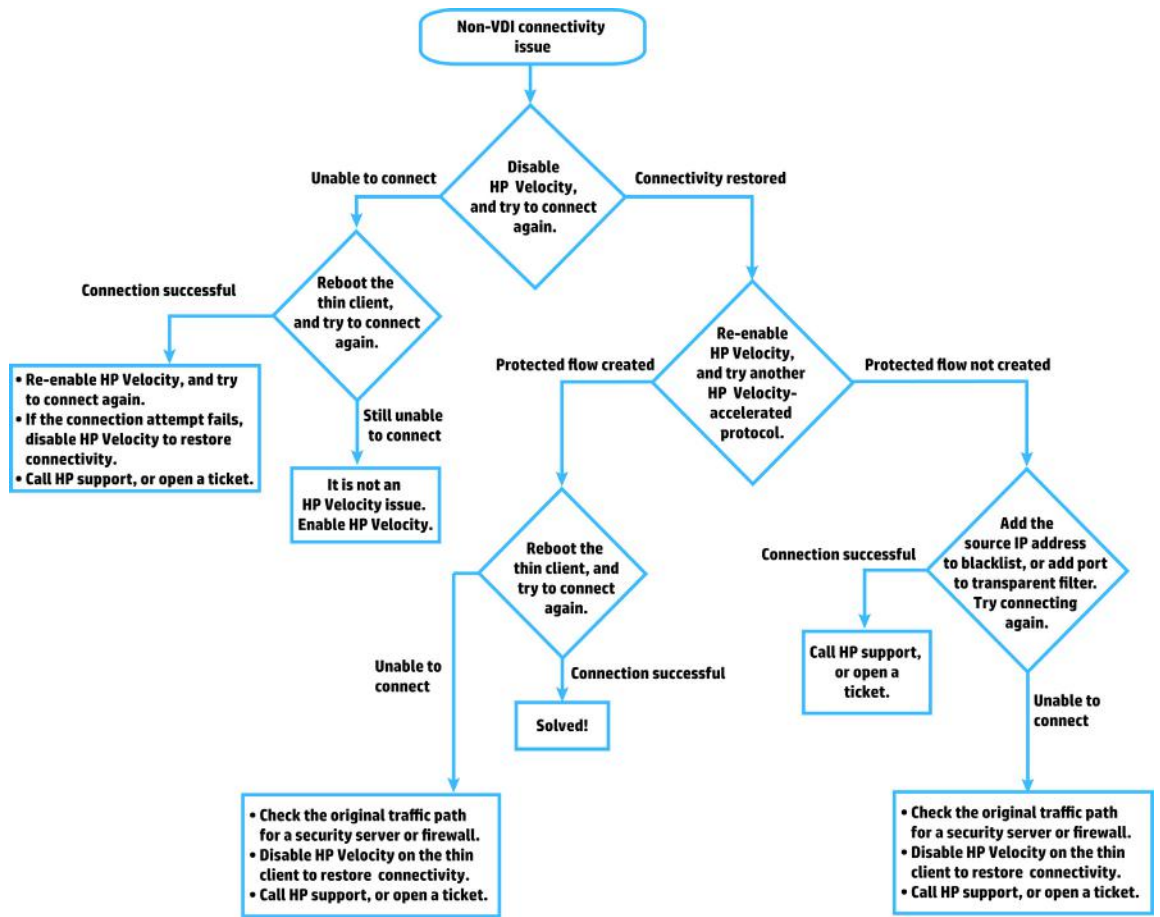
This section provides decision trees for troubleshooting the following issues:

