Service Guide

Directory Services

Version: June 28, 2024

This Service Guide ("SG") sets forth a description of the Active Directory Services, including technical details ("Services") offered by Lumen. "Lumen" is defined as CenturyLink Communications, LLC d/b/a Technologies Group or its affiliated entities. This SG is subject to and incorporated into the Agreement and the Hybrid Technologies Service Exhibit, formerly the CenturyLink TS Service Exhibit including the Managed Hosting Services 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, Service Exhibit, or Service Orders to SSG, will mean SG.

1.   Service Details.

1.1   Standard Service Description. Directory Services 1.0: Microsoft Active Directory (AD) is a Managed Hosting service (the "Service"). The standard Service consists of the licensing, installation, configuration, administration, monitoring, maintenance and support for the software components listed in section 1.1. The Service Level Agreement (SLA) associated with this Service Guide is the "Managed Hosting Services SLA."

1.2   Software Components. Customer selects the version, services and deployment scenario from the following sections.

1.2.1   Supported Versions.

(a)   Microsoft Active Directory 2022
(b)   Microsoft Active Directory 2019
(c)   Microsoft Active Directory 2016

1.2.2   Supported Active Directory Services.

(a)   Microsoft Active Directory, Directory Services
(b)   Active Directory Backups, Snapshots, Replication, and Recycle Bin

1.3.1   Deployment Scenarios.

(a)   Stand alone forest
(b)   Extended Domain
(c)   Child Domain

1.3   Licensing. Licensing is included in the Lumen provided Operating System subject to the Microsoft Service Provider Use Rights and License Agreement**.** All users of the Service are subject to the terms and conditions of the referenced license agreement.

1.4   Installation. Lumen will perform installation tasks marked with an "X" in the Lumen column in Table 1.0 for the supported operating systems and hosting Lumen platforms listed below. Customer selects the operating system and platform at the time of purchase.

1.4.1   Supported Operating Systems.

(a)   Microsoft Windows Server 2022
(b)   Microsoft Windows Server 2019
(c)   Microsoft Windows Server 2016

1.4.2   Supported Hosting Platforms.

(a)   Dedicated Cloud Compute (Virtual Intelligent Hosting)
(b)   Managed Server (Intelligent Hosting)

1.5   Configuration. Lumen will provide configuration tasks marked with an "X" in the Lumen column in Table 1.0 Roles and Responsibilities.

1.6 **Administration.** Lumen will provide administration tasks marked with an "X" in the Lumen column in Table 1.0 Roles and Responsibilities.

1.6.1 **Security.** Lumen utilizes NIST guidance for additional security standards when deploying Microsoft AD and will provide security policies for Microsoft AD to Customer upon request.

(a) **Active Directory Replication Traffic:** Items are described in Table 2.0
(b) **Active Directory Client Authentication Traffic:** Items are described in Table 3.0
(c) **CyberArk Traffic:** Items are described in Table 4.0

1.6.2 **Access.** Customers are given administrative full control and domain/enterprise admin rights to Managed Microsoft AD. Lumen will require an account within the domain with domain, enterprise and schema admin rights to perform a schema extension of both the forest and domain as described in Table 1.0. Any Outages directly caused by Customer's access will not be subject to SLA credits.

1.7 **Monitoring.** Lumen will provide administration tasks marked with an "X" in the Lumen column in Table 1.0 Roles and Responsibilities Lumen will enable application level monitoring for each environment as they are created within the product configuration.

1.7.1 **Production Environment Notification.** Lumen will retain primary notification and resolution responsibilities for all automated environment alerts in the production environment. The production environment is subject to SLA credits.

1.7.2 **Non-Production Environment Notification.** A Customer technical contact will be engaged to perform primary resolution of incidents associated with a non-production level environment. The non-production environment is not subject to SLA credits.

1.7.3 **Monitored Values.** Table 5.0 describes the Monitors available for the Service.

1.8 **Maintenance and Support.** Lumen will provide maintenance and support tasks marked with an "X" in the Lumen column in Table 1.0 Roles and Responsibilities.

1.8.1 **Patch Releases.** Lumen certifies, approves and delivers Microsoft monthly roll-up patches and Hotfixes for installation in a Customer environment upon Customer's request. Customer must approve the installation by contacting Lumen support. Any Outages directly caused by Customer's failure to accept the implementation of a patch will not be subject to SLA credits.

