CenturyLink Service Guide

Utility Storage

This CenturyLink Service Guide ("SG") sets forth a description of Utility Storage ("Service") offerings by CenturyLink, including technical details and additional requirements, if any. This SG is subject to and incorporated into the Service Agreement and Service Schedule between the parties. The specific details of the Service ordered by Customer will be set forth on the relevant Service Order. For avoidance of doubt, any references in the Agreement, Schedules, or Service Orders to SSG, shall mean SG.

Version	Previous	Section Modified	Date
HOS-20170221-SG-UtilityStorage	HOS-20141009-SG-UtilityStorageService	New Format	February 21, 2017

Service Description

1. **Standard Service Description**: Utility Storage (the "Service") is a Managed Hosting product that consists of the installation, configuration, administration, monitoring, support and maintenance for the components described in Section 1.1. Utility Storage is a multi-tenant product that provides block storage via a Fibre Channel Interface. The Service is managed by CenturyLink if the customer has a CenturyLink Managed Hosting Environment, however when a customer has a CenturyLink Colocation Environment, customer may choose to self-manage or have CenturyLink manage. Customer must execute a Managed Hosting Service Schedule to purchase this Service and the Service Level Agreement (SLA) associated with this Service is the Utility Storage SLA."

1.1. **Storage Area Network** (SAN): Customer will be allocated the amount of SAN attached storage for which they have ordered. Customer orders SAN attached storage by selecting the amount of disk capacity and QOS level required as described in Table 1.0 below. The following are included in the standard Service:

1.1.1. **Disk Capacity**: Usable storage capacity available in 50 GB increments with a maximum of 16,000 GB per Logical Unit Number (LUN).

1.1.2. **QOS Level**: Quality of Service Level describes the RAID protection available. See Table 1.0 for additional detail.

1.1.3 **Support and Maintenance**: 24/7/365 maintenance, management, monitoring and support (see Table 2.0 Roles and Responsibilities for additional information).

1.1.4 **Supported Operating Systems**: See Table 3.0 which describes the supported operating systems for the Services herein. The matrix of supported operating systems is subject to change as new versions of operating systems are tested and introduced into CenturyLink's standard support model and end of life operating systems are no longer supported. All configurations and combinations of operating systems and software must be listed on our storage vendor's compatibility matrices to be deemed compatible with the Service.

1.2. **Configuration:** CenturyLink will perform configuration tasks marked with an "X" in the CenturyLink column in Table 2.0. CenturyLink's SLA only applies to the respective vendors' supported configurations at the time SLA support requests are triggered. If any configuration or version is identified as "unsupported" by a vendor, the Services are subject to all of the following conditions and/or requirements: (i) a service level objective ("SLO") in lieu of any other applicable SLA will apply. This SLO shall refer to reasonable effort support by CenturyLink, and no credits shall apply; (ii) CenturyLink, in its reasonable discretion may elect to charge the customer for any support or additional tasks/work incurred resulting from Customers continued use of unsupported configuration. Customer acknowledges and agrees that it is solely responsible for selecting and ensuring its software and systems are up to date and supportable. Customer's failure to do so may result in CenturyLink's inability to provide the Services and CenturyLink shall have no liability therefrom. When an operating system and/or any 3rd party software used in connection with the Service is no longer supported by the applicable vendor, then 1) CenturyLink's SLA will no longer apply, and 2) Customer may be required to purchase vendor supported upgrades at an additional cost to allow CenturyLink to continue to provide the Services.

1.3. **Licensing and Third Party Terms**:

If any third party software, including any corresponding documentation, is provided to Customer by CenturyLink in connection with the Service, Customer agrees to be bound by any additional licensing terms and conditions applicable to such third party software and that it will use such third party software strictly in accordance with such terms and conditions. CenturyLink makes no representations or warranties whatsoever with regard to such third party software.