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

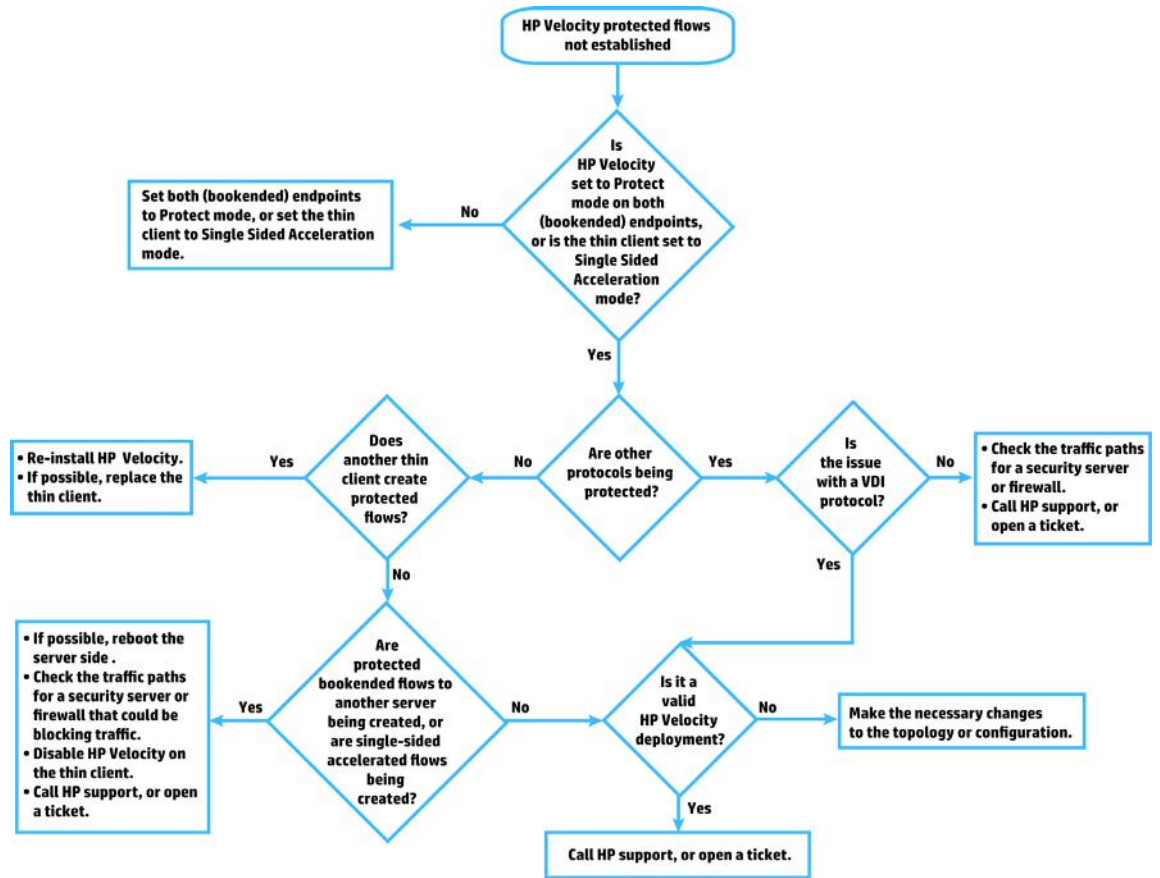
VDI connectivity issue