1.8.2 **Change Management.** All changes to the Lumen managed applications, systems, network and facilities are subject to Lumen's change management process. This process is intended to confirm that work is reviewed for completeness (risk assessment, completed test procedure, metrics for measuring progress, back out procedure, etc.) and accuracy prior to scheduling and implementation.

1.8.3 **Maintenance Windows.** All times listed under Maintenance Windows are local times and subject to change. Lumen will use commercially reasonable efforts to perform routine maintenance only during the Saturday or Sunday defined maintenance windows. See Definitions for additional information.

1.8.4 **Support.** Support for the Service is provided through the project manager during installation, content migration and Customer validation. At the point of go-live the Service is passed from project management to Lumen Service Center for full 24x7 monitoring and management. The point of go-live is when Customer notifies Lumen project manager that the environment is ready to go-live.

2. **Customer Responsibilities.** Customer is responsible for all tasks with an "X" in the Customer column in Table 1.0 Roles and Responsibilities and any other Customer responsibilities as detailed in this SG. Customer acknowledges and agrees that its failure to perform its obligations set forth in this SG and in Table 1.0 may result in Lumen's inability to perform the Services and Lumen will not be liable for any failure to perform in the event of Customer's failure.

2.1. **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 24 x 7 with sufficient knowledge, authority and access to address configuration issues, event notifications, system or infrastructure modifications and authentication of applicable Lumen systems.

3. **Additional Services.** Customer may elect, at an additional fee and separate contract terms and conditions (i.e. Advanced Managed Services), to have Lumen complete one or more of the tasks in Table 1.0 with an "X" in the Customer column. Contact a sales representative for additional information.

3.1.1. **Minor Releases.** Minor Releases (see Definitions) require a new installation of the software binaries, which requires an Order containing a change request to be signed by Customer.

3.1.2. Major Releases. Major Releases (see Definitions) require a new installation of the software binaries, which requires an Order containing a change request to be signed by Customer.

3.1.3. SSL Certificates. SSL Certificates are small data files that digitally bind a cryptographic key to an organization's details. When installed on a web server, it allows secure connections from a web server to a browser.

Tables and Appendices.

Table 1.0 Roles and Responsibilities.

Activity	Task	Lumen	Customer
License	Procure SSL Certificate for LDAPs (if purchased separately)	X	
	Maintain licensing and support with Microsoft	X	
Installation	Prepare server for Active Directory (OS specific parameters)	X	
	Provide detailed requirements prior to physical build work (e.g., the Customer's environment domain)		X
	Install Microsoft AD and DNS services	X	
	Harden Microsoft AD referencing NIST guidance and Lumen standards	X	
	Install SSL Certificates for LDAPs (must be purchased separately)	X	
	Install Lumen Monitoring	X	
	Perform quality assurance against Microsoft AD installation/hardening	X	
	Provide sign off that environment is ready to go-live		X
Configuration	Configure DNS server services	X	
	Configure NTP server services	X	
	Configure DNS/NTP client services on Lumen managed servers	X	
	Configure DNS/NTP client services on Customer managed servers		X
	Configure sites & services for Lumen managed sites	X	
	Configure and on-board Customer environment into Lumen CyberArk for Lumen operational support.	X	
	Customer to provide accounts and network access.		X
	Perform Lumen supported schema extensions (if necessary)	X	
	Configure sites & services for non-Lumen managed sites (if necessary)		X
	Configure sites & services for non-Lumen managed sites (if necessary)	X	
	Configure trusts to non-Lumen managed environments		X
	Perform non-Lumen supported schema extensions		X
	Create/Modify Lumen standard group policies	X	
	Change domain/forest function level	X	
	Configure Lumen monitoring	X	
	Install and configure Lumen disk/tape backups (if purchased separately)	X	
	Data validation, user acceptance testing (UAT), site acceptance testing (SAT)		X
	Unlock user accounts	X	