In conjunction with the Services, you may be allowed to use certain software developed and owned by third parties ("Third Party Software"). The Customer's election to use the Third Party Software constitutes acceptance of the additional terms and conditions for the HPE software located at the following URL: www.hpe.com/software/SWlicensing.

2. **Additional Required Services**: The items below are added to the standard Service (described in Section 1.0) for an additional fee described in a separate Service Order. Contact a sales representative for additional information.

2.1. **SAN Connect**: Includes dual paths from the Host Bus Adapter ("HBA") to the SAN Storage SAN fabric. Dual

Fibre runs from the Customer compute location to ports within the SAN Storage platform.

2.2. **HBA (Fibre Channel cards):** Installation and configuration including the capture of the World Wide Name ("WWN") and zone to configured LUNs. CenturyLink confirms that appropriate drivers are installed on host and appropriate firmware is installed on the HBAs.

2.3. **Customer's Host Requirement**: Customer must have two single channel port cards. For hosts that have only one Peripheral Component Interconnect ("PCI") slot available, a dual channel card may be utilized.

3. **Additional Optional Service:** QOS Migration is an optional service for the movement of an entire LUN from one QoS level to a different QoS level. QOS is available for an additional cost and may require a separate Service Order.

3.1. Migration occurs online without a service disruption to the LUN.

3.2. All migration requests within a discrete storage infrastructure are processed serially to avoid long delays in completion.

3.3. Commencement and completion of migration is based upon current production activity and therefore is not specifically scheduled. QoS Migration is designed as a low priority process to prevent interference with access to mission critical data as such length of migration time will vary.

3.4. Email notification at migration commencement and completion.

4. **Customer Responsibilities**: Customer is responsible for all tasks marked with an "X" in the Customer column in Table 2.0 Roles and Responsibilities. Customer acknowledges and agrees that its failure to perform its obligations set forth in Table 2.0 may result in CenturyLink's inability to perform the Services and CenturyLink shall not be liable for any failure to perform in the event of Customer's failure.

4.1. **Provide Contact**: Designate and maintain a Customer Contact during the Service Term (including current contact information). "Customer Contact" means a technical point of contact available 24x7 with sufficient knowledge, authority and access to address configuration issues, event notifications, system or infrastructure modifications and authentication of applicable CenturyLink systems.

4.2. **Allow Access**: Colocation Customers agree, as reasonably requested by CenturyLink, to provide access to Customer's equipment and to otherwise cooperate with CenturyLink in performing the Service.

4.3. **Notification of Changes**: Customer agrees to notify CenturyLink of any changes in the Customer hardware, including any system configuration changes or any hardware or software upgrades, which may affect the services provided. Any Customer action which causes the data residing within the Storage Service to become inaccessible directly caused by Customer's failure to notify CenturyLink of changes will not be subject to the SLA.

4.4. **Hardware Purchase**: Installation of an additional dedicated network interface card ("NIC") is also required for all Customers when total sustained IP traffic consumes 60% or more of server bandwidth. Customers with Dedicated Cloud Compute or Managed Hosting must purchase the NIC from CenturyLink. Colocation customers may purchase the NIC from CenturyLink or another vendor.

4.5. Customer acknowledges and agrees that it is solely responsible for selecting and ensuring its software and systems are up to date and supportable.

4.6. Customer consents to CenturyLink's and its affiliates or subcontractors' use and transfer to the United States, or other countries, data or information (including business contact information such as names, phone numbers, addresses and/or email addresses) of the customer for the sole purpose of: (i) fulfilling its obligations under the Agreement; and (ii) providing information to Customer about CenturyLink's products and services. Customer represents that it will ensure that all information provided to CenturyLink is accurate at all times and that any business contact has consented to CenturyLink's processing of such information for the purposes identified herein.

