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Mitel Standard Linux
Installation and Administration Guide Release 10.3
September 2015

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ABOUT THIS GUIDE

The Mitel® Standard Linux Installation and Administration Guide is intended for Resellers who are installing and configuring Mitel Standard Linux (MSL).

Note: Prior to Release 8.2, MSL was called Managed Application Server.
ABOUT MITEL STANDARD LINUX

Mitel Standard Linux (MSL) is an operating system and server solution for single-site and branch-based enterprises. MSL provides a base for a suite of managed services and applications delivered from the Mitel Applications Management Center (AMC) or available on CD/DVD.

MSL can provide one of the following network configurations:

- **Server-gateway**: functions as an Internet-facing server with firewall capability.
- **Server-only**: functions as an internal server on the local area network (LAN).
- **Server-gateway with Bridged Interface**: functions as an Internet-facing server with firewall capability, and as a bridge to the corporate firewall for data traffic. This configuration requires a minimum of three network interface cards.

Server-gateway Configuration

In the server-gateway configuration, MSL manages the connection to the Internet by routing Internet data packets to and from the network (which allows all the computers on the network to share a single Internet connection) and by providing security for the network, minimizing the risk of intrusions.

When one of the computers on the local network contacts the Internet, MSL not only routes that connection, but seamlessly interposes itself into the communication. This prevents a direct connection from being established between an external computer on the Internet and a computer on the local network, which significantly reduces the risk of intrusion.

Throughout this document, the term "MSL" refers specifically to the operating system software that is installed on a computer that hosts the application(s) and subscription services delivered from the AMC.
When MSL is deployed in server-only mode, it provides the network with services, but not the routing and security functions associated with the role of “gateway”. The server-only configuration is typically used for networks that are already behind a separate firewall. In other words, a separate firewall fulfills the role of gateway, providing routing and network security.
Server-gateway with Bridged Interface Configuration

In this configuration, MSL is deployed parallel to the corporate firewall, providing a public interface to the Internet for VoIP traffic, and a bridged interface to the firewall for all other traffic.

To enable this functionality, the MSL server requires at least three network interface cards. The first NIC connects directly to the LAN, the second connects to the Internet, and the third connects to the WAN interface of the firewall in bridged mode.

When incoming traffic arrives on the server's WAN interface, it is routed to the appropriate network segment. Voice packets are sent directly to the Voice VLAN and data packets are bridged to the firewall's WAN interface. By separating the traffic between the voice and data network segments, QoS for voice calls is improved. This setup also enables a Voice VLAN to be installed into an existing Data VLAN without having to update the firewall rules.

As part of this configuration, you can prioritize voice over data traffic using the Mitel Border Gateway’s “Bandwidth Management” feature. Simply program the maximum amount of bandwidth available on the WAN communication links (inbound and outbound). The system employs these settings to establish traffic shaping queues which give priority to voice calls ahead of data traffic.

![Figure 3. Server-gateway with Bridged Interface configuration example](ML0023)

After installation, MSL can be configured and managed remotely from one of two interfaces:

- The web-based server manager, accessed from the administrator’s desktop
- The server console, accessed from the server itself or remotely using an SSH client

SECURITY FOR MSL APPLICATIONS

MSL may host many standalone applications with very different features. While it is technically feasible to install several applications on the same MSL, the inherent design of
each application may impact co-residency considerations. For example, the Mitel Border Gateway (formerly Teleworker) application is specifically designed for direct connection to the public Internet. Other MSL applications, like MiCollab Mobile Client, Live Business Gateway, and NuPoint Unified Messaging (UM), are designed to operate within the enterprise LAN.

Security best practices suggest that highly secure deployments of applications designed to operate within the enterprise LAN should be installed behind a firewall on an MSL server deployed in server-only configuration and not co-resident with applications specifically designed for connection to the public Internet. For this reason Mitel does not recommend that standalone enterprise-only applications and MiVoice Border Gateway be installed on the same MSL server.
WHAT'S NEW IN THIS RELEASE

MSL Release 10.3 provides the following new features:

- **General Improvements:**
  - **Kernel Update:** MSL 10.3 is based on CentOS 6.6, providing improved security and server compatibility.
  - **Full 64-bit version:** MSL 10.3 provides a full 64-bit distribution for improved memory management. Migration from a 32-bit to a 64-bit system requires a fresh software installation, either manually or using the new Remote Fresh Install blade. The following table outlines the available upgrade methods:

<table>
<thead>
<tr>
<th>UPGRAADING FROM..</th>
<th>UPGRAADING TO..</th>
<th>SUPPORTED UPGRADE METHODS</th>
</tr>
</thead>
</table>
| 9.x and earlier releases (32-bit) | 10.3 (32-bit) | • Fresh Install from CD/DVD/USB  
| | | • Remote Fresh Install |
| 10.0 releases (32-bit) | 10.3 (32-bit) | • Upgrade from CD/DVD/USB  
| | | • ServiceLink |
| | 10.3 (64-bit) | • Fresh Install from CD/DVD/USB  
| | | • Remote Fresh Install |
| 10.0 SP1 (64-bit hybrid) | 10.3 (64-bit) | • Fresh Install from CD/DVD/USB  
| | | • Remote Fresh Install |
| 10.1 and later releases (32-bit) | 10.3 (32-bit) | • Upgrade from CD/DVD/USB  
| | | • ServiceLink |
| | 10.3 (64-bit) | • Fresh Install from CD/DVD/USB  
| | | • Remote Fresh Install |
| 10.1 and later releases (64-bit full) | 10.3 (64-bit) | • Upgrade from CD/DVD/USB  
| | | • ServiceLink |

Consult your application documentation to confirm the exact upgrade steps you should follow. In some cases, you will be required to upgrade MSL before upgrading the application. In other cases, you will be required to upgrade the application software first.