Activity	Task	Lumen	Customer
Administration	Reset user passwords	X	
	Disable users	X	
	Application log monitoring	X	
	Update managed servers with all recommended security patches, service packs and hotfixes upon Customer request	X	
	Bulk Create Users/Groups (flat OU/container)	X	
	Join Lumen managed servers to a Lumen managed Active Directory domain/forest	X	
	Join Lumen managed servers to Customer managed Active Directory domain/forest		X
	Bulk create miscellaneous objects		X
	Create/Modify/Delete users, groups, OUs, containers, DNS Records, custom group policies, SPN records and miscellaneous objects		X
	Migrate objects from an external environment		X
Maintenance and Support	Backup Active Directory (requires a Lumen backup service to be purchased separately)	X	
	Coordinate patching with Customer during maintenance hours	X	
	Perform an authoritative restore of Active Directory	X	
	Perform a non-authoritative restore of Active Directory		X
	Perform an object-level restore in Active Directory		X

Table 2.0 – Active Directory Replication Traffic.

Traffic	Protocol	Source Port	Destination Port
ICMP	ALL		
RPC Endpoint Mapper	TCP/UDP	1024-65535	135
RPC Dynamic Assignment * Default Windows 2003 R2 and earlier ** Default Windows 2008 and later	TCP/UDP	1024-65535	1024-65535* 49152-65535** 6000-6199
NetBIOS Name Service	TCP/UDP	1024-65535	137
NetBIOS Datagram Service	UPD	1024-65535	138
NetBIOS Session Service	TCP	1024-65535	139
SMB over IP	TCP/UDP	1024-65535	445
LDAP	TCP/UDP	1024-65535	389
LDAP over SSL	TCP	1024-65535	636
Global Catalog LDAP	TCP	1024-65535	3268
Global Catalog LDAP over SSL	TCP	1024-65535	3269
Kerberos	TCP/UDP	1024-65535	88
DNS	TCP/UDP	1024-65535	53
NTP	UDP	123	123
SMTP	TCP	1024-65535	25

Table 3.0 – Active Directory Client Authentication Traffic.

Traffic	Protocol	Source Port	Destination Port
ICMP	ALL		
RPC Endpoint Mapper	TCP/UDP	1024-65535	135
RPC Dynamic Assignment * Default Windows 2003 R2 and earlier ** Default Windows 2008 and later	TCP/UDP	1024-65535	1024-65535* 49152-65535** 6000-6199
SMB over IP	TCP/UDP	1024-65535	445
LDAP	TCP/UDP	1024-65535	389
LDAP over SSL	TCP	1024-65535	636
Global Catalog LDAP	TCP	1024-65535	3268
Global Catalog LDAP over SSL	TCP	1024-65535	3269
Kerberos	TCP/UDP	1024-65535	88
DNS	TCP/UDP	1024-65535	53
NTP	UDP	123	123

Table 4.0. CyberArk Traffic

Traffic	Protocol	Source Port	Destination Port
ICMP	ALL		
RPC Endpoint Mapper	TCP/UDP	1024-65535	135
RPC Dynamic Assignment * Default Windows 2003 R2 and earlier ** Default Windows 2008 and later	TCP/UDP	1024-65535	1024-65535* 49152-65535** 6000-6199
SMB over IP	TCP/UDP	1024-65535	445
LDAP	TCP/UDP	1024-65535	389
LDAP over SSL	TCP	1024-65535	636
Global Catalog LDAP	TCP	1024-65535	3268
Global Catalog LDAP over SSL	TCP	1024-65535	3269
Kerberos	TCP/UDP	1024-65535	88
DNS	TCP/UDP	1024-65535	53
RDP	TCP	3389	3389

Table 5.0 Monitors for Microsoft Active Directory Service.

Monitors included in the standard Service at no additional charge.

Monitor	Description	Frequency
Replication Queue	Alarms when the number of Active Directory synchronizations queued is above 1	5 Minutes
DNS Failures	Alarms when the number of failed DNS zone transfer requests is above 1	5 Minutes
DNS CPU Usage	Alarms when the DNS service consumes more than 75% of the CPU	5 Minutes
DNS Memory Usage	Alarms when the DNS service consumes more than 35MB of memory	5 Minutes