Tables and Appendices

Table 1.0 Utility Storage

Item	Characteristics
Drive Type	SAS
QOS Levels	QoS 1: Storage for applications with write-intensive requests; RAID 10 (Mirrored) QoS 2: Storage for applications with read-intensive requests; RAID 50 (3D + 1P) QoS 3: Storage for I/O intensive applications, particularly read-intensive request; RAID 50 (7D + 1P) QoS 4: Storage for SATA RAID50 7+1. Best choice for archive, reference, or backup data
Usable Storage Capacity	Available in 50Gb increments
Available Storage Type	SAN
Max LUN or Volume Size	16TB
Reporting	CenturyLink Portal: Capacity, QOS Level, Server Relationship

Table 2.0 Roles and Responsibilities

CenturyLink Managed

Activity	Task	CenturyLink	Customer
Installation	Obtain and deploy all hardware, including Network Interface Card(s) (NIC), in which licensed software will be installed either through CenturyLink Managed Hosting Services or through self- implementation	X	
	Provide switch dedicated to SAN Storage and complete ongoing management of the switch	X	
	Allow CenturyLink to install necessary software to enable operations, monitoring and reporting		X
	Install and configure a VLAN compatible with the SAN Storage service	X	
	Installation of an additional dedicated NIC is required to segregate file-sharing traffic. Segregating all file sharing traffic simplifies connectivity, preventing any degradation in performance of the Customers' other networking services, and eliminating the possibility of bandwidth usage charges in conjunction with other CenturyLink Network and Security products. See section 2.5 for additional information	X	
Configuration	Provide access to Customer's premises and equipment and to otherwise cooperate with CenturyLink in performing the services		X

Activity	Task	CenturyLink	Customer
Administration	Notify CenturyLink of any changes in the Customer hardware, including any system configuration changes or any hardware or software upgrades, which may affect the services provided hereunder		X
Monitoring	Creation of partitions, adding volumes, adding or modifying shares and exports and facilitating the addition of capacity	X	
Monitoring	Monitoring the environment including the disk array, management console(s), storage operating systems, SAN fabric, and fibre running to Customer Environment	X	
Management and Support	Customer shall provide (or order through CenturyLink as available) all NICs, and multi-pathing (failover) software required to deliver the Services to the Customer and keep maintenance contracts current as applicable		X
Management and Support	Administer changes, microcode upgrades and/or other hardware / software improvements / upgrades.	X	

Customer Managed

Activity	Task	CenturyLink	Customer
Installation	Obtain and deploy all hardware, including Network Interface Card(s) (NIC), in which licensed software will be installed either through CenturyLink Managed Hosting Services or through self- implementation		X
Installation	Provide switch dedicated to SAN Storage and complete ongoing management of the switch		X
Installation	Provide configuration guidelines for the switch	X	
Installation	Install and configure a VLAN compatible with the SAN Storage service (CenturyLink provides configuration guidelines for the VLAN)		X

Category	Description		
	Allow CenturyLink to install necessary software to enable operations, monitoring and reporting		X
Installation (Con't)	Installation of an additional dedicated NIC is required to segregate file-sharing traffic. Segregating all file sharing traffic simplifies connectivity, preventing any degradation in performance of the Customers' other networking services, and eliminating the possibility of bandwidth usage charges in conjunction with other CenturyLink Network and Security products. See section 2.5 for additional information.		X
Configuration	Provide access to Customer's equipment and to otherwise cooperate with CenturyLink in performing the services		X
Administration	Notify CenturyLink of any changes in the Customer hardware, including any system configuration changes or any hardware or software upgrades, which may affect the services provided hereunder		X
Monitoring	Creation of partitions, adding volumes, adding or modifying shares and exports and facilitating the addition of capacity	X	
Monitoring	Monitoring the environment including the disk array, management console(s), storage operating systems, SAN fabric, and fibre running to Customer Environment	X	
Maintenance and Support	Customer shall provide (or order through CenturyLink as available) all NICs, and multi-pathing (failover) software required to deliver the Services to the Customer and keep maintenance contracts current as applicable		X
	Administer changes, microcode upgrades and/or other hardware/software improvements/upgrades	X	

