

Horizon Protocol Optimization

⚠ Disclaimer

My postings are my own and don't necessarily represent VMware's positions, strategies or opinions.

External links:

- GPO parameters: http://getadm.com/?Category=VMware_Horizon_7
- PCoIP Tuning: <https://kb.vmware.com/kb/1014686>
- Blast Extreme tuning: <https://techzone.vmware.com/resource/vmware-blast-extreme-optimization-guide>

General Tips

- Turn Hardware Acceleration in all software:
 - Browsers: IE, FireFox, Chrome
 - MSOffice 2013+: Word, Excel properties
- PCoIP Tuning:
 - Lower audio quality 500kbps 150kbps. If audio is not needed, disable it (Enable/Disable Audio in the PCoIP session).
 - Lower FPS 30 12-15 (Configure PCoIP Image Quality Levels)
 - Check the image quality levels, try Minimum Image Quality = 40% , Maximum Image Quality = 70% OR Minimum Image Quality = 60% , Maximum Image Quality = 80%
 - Turn off "Build to Lossless"

Blast Tuning

Dynamic Environment Manager

Settings	High Speed LAN	LAN	Dedicated WAN	Broadband WAN	Low Speed WAN	Extremely Low-Speed Connection
MaxBandwidthKbps	1,000,000 (1Gbs)	1,000,000 (1Gbs)	1,000,000 (1Gbs)	5,000 (5Mbs)	2,000 (2Mbs)	1,000 (1Mbs)
MinBandwidthKbps	256	256	256	256	128	128
EncoderMaxFPS	60	30	30	20	15	5
AudioEnabled	1	1	1	1	1	0
JpegQualityHigh	90	90	90	70	60	50
JpegQualityMid	35	35	35	35	35	35
JpegQualityLow	25	25	25	20	20	20
H264MaxQP	28	36	36	36	36	42

Tuning in PoC

ENCODERMAXFPS

- Description The Encoder Maximum Frame Rate setting dictates the speed at which updates are sent to the remote Horizon client. Most users cannot distinguish a Blast Extreme setting running at 24fps from a session running at 30fps. Lowering this value can reduce the quantity of bandwidth required per session resulting in better overall performance.
- Tuning methodology starting at 30, reduce the value by 1 and perform a series of consistent visual tests. Continue reducing the value by 1 through several test cycles until the value is so low that the tests yield undesirable results. Return the setting to a value of +1 over the lowest observed number with acceptable results.
- Default value 30
- PoC final value 23
- Range 1/120
- HKLMSOFTWARE\Policies\VMware, Inc.\VMware Blast\Config\EncoderMaxFPS

AUDIOENABLED

- Description The Audio Enable setting enables or disables audio on the virtual desktop. Since audio can consume significant bandwidth, this setting should be at zero for all use cases where audio is not required.

- Default value 1
- PoC final value 0
- Range 0/1
- HKLM\SOFTWARE\Policies\VMware, Inc.\VMware Blast\Config\AudioEnabled

H264MAXQP

- Description The H.264 maximum Quantization Parameter setting controls how much the resulting image is quantized, i.e. lossy compressed. This maximum QP sets the upper bound for quantization, i.e. the lowest quality.
- Tuning methodology starting at 28, increase the value by 1 and perform a series of consistent visual tests. Continue increasing the value by 1 through several test cycles until the value is so high that the tests yield undesirable results. Return the setting to a value of -1 under the highest observed number with acceptable results. We advise keeping these values within +/- 5 of the defaults, as more significant changes can have drastic effects.
- Default value 36
- PoC final value 38
- Range 0/51
- HKLM\SOFTWARE\Policies\VMware, Inc.\VMware Blast\Config\H264maxQP

H264MINQP

- Description The H.264 minimum Quantization Parameter setting controls how much the resulting image is quantized, i.e. lossily compressed. This minimum QP sets the lower bound for quantization, i.e. the best quality.
- Tuning methodology starting at 15, reduce the value by 1 and perform a series of consistent visual tests. Continue reducing the value by 1 through several test cycles until the value is so low that the tests yield undesirable results. Return the setting to a value of +1 over the lowest observed number with acceptable results. We advise keeping these values within +/- 5 of the defaults, as more significant changes can have drastic effects.
- Default value 10
- PoC final value 10
- Range 0/51
- HKLM\SOFTWARE\Policies\VMware, Inc.\VMware Blast\Config\H264minQP

