



App Map for HP Moonshot System with Leostream and HP Remote Graphics Software

Delivering high-performance desktops using a hosted desktop infrastructure

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Executive summary

Today's technological world relies on computers to run a successful business. For years, organizations have provided desktops, laptops, and workstations to their employees as a means to get their jobs done. While many IT processes for procuring and delivering these desktops have remained unchanged, the business needs these processes address, have evolved with the times. Organizations require higher security for the data on desktops, lower costs for refreshing desktops, and streamlined processes for managing the day-to-day IT needs. IT staffs often find themselves balancing the modern needs of their end users, including mobile access to their desktops, with the demanding requirements of their company, including but not limited to saving money while increasing data security.

The HP Moonshot System allows enterprises to build a full hosted desktop infrastructure (HDI) that recognizes the benefits of virtual desktop infrastructure (VDI)—such as corporate data securely housed in the corporate data center and not on users' end-point devices. It also provides end users with the compute and experience they require.

HP Moonshot requires less space, power consumption, and complexity than traditional server solutions, lowering operational costs. Its energy-efficient system-on-a-chip (SoC) design and shared infrastructure across 45 hot-pluggable server cartridges in a 4.3U chassis delivers low power consumption, ultra-high density, and flexible scale-out with significantly less cabling.

Leostream provides the tools IT needs to manage HP Moonshot to assign desktops hosted on HP ProLiant m700 Server Cartridges to end users, and to connect users to those desktops using HP Remote Graphics Software (RGS). HP RGS, in turn, provides best-in-class performance for the end users' remote desktop connections. The combination of HP Moonshot with the Leostream Connection Broker and HP RGS provides a full-stack solution that simplifies the IT task of managing HDI at a lower cost and with better end-user experience.

Target audience: This document is intended for IT decision makers, architects, and installers who are interested in deploying a successful, low-cost HDI using the Leostream Connection Broker and HP RGS; Secondary audience: Technical Presales, Channel Partners.

A working knowledge of server architecture, networking architecture, and Microsoft® Windows® Deployment Services is recommended.

Document purpose: The purpose of this document is to describe a recommended architecture/solution, and to provide the information necessary to configure Leostream for use with HP Moonshot. Information on installing and configuring HP Moonshot System hardware and software is detailed in the documentation referenced throughout this guide.

This white paper describes testing performed by HP in January 2015.

Introduction

An HDI provides users with Microsoft Windows desktops by using high-density, unshared desktop images running on enterprise hardware. Each user's desktop image runs on dedicated, unshared hardware and each end user remotely accesses their desktop image using a display protocol and client device, resulting in predictable performance.

Why HDI?

An HDI solution shares many of the benefits of a classic VDI deployment. Both VDI and HDI deliver data security, power savings, and centralized management of user assignments to desktops. HDI is unique from VDI in that each user has dedicated hardware in the data center, and this can improve the end-user experience.

A key aspect of the end-user experience is video quality. In traditional solutions, achieving exceptional video quality can be a challenge because GPU functionality is typically provided by software rendering on the system CPU instead of specialized hardware. Direct-mapped GPU technology in the virtual environment or virtualizing dedicated GPU hardware among many users exists today, but user density is low and the cost can be high.

The HP Moonshot HDI solution leverages the HP ProLiant m700 Server Cartridge and latest SoC from AMD with built-in GPU/APU. This solution enables delivery of a natural desktop video experience, all in a low-power envelope with high density.

Why Leostream and HP Remote Graphics Software?

Building HDI using HP Moonshot provides data security by placing the desktops in the data center, and enables high-performance end-user experience by providing a built-in GPU. The remaining challenge for IT, then, is user management. How does IT simplify and perfect the end-user experience?

The Leostream Connection Broker integrates with HP Moonshot System Chassis Management software to allow IT to manage inventory, control power, and deploy operating systems to the HP ProLiant m700. Using Leostream, IT can easily manage multiple chassis, simultaneously. In addition, Leostream provides the tools needed to assign users to the

appropriate desktop hosted on HP Moonshot, and connect users to their desktops using HP RGS. HP RGS provides flawless, secure, and instant access to desktops hosted on HP Moonshot from any location.

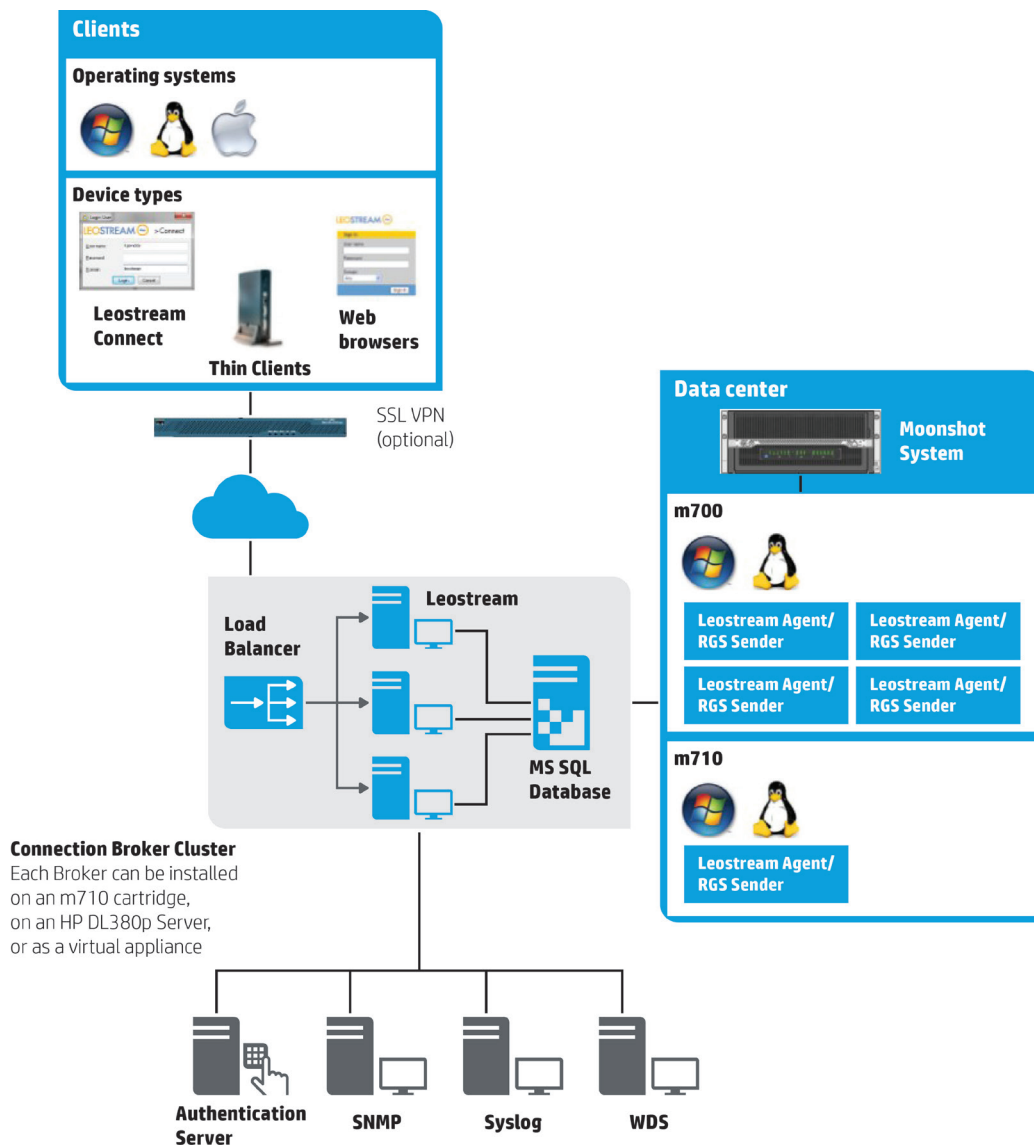
In the end, the combination of Leostream and HP RGS yields an HP Moonshot solution for hosted desktop that is easy to manage yet provides the required end-user experience.

Overview

The underlying infrastructure for this App Map is the HP Moonshot System, which, along with the HP ProLiant m700, provides designated switch modules paired with uplink modules, a highly flexible chassis fabric, and built-in storage. This App Map (reference architecture) uses the following technologies that are discussed in detail in the following sections.