Table 3.0 Supported Operating Systems

Operating System	SAN Storage
Microsoft Windows 2008	●
Microsoft Windows 2008 R2	●
Microsoft Windows 2012	●
Microsoft Windows 2012 R2	●
Sun Solaris 10	●
RedHat Linux 5	●
RedHat Linux 6	●
RedHat Linux 7	●
VMware ESXi 5.1	●
VMware ESXi 5.5	●
VMware ESXi 6.0	●
VMware ESXi 6.0 U2 (3.2.1MU5 and higher)	●

Table 4.0 Availability

Data Center
ZZAT1
ZZBLR2
ZZBO2
ZZCH3
ZZCH4
ZZDC2
ZZDC3
ZZDC4
ZZDL2
ZZDN1
ZZFR4
ZZFR6
ZZHKNG2
ZZLA1
ZZLO1
ZZLO4

ZZLOND
ZZMP2
ZZNJ2
ZZNJ2X
ZZNJ3
ZZSC8
ZZSC9
ZZSE2
ZZSING2
ZZSG8/ZZSG9
ZZTKYO
ZZTR1
ZZTR3

Definitions

Block Size: A fixed length sequence of bits or bytes.

CenturyLink Portal: The interface that ties together centralized systems that CenturyLink uses to provide services to Customers. Included in CenturyLink Portal, which is located at https://savvisstation.savvis.com/, are systems for order processing, provisioning, procurement, management and monitoring, change management, billing, Customer support/ticketing and reporting.

Colocation: A Data Center Service offering from CenturyLink where equipment, space, power, cooling physical security and bandwidth are available for rental to Customers.

Data Center means the facility in which the Systems are located.

Dedicated Cloud Compute ("DCC"): A managed server service that includes use of a dedicated standalone server, virtualization, space and power for the server, operating system license, network connectivity, management and monitoring of the server hardware and operating system.

Environment: The setting where software and other products are placed into operation for their intended uses by end users.

Fibre Channel Interface: Fibre Channel, or FC, is a high-speed network technology (commonly running at 4-, 8- and 16-gigabit per second rates) primarily used to connect computer data storage.

Foundation Hosting: A CenturyLink managed server service that includes use of (a) a dedicated standalone server provided and owned by CenturyLink, (b) space and power for the server, (c) network connectivity, and (d) failed server hardware replacement services, which are initiated in response to a trouble ticket opened by the Customer

Hosting Area Network (HAN): The managed networking infrastructure that supports CenturyLink Managed Hosting services.

Host Bus Adapters (HBAs): A host bus adapter (HBA) provides input/output (I/O) processing and physical connectivity between a server and a storage device.

Intelligent Hosting: A CenturyLink managed server service that includes use of a dedicated standalone server, space and power for the server, operating system license, network connectivity, management and monitoring of the server hardware and operating system.

LUNS: A logical unit number (LUN) is a number used for identifying a logical unit relating to computer storage. LUNs are essential for managing the block storage arrays of

a storage area network (SAN).

Maintenance Windows: A period of time designated in advance by CenturyLink, during which preventive maintenance that could cause disruption of service may be performed. Current Scheduled Maintenance windows are:

- Americas: Saturday 00:00AM to 5:00AM; Sunday 00:00AM to 5:00AM
- EMEA: Saturday 02:00AM to 6:00AM
- APAC (Except Japan): Saturday 21:00 (GMT) AM to Sunday 01:00 (GMT)
- Japan: Sunday 04:00 (JST) to 8:00 (JST)

Peripheral Component Interconnect (PCI) A PCI slot is used to add extension cards to a machine.

Read/Write Operations: Capable of being displayed (read) and modified (written to). Most objects (disks, files, directories) are read/write.

Storage Area Network (SAN) is a dedicated fibre channel network that provides access to consolidated, block level data storage.

Storage Array: A data storage system that contains multiple disk drives and a cache memory. It efficiently distributes data across multiple drives and enables fault tolerance through redundant array of independent disks (RAID).

SAN Storage: Block storage that is connected to servers via a Storage Area Network (SAN).

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