- **MiCollab Installation Improvement:** The Install Applications panel, which previously allowed only AMC software download, now provides the option to install or upgrade software from local media. In the future, this feature will be enhanced to enable local downloads from a network share or USB drive.

- **SFTP Restore:** Since MSL 10.0, it has been possible to perform network backups to Linux servers that support secure FTP (SFTP). However, to restore an SFTP backup, users had to copy it to a removable device such as USB key, and then select the "Restore" from Backup option from the Server Console. With MSL 10.3, it is now possible to restore an SFTP backup directly from a network file server.

- **Virtual Environment Enhancements:**
  - If you are deploying to VMware vCenter server, you can now configure the MSL settings (such as the DNS and interface IPs) as part of the initial OVF deployment. This eliminates the need to use the server console for this purpose.
  - You will be forced to change the administrator password the first time you power on a system in a VMware environment. This requirement ensures that any password information stored in the virtual appliance cannot be used to access the server.
  - The Mitel Virtualization Tool now includes a Storage Monitoring utility that you can use to detect file system errors and take corrective action such as issuing an email notification or rebooting the system.
• **Security Enhancements:**
  - To address security vulnerabilities, MSL will distribute security patches through the Blades panel. You will be notified by Mitel Product Support whenever a new patch is available.
  - Increased protection against dictionary-based attacks, and enhanced cookie security.
  - To facilitate client access to MSL, you can now import third-party SSL certificates in PKCS#12 format as well as PEM format.

• **Performance Enhancements** (invisible to users):
  - The Linux CFS process scheduler has been retuned to maximize CPU utilization and improve voice quality performance.
  - To prevent LDAP file system corruption in the event of an unexpected shutdown, the backend database has been configured to use shared memory rather than files.

MSL Release 10.1 provides the following new features:

• Both MSL 10.1 and MSL 10.0 SP2 are based on CentOS 6.5. The MSL 10.1 release is available in i686 (32-bit kernel, 32-bit user space) and x86-64 (64 bit kernel and user space) versions. CentOS 6.0 is required to ensure compatibility with recently released hardware servers.

• **Integration with Hosted and Cloud-based Systems:**
  - Support for the OAuth 1.0 protocol has been discontinued with the release of MSL 10.1. If you are currently using OAuth 1.0 and upgrade to the latest MSL software, you should reprogram API access for your application using an OAuth 2.0 Service Account. After you have done this, the OAuth 1.0 tab will be removed from the server manager interface. If you are installing new software (including install/database restore) only OAuth 2.0 is available for configuration.

• **Web Services:**
  - MSL supports the Web Services framework, a Representational state transfer (REST) API that enables management integration through the Oria Provisioning Portal.

• **Networking enhancements:**
  - IPv6 in IPv4 Tunnel: The MSL Server Manager has a new screen which enables you to encapsulate IPv6 packets for transmission across an IPv4 network such as the internet. The screen also allows you to program the external interface of the tunnel with an IPv6 address, which allows it to be addressable by IPv6 traffic on the internet. Both of these functions require the MSL server to be operating in server-gateway mode.
  - Trusted networks and network routes: The “Local Networks” screen in the MSL Server Manager has been renamed “Networks” and now allows you to add trusted networks and routes for both IPv4 and IPv6 protocols. You may define subnetworks using either a subnet mask or a prefix in CIDR format.
  - Remote Management: You can now configure remote access and secure shell (SSH) settings for both IPv6 and IPv4 networks.
  - Default Gateway: It is now possible to specify an IPv6 default gateway address when you originally install and configure the MSL software using the server console.

• Event/alarm notification has been added to top of the MSL Server manager interface.

• Most of the Mitel product portfolio has been rebranded. These changes are reflected as follows on the MBG interface:
<table>
<thead>
<tr>
<th>OLD PRODUCT NAME</th>
<th>NEW PRODUCT NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>5000 Communications Platform</td>
<td>MiVoice Office</td>
</tr>
<tr>
<td>Mitel Communications Director</td>
<td>MiVoice Business</td>
</tr>
<tr>
<td>MiCollab</td>
<td>MiCollab</td>
</tr>
<tr>
<td>NuPoint Unified Messaging</td>
<td>MiCollab NuPoint Unified Messaging</td>
</tr>
<tr>
<td>Speech Auto Attendant</td>
<td>MiCollab Speech Auto Attendant</td>
</tr>
<tr>
<td>Mitel Collaboration Advanced</td>
<td>MiCollab Audio, Web and Video Conferencing</td>
</tr>
<tr>
<td>Unified Communicator Advanced</td>
<td>MiCollab Client</td>
</tr>
<tr>
<td>Unified Communications Advanced Mobile</td>
<td>MiCollab Mobile Client</td>
</tr>
<tr>
<td>Unified Communications Server</td>
<td>MiCollab Client Service</td>
</tr>
<tr>
<td>Mitel Border Gateway</td>
<td>MiVoice Border Gateway</td>
</tr>
<tr>
<td>Unified Communicator 360</td>
<td>MiVoice Conference Unit</td>
</tr>
<tr>
<td>Mitel Enterprise Manager</td>
<td>MiVoice Enterprise Manager</td>
</tr>
</tbody>
</table>

MSL Release 10.0 provides the following new features:

- **General Enhancements:**
  - MSL 10.0 is based on CentOS 6.3 and is available in both i686 (32-bit kernel, 32-bit user space) and x86-64 (64 bit kernel, 32-bit user space) versions. CentOS 6.0 is required to ensure compatibility with recently released hardware servers.
  - Clustering has been removed from the interface due to the discontinuation of the NPM 640 system.
  - The ETX option has been removed from the software installation procedure due to the discontinuation of the ETX and APC product variants.