- HP Moonshot 1500 Chassis
- HP ProLiant m700 Server Cartridge
- HP Moonshot iLO Chassis Management Firmware
- HP Thin Clients
- HP Remote Graphics Software
- Microsoft Windows Deployment Services
- Leostream Connection Broker

Figure 1. High-level solution architecture

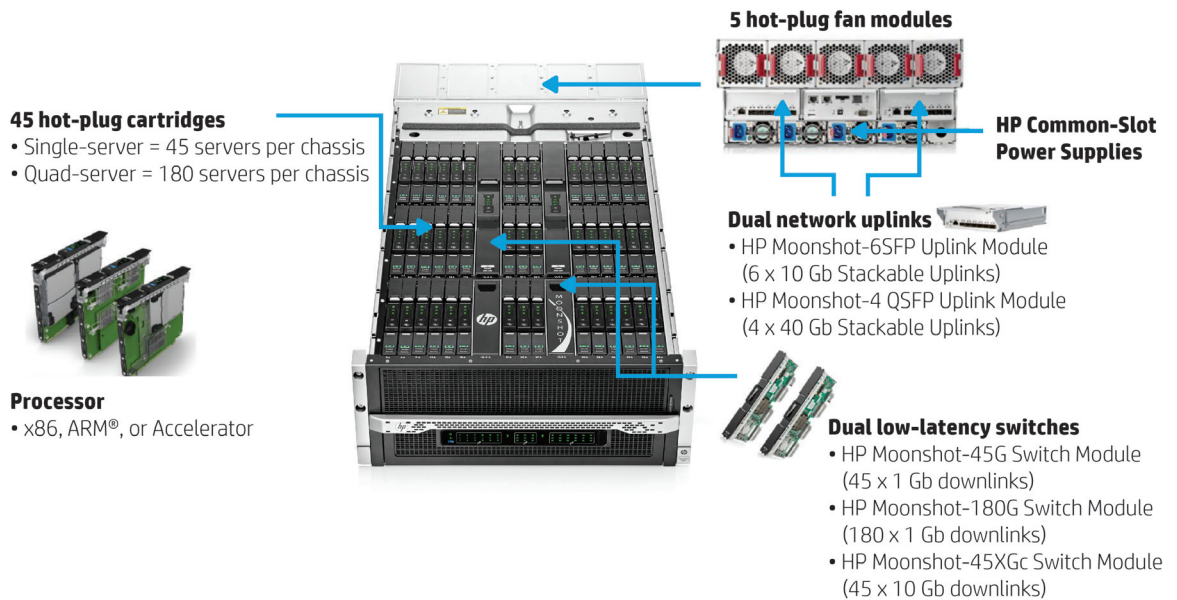


Solution components

HP Moonshot 1500 Chassis

The HP Moonshot System is a leap forward in infrastructure design that addresses speed, scale, and specialization needs. The HP Moonshot 1500 chassis provides several shared functions that are leveraged by HDI solutions. HP Moonshot provides a variety of servers, which HP designates as cartridges and are purpose built for different workloads. For HDI workloads, HP Moonshot utilizes the HP ProLiant m700. Figure 2 illustrates several components of the HP Moonshot 1500 Chassis.

Figure 2. HP Moonshot 1500 Chassis front and rear view



For more information on HP Moonshot System, visit hp.com/go/moonshot.

HP ProLiant m700 Server Cartridge

HP ProLiant m700 Server Cartridge features four AMD Opteron X2150 APUs for hosted desktop workloads. It provides a consistent, reliable PC experience for the most demanding mobile workers, while delivering improvement in TCO and lower power consumption.

Because each user has an independent CPU, NIC, RAM, SSD storage, and GPU, the high-density HP Moonshot System with the HP ProLiant m700 delivers a fully functional PC desktop experience to each user. Users enjoy consistent, reliable performance, and high-quality service running varied individual workloads.

Table 1. HP ProLiant m700 Server Cartridge specifications

HP ProLiant m700 Server Cartridge



CPU	(4) 15 W AMD Opteron X2150 APU/4 core/1.1—1.8 GHz w/ Integrated GPU
Memory	(4) 8 GB SO-DIMMs Total 1 SO-DIMM per processor, each up to 1600 MHz, DDR3 SO-DIMM ECC (8 GB)
Network	Onboard NIC: 1 dual port 1GbE NIC per CPU Switch: 180 1GbE Downlinks Uplink Module: 4 x 40GbE QSFP+ ports
Storage	1) HP m700 4 x 32 GB iSSD Mezzanine for local storage (1 x 32 GB per CPU) or 2) HP m700 64 GB iSSD Mezzanine FIO Kit (256 GB iSSD per cartridge)
Power	Chassis: 3510 W Peak, 1755 W Typical, 900 W Idle Cartridge: 78 W Peak, 39 W Typical, 20 W Idle Node: 19.5 W Peak, 10 W Typical, 5 W Idle
OS	Microsoft Windows® 7 Enterprise and Professional with Service Pack 1 (x64) Microsoft Windows 7 Enterprise and Professional with Service Pack 1 (x86)

HP Moonshot iLO Chassis Management Firmware

HP Moonshot iLO Chassis Management Firmware is the gateway for aggregated chassis management on the HP Moonshot System. As a single point-of-access to the chassis, iLO CM firmware provides CLI, IPMI, and remote serial console access to configure, update, and operate the HP Moonshot System.

Leostream requires the CM firmware CLI to manage the HP Moonshot System. Leostream supports iLO CM version 1.30 and later versions.

HP Thin Clients

The HP Thin Client portfolio encompasses a large selection of access devices for connecting users to desktops using HP RGS and HP Velocity. HP Velocity, a software solution built into HP RGS and tested with HP Thin Clients, improves the user experience for remote desktop and virtualized applications by addressing common network bottlenecks, such as packet loss, network latency, and Wi-Fi congestion. HP Velocity provides the greatest performance improvement for remote and branch offices, teleworkers, Wi-Fi, and 3G/4G.

Table 2. HP Thin Client portfolio

Thin Client receiver	Windows embedded	Embedded Linux®
HP t620	WES7, WES8	HP ThinPro 5
HP t820	WES7, WES8	-
HP mt41	WES7	-

HP Remote Graphics Software

HP RGS provides flawless, secure, and instant access to desktops hosted on HP Moonshot System from any location. RGS provides 3D graphics support for the latest versions of Open GL and Direct X.

All applications run natively on the remote desktop, taking full advantage of its graphics resources. The remote desktop is transmitted over a standard network to a window on a local computer using advanced image compression technology specifically designed for digital imagery, text, and high-frame rate video applications.

A local keyboard and mouse are supported, as well as redirection of most USB devices to provide an interactive, high-performance workstation experience. In addition, with HP RGS 7.0 end users can access their desktop from a Windows® 8 tablet by turning swipes into hot keys, pinches into zooms, and taps and presses into precise onscreen mouse clicks.

For more information on HP RGS, visit hp.com/go/rgs.

Microsoft Windows Deployment Services

Microsoft Windows Deployment Services (WDS) enables Leostream to deploy Windows operating systems over the network onto individual HP ProLiant m700 server nodes. In order to use WDS with HP Moonshot System, HP Moonshot Windows Deployment Pack (MWDP) is needed to inject Moonshot-specific drivers to base Windows images. Information on configuring your Windows images for use with the HP Moonshot System can be found in the [Operating System Deployment on HP ProLiant Moonshot Server Cartridges User Guide](#).

Leostream Connection Broker

The Leostream Connection Broker lies at the heart of any HDI deployment, and is the key component for deploying operating systems to HP Moonshot nodes, assigning desktops to users, connecting users to their desktops, and controlling the end-user experience. When used with an HP Moonshot System, the Leostream Connection Broker deploys operating system to the individual nodes using Microsoft WDS.

The Leostream Connection Broker consists of the following four components:

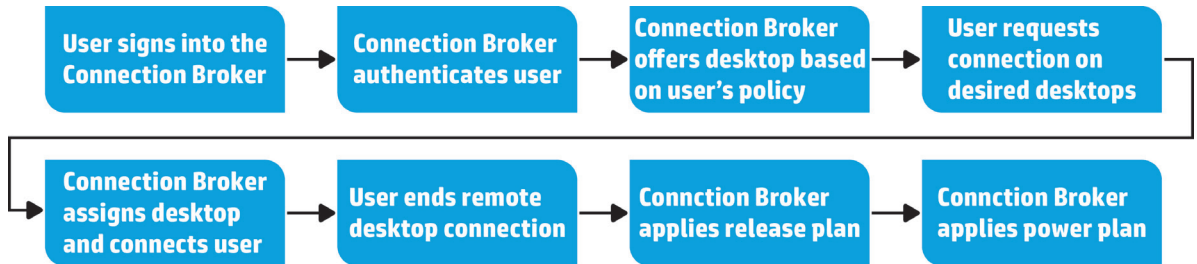
- **Connection Broker:** The main virtual appliance that manages the HDI. The Connection Broker is the central management layer for configuring your deployment, including: inventorying nodes in the HP Moonshot System, deploying operating systems, assigning nodes to users, and defining the end-user experience.
- **Leostream Agent:** The Leostream Agent is installed on each desktop, and provides the Connection Broker with insight into the connection status of remote users. It is required when using Microsoft WDS in conjunction with Leostream.

- **Leostream Connect:** A software client provided by Leostream that allows users to connect to their desktops from fat or thin clients. Certain thin clients provide built-in Leostream clients. Leostream Connect is available as a Windows application and as a Java application that runs on Linux and Mac OS X operating systems. Users that connect to desktops using RGS must use Leostream Connect or a thin client that supports Leostream logins and RGS connections.
- **Database:** In a proof-of-concept environment, the Connection Broker stores all information in an internal database. Production deployments that use Connection Broker clusters must use an external Microsoft SQL Server 2012 or 2014 database.