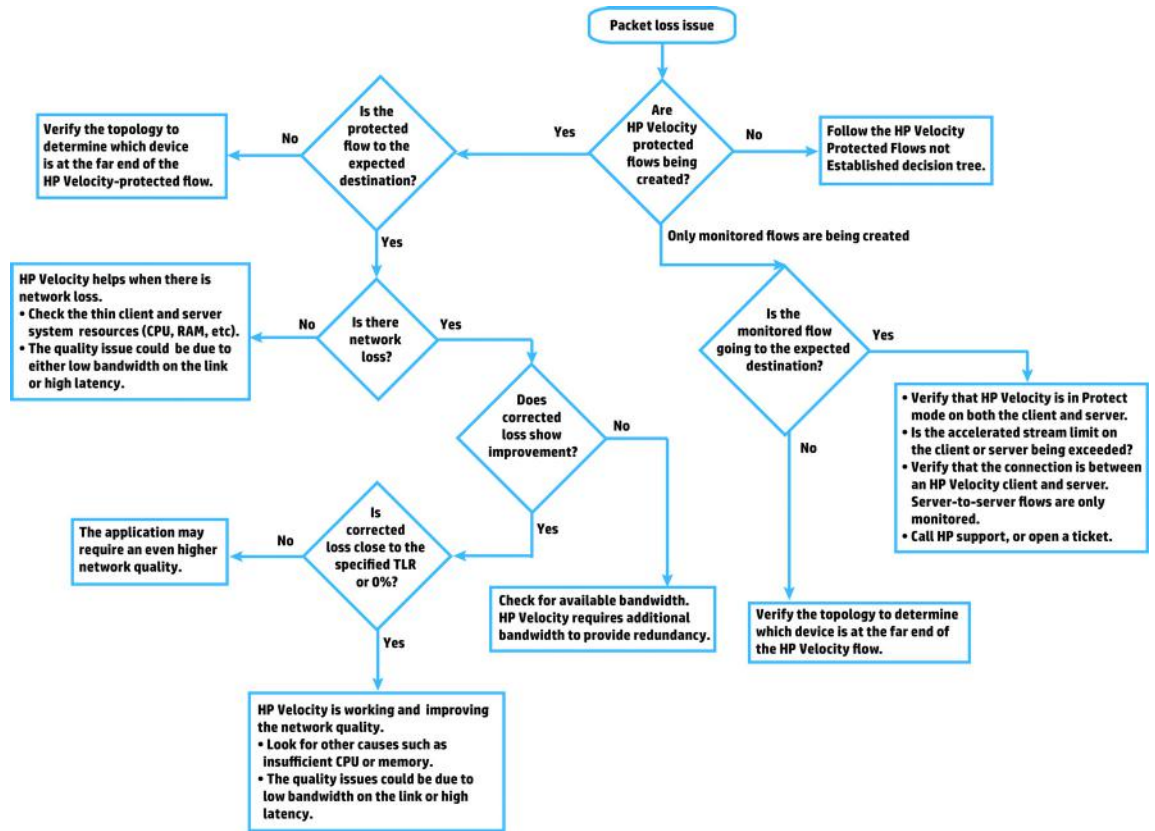
Non-VDI connectivity issue



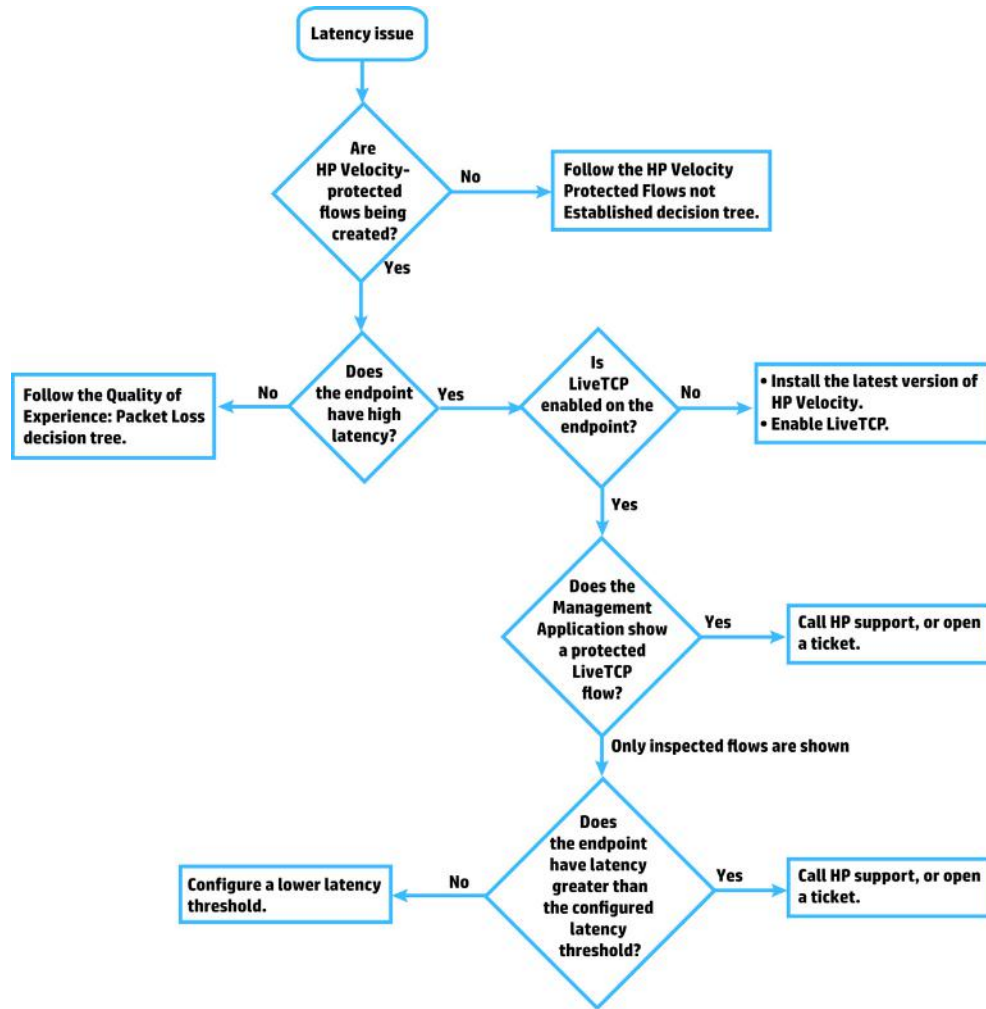
HP Velocity-protected flows not established