- **Installation and Upgrades:**
  - If you select "Restore from Backup?" after installing MSL software, you may now obtain the backup files from another running server in addition to a network drive or removable device. The new option facilitates the replacement of an existing MSL 9.x server (physical or virtual) with a new MSL 10.x server.
  - Physical servers running MSL 9.3 or 9.4 can now upgrade to MSL 10 without physical media or console access. Use the new MSL Remote Fresh Install (RFI) blade to automatically upgrade to Release 10 from the Blades panel while maintaining configuration settings.
    **Note:** The RFI blade requires sufficient disk space for a backup. If your system has insufficient disk space, the blade will be unavailable on the Blades panel.

- **Security Enhancements:**
  - Increased resistance to cross-site request forgery and scripting attacks.
  - Communications between the MSL server and the AMC now use SSHv2 for improved security.
  - SNMP security enhancements: Administrators may now choose between SNMPv2c and SNMPv3. SNMPv3 is the latest version of the SNMP protocol and introduces authentication and encryption for network management communications.
  - For increased security, you can use SSL client certificates to authenticate VPN connections for remote users.

- **Alarm Enhancements:**
The Event Viewer panel has been enhanced to make it easier to determine the reason for alarms. New settings enable you to clear a single event (as opposed to all events) and display only new events (as opposed to both new and cleared events). Also, the "Start" and "End" date fields have been made to easier to use.

- **MSL Backup Enhancement:**
  - You can now perform network backups to Linux servers that support secure FTP (SFTP). Previously, you were limited to performing network backups to Windows servers using the SMB/CIFS protocol.

- **Integration with Hosted and Cloud-based Systems:**
  - Support for configuration of OAuth 1.0 and OAuth 2.0 protocols for application interaction with cloud-based systems like Google Contacts and Google Calendar.
  - The destination port for outbound SMTP can now be set to 587 (TLS), in addition to 465 (SSL) or 25 (clear text). The use of secure ports is required by some hosted email service providers such as Google Apps.

MSL Release 9.4 SP1 provides the following new features:

- **Server Manager Enhancements:**
  - The email settings can now be configured to support a direct connection to an SMTP relay (smart host) such as Google Apps using secure port 465.
  - The new "Log Collector" utility allows you to create an archived file of system-level logs and then save the file to another location such as your local PC.

MSL Release 9.4 provides the following new features:

- **General Enhancements:**
  - MSL 9.4 is based on CentOS 5.7 and is available in both i686 (32-bit kernel, 32-bit user space) and x86-64 (64 bit kernel, 32-bit user space) versions.
  - **ServiceLink upgrades (from the “Blades” panel) are available for both versions effective with the following releases:**
    - 32-bit: Rel 9.1.24.0 and later
    - 64-bit: Rel 9.2.21.0 and later

- **MSL Backup Enhancements:**
  - Network backups can be now be made to a specific sub-directory on the MSL server. Previously, backups were always placed in the root directory.
  - When restoring backup files on an operational system, the following prompt no longer appears: “Do you wish to restore from backup?” The prompt still appears when you perform a restore during the software installation process.
  - In previous releases, after you restored a backup configuration the default gateway address displayed incorrectly. This problem has been corrected.

- **Installation Enhancements:**
  - USB storage devices may now be formatted with the NTFS file system in addition to FAT32 and EXT3. This allows for file sizes larger than 4 GB.
  - It is no longer possible to switch (upgrade or downgrade) between the 32-bit and 64-bit kernel versions of MSL. If you attempt to do so, you will receive an error message.
  - On an initial installation, when you configure the server parameters you are now prompted to “Enter Local Subnet Mask” rather than “Select local subnet mask.”

- **Server Console Enhancements:**
- There is no longer a need to log in a second time after selecting “Access Server Manager” from the Server Console menu.
- In previous releases, if you upgraded a software blade from the Server Console, the new software version would be displayed irrespective of whether the upgrade was successful. This problem has been corrected and the actual software version now displays in all circumstances.
- When you initiate a reboot, shutdown or reconfigure from the Server Console or Server Manager, you will be prompted to confirm your selection. In previous releases, these actions occurred immediately.
- If you configure a Corporate DNS server address, you can now specify whether it should perform name resolution for all domains, or only for non-local domains.

**Server Manager Enhancements:**
- It is now possible to download SSL certificates and private key files from one MSL server and upload them to another.
- Regular patterns can now be used in the “Filter Pattern” and “Highlight Pattern” fields on the View Log Files panel. In addition, log download performance has been optimized for faster viewing of large logs.
- A new “cache” option has been added to the Blades panel. It enables you to download software blades for installation/upgrade at a later time.
- The System Information panel now indicates whether the MSL Kernel Version is 32- or 64-bit.
- Cluster management has been made easier: You can now remove a cluster simply by clearing its Cluster IP address, and you can update a password in the server manager and have the change replicated across the cluster nodes.