How Leostream manages users

Figure 3 illustrates the different steps involved in connecting users to desktops. With the exception of authenticating users, policy and plan logic determines how the Connection Broker handles each step.

Figure 3. How Leostream connects users to desktops

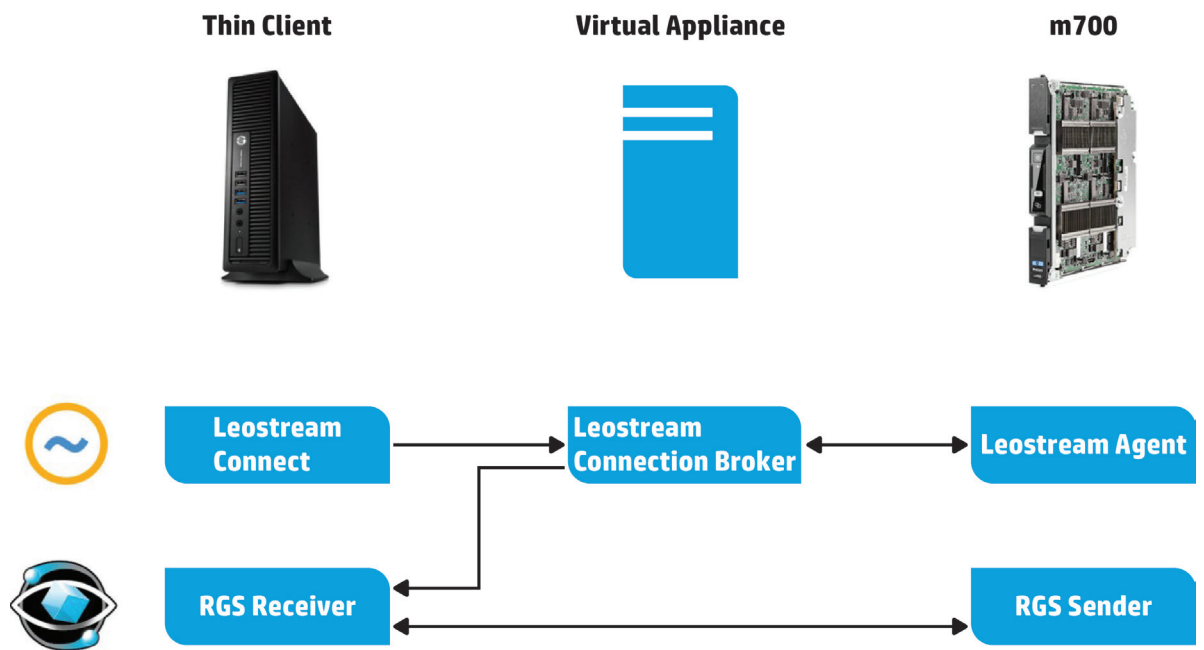


1. **User signs into the Connection Broker:** Users log into the Connection Broker using the Leostream Connect software client or an HP Thin Client when connecting to desktops using HP RGS. Different clients support different types of authentication systems, such as user name/password, smart cards, or fingerprint readers.
2. **Connection Broker authenticates user:** After the Connection Broker receives the user's credentials from the client device, it searches for the user in the domains defined in the broker. If the user previously logged in, the Connection Broker begins by looking in the authentication server used for the previous login then searches the remaining authentication servers in the order defined by the authentication server's **position**. If this is the first time the user logged in, the Connection Broker searches all authentication servers in order of their position.
3. **Connection Broker offers resources based on user's policy:** The Connection Broker assigns a Leostream policy to the user using the assignment table associated with the authentication server chosen in step 2. The policy determines the desktops and applications offered to the user, USB pass-through permissions, and the display protocol to use.
4. **User requests connection to desired desktop:** The client lists all desktops offered to the user by their policy. The user then requests a connection to their desired desktop.
5. **Connection Broker assigns desktop:** After the user requests a connection, the Connection Broker assigns that desktop to the user. When a desktop is assigned to a particular user, the Connection Broker never offers that desktop to another user.
After assigning, the Connection Broker passes configuration information used to establish the desktop connection to the client device. The client device, such as Leostream Connect, then launches the native client for the display protocol. In the case of an HP RGS connection, Leostream Connect launches the RGS Receiver. Neither the Connection Broker nor the Leostream Connect client proxy the RGS connection.
6. **User ends remote desktop session:** When the user disconnects or logs out of their RGS session, the Connection Broker applies any power control or release actions specified by the plans assigned to that desktop in the user's policy.
7. **Connection Broker unassigns desktop:** The Release Plan indicates if the Connection Broker releases the desktop back to its pool and unassigns the desktop. Otherwise, the Connection Broker retains the desktop assignment.
8. **Connection Broker applies power policy:** Lastly, the Connection Broker takes any power control actions set in the user's power plan.

Capacity and sizing

This section provides an overview of the performance testing process for the Leostream and HP RGS solution on HP Moonshot with HP ProLiant m700 Server Cartridges. The test setup consisted of one HP ProLiant m700 in an HP 1500 Moonshot Chassis as the target machine, one HP t820 Flexible Thin Client as the client machine, and the Leostream Connection Broker virtual appliance, running on an HP ProLiant DL380p Gen8 Server. The Leostream Connection Broker virtual appliance does not have to run on a DL380p Gen8 Server as there are many installation options to fit most environments. Because the Leostream management allows HP RGS to make a direct connection between the target and client machine, the Leostream Connection Broker infrastructure component will not affect performance. Figure 4 illustrates the test setup used for this performance testing.

Figure 4. Test setup flow



System performance was characterized by capturing key metrics during varying workloads designed to be representative of the system load generated by an office worker. To evaluate the HP and Leostream solution using HP RGS on the HP ProLiant m700, this paper focused on the following key criteria:

- Frames per second
- Network bandwidth
- CPU utilization percentage
- GPU utilization percentage
- Power consumption

Frames per second were measured at the client machine, to gauge user experience. All other system-level performance data was measured at HP ProLiant m700, to assess how well it handled the workload. Disk throughput and memory utilization were also collected during testing, and commonly important criteria for performance testing were not significantly affected in any of the tests. As an HDI solution, each user on an HP ProLiant m700 will always have 8 GB of RAM, which is more than enough for typical office worker uses. In addition, the M.2 SSD onboard the HP ProLiant m700 never encountered queue build-ups or low enough throughput to affect performance. Therefore, these system parameters are not reported in the following data.

Table 3 describes the configuration of the HP ProLiant m700, pointing out relevant software and firmware versions.

Table 3. HP ProLiant m700 configuration

Software/Firmware	Version
OS	Windows 7 Enterprise, Service Pack 1
GPU driver	AMD Catalyst Control Center 14.12
Leostream agent	5.6
Remote Graphics Sender	7.0.1.4338
Windows Media Player	12.0.7601.17514
Adobe® Acrobat® Reader XI	11.0.10
Microsoft Office Professional Plus 2013	15.0.4569.1506
MurGee Auto Keyboard	1.6
TechPowerUp GPU-Z	0.8.0
System ROM	10/02/2014
Satellite firmware	10/01/2014
Cartridge data	10/31/2014
CPLD	06
Chassis Firmware (Moonshot 1500)	4.6.0
iLO CM (Moonshot 1500)	1.30

In addition to the HP ProLiant m700 target, this solution utilized an HP t820 Flexible Thin Client as a client running HP RGS receiver to display and interact with the remote desktop. Table 4 describes the specifications and configuration of the thin client running RGS receiver and viewing the hosted desktop.

Table 4. HP t820 Flexible Thin Client configuration

Component	Description/Version
CPU	Intel® Core™ i5-4570S @ 2.90 GHz
GPU	AMD Radeon HD 7560A MXM
Memory	4 GB
OS	Microsoft Windows Embedded, Build 7601
RGS Receiver	7.0.0.3913

Workload description

This section describes the workload profile used to evaluate HP RGS performance on HP Moonshot with HP ProLiant m700. The workload was designed to typify an office worker's use of the system through some representative tasks. These tasks include playing a full screen 1080p video, interacting with a PDF document, and interacting with a Microsoft Word document. Specifically, three tests were run:

- Play a 1080p MP4 movie trailer (90 seconds in duration) in Windows Media Player
- Scroll rapidly (50 page down clicks per second) through a 106-page PDF (text only) opened in Adobe Acrobat Reader XI
- Scroll rapidly (50 page down clicks per second) through a 106-page DOC (text only) opened in Microsoft Word 2013

For each of these tests, data was collected with the image quality in RGS set to 25, 50, 65, and 100. These selections allow a broad view of how RGS can handle different bandwidth requirements, and include the RGS default image quality setting of 65. Appropriate settings within the RGS receiver will depend highly on the environment in which the solution is placed, but as a guide the settings used for testing are listed below. These settings were chosen to tune the environment for best performance and user experience.