Quality of Experience: Packet-loss issue



Quality of Experience: Latency issue



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>`.

Parameters**Table 19: /config/liveq parameters**

Parameter	Value	Default
TargetLossRate	<ul style="list-style-type: none"> • 0.4 = 0.4% • 0.2 = 0.2% • 0.1 = 0.1% • 0.04 = 0.04% 	0.04
CongestionAvoidance	<ul style="list-style-type: none"> • Enabled • Disabled 	Enabled
BandwidthControl	<ul style="list-style-type: none"> • Default • Low • Medium 	Default
ProtectionFilters	Any UDP ports	1 to 65535

config/livetcp**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/livetcp` 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/livetcp
```

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

Parameters**Table 20: /config/livetcp parameters**

Parameter	Value	Default
LatencyThreshold	0 to 2000 ms (duration)	5 ms
CongestionControl	<ul style="list-style-type: none"> • Standard • TcpFriendly 	Standard
AccelerationFilters	Any TCP ports	1 to 65535
PersistentFilters	Any TCP ports	3389

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

Parameter	Values	Default
ProtectedFlows	64 to 4096	2048
localSystemInformationCollection	<ul style="list-style-type: none"> Enabled Disabled 	Enabled
remoteSystemInformationCollection	<ul style="list-style-type: none"> Enabled Disabled 	Enabled

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

Parameter	Default	Evaluation order
<code>BlacklistIpAddresses</code>	255.255.255.255/32	1
<code>WhitelistIpAddresses</code>	All IP addresses	2
<code>WhitelistTcpPorts</code> , <code>WhitelistUdpPorts</code>	All ports	3
<code>BlacklistTcpPorts</code> , <code>BlacklistUdpPorts</code>	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:

```
cat /proc/net/hp-velocity/config/system/settings
```

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

Parameters

Table 23: /config/settings parameters

Parameter	Values	Default
OperationalMode	<ul style="list-style-type: none"> • Enabled • Disabled 	Enabled
LiveQ-PacketLossProtection	<ul style="list-style-type: none"> • Enabled • Disabled 	Enabled
LiveTCP-LatencyMitigation	<ul style="list-style-type: none"> • Enabled • Disabled 	Enabled
LiveWifi-Prioritization	<ul style="list-style-type: none"> • Enabled • Disabled 	Enabled
TCPOptionBeacon	<ul style="list-style-type: none"> • Enabled • Disabled 	Enabled
TCPTelemetry	<ul style="list-style-type: none"> • Enabled • Disabled 	Disabled
SingleSidedAccelerate	<ul style="list-style-type: none"> • Enabled • Disabled 	Disabled

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

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