**Virtualization Enhancements:**
- OVA files for all Mitel Virtual appliances now include the Mitel Virtual Framework (MVF) blade. This software blade manages optional VMware features like Site Recovery Manager and High Availability. See your application documentation for instructions on how and when to update this blade.
- If the MAC address of the network interface card in a single-NIC system changes (for example, if you create a new virtual machine (VM) and then restore a backup from a previous VM), MSL 9.4 recognizes and stores the changed address. In previous releases, you may have had to step through the “Configure this Server” option to make MSL recognize the updated NIC. Note: This feature may not be effective for physical hardware with multiple NICs. If networking does not respond properly, you may still have to step through the “Configure this Server” option to reset the addresses.

MSL Release 9.3 provides the following new features:

**Installation Enhancements:**
- CD boot screens now indicate when the 64-bit MSL version is being installed.
- A USB device can now be used to install/upgrade MSL software.

**Internet Protocol Version 6 (IPv6) Support:**
- Server Console: Local Networks and WAN Interface configuration screens now have the ability to accept IPv6 addresses.
- Server Manager: The server manager can be accessed via IPv6. Along with Local Networks and WAN configuration screens, the Review Configuration screen now
displays IPv6 information. IPv6 access to System Monitoring and SSH are also provided.

- **Remote SSH Access Security Improved:**
  - Secure shell access is extended to remote management networks in addition to local networks. This enables external administrators, such as Mitel Product Support personnel, to access the system in relative security and avoid using the “Allow public access” option.

- **AMC Synchronization Improvements:**
  - Online Sync: If an AMC synchronization has not been successfully completed within the re-sync interval (24 hours by default), a Major alarm is raised.
  - Offline Sync: Offline systems that migrate to MSL 9.3 will generate a Major alarm indicating that AMC synchronization has failed. To disable auto-synchronization and prevent further alarms, re-do the offline activation procedure.

- **Download Manager:**
  - MSL software can now be downloaded from Mitel OnLine using the optional Download Manager, an ActiveX application installed through your web browser. In addition, you can still use HTTP to download software.

MSL Release 9.2 provides the following new features:

- **Installation Enhancements:**
  - Server and APC (ETX) installations are now packaged in one image. You can select either package at the initial boot.
  - Rescue mode images are supplied for file recovery in case of MSL failure
  - Hardware detection and memory test utilities now appear as options at boot time
  - When MSL detects a system with multiple hard disks, such as NuPoint with a storage array, it prompts you to include/exclude each drive in the MSL partition.
  - MSL displays an error message if it cannot detect a hard drive (usually caused by incompatible SCSI/SAS hardware).

- **Server Manager Enhancements:**
  - ServiceLink AMC Synchronization: Offline synchronization support has been added for deployments that do not have USB capability. Also, it is now possible to perform an online synchronization via a proxy by entering the proxy's IP address and connection port.
  - Time Server Connectivity: A Query button has been added to the NTP/Date and Time screen to ensure that network connection to the time server is valid.
  - System Information Enhanced: The System Information option now provides hardware manufacturer and product name/model information.
  - Network Interface Card Settings: The NIC Settings screen provides an interface to configure NIC speed for deployments that need to override the default setting of “auto-negotiate”.

- **Server Console Enhancements:**
  - The server console now includes a “Restore from backup” menu item that provides an “on demand” restore option. You can restore from a backup that was saved to either a removable device (USB/CD), or to a network file share. This option reboots the server and then displays the “Do you want to restore from backup?” prompt.

- **Alarm Enhancement:**
- Event Viewer: The Event Viewer panel is enhanced with configurable start and end dates for searches (the default time period is the previous 7 days), and the ability to enter regular expressions (regex) in the Text filter field.

- E-mail Settings: MSL 9.2 extends alarm capabilities to configurable email notification. Emails are sent to the configured administrator email account if alarms meet or exceed the user-selected severity.

MSL Release 9.1 SP1 provides the following new features:

- **MSL Backup Enhancements:**
  - Desktop backup handles larger data sets, with more accurate reporting of pre-compressed backup size

- **Scheduled Network Backup now supports:**
  - daily, weekly, and monthly backups
  - configurable backup storage – set a maximum number of backup files to keep on server
  - “Backup Now” button for immediate backup

- Certificate Signing requests for submission to third-party certificate authorities are now generated with 2048-bit keys

- RAID Array events are now forwarded to the “Forwarding address for administrative email”, if configured, or delivered to admin-raidreport@<domain name>.

MSL Release 9.1 provided the following new features:

- **Scheduled Network Backups:** setup a schedule for automatic network backup

- **Web Server Certificates Panel:** generate Certificate Signing Requests and import third-party signed SSL certificates

- **Offline Synchronization Menu:** Provides an offline method to synchronize with the AMC.

- **Keyboard Selection:** Installation procedure allows for selection of non-US keyboards

- **Improved Backup Verification Handling:** MSL offers a "Try again" screen if the USB device is not detected.

- **‘memtest’ Utility Improvements:** use the memtest utility to test server memory even on the most recent CPUs.

- **MAS Applications Installation from CD/DVD:** When installing application blades, MSL recognizes MAS deployments and routes the installation to a MAS-specific process. (The CD/DVD installation procedure for non-MAS applications remains the same.)