JPEGQUALITYHIGH

- Description The JPEG Quality High setting specifies the image quality of the desktop display for JPEG/PNG encoding. The high-quality settings are for areas of the screen that are more static, resulting in a better image quality. Lowering this value can reduce the quantity of bandwidth required per session resulting in better overall performance.
- Tuning methodology starting at 90, reduce the value by 2 and perform a series of consistent visual tests. Continue reducing the value by 2 through several test cycles until the value is so low that the tests yield undesirable results. Return the setting to a value of +1 over the lowest observed number with acceptable results.
- Default value 90
- PoC final value 75
- Range 1/100
- HKLM\SOFTWARE\Policies\VMware, Inc.\VMware Blast\Config\JpegQualityHigh

JPEGQUALITYMID

- Description The JPEG Quality Mid setting specifies the image quality of the desktop display for JPEG/PNG encoding. The mid-quality settings are for areas of the screen that change periodically, resulting in a better image quality. Lowering this value can reduce the quantity of bandwidth required per session resulting in better overall performance.
- Tuning methodology starting at 35, reduce the value by 1 and perform a series of consistent visual tests. Continue reducing the value by 1 through several test cycles until the value is so low that the tests yield undesirable results. Return the setting to a value of +1 over the lowest observed number with acceptable results.
- Default value 30
- PoC final value 30
- Range 1/100
- HKLM\SOFTWARE\Policies\VMware, Inc.\VMware Blast\Config\JpegQualityMid

JPEGQUALITYLOW

- Description The JPEG Quality Low setting specifies the image quality of the desktop display for JPEG/PNG encoding. The mid-quality settings are for areas of the screen that change frequently, resulting in a better image quality. Lowering this value can reduce the quantity of bandwidth required per session resulting in better overall performance.
- Tuning methodology starting at 25, reduce the value by 1 and perform a series of consistent visual tests. Continue reducing the value by 1 through several test cycles until the value is so low that the tests yield undesirable results. Return the setting to a value of +1 over the lowest observed number with acceptable results.
- Default value 25
- PoC final value 20
- Range 1/100
- HKLM\SOFTWARE\Policies\VMware, Inc.\VMware Blast\Config\JpegQualityLow

MINBANDWIDTHKBPS

- Description Similar to the PCoIP bandwidth floor, the Minimum Bandwidth Kbps setting specifies a reservation of bandwidth for Blast Extreme. The protocol will immediately begin consuming this quantity of bandwidth if the pixel rates demand it without any throttling.
- Tuning methodology starting at 256, increase the value by 1024 and perform a series of consistent visual tests. The perceived performance of the session should eventually improve as the value increases. Continue increasing the value by intervals of ~1024 through test cycles until the tests results stop improving. Return the setting to a value of ~1024 over the lowest observed number with acceptable results.
- Default value 256
- PoC final value 7168

- Range 1/100000000
- HKLM\SOFTWARE\Policies\VMware, Inc.\VMware Blast\Config\MinBandwidthKbps

UDPENABLED

- Description In Horizon 7.6, Blast Extreme uses an “Adaptive Transport” technology to detect sub-optimal network conditions and if necessary, respond by transitioning the Blast Extreme data stream from TCP to UDP. On networks with consistent packet loss (drops) due to network congestion or other adverse conditions, UDP may yield better performance. However, on many high intensity workloads, TCP has been observed to perform better.
- Tuning methodology With all other Blast Extreme settings at their defaults, set the registry value to 1 and disconnect from the VM. Log back into the VM and perform a series of consistent visual tests. Switch the registry value from 1 to 0 and disconnect from the VM. Log back into the VM and perform a series of consistent visual tests. Choose the option that yields the best test results.
- Default value 1
- PoC final value 0
- Range 1/0
- HKLM\SOFTWARE\Policies\VMware, Inc.\VMware Blast\Config\UdpEnabled

PCoIP Tuning

Dynamic Environment Manager

PCoIP Profile	Suggested BW for Profile (Mbps)	Max Session BW (kbps)	Min Session BW (kbps)	Enable BTL	Max Initial Image Quality	Minimum Image Quality	Max FPS	Max Audio BW (kbps)	Image Quality Performance
Workstation	20	900000	100	Yes	100	50	60	1600	50
LAN	10	900000	100	Yes	90	50	30	1600	50
Default	5	900000	100	No	80	40	30	500	50
Low Speed Broadband	2	5000	100	No	70	40	20	500	50
T1	1	2000	100	No	70	30	15	200	25
Sub T1	0.5	1000	100	No	70	30	5	90	0

Tuning in PoC

PCOIP.EVENT_FILTER_MODE

- Description The event filter mode setting dictates the level of PCoIP event logging. All tuning and troubleshooting should be done with the log at level 3 (debug). This setting should be backed down to level 2 under normal, production conditions.
- Default value 2
- Optimal value 3
- Range 0/3
- HKLM\SOFTWARE\Policies\Teradici\PCoIP\pcoip_admin_defaults\pcoip.event_filter_mode
- Type: REG_DWORD

