![CenturyLink logo]

CenturyLink Service Guide

Managed Dedicated Load Balancing

and SSL Acceleration

This Service Guide ("SG") sets forth a description of the Managed Dedicated Load Balancing and SSL Acceleration Services offered by CenturyLink, including technical details and additional requirements or terms. This SG is subject to and incorporated into the Agreement and Hosting 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, Schedule, or Service Orders to SSG, shall mean SG.

Version	Previous	Section Modified	Date
HOS-SG-Managed-LoadBalancing-022018	NET-20140512-SG-DataCenterNetworkServices_3.0	Miscellaneous	February 20, 2018

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Managed Dedicated Load Balancing and SSL Acceleration

1. **Standard Service Description:** CenturyLink Managed Dedicated Load Balancing and SSL Acceleration Services provide a pair of devices, fully managed by CenturyLink, which reside in the CenturyLink Hosting Area Network (HAN) within CenturyLink Managed Hosting facilities. **The Service is only available to Customers that purchase CenturyLink Managed Server 1.0: Managed Server (i.e. Intelligent Hosting) or Dedicated Cloud Compute services, as well as a CenturyLink Firewall service under separate terms and charges.**

   Managed Load Balancing service is available in two versions (Small and Medium) and includes dedicated hardware, software, installation and 24/7 monitoring and support. CenturyLink Managed Dedicated SSL Acceleration service includes hardware, software, installation and 24/7 monitoring and support.

   1.1. **Licensing and Third-Party Software 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 regarding such third-party software.

   1.2. **Indemnification:** CenturyLink and its affiliated companies shall not be liable to Customer or indemnify Customer for any claims of infringement of patent, copyright or other intellectual property right related to third-party software components.

   1.3. **Security:** Access to the load balancing devices is limited to CenturyLink personnel only. Read-only or "view" access to the devices is not permitted. Due to the way the devices are deployed and managed by CenturyLink, we are unable to grant this access as this would create a security risk for CenturyLink and our other Customers. At Customer request, CenturyLink can provide a "snapshot" of the load balancer configuration in the web portal. Snapshots are not available in real-time, but represent a point-in-time view of the configuration.

2. **Service Components**

Version	Service Element	Description
Small	Specification	▪ Intel Dual Core processor ▪ 500 GB hard drive ▪ 8 GB RAM ▪ Included is a 400W Power Supply. Power consumption is 74W at 110V input, and the unit produces 252 BTUs of heat per hour
	Supports	▪ 5Gbps throughput ▪ 2,000 SSL TPS (Transactions Per Second)
Medium	Specification	▪ Intel Quad Core processor ▪ 500 GB hard drive ▪ 16 GB RAM ▪ The unit is powered by a 400W power supply. Power consumption is 95W at 110 input, and the unit produces 324 BTUs of heat per hour.
	Supports	▪ 10Gbps throughput ▪ 4Gbps of compression ▪ 4,500 SSL TPS (Transactions Per Second)

3. **Pricing Model:** Managed Dedicated Load Balancer is priced at a fixed monthly fee and a one-time installation fee. A single subscription to a Managed Dedicated Load Balancer provides two load balancers: one active and one idle backup.

Dedicated Load Balancer Options

1. **Load Balancing Methodology:** Managed Dedicated Load Balancers support the following algorithmic functions based on the Customer's specific requirements and configurations:

Methodology	Description
Round Robin	Distributes connections evenly among the servers
Least Connections	Distributes connections based on number of current connections.
Ratio	Distributes connections in proportion to user-defined ratios
Fastest	Distributes connections based on response times of the servers

2. **Standard Persistence Options:** As Internet traffic enters the data center through the CenturyLink Internet routers, it is passed through a pair of CenturyLink Managed Dedicated Load Balancers / Firewalls where the following algorithmic functions are supported based on the Customer's specific requirements and configurations.