- **Update MiCollab Panel:** For MAS deployments only, MSL now provides a dedicated menu in the server console for updating the MAS application.
ACCESSING THE MSL QUALIFIED HARDWARE LIST

To access the MSL Qualified Hardware List:

1. Log in to Mitel OnLine.
2. Point to Support and then click Product Documentation.
3. Point to Applications and Solutions, and then select Mitel Standard Linux from the drop-down list.
4. Click Qualified Hardware List.
AMC LICENSING

ABOUT THE APPLICATIONS MANAGEMENT CENTER

The Mitel Applications Management Center (AMC) is an online service accessed via the Internet that provides licensing, monitoring, management, and a variety of other services for installations of Mitel software applications. The AMC is also the procurement and provisioning interface for AMC-delivered products and services. As a reseller of Mitel products, you receive a unique licensing account on the AMC system. By logging in to the AMC with the user name and password you are given when you obtain your account, you can view a list of your AMC-enabled products, check their status, and add or drop services from any of them.

When you place a new order for Mitel products with Customer Services, the order information is entered into the AMC system. The AMC places the purchased licenses into your licensing account. Before you can install application software, there are four steps to follow:

- In your AMC account, create an Application Record for the MSL-based system and take note of the Application Record ID.

  Note: Each Application Record represents one physical hardware device (server or controller).

- Assign all application licenses to the MSL Application Record.

- Assign all User and Device licenses to the appropriate 3300 ICP Application Record.

- Install the MSL-based software and register with the AMC to activate the license.

When the installation of the MSL operating system is complete, it generates a unique Hardware ID. When connected to the AMC through the Internet, you must enter the Application Record ID (also called Service Link ID) that you created for this installation. MSL uses the Hardware ID and the Application Record ID to identify itself to the AMC. Upon synchronization with the AMC, purchased software and options become available.

After online registration, MSL will connect to the AMC regularly via a secure, encrypted connection to synchronize or “sync”. When you add or delete services using your AMC account, MSL receives its new configuration instructions from the AMC at the next sync. You can force an immediate sync by clicking the Sync button on the Status page of the server manager. You can also use Sync to check that connectivity between the server and the AMC has been restored after a network problem.

The most important services provided by the AMC for the MSL family of products are:

- Licensing
- Software blade downloads
- Software Updates (security patches)

  Note: If your server is behind an additional firewall, that firewall must be configured to allow outbound SSH packets on TCP port 22 to permit server communication with the AMC.

REQUEST A NEW AMC ACCOUNT

To request an AMC account, send an email containing the following information to amc_accounts@mitel.com:
• Name of your certified Technician
• Full company name
• Company mailing address
• Phone 1/Phone2
• Fax number
• Admin email (address of the person who should receive notification of service expiry dates)
• Tech email (address of the person who should receive notification of update releases and other technical notices)
• Company URL (if any)
• Your Mitel SAP account number
• Specify if you would like your user ID and password delivered to you by fax, phone, or both (for security reasons user IDs and passwords are not sent by email).

Please allow two business days for your AMC account to be created.

ACCESS YOUR AMC ACCOUNT

To access your account for the first time:
1. Go to the Mitel web site (http://www.mitel.com) and log in to your Mitel OnLine account.
2. In the menu bar, point to Purchasing and then click AMC.
3. Sign in with your unique AMC ID and password to establish your "single sign on". On subsequent visits, you access your AMC account directly after signing in to Mitel OnLine.

For information about using the AMC, click the online Help link in your AMC account.

FIND MORE INFORMATION

To access documentation/software from the Internet:
1. Log in to Mitel OnLine.
2. Point to Support.
3. Do one of the following:
   • Click Product Documentation to access documentation
   • Click Software Downloads to access MSL software

Note: You must be a registered user to access documentation and software downloads through Mitel OnLine.
INSTALLING THE HARDWARE

MSL software relies upon the host computer meeting the documented hardware standards. Mitel Networks Corporation reserves the right to limit support for hardware configurations that we determine to be incompatible with MSL software. Please note that future applications from Mitel may be certified and supported only on specific hardware platforms that provide the requisite speed and performance.

GENERAL REQUIREMENTS OF THE MSL HOST COMPUTER

Hardware requirements for the MSL host are generally dictated by the requirements of the applications that it hosts. Here are some general notes:

- The amount of available RAM is one of the most important considerations for performance as it reduces the load on the disks. If a tradeoff is required, extra RAM is usually more beneficial than a faster CPU.
- For a dedicated connection in a server-gateway configuration, the server requires two Ethernet adapters (also called network adapters or network interface cards). For a server-gateway with a bridged interface, the server requires three Ethernet adapters (one for the LAN, another for the WAN, and a third for the bridged connection to the WAN interface of the firewall). For a server-only configuration, only one Ethernet adapter is needed.
- The software supports most external modems; internal modems are not supported.

To test server memory before installing MSL, or to debug possible memory problems, see Troubleshooting on page 105.

HARDWARE COMPATIBILITY

Please refer to the MSL Qualified Hardware List available at Mitel OnLine for a complete list of supported servers along with a matrix that provides the correct MSL version for all MSL-compatible applications. Mitel recommends servers from this list only and reserves the right to limit support for other hardware configurations.

ABOUT RAID

MSL supports disk redundancy, also called RAID Level 1. Disk redundancy ensures that all data is written to two separate hard disks installed in the server. If the primary disk fails, the mirror disk will continue as if nothing had happened. All of the data is protected.