Table 5. RGS settings

RGS setting	Value
Force full-screen image updates	ON
Advanced video compression on sender	OFF
Image quality	25, 50, 65, 100
Increase text rendering quality	ON
Adaptive image quality	OFF
Remote audio	STEREO, quality set to MEDIUM
Remote USB and remote clipboard	ENABLED

In addition, delivered resolution was set to 1920x1080 pixels. This value cannot be directly set in RGS receiver, and was instead set in the AMD Catalyst Control Center, running on the HP ProLiant m700, from within the RGS session.

Workload data/results

The three workloads mentioned in Workload description were run on a single HP ProLiant m700 node. Since each user is assigned a unique node of the HP ProLiant m700, performance is predictable and linearly scalable.

Video workload

Table 6 shows a summary of performance results for the video workload.

Table 6. HP ProLiant m700 performance metrics: video workload

Image quality setting	Average frames per second	Average network bandwidth (Mbps)	Average GPU % utilization	Average CPU % utilization
25	17.5	20.4	63.3	45.4
50	17.1	21.2	61.9	45.4
65	17.3	23.2	59.8	44.5
100	14.2	28.5	64.5	52.6

Table 7 takes a closer look at the frames per second data from the video workload.

Table 7. Frames per second data: video workload

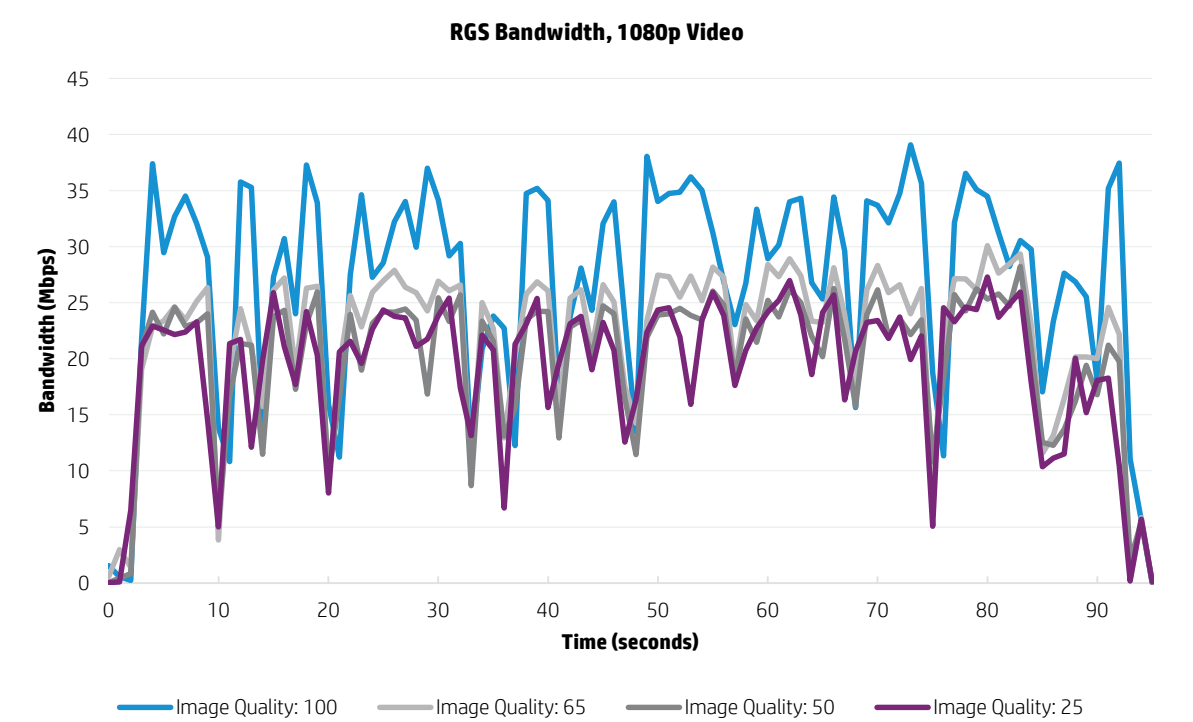
Image quality setting	Average frames per second	Maximum frames per second	Minimum frames per second
25	17.5	39	10
50	17.1	43	8
65	17.3	41	11
100	14.2	40	7

Table 8 and figure 5 take a closer look at the network interface results for the video workload.

Table 8. Network interface data: video workload

Image quality setting	Average network bandwidth (Mbps)	Peak network bandwidth (Mbps)
25	20.4	27.3
50	21.2	28.2
65	23.2	30.1
100	28.5	39.1

Figure 5. RGS bandwidth vs. time across multiple image qualities, video workload



PDF workload

Table 9 shows a summary of performance results for the PDF workload.

Table 9. HP ProLiant m700 performance metrics: PDF workload

Image quality setting	Average frames per second	Average network bandwidth (Mbps)	Average GPU % utilization	Average CPU % utilization
25	31.8	9.8	5.2	50.3
50	31.1	10.3	4.1	64.3
65	31.0	12.2	3.0	65.8
100	28.3	20.5	5.1	69.6

Table 10 takes a closer look at the frames per second data from the PDF workload.

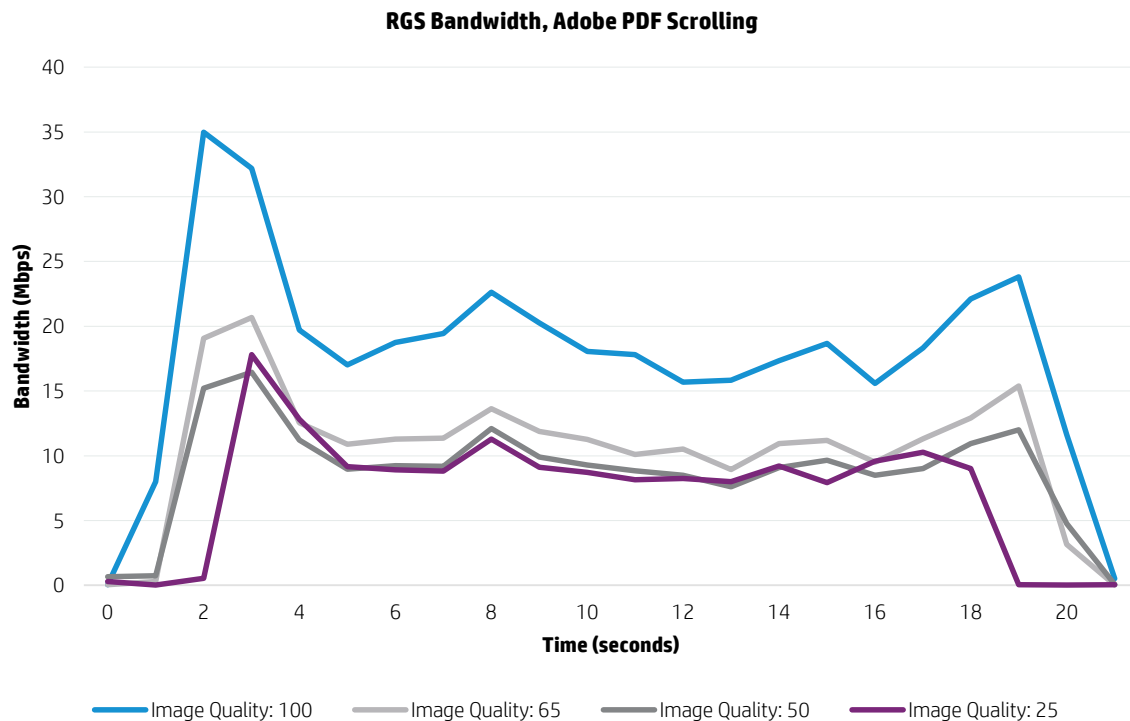
Table 10. Frames per second data: PDF workload

Image quality setting	Average frames per second	Maximum frames per second	Minimum frames per second
25	31.8	36	23
50	31.1	33	26
65	31.0	34	23
100	28.3	33	9

Table 11 and figure 6 take a closer look at the network interface results for the PDF workload.

Table 11. Network interface data: PDF workload

Image quality setting	Average network bandwidth (Mbps)	Peak network bandwidth (Mbps)
25	9.8	17.8
50	10.3	16.5
65	12.2	20.7
100	20.5	35.0

Figure 6. RGS Bandwidth vs. time across multiple image qualities, PDF workload


Word workload

Table 12 shows a summary of performance results for the Microsoft Word workload.

Table 12. HP ProLiant m700 performance metrics: Word workload

Image quality setting	Average frames per second	Average network bandwidth (Mbps)	Average GPU % utilization	Average CPU % utilization
25	18.4	4.1	32.3	67.3
50	19.0	4.9	31.0	64.5
65	20.1	5.3	30.9	69.6
100	19.6	7.5	30.4	64.4

Table 13 takes a closer look at the frames per second data from the Word workload.