Source Address Persistence		Continues to route a connection to the same server based on Source IP Address
Cookie Persistence	Insert Mode	Load balancer inserts a cookie into all data going to a client and equates the cookie to a server. When the client sends another data stream, the data stream will have the cookie embedded in the data. The Load Balancer will see the cookie and route the data with the cookie in the data to the same server as before.
	Rewrite Mode	The Load Balancer inserts a cookie to all data going to a client and equates the cookie to a server. When the client sends another data stream, the data stream will have the cookie embedded in the data. The Load Balancer will see the cookie and route the data without the cookie in the data to the same server as before.
	Passive Mode	Similar to Rewrite Mode, except that the Server will initiate the cookie instead of the Big-IP and the Server will generate a new cookie each time it sends data to the client.
	Hash Mode	Similar to Passive Mode, except that the same cookie generated by the Server is used throughout the entire session.

3. **iRules:** An iRule is a script that can examine traffic between clients and servers and use that information to change the flow of traffic. CenturyLink does not develop iRules as part of this Service. If the Customer provides the syntax for an iRule, we will implement the iRule on the customer's behalf at no additional charge. Additionally, we do not provide support or troubleshooting for iRules. Assistance with developing, troubleshooting or supporting iRules may be obtained through our Service Management.

4. **Optional Load Balancing Services**
   Additional Managed Dedicated Load Balancing options are available only on the Medium device for an incremental fee:

Compression	Used to compress data through the load balancer to the Customer PC. Service supports up to 2.5Gbps.
Fast Cache	Caches the most frequently accessed URL pages/images to offload requests to the customer servers. Available on a per-server basis.
Rate Shaping	Bandwidth control that shapes the amount of bandwidth that can access a virtual server (load balancing pool).

Monitoring

CenturyLink provides monitoring of load balanced devices to determine system availability 24/7.

Certificate	Description
Node/Pool Member Availability	*Health checks are enabled and defined by Customer at the time of setup for a new VIP/pool for the purpose of determining node availability for the load balanced application. Failed health checks will mark a pool member as "down" and remove it from the traffic path until it clears health check. Failed health checks will also trigger an alert and investigation by the CenturyLink operations team. It is imperative that health checks are properly configured to avoid false positive alerts.*
Device and Physical Interface Availability	*SNMP traps are received to indicate availability concerns at the device and interface level.*
Resource Utilization	*Measures utilization of critical system resources and alerts in the event that resources are utilized above established thresholds. (i.e. memory, CPU, disk space, etc.)*
Licensing Limitations	*In the event that licensing limits are exceeded resulting in traffic loss, alerts are generated to indicate the drop of traffic. (i.e. SSL TPS, port exhaustion, compression, etc.)*
Individual Hardware Component / Environmental Health	*Alerts generated in the event of hardware issues, or conditions that are a threat to hardware. (i.e. high temperature, power module failure, etc.)*
High-Availability Status	*In the event of a change in high availability status, alerts are generated to investigate cause for change in status (i.e. unexpected failover of active to standby load balancer device.)*

Maintenance and Support

1. 24/7 support for Load Balancing and Customer inquiries is included in the Service.

2. To manage configuration consistency and accountability for changes, all system administration and device passwords will be managed by CenturyLink. Customer will not have access to load balancer passwords or be able to make changes to the load balancer configurations. Customer must request any changes by contacting the CenturyLink Response Center. Customer must provide complete authentication credentials to the CenturyLink Response Center when requesting changes.

3. A limited number of status reports will be available for customer viewing on the CenturyLink portal, SavvisStation.

Tasks Performed on Behalf of the Customer

1. **Installation**

   1.1. CenturyLink will work with the Customer to perform a review of the Customer's network configuration, Load Balancing and SSL Acceleration requirements to discuss options for configuring the Service.

   1.2. CenturyLink will supply hardware and software appropriate to the level of service purchased.

   1.3. CenturyLink will work with the Customer to connect the Load Balancer and SSL Accelerator to the pool of servers as agreed upon with the Customer.