If a disk failure occurs while using MSL software RAID, email notification is sent immediately to the administrative forwarding address configured on the MSL server. If the forwarding address has not been configured, the email is sent to admin-raidreport@<domain name>, which must be a valid email account your domain's email server. If neither of these addresses is valid, the notification is not delivered. For this reason, we strongly recommend that you configure an administrative forwarding address.

Disk redundancy can be accomplished using either the MSL operating system software RAID, or an actual hardware RAID controller.

**Note:** Although RAID improves data reliability, to fully protect your system you should perform a backup on a periodic basis. For details, see Perform Backup on page 95.
Hardware RAID

A hardware implementation of RAID uses special-purpose RAID controller hardware. On a desktop system this can be a PCI or PCI-e expansion card. Most hardware implementations provide a cache that generally improves RAID performance. In most systems the write cache is battery-protected, so pending writes are not lost when power fails. Hardware implementations provide guaranteed performance, add no overhead to the local CPU system, and can support many operating systems since the controller presents a virtual single logical disk to the operating system. You configure a RAID array in the controller where you will install MSL. MSL sees this array as a single disk.

MSL is compatible with the recommended hardware-based RAID controllers. The RAID array that will store MSL must be configured before installing MSL.

Note: MSL RAID drive failure notification is not active when hardware RAID is used. To enable drive failure notification, additional RAID adapter-specific software must be installed.

Software RAID

Software implementations of RAID are now supplied by many operating systems. A software layer sits above the disk device drivers and provides an interface between the logical and physical drives. Software RAID must run on a host server attached to storage, and the server's processor must dedicate processing time to run the RAID software. Processing time required for RAID1, which MSL uses, is negligible. An advantage of software RAID is that it allows RAID disks to be easily moved from one computer to another, which is very useful when hardware fails.

Firmware or Driver-Based RAID

To supply a RAID controller that is cheaper than Hardware RAID, some manufacturers have introduced Firmware RAID, which is not a RAID controller chip but is simply a standard disk controller chip with special firmware and/or drivers. During early-stage bootup, the RAID is implemented by the firmware. When a protected-mode operating system kernel (such as MSL) is loaded, the drivers take over. The bulk of RAID processing is done by the host computer's CPU, not by the “RAID controller” itself. Most embedded RAID devices are Firmware/Driver-based RAID controllers and have been used on many entry-level servers.

Firmware/driver-based RAID, known as “dmraid” in MSL, is NOT supported.

MSL Software RAID

The MSL system uses Linux software RAID, which has proven reliability and supportability. The MSL RAID configuration utility also includes management, monitoring, and reporting capabilities. Moreover, if a hardware problem occurs, the system can usually be rescued by moving the disks to another system. This is not the case for hardware- or firmware-based RAID.

To enable software RAID1 support, you must have two disks that are the same size or that are capable of having partitions of the same size. These disks can be SCSI, IDE, Serial ATA (SATA), or Serial Attached SCSI (SAS) drives. When the MSL installer detects a server with two fully functional disks, it will configure the disks into a RAID Level 1 array, which is subsequently controlled by the MSL operating system. You can install MSL software on a single disk and then insert a second (blank) disk at a later date to create a mirrored pair (use the “Manage Disk Redundancy” option in the server console to activate the second disk).
If two disks are installed that are not configured into an existing hardware-controlled array, the MSL installation automatically creates an MSL-controlled RAID1 array.

**Note:** MSL does not support RAID Level 0 (disk striping), because it does not provide data protection. MSL does not support RAID Level 5 (disk striping with parity) because of the poor performance and reliability of software implementations of RAID5. If you are seeking RAID5 support, Mitel recommends you consider one of the many hardware implementations, which will provide both protection and performance.

**BIOS Settings for RAID**

The BIOS for each server can be unique. As a result, we must analyze the SATA/RAID controller settings on a server-by-server basis. This process is part of the MSL hardware qualification program, and involves testing new servers and recommending the appropriate BIOS settings for various SATA/RAID controllers. See the MSL Qualified Hardware List available at Mitel OnLine.

This process is part of the MSL hardware qualification program.

Each server BIOS is different and we analyze the SATA/RAID controller settings, on a server-by-server basis, in the MSL hardware qualification program. As new servers are tested, recommendations will be made about BIOS settings to use when dealing with various SATA/RAID controllers. See the MSL Qualified Hardware List available at Mitel OnLine.

**Test the RAID Configuration**

Prior to deploying the system, you can test the MSL software RAID configuration to confirm that the system can operate with only one disk.

To test the RAID configuration before deployment:

1. Access the server console and log in as "admin".
2. From the console, select the option to **Reboot, reconfigure or shut down this server**.
3. Select **Shutdown** and press **OK**.
4. Remove or disconnect one of the two drives.
5. Restart the system and allow it to fully boot.
6. From the console, select the option to **Reboot, reconfigure or shut down this server**.
7. Select **Shutdown** and press **OK**.
8. Reconnect the disconnected drive and disconnect the other drive.
9. Restart the system and allow it to fully boot.
10. From the console, select the option to **Reboot, reconfigure or shut down this server**.
11. Select **Shutdown** and press **OK**.
12. Reconnect the disconnected drive. (Both drives should now be connected.)
13. Restart the system and allow it to fully boot.
14. From the console, select the option to **Manage disk redundancy**.
15. Select **Yes** to activate the unused disk and begin the RAID resynchronization process.
16. Click **Next** to return to the console menu.