Table 13. Frames per second data: Word workload

Image quality setting	Average frames per second	Maximum frames per second	Minimum frames per second
25	18.4	37	6
50	19.0	30	6
65	20.1	35	6
100	19.6	42	2

Table 14 and figure 7 take a closer look at the network interface results for the Word workload.

Table 14. Network interface data: Word workload

Image quality setting	Average network bandwidth (Mbps)	Peak network bandwidth (Mbps)
25	4.1	8.9
50	4.9	10.1
65	5.3	13.2
100	7.5	17.0

Figure 7. RGS Bandwidth vs. time across multiple image qualities, Word workload

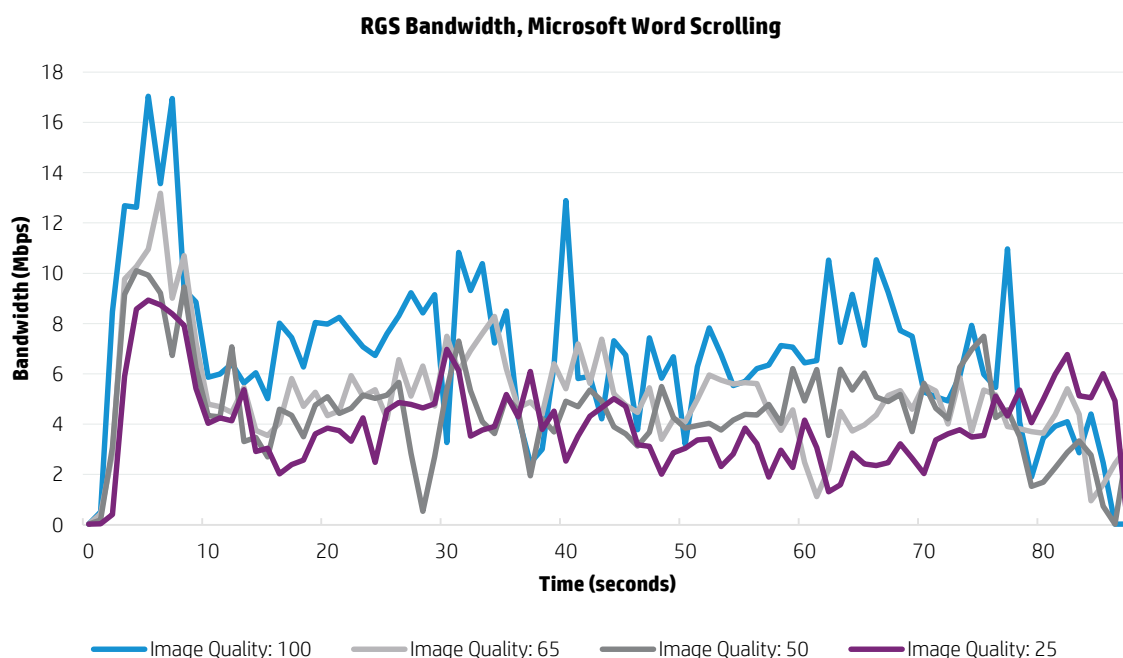


Table 15 shows the measured cartridge power and utilized power (by a single node) for each of the workloads at image quality set to 100. Since the local workload on the HP ProLiant m700 does not change with changes in image quality settings, and resource use (apart from network bandwidth) stays relatively constant, only one image quality is reported here. Note that the average measured power for an HP ProLiant m700 set to “OFF” is 7.2 W, and, therefore, 7.2 W is subtracted from the measured cartridge power to obtain the utilized power, or how much power the workload is actually using.

Table 15. HP ProLiant m700 node power consumption

Workload	Average measured cartridge power (W)	Average utilized node power (W)
Idle (ON)	27.3	20.1
Video	33.8	26.5
PDF	31.7	24.4
Word	33.0	25.7

Analysis and recommendations

On further analysis of the system-level parameters, tests showed that no resource was exhausted on any of the given workloads. In this HDI solution where each node is only responsible for delivering one desktop to a single user, this indicates that performance is likely to remain very strong for typical use cases and applications as tested. The HP ProLiant m700 does have a built-in GPU to aid in processing when applications are optimized, such as playing a video in Windows Media Player or scrolling through a document in Microsoft Word. However, this solution is not limited to only those applications, and similar performance can be expected of a variety of light-to-medium applications.

The proposed solution in this reference architecture is a basic building block that can be repeated to scale up the infrastructure, yielding much larger implementations with minimal alterations to the overall infrastructure. This scaling is as simple as adding and provisioning more HP ProLiant m700 and clients to access the desktops through RGS. User scalability is a constant in this solution, as each user maps to a single node. Therefore, four users map to a single HP ProLiant m700, and this number remains constant as the solution scales, yielding perfectly linear scalability. This allows 180 users per HP Moonshot chassis, with constant and predictable performance.

By implementing the Leostream and HP Remote Graphics Software solution on HP Moonshot with HP ProLiant m700, sizing is easily predicted with few variables and consistent performance can be expected across all users, independent of the percentage of active users. The dedicated resources of each HP ProLiant m700 node allow for excellent user experience with a variety of applications.

Configuration guidance

For information on Leostream infrastructure installation and configuration, refer section “[Implementing a proof-of-concept](#)” in this document. Additional information is provided in documents listed in the “[Resources](#)” section of this document.

Bill of materials

Table 16 provides a simple tabular bill of materials (BOM) for the key components of this reference architecture. The actual BOM might contain electronic licenses to use (E-LTU) parts. Electronic software license delivery is now available in most countries. HP recommends purchasing electronic products rather than physical products (when available) because it offers faster delivery and greater convenience (i.e., no tracking and managing of confidential paper licenses). For more information, contact your HP representative or reseller.

Note

The part numbers in table 16 are valid at the time of this publication but are subject to change. The BOM does not include complete support options or other rack and power requirements. If you have questions regarding ordering, consult with your HP reseller or HP sales representative. To contact a sales expert visit, hp.com/large/contact/enterprise/index.html.

Table 16. Bill of materials

Quantity	Part number	Description
1	740872-B21	HP Moonshot 1500-m700-1 Chassis
4	AF556A	HP 1.83M 10A C13-UL US Power Cord
4	684532-B21	HP 1500W Ht Plg Pwr Supply Kit
2	704642-B21	HP Moonshot-180P 1Gb Switch Kit
2	704652-B21	HP Moonshot-4QSFP+ Uplink Module Kit
1	681254-B21	HP 4.3U Rail Kit
1	681260-B21	HP 0.66U Spacer Blank Kit
45	733747-B21	HP ProLiant m700 32GB iSSD Svr Cartridge
45	U0RW0AS	MS Non-WS2012 OS + Application Support

Summary

The increased need for data security is forcing IT departments to move desktop workloads into the data center. This App Map for the HP Moonshot System with Leostream, HP ProLiant m700 Server Cartridges, and HP RGS allows enterprises to reap the data security benefits of VDI, but at a lower cost and complexity, and with excellent end-user experience. The innovative HP Moonshot 1500 Chassis platform is space and energy efficient, lowering operational costs, and is less complex to set up than traditional server hardware, simplifying IT. When used with the Leostream Connection Broker, IT can easily define and manage a hosted desktop solution that provides the appropriate desktop resource to each user, based on the user's identity and their location. By leveraging the high-performance HP RGS protocol to connect users to their desktop, end users experience at-their-desk performance for the applications running on their hosted desktop. The highly scalable combination of the HP Moonshot System, Leostream, and HP RGS is an ideal choice for enterprises requiring a secure, high-performance hosted desktop solution.

Implementing a proof-of-concept

Figure 8 shows high-level configuration steps for implementing a proof-of-concept.

Figure 8. Implementing proof-of-concept



Information on configuring the Leostream Connection Broker to deliver Moonshot desktops can be found in the “Basic Connection Broker Configuration” and “Advanced Leostream Configurations” sections of the [HP Moonshot Systems for Hosted Desktops: Getting Started with Leostream](#) document.

Leostream Connection Broker installation and general configuration

The Leostream Connection Broker is available as a virtual appliance or as an ISO that installs bare-metal onto certain HP server hardware. The deployed Leostream Connection Broker is managed as an appliance. Leostream delivers updates as a single update file that maintains the Connection Broker application and underlying operating system.

The Leostream Connection Broker 8.0 appliance consists of the following components:

- CentOS Linux 6.6
- Apache 2.2.29 Web Server
- OpenSSL version 1.0.1l
- VMware® virtual hardware version 8 (when installed on VMware vSphere)

Installing the Connection Broker virtual appliance

If you are running your HDI in a data center that includes virtualization, use the Leostream Connection Broker virtual appliance. The Connection Broker runs as a virtual appliance within the following virtualization platforms:

- VMware Workstation 9 and higher
- VMware vSphere 5.x
- Citrix® XenServer 6.x
- Microsoft Hyper-V Server 2012 and Windows Server® 2012 R2 Hyper-V (requires SCVMM)
- Red Hat® Enterprise Virtualization 3.0

The Connection Broker requires virtual resources equivalent to the following hardware:

- 1500 MHz or faster Intel® Pentium® IV processor (or equivalent)
- 1 vCPU
- 2.0 GB of RAM
- 8 GB of hard drive space
- Bridged Ethernet adapter, ideally with Internet connectivity

Installation instructions for each virtualization platform can be found in the [Leostream Installation Guide](#). For information on scaling Leostream Connection Broker deployments, see [Scaling up Leostream environments](#).