Monitor	Description	Frequency
Active Directory CPU Usage	Alarms when Active Directory consumes more than 80% of the CPU	5 Minutes
Active Directory Memory Usage	Alarms when the DNS service consumes more than 60MB of memory	5 Minutes
LDAP Bind Time	Alarms when the bind time is over 600 milliseconds	5 Minutes
Time Offset	Alarms when the time offset between the local Domain Controller and the PDC is greater than 1 second	15 Minutes
Subnet Undefined	Alarms when a subnet is not defined for a site in Active Directory	Instantly
Connectivity	Alarms when a Domain Controller cannot be pinged, is not registered in DNS, cannot be reached via RPC or cannot be reached via LDAP	5 Minutes
Replication	Alarms when replication is failing between Domain Controllers	15 Minutes
Topology	Alarms when the Active Directory topology does not include all Domain Controllers	15 Minutes
Cut Off Servers	Alarms when a replication partner is offline	5 Minutes
Advertising	Alarms when a Domain Controller in unable to come online	5 Minutes
Role Holder Check	Alarms when a Domain Controller cannot locate a role holder	5 Minutes
Intersite Replication	Alarms when intersite replication is failing	5 Minutes
FSMO connectivity	Alarms when a Domain Controller cannot reach a role holder	5 Minutes
Active Directory Services	Alarms when a core service for Active Directory is not running	5 Minutes
SYSVOL Access	Alarms when the SYSVOL share is unreachable	5 Minutes
Incoming/Outgoing Replication	Alarms when replication is failing	10 Minutes

Definitions.

Active Directory Client Authentication. Use Active Directory (AD) Client Certificate authentication to map client certificate information across many servers.

Active Directory Replication. The process by which the changes that are made to Active Directory objects on one domain controller are automatically synchronized with other domain controllers.

Child Domain. The purpose of a Child Domain is to provide customers with single sign-on access to their Lumen Managed Hosting environment from their corporate infrastructure. Customer has the ability with this deployment to allow any end user in their existing corporate Active Directory forest to access applications in the Lumen-managed Child Domain using their corporate identity. The extension of a Child Domain from the customer's existing corporate forest allows Lumen to manage Customer's managed services within Lumen, but Lumen employees do not have access outside of the Child Domain into Customer's corporate infrastructure. This deployment is most often used when the hosted infrastructure and/or services with Lumen serve only the Customer's internal corporate users.

Clean Upgrade. Upgrade to a newer version of an operating system or application on a computer. In a clean upgrade of an OS, the hard disk is formatted and completely erased. In a clean upgrade of an application, the older version is uninstalled first.

Destination Port. Destination ports may be well-known ports for the major Internet applications, such as web and e-mail.

Domain Controller. A server within the Customer domain that is hosting the Active Directory domain.

Extended Domain. The purpose of an Extended Domain is to provide customers with single sign-on access to their Lumen Managed Hosting environment from their corporate infrastructure. Customer has the ability with this deployment to allow any end user in their existing corporate Active Directory forest to access applications in the Lumen-managed Extended Domain using their corporate identity. The extension of a domain from the customer's existing corporate forest allows Lumen to manage Customer's managed services within Lumen, but Lumen employees do have access to the domain into Customer's corporate infrastructure, and this often drives customers to select the Child Domain implementation below. This deployment is most often used when the hosted infrastructure and/or services with Lumen serve only the Customer's internal corporate users.

Hotfix. A hotfix or quick fix engineering update is a single cumulative package that includes information that is used to address a problem in a software product.

Maintenance Windows. A period of time designated in advance by Lumen, during which preventive maintenance that could cause disruption of service may be performed. More information is available at https://www.ctl.io/legal/managed-hosting/maintenance-windows/.

Major Release. Major Releases (X.y.z) are vehicles for delivering major and minor feature development and enhancements to existing features. They incorporate all applicable error corrections made in prior Major Releases, Minor Releases, and Patch Releases. Software provider typically has one Major Release per year.

Microsoft Active Directory. Active Directory is a directory service implemented by Microsoft for Windows domain networks.

Minor Release. Minor Releases (x.Y.z) are vehicles for delivering minor feature developments, enhancements to existing features, and defect corrections. They incorporate all applicable error corrections made in prior Minor Releases, and Patch Releases. Minor Releases require a Clean Upgrade.

Patch Release. Patch Releases (x.y.Z) are vehicles for delivering security fixes, feature developments, enhancements to existing features, and defect corrections. They incorporate all applicable error corrections made in prior Patch Releases.

Source Port. The source port is a next-available number assigned by TCP/IP to the client. This assigned number is how the network address translation method determines which user to send back the responses to.

Upgrades. Upgrades mean a Major Release or Minor Release of the software.