17. Wait for a few minutes and select the option to **Manage disk redundancy**. If synchronization is complete, the screen will indicate that "All RAID devices are in clean state." If it is incomplete, exit the screen and continue waiting. Depending on the amount of data stored to disk, the synchronization process may take 15 minutes or longer. Accordingly, you may need to exit and re-access the screen several times. (Note that the screen is **not** updated automatically.)

18. After you receive the message that "All RAID devices are in clean state," click **Next** to return to the console menu.

19. Click **Exit from the server console**. The system is ready to be deployed.
INSTALLING MSL SOFTWARE

Installation of MSL consists of the following tasks:

- Collect Site Information (this page).
- Read Installation Notes on page 20.
- Create Application Record on page 21.
- Obtain MSL software on page 21.
- Install MSL Software page 22.
- Configure MSL on page 24.
- Launch the Server Manager on page 42.

COLLECT SITE INFORMATION

The following table lists the information you need to enter during installation and configuration. For efficient installation, we recommend that you gather this information beforehand:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>NOTES</th>
<th>YOUR INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server Configuration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Administrator Password</td>
<td>For password strength, choose a password that contains a mix of upper and lower case letters, numbers, and punctuation characters, and that is not a dictionary word.</td>
<td></td>
</tr>
<tr>
<td>2. Domain Name</td>
<td>Names must start with a letter; can contain letters, numbers, and hyphens. For more information, see page 24.</td>
<td></td>
</tr>
<tr>
<td>3. System Name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. IP address of your MSL server</td>
<td>The local, static IP address of the server where you are installing MSL.</td>
<td></td>
</tr>
<tr>
<td>4b. IP address of your external NIC(s)</td>
<td>The IP address of your external Ethernet connection.</td>
<td></td>
</tr>
<tr>
<td>4c. Alias IP for your external NIC</td>
<td>A second, alias IP address used for applications that require a server with two IPs (like Audio, Web and Video Conferencing)</td>
<td></td>
</tr>
</tbody>
</table>
| 5. External Interface Connection | Cable Modem? You need to know if the ISP requires an Account Name OR an Ethernet address as identification in DHCP requests  
DSL Connection? You need to know the username and password for authentication  
Direct Connection? You need to know the static IP address  |                  |
| 6. Gateway IP Address       | The IP address that your MSL server                                                                                                                                                                   |                  |
### INSTALLATION NOTES

- If you are performing a fresh install, see Install MSL Software on page 22.
- If you are upgrading from a previous release of MSL software, see Upgrading MSL Software MSL Software on page 29.

### CREATE APPLICATION RECORD

Create an Application Record for this MSL installation in your AMC license account. You will use the ID number of this Application Record to activate your MSL license. For information about creating Application Records, refer to the online help in your AMC account.

### OBTAIN MSL SOFTWARE

Before you can install MSL software, you must download the ISO image of the software from Mitel Online and then copy it to a CD/DVD-ROM or USB flash drive.

Download Image from Mitel Online

To download an ISO image of MSL software:

1. Log on to Mitel OnLine.
2. Move your pointer over Support and then click Software Downloads.
3. Click the name of the application software you want to install. The correct MSL load for your software is included on this page.

**Note:** Make sure to download the correct MSL kernel version, either 32-bit or 64-bit. You cannot switch versions when performing a software upgrade or downgrade.
4. Click the `MSLx.x.x.iso` link.

5. Select a download method: **HTTP** or the **Software Download Manager**.

6. Select a location on your maintenance PC to store the downloaded software ISO images.

**Copy Image to CD or DVD**

For 32-bit installations of MSL, use a CD. For 64-bit installations of MSL, use a DVD.

To build a CD or DVD from the downloaded ISO image:

7. Insert a CD or DVD disc into the CD/DVD-ROM drive of the maintenance PC.

8. Navigate to the stored MSL software ISO image and double-click the file. Your CD/DVD burning software builds the CD or DVD.

---

**Note:** The `.iso` file must be written as an image and not as a file.

---

**Copy Image to USB**

Use a USB storage device that is formatted as FAT32 (DOS), EXT3 (Linux), or NTFS (Windows and Linux).

---

**WARNING:** All existing data is erased from the USB drive when you copy an ISO image to it.

---

**Linux Environment**

To write the image from a Linux system to a USB flash drive:

1. Open a command prompt and execute the `dd` command.
   - Command structure: `dd if=<source> of=<target>`
   - Command example: `dd if=msl-9.2.22.0.iso of=/dev/sda`

---

**Note:** Use the “`enum_devices`” command to determine the `<target>` block device of your USB flash drive. This command is available only with MSL, not with other versions of Linux.

---

**Windows Environment**

To write the image from a Windows system to a USB flash drive:

- Obtain a USB Image Tool (such as `www.alexpage.de/usb-image-tool/`) and use it to write the image to the USB flash drive.

---

**INSTALL MSL SOFTWARE**

The following procedure describes how to install MSL software to a workstation from a CD/DVD or USB flash drive. As part of this process, you are provided with the option to either erase all disks and perform a fresh install or upgrade the existing software.