Installing the Connection Broker on HP server hardware

The Leostream Connection Broker is available as an ISO created using standard backup-and-restore software. This ISO is intended for installation on an HP ProLiant DL380p Gen8 Server. Other hardware configurations may not be compatible.

The Connection Broker ISO can be downloaded at the following location:

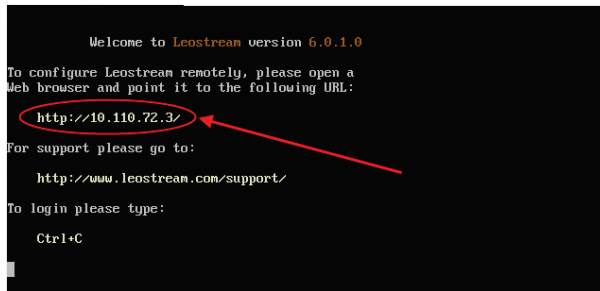
leostream.com/downloads/LeostreamConnectionBroker_Restore_DL380.iso

Before proceeding with the installation, check the integrity of the downloaded ISO. The MD5 hash for the ISO is:

a8bd81102a8e335975b34954aadb20e9

Starting the Connection Broker

After you install and start your Connection Broker, the Connection Broker IP address appears in the console, for example:



If the console cannot obtain an IP address from DHCP, you can manually configure the network. See “Manually Configuring the Connection Broker Address” section in the [Leostream Installation Guide](#) for more information. For information on configuring the Connection Broker IP address from within the Connection Broker Administrator Web interface, see “Setting Network Configuration and Connection Broker VIP” in the [Connection Broker Administrator’s Guide](#).

Point your Web browser at the Connection Broker IP address. The Connection Broker **Sign In** dialog, shown in the following figure, opens. By default, log in as:

- User name: admin
- Password: leo



The screenshot shows a 'Sign In' dialog with the following fields:

User name: [text input field]

Password: [password input field]

Below the fields is a link: 'Signing in constitutes continued acceptance of the [license agreement](#)'

At the bottom is a 'Sign In' button.

Welcome to the Leostream Connection Broker

Sign in with user name **admin**, password **leo**

You will be able to change the password from the >Users >My Options page.

Adding the Leostream License Key

The first time you sign in, the **Leostream license** dialog, shown in the following figure, opens.

The screenshot shows a 'Leostream license' dialog with the following elements:

License key: [large text input field]

Below the field is a checkbox: 'I have read and accept the [License Agreement](#)'

At the bottom right is a 'Save' button.

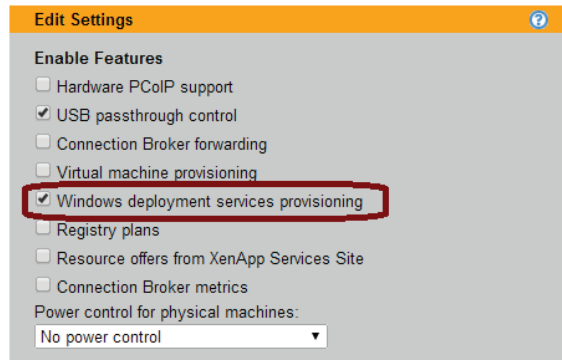
If you have not obtained a Leostream license for your Connection Broker, contact sales@leostream.com. After you obtain a license, cut-and-paste your Leostream license key into the **License key** edit field. Ensure that there are no spaces in or after the sequence and that you include the lines containing the text -----BEGIN LICENSE----- and -----END LICENSE-----.

Read the license agreement and, if you accept it, select the **I have read and accept the License Agreement** check box and click **Save**. You now have access to the Connection Broker Administrator Web interface.

Configuring general Connection Broker settings

More advanced Connection Broker features are disabled, by default. When working with an HP Moonshot System, in particular, you must explicitly turn on the feature to use WDS, as follows.

1. Go to the **> System > Settings** page.
2. In the **Enable Features** section, select the **Windows deployment services provisioning** option, as shown in the following figure.



The screenshot shows the 'Edit Settings' window with the 'Enable Features' section. The following features are listed with checkboxes:

- ☐ Hardware PCoIP support
- ☒ USB passthrough control
- ☐ Connection Broker forwarding
- ☐ Virtual machine provisioning
- ☒ Windows deployment services provisioning
- ☐ Registry plans
- ☐ Resource offers from XenApp Services Site
- ☐ Connection Broker metrics

Below these features, there is a section for 'Power control for physical machines:' with a dropdown menu set to 'No power control'.

The **Power control for physical machines** option does not apply to Moonshot nodes. The Connection Broker uses the Chassis Manager CLI to power control individual nodes.

3. In the **> System > Settings** page, in the **Authentication Server Features** section, indicate if users have the option to specify their domain by checking the **Add domain field to login page** option. Keep this option unchecked if you want to hide the **Domain** field from end users.
4. Users that launch RGS connections to Moonshot nodes typically log in using the Leostream Connect software client. Use the **Leostream Connect Configuration** section to set default Leostream Connect behaviors, for example, if the client should log the user out of Leostream after they close their RGS session.
5. Click **Save**.

For a full description of the options on the **> System > Settings** page, see “Chapter 3: Configuring Connection Broker Settings” in the [Connection Broker Administrator's Guide](#).

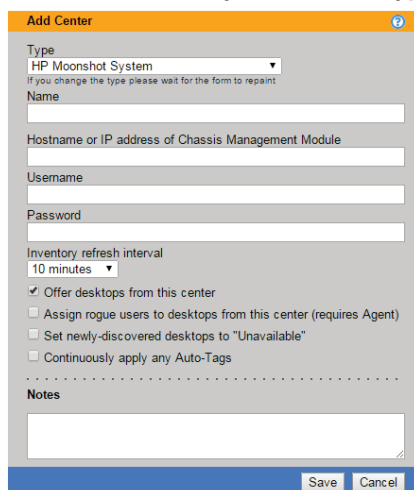
Managing the HP Moonshot System with m700 Server Cartridges

Creating an HP Moonshot System center

Leostream defines centers as the external systems that the Connection Broker communicates with to inventory desktops and other resources (such as OS images, applications, printers, and Teradici PC-over-IP host devices). The Leostream center for the HP Moonshot System uses the HP Chassis Manager Command Line Interface.

To create a center that communicates with the chassis manager:

1. Go to the **> Resources > Centers** page.
2. Click **Add Center**. The **Add Center** form opens.
3. Select **HP Moonshot System** from the **Type** drop-down menu. The form updates, as follows:



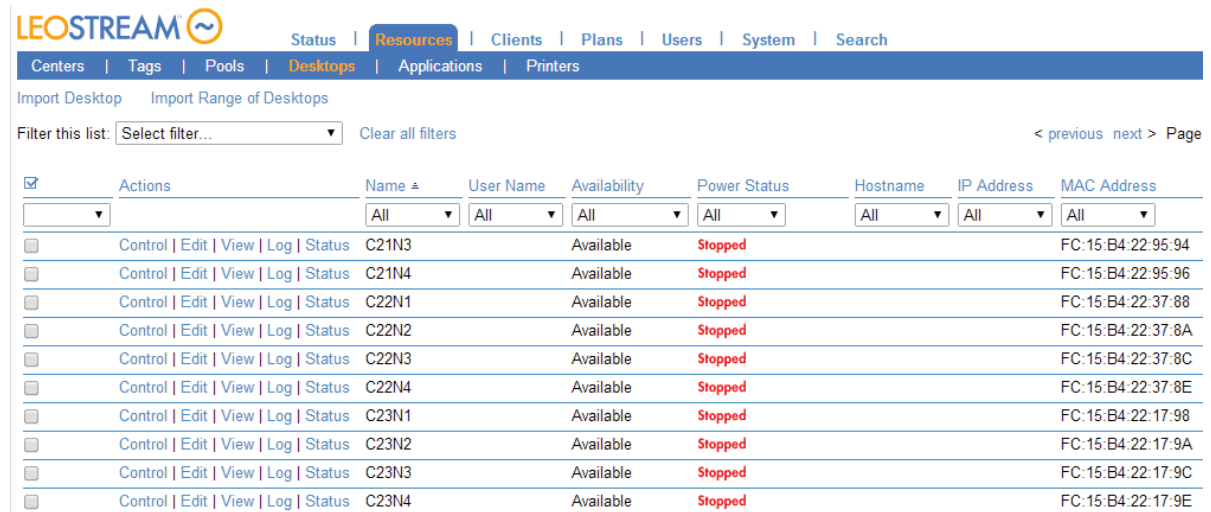
The screenshot shows the 'Add Center' form with the following fields and options:

- Type:** HP Moonshot System (selected in a dropdown menu)
- Name:** (text input field)
- Hostname or IP address of Chassis Management Module:** (text input field)
- Username:** (text input field)
- Password:** (text input field)
- Inventory refresh interval:** 10 minutes (selected in a dropdown menu)
- ☒ Offer desktops from this center
- ☐ Assign rogue users to desktops from this center (requires Agent)
- ☐ Set newly-discovered desktops to "Unavailable"
- ☐ Continuously apply any Auto-Tags
- Notes:** (text area)

At the bottom of the form are 'Save' and 'Cancel' buttons.