2. **Configuration**
   As part of the Installation, CenturyLink provides the following Components to connect the Load Balancers to the CenturyLink Hosting Area Network (HAN):

Connectivity	Description
3 FE/GE Ports per Load Balancer (total of 6)	1 Outbound 1 Inbound 1 Management
2 Data VLANS per Load Balancer (total of 4)	
Cabling of devices to CenturyLink's Network	

3. **Administration**

   3.1. CenturyLink system administrators will perform ongoing, reasonable Load Balancer and SSL Acceleration configuration changes as requested by the Customer (see change detail below).

   3.2. CenturyLink will provide ongoing administrative support for standard additions, deletions and changes to the existing configuration (e.g., adding or removing a server, a VLAN, or an IP).

   3.3. Any Ports and VLANs in addition to those included in the standard CenturyLink design shall be subject to incremental charges as set forth in the relevant Order Form. Any Port or VLAN requested by Customer after the initial installation of the Service shall also be subject to additional, incremental charges.

   3.4. Customer must request any configuration changes through the standard Change Management process.

Customer Responsibilities

1. Where applicable, Customer must provide IP architecture for all network connections to real and managed servers, depending on the environment.

2. In order for CenturyLink to properly configure and install the Dedicated Load Balancing and SSL Acceleration devices, when applicable, Customer must provide CenturyLink with a topology of their existing network, server architecture, port 80 and 443 (and other ports as deemed necessary by Customer) requirements, and throughput requirements.

3. Because persistence methods vary with regard to configuration requirements, the Customer must provide all information necessary for CenturyLink to properly configure the persistence element of the Load Balancing Service.

4. CenturyLink's obligation to provide the Service is contingent upon Customer's compliance with all its responsibilities under this SG. If Customer fails to comply with the terms of this SG, CenturyLink may suspend the Service.

5. Customer will not, nor instruct or permit any other party to, make any physical changes or take actions that would reduce the effectiveness of the Dedicated Load Balancing devices.

6. If the Customer declines to purchase Internet service through CenturyLink, the Customer must have a reliable and stable Internet connection. A connection is defined as unstable if it results in three false alarms per month. If there are three false alarms, the Customer will be charged a $300 false alarm fee. After the first alarm, the Customer may contact the CenturyLink Response Center to discontinue the monitoring after which such time, CenturyLink shall temporarily cease delivering the monitoring service as set forth in the "Monitoring" section of this SG.

7. Customer must provide a 24/7 English-speaking technical contact in the event of questions or in case of emergencies.

8. SSL Certificates

   8.1. If the Customer selects SSL Acceleration Service, the customer must provide a valid X.509 SSL server certificate from an established CA (Certificate Authority). Customer must provide SSL server certificate in either the PKCS12 or PFX12 format, including the private key and private key password.

   8.2. If the Customer provides an X.509 SSL server certificate, in lieu of purchasing an X.509 SSL server certificate through CenturyLink, then the Customer must notify CenturyLink two weeks in advance of the certificate's expiration date. This notification must be handled via our standard Change Management process.

   8.3. Upon request, CenturyLink can generate a certificate signing request (CSR) at no additional cost for the Customer to send to the CA. Customer must make this request via our standard Change Management process at least two weeks in advance of the date required.

Exclusions

If a customer requires any additional services not explicitly included herein as either standard or optional services, they should contact their sales representative for assistance and information on similar products or consulting services.

Definitions

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

SavvisStation. The name for the interface that ties together all the centralized systems that CenturyLink uses to provide services to customers. Included in SavvisStation are systems for order processing, provisioning, procurement, management and monitoring, change management, billing, customer support / ticketing and reporting.

SSL Acceleration. SSL acceleration (or "SSL off-loading") refers to off-loading processor-intensive SSL encryption and decryption from a server to a device configured to accelerate the SSL encryption/decryption routine.