PCOIP.MAXIMUM_FRAME_RATE

- Description The maximum frame rate setting dictates the speed at which updates are sent to the remote Horizon client. Most users cannot distinguish a PCoIP setting running at 24fps from a session running at 30fps. Lowering this value can reduce the quantity of bandwidth required per session resulting in better overall performance.
- Tuning methodology starting at 30, reduce the value by 1 and perform a series of consistent visual tests. Continue reducing the value by 1 through several test cycles until the value is so low that the tests yield undesirable results. Return the setting to a value of +1 over the lowest observed number with acceptable results.
- Default value 30
- PoC final value 23
- Range 1/120
- HKLM\SOFTWARE\Policies\Teradici\PCoIP\pcoip_admin_defaults\pcoip.maximum_frame_rate
- Type: REG_DWORD

PCOIP.MAXIMUM_INITIAL_IMAGE_QUALITY

- Description The maximum image quality setting dictates the quality of still or mostly still graphics being sent to the Horizon client. Lowering this value can reduce the quantity of bandwidth required per session resulting the perception of a faster, snappier user interface. Most users cannot distinguish a PCoIP session running at a value of 70 over a value of 80. Regardless of this settings value, all images are built out to a near-lossless quality over time.
 - Tuning methodology starting at 80, reduce the value by 5 and perform a series of consistent visual tests. Continue reducing the value by intervals of 5 through test cycles until the value is so low that the tests yield undesirable results. Return the setting to a value of +5 over the lowest observed number with acceptable results.
 - Default value 80
 - PoC final value 70
 - Range 30/100
 - HKLM\SOFTWARE\Policies\Teradici\PCoIP\pcoip_admin_defaults\pcoip.maximum_initial_image_quality
 - Type: REG_DWORD

PCOIP.MINIMUM_IMAGE_QUALITY

- Description The minimum image quality setting dictates the quality of moving or rapidly changing graphics being sent to the Horizon client. Lowering this setting will make the user perceive that they are experiencing a faster framerate. However, reducing this value lowers the image quality which can become problematic. Most users cannot distinguish a PCoIP session running at a value of 35 over a value of 40.
 - Tuning methodology starting at 40, reduce the value by 1 and perform a series of consistent visual tests. Continue reducing the value by intervals of 1 through test cycles until the value is so low that the tests yield undesirable results. Return the setting to a value of +1 over the lowest observed number with acceptable results.
 - Default value 80
 - PoC final value
 - Range 30 100
 - HKLM\SOFTWARE\Policies\Teradici\PCoIP\pcoip_admin_defaults\pcoip.minimum_image_quality
 - Type: REG_DWORD

PCOIP.USE_CLIENT_IMG_SETTINGS

- Description The use client image settings value dictates if PCoIP settings specified at the Horizon client will be honored thus overriding what is set in the VDI VMs registry or via GPO. During tuning sessions, this value should always be set to 0 (zero).
 - Default value 1
 - PoC final value 0
 - Range 0/1
 - HKLM\SOFTWARE\Policies\Teradici\PCoIP\pcoip_admin_defaults\pcoip.use_client_img_settings
 - REG_DWORD

PCOIP.ENABLE_AUDIO

- Description The PCoIP audio enable setting enables or disables audio on the virtual desktop. Since audio can consume significant bandwidth, this setting should be at zero for all use cases where audio is not required.
 - Default value 1
 - PoC final value 0
 - Range 0/1
 - HKLM\SOFTWARE\Policies\Teradici\PCoIP\pcoip_admin_defaults\pcoip.enable_audio
 - REG_DWORD

PCOIP.DEVICE_BANDWIDTH_FLOOR

- Description The PCoIP device bandwidth floor setting modifies the minimum expected bandwidth transmission rate for the session in kpb/s. When you use this setting to reserve bandwidth for an endpoint, the session does not have to wait for bandwidth to become available, which improves session responsiveness. The default value is 0, which means that no minimum bandwidth is reserved.
- Tuning methodology starting at 0, increase the value by 5000 and perform a series of consistent visual tests. The perceived performance of the session should eventually improve as the value increases. Continue increasing the value by intervals of ~5000 through test cycles until the tests results stop improving. Return the setting to a value of ~1000 over the lowest observed number with acceptable results.
- Default value 0
- PoC final value 30000 (this value is very high for a long-haul WAN link)
- Range 0/100000000
- HKLM\SOFTWARE\Policies\Teradici\PCoIP\pcoip_admin_defaults\pcoip.device_bandwidth_floor
- REG_DWORD

Performance counters

Perfmon:

- PCoIP latency (record for several hours during user work)

Check that VM is not utilizing CPU more than 90% - or it may not have the resource to process the PCoIP codec.