4. Enter a name for the center in the **Name** edit field.
5. Enter the appropriate information in the **Hostname or IP address of Chassis Management Module** edit field.
6. In the **Username** and **Password** edit fields, enter the credentials for a user with administrator privileges to the Chassis Manager.
7. The **Refresh interval** instructs the Connection Broker on how often to refresh the desktops imported from this center. The refresh interval is the length of time between when one refresh action completes and the next refresh action begins.
For the HP Moonshot System, the refresh interval is responsible for checking the power state of each node and querying any installed Leostream Agents for operating system information.
8. Leave the remaining settings at their default values and click **Save**.

After you save the center, the Connection Broker contacts the Chassis Manager to retrieve information about the cartridges and nodes installed in the chassis, and displays the nodes on the **Resources > Desktops** page. If the nodes do not have an installed operating system, or a running Leostream Agent, the Connection Broker retrieves only the nodes' MAC addresses from the chassis manager, for example:



Actions	Name	User Name	Availability	Power Status	Hostname	IP Address	MAC Address
<input type="checkbox"/> Control Edit View Log Status	C21N3	All	Available	Stopped	All	All	FC:15:B4:22:95:94
<input type="checkbox"/> Control Edit View Log Status	C21N4	All	Available	Stopped	All	All	FC:15:B4:22:95:96
<input type="checkbox"/> Control Edit View Log Status	C22N1	All	Available	Stopped	All	All	FC:15:B4:22:37:88
<input type="checkbox"/> Control Edit View Log Status	C22N2	All	Available	Stopped	All	All	FC:15:B4:22:37:8A
<input type="checkbox"/> Control Edit View Log Status	C22N3	All	Available	Stopped	All	All	FC:15:B4:22:37:8C
<input type="checkbox"/> Control Edit View Log Status	C22N4	All	Available	Stopped	All	All	FC:15:B4:22:37:8E
<input type="checkbox"/> Control Edit View Log Status	C23N1	All	Available	Stopped	All	All	FC:15:B4:22:17:98
<input type="checkbox"/> Control Edit View Log Status	C23N2	All	Available	Stopped	All	All	FC:15:B4:22:17:9A
<input type="checkbox"/> Control Edit View Log Status	C23N3	All	Available	Stopped	All	All	FC:15:B4:22:17:9C
<input type="checkbox"/> Control Edit View Log Status	C23N4	All	Available	Stopped	All	All	FC:15:B4:22:17:9E

If the nodes have an installed operating system with a running Leostream Agent, the Connection Broker contacts the Leostream Agent to obtain information about the desktop's hostname, IP address, operating system version, alternate MAC address, and more.

You can click the **Status** link next to the HP Moonshot System center to display the general information about the chassis, as well as temperatures, power supply status, and more (see [Viewing Chassis and Node Status](#) for more information).

Configuring WDS

Your WDS must be configured properly before you can use it with Leostream, as described in the next session.

Creating an initial install image

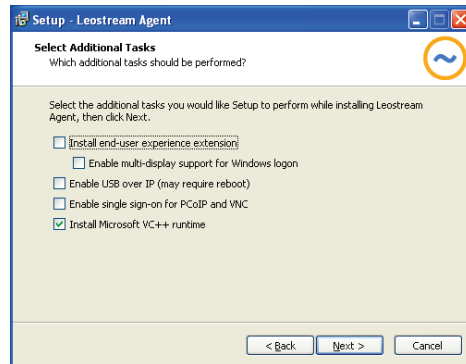
Leostream deploys operating systems to the HP ProLiant m700 using WDS. Before adding a standard Windows 7 SP1 operating system image to your WDS server, you may want to customize it by adding applications, data, etc. Most importantly, to provide RGS connections to your users, you must install the RGS Sender, as well as the AMD graphics drivers, available through hp.com/support. On the support page, choose your country (if needed). Click Drivers and Downloads and enter a search term (for example, ProLiant m700).

In order to deploy a Windows image onto a Moonshot cartridge, the image must be modified using a software bundle provided by HP. The HP software bundle contains the minimum set of drivers necessary to deploy a functional Windows image on the cartridge, as well as scripts and unattend files to use in WDS. Using the scripts, drivers, and unattend files in the software bundle, the deployed instance of Windows has SAC and RDP enabled.

For a full description on creating a custom Windows image and modifying the boot and install images using the HP software bundles, see the [Operating System Deployment on HP ProLiant Moonshot Server Cartridges User Guide](#).

Installing the Leostream Agent

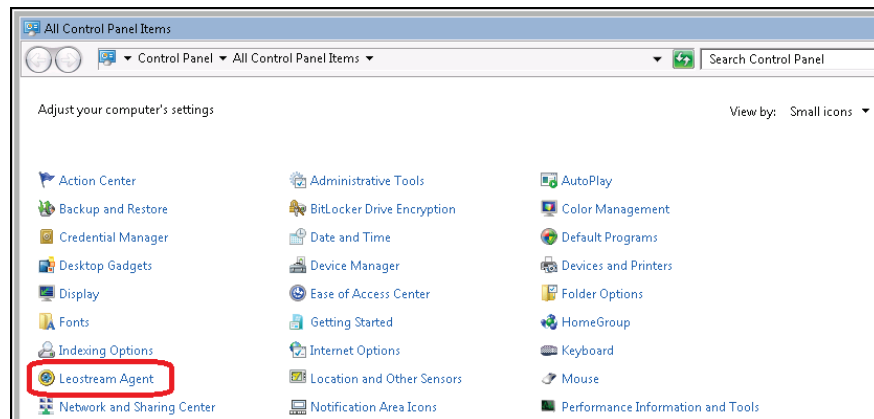
In order to use your WDS with Leostream, you must install the Leostream Agent on the Windows server hosting WDS. See the [Leostream Installation Guide](#) for complete instructions. When installing the Leostream Agent, select only the task that installs the Microsoft VC++ runtime library, as shown in the following figure.



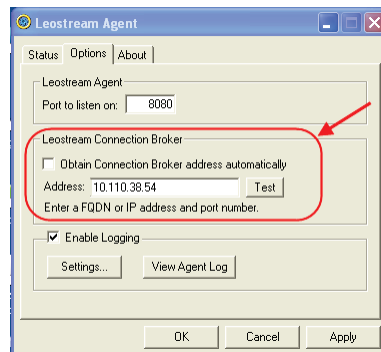
Click **Next >** to continue with the installation using only the selected task.

By default, the Leostream Agent looks for a DNS SRV record associated with your Connection Broker. If you do not have a Connection Broker DNS SRV record, you can enter the Connection Broker address in the Leostream Agent Control Panel dialog, as follows.

1. Open the **All Control Panel** Items window and switch the View by drop-down menu to **Small icons**.
2. Double-click **Leostream Agent** in the **Control Panel**, circled in the following figure. The Leostream Agent dialog opens.



3. Go to the **Options** tab.
4. Uncheck the **Obtain Connection Broker address automatically** option. The **Address** edit field enables, as shown in the following figure.



5. Enter the Connection Broker address in the edit fields.
6. Click **Apply** to accept the address and leave the Leostream Agent dialog open, or **Ok** to accept the address and close the dialog.
7. You must run the Leostream Agent Control Panel dialog as the desktop administrator to save changes.

Click **Test** to check if the address you entered is valid. A dialog opens indicating if the Leostream Agent can contact the Connection Broker at the specified address.

Creating a WDS center

You must correctly configure the WDS server for use with Leostream before proceeding. See the “Setting Windows Deployment Server Options” section of [HP Moonshot Systems for Hosted Desktops: Getting Started with Leostream](#) for more information. After you configure your WDS, to use it with Leostream and deploy Windows images to your Moonshot nodes, create a WDS center in your Connection Broker.

To create a WDS center:

1. Go to the **> Resources > Centers** page in your Connection Broker.
2. Click the **Add Center** link.
3. In the **Add Center** form, select **Windows Deployment Services** from the **Type** drop-down menu.
4. In the **Name** edit field, enter a user-friendly display name for this center.
5. In the **Hostname or IP address of the Windows deployment services server** edit field, enter the WDS server address.
6. To limit the number of concurrent deployment commands sent to the WDS server, enter that limit into the **Maximum concurrent deployments** edit field. Enter zero or leave the field blank to allow an unlimited number of simultaneous deployments.
For information on configuring your WDS server to support a large number of concurrent connections, refer to the [WDS documentation](#) on optimizing performance and scalability.
7. Enter any arbitrary notes into the **Notes** edit field.
8. Click **Save**.

When you save the form, the Connection Broker instructs the Leostream Agent installed on the WDS server to perform two tasks.

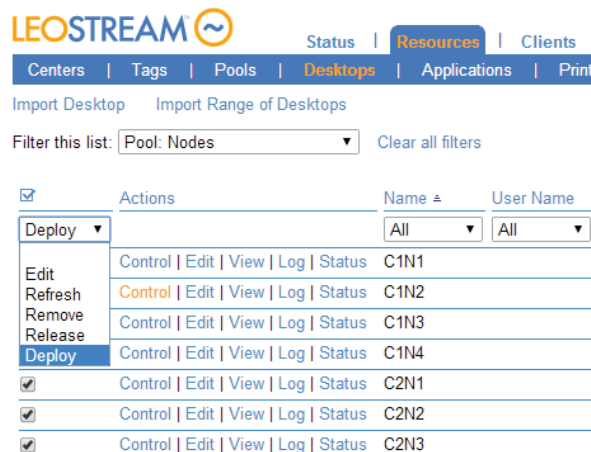
- The Leostream Agent returns a list of all available Windows images and unattend files to the Connection Broker.
- The Leostream Agent prepares all default images for deployment. During this step, the Leostream Agent is injected into the default image, allowing new desktops deployed from this image to register with the Connection Broker, automatically.

Contact supportsite@leostream.com for information on how the Leostream Agent prepares the images for deployment by the Connection Broker.

Deploying operating systems

You can deploy an operating system onto one or more nodes using the **Deploy** bulk action available for desktops. For example:

1. Go to the **> Resources > Desktops** page in your Connection Broker.
2. In the **Bulk Action** column, select the checkbox associated with each desktop. To select all the listed desktops, click the check box at the top of the **Bulk action** column.
If the check boxes are not visible, click the customize link at the bottom of the **> Resources > Desktops** page and add the **Bulk actions** column to the **Selected items** list.
3. Select the **Deploy** action from the drop-down menu at the top of the column of checkboxes, as shown in the following figure.



- In the **Deploy desktop** form that opens, select the image to deploy from the **Operating system** drop-down menu. All nodes are deployed from the same image.
Ensure that you select an image that has been prepared to use on HP ProLiant m700 Server Cartridges.
- Click **Ok**.

The Connection Broker switches the boot mode of each selected node to PXE, and powers on (or restarts) the node. If the number of selected nodes exceeds the maximum number of concurrent deployments specified in the WDS center, the Connection Broker powers on the maximum number of allowed nodes, and marks the remaining nodes as scheduled.

After the initial PXE boot succeeds and begins deploying the operating system to the node, the Connection Broker automatically switches the boot mode for that node to HDD.

The deployment completes when the Leostream Agent injected into the image installs and registers with the Connection Broker, providing the hostname and IP addresses of the newly deployed operating system. The node's **Power Status** switches to running and the remaining node information is populated as shown in following the example.

Name ▲	Availability	Power Status	Hostname	IP Address	MAC Address	Machine Name	Operating System	Leostream Agent Status	Leostream Agent Version
All ▼	All ▼	All ▼	All ▼	All ▼	All ▼	All ▼	All ▼	All ▼	All ▼
C10N1	Available	Running	WIN-QBGBGFCA3OI	10.27.101.11	FC:15:B4:22:F6:68	WIN-QBGBGFCA3OI	Windows 7		5.6.29.0
C10N2	Available	Running	WIN-EE0HMQV100C	10.27.101.21	FC:15:B4:22:F6:6A	WIN-EE0HMQV100C	Windows 7		5.6.29.0
C10N3	Available	Running	WIN-CEQJRAO3272	10.27.101.18	FC:15:B4:22:F6:6C	WIN-CEQJRAO3272	Windows 7		5.6.29.0
C10N4	Available	Deploying			FC:15:B4:22:F6:6E				

Viewing Chassis and Node Status

The Status link, circled in the following figure, for the HP Moonshot System center you created on the > Resources > Centers page uses the Chassis Manager CLI to return basic status information for the Moonshot Chassis. You can use this information to track the internal temperature of the chassis, as well as the status of fans, etc.

The screenshot shows the Leostream web interface. The top navigation bar includes links for Status, Resources, Clients, and Plans. Below this is a secondary navigation bar with links for Centers, Tags, Pools, Desktops, Applications, and Printers. The main content area shows a table with columns for Actions, Name, and Type. The first row in the table is for a center named 'Moonshot' of type 'HP ConvergedSystem 100'. The 'Status' link in the Actions column is circled in red.

The output displayed by clicking the **Status** link is a combination of the information provided by the following three chassis manager commands:

- show chassis info
- show chassis status
- show chassis temperature

The **Status** link on the > Resources > Desktops page, circled in the following figure, provides information about any active connections to the desktop, if the Leostream Agent installed on the node is responding, as well as status information returned by the chassis manager.

The screenshot shows the Leostream web interface. The top navigation bar includes links for Status, Resources, Clients, Plans, Users, System, and Search. Below this is a secondary navigation bar with links for Centers, Tags, Pools, Desktops, Applications, and Printers. The main content area shows a table with columns for Actions, Name, User Name, Availability, Power Status, and Hostname. The first row in the table is for a desktop named 'C10N1' with user name 'All', availability 'Available', and power status 'Stopped'. The 'Status' link in the Actions column is circled in red.

You can use the **Status** link for a desktop to retrieve status information from the chassis manager even if an operating system is not yet installed on the node.

The output displayed by clicking the **Status** link for a desktop is a combination of the information provided by the following two chassis manager commands:

- show node status
- show node detail

Leostream Connection Broker Configuration

Information on configuring the Leostream Connection Broker to deliver Moonshot desktops can be found in the “Basic Connection Broker Configuration” and “Advanced Leostream Configurations” sections of the [HP Moonshot Systems for Hosted Desktops: Getting Started with Leostream](#) document.

Appendix

Scaling up Leostream environments

The Leostream Connection Broker is designed to handle large-scale deployments simply and effectively. Because Leostream is not in the data path of the user’s desktop connection, Leostream measures scale by the number of users logging in at any point in time, not at the number of users actively logged in.

To scale a Leostream environment, create a cluster of Leostream Connection Brokers connected to a single Microsoft SQL Server database. The database holds all the Connection Broker configuration information, as well as the Leostream Job Queue. The brokers in the cluster work off the common job queue to handle user logins, center scans, and any other scheduled Connection Broker job.

Creating a cluster addresses three scalability goals:

- **Availability:** Using clusters enhances availability by allowing any Connection Broker instance in the cluster to handle the necessary system functions without operator intervention. If one Connection Broker in the cluster fails, user logins are processed by the other Connection Brokers, resulting in no break in the end-user experience. Connection Broker instances that are not handling logins automatically process other system tasks.
- **Disaster recovery:** Using clusters also allows you to mitigate system or site failures. Run each Connection Broker in the cluster on a different virtualization host, to ensure resiliency to a host failure. Place Connection Brokers or entire clusters in different data centers or regions to support disaster recovery scenarios.
- **Capacity:** The number of logins per second that can be handled depends on the overall structure of your Connection Brokers, database, and authentication server. Typically, each Connection Broker can handle five logins per second. To increase this throughput, add additional Connection Brokers on different hosts and spread the traffic between the Connection Brokers using a load balancer. The throughput scales linearly when using up to ten Connection Brokers.

For information on creating a Leostream cluster, see “Chapter 18: Scaling Deployments” in the [Connection Broker Administrator’s Guide](#).

Resources

HP Moonshot Systems for Hosted Desktops: Getting Started with Leostream

leostream.com/hs-fs/hub/453598/file-2264433291-pdf/documentation/Using_Leostream_with_HP_MoonshotSystem.pdf

Leostream Installation Guide

leostream.com/hs-fs/hub/453598/file-2100532584-pdf/documentation/installation_guide.pdf

Leostream Connection Broker Administrator's Guide

leostream.com/hs-fs/hub/453598/file-2101319952-pdf/documentation/leostream_users_manual.pdf

Leostream Agent Administrator's Guide

leostream.com/hs-fs/hub/453598/file-2097062368-pdf/documentation/leostream_agent.pdf

Operating System Deployment on HP ProLiant Moonshot Server Cartridges User Guide

h20564.www2.hp.com/hpsc/doc/public/display?docId=c03933547

HP Remote Graphics Software 7.0 User Guide

h20565.www2.hp.com/hpsc/doc/public/display?sp4ts.oid=7275919&docId=emr_na-c04529581&docLocale=en_US

Leostream Choosing and Using Display Protocols

leostream.com/hs-fs/hub/453598/file-2101370092-pdf/documentation/leostream_display_protocols.pdf

To help us improve our documents, please provide feedback at hp.com/solutions/feedback.

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