---

**Note:** If this configuration utilizes a hardware-based RAID 1, 5, or 10 solution, you must read your server vendor installation documentation and then complete the RAID configuration prior to installing MSL software.
Caution: The computer on which you install this software will be totally dedicated to being the server. The hard drive of this computer will be erased and re-written with the Linux operating system. This means that while this computer is acting as the server, you cannot use it for any other purpose. Depending on which install option you select, the installation process may format and erase all attached hard drives. If you have multiple hard drives, be sure to back them up before starting the installation process.

The installation (or upgrade) process rewrites the boot sector on the hard drive. Machines with BIOS boot sector virus detection enabled may fail to boot unattended. This detection should be disabled in the system’s BIOS.

To install MSL software on a workstation:

1. If you have a previous version of MSL, back up your configuration and data files using the Backup procedure. See Performing Backup on page 95 for more information.
2. Configure your system to boot from either the CD/DVD ROM drive or the USB drive.
3. Insert the MSL software CD/DVD or USB drive you created in the Obtain MSL Software section.
4. Reboot the computer. The installation script runs automatically and the MSL Installer dialog appears.
5. Select a software installation package:
   - SL for a server installation.
   - Rescue Mode for a minimal server installation. This option provides a functional Linux environment that allows you to access the files stored on your hard drive even if you cannot run MSL. Select rescue mode only at the direction of Mitel Product Support.
6. Use the arrow keys to select the appropriate keyboard type and then select OK.
7. If you are installing from CD or DVD, you are prompted to test it. Click OK and then Test to test the media for validity and readability, or click Skip to proceed to the installation. The software installer runs.

   MSL detects the installed hard drive(s). If multiple drives are found and they are not already configured in a hardware-based RAID 1, 5 or 10 array, MSL automatically configures them in an MSL software-based RAID 1 array.

   Note: If MSL cannot detect any hard drives (typically because the server has SCSI or SAS hardware that is not compatible with MSL), an error message is displayed.

8. If you do not have a previous version of MSL software, you are offered an Install option. Click Yes and proceed to Step 9. If you do have a previous version of MSL software, you will be prompted to perform an upgrade; see Upgrading MSL Software on page 29 for more information.
9. If you have a previous version of MSL software, you are offered two choices:
   - Erase all disks and perform a fresh install. Select this option if you are performing a major upgrade (i.e. upgrading to Release 10.0 from a previous release), and then proceed to the next step. Because this erases your configuration settings, ensure that you have performed a backup as instructed in Step 1.
- **Upgrade existing software**: Select this option if you wish to retain your configuration and application data, and then proceed to the next step.

10. Choose your **Time Zone** from the list.

11. If you selected **Erase all disks and perform a fresh install**, the screen displays a warning that your disks will be formatted and asks for confirmation. Click **Yes**.

12. A log of the installation is created and stored in `/root/install.log`.

13. Finishing the installation is automatic and takes only a few minutes. At the end of the process, you are prompted to remove the media and then reboot the system.

### CONFIGURE THE SERVER

After the system has restarted and is no longer booting from the installation media, you are ready to log in and configure the system. If your ISP provided a summary of configuration choices and network information, refer to it while completing the screens in the configuration section of the server console.

The following steps walk you through the configuration settings as they appear on the screen. For more information about a particular step, refer to the Details section included with each step.

**Restore from Backup?**

- Click **No** if this is your initial installation of MSL software. Continue with the next configuration step “Set Administrator Password”.

  OR

- Click **Yes** to restore server configuration if you have a backup file and are installing MSL subsequent to an initial installation. You are then prompted to select the location of the backup file—a **network share**, **removable device**, or **another running server**. Once you have located the backup file, you can perform the restore and the MSL installation will be complete. See also **Restore Configuration Data** on page 97.

**Set Administrator Password**

- Enter the Administrator password and then re-enter it for confirmation.

  The Administrator password (or System password) is used to access the server manager and the server console as the "admin" user and the Linux shell as the "root" user. Choose a secure, non-trivial password that is at least eight digits in length and contains a mix of numbers, upper and lower case letters, and punctuation characters.

After you have entered and confirmed the password, the MSL software examines the password for strength. If it is found to be weak, you are offered the chance to change it or continue.

**Configure Domain Name**

- Enter the primary domain name that will be associated with the MSL server. (Default is "mycompany.local").

Enter the primary domain name that will be associated with this MSL server. This domain will be the default for the web-based server manager. The name must start with a letter and can contain letters, numbers, and hyphens. (For example, mitel.com.)
Note: If you are using the MSL server as a DNS source, changing the domain name will require the server and all clients to reboot, and all references (such as bookmarks) that point to the server will require manual modification.

Configure System Name
- Enter a system name for the server (host name). Enter a unique system name for the server. The name must start with a letter and can contain letters, numbers, and hyphens (for example, Server-1).

Select Local Network Adapter
- Use the keyboard up/down arrows and the space bar to select the adapter(s) to configure as Local.

MSL automatically detects your system's Ethernet adapters and displays them so you can configure them as "Local Network (LAN)" adapters or, in a later step, as "WAN" adapters. In the initial screen, you can configure multiple LAN connections, each consisting of one or more adapters (multiple adapters are bonded together to present a virtual single interface). You must configure at least one LAN connection.

To configure multiple LAN adapters without bonding them, select only the first adapter on this initial screen. After you have configured your WAN connection (if required), you are offered the option of configuring any remaining adapters as LAN or bridged interfaces.

Note:
- If your application is deployed in a server-gateway configuration, you need to configure at least one adapter as a WAN interface.
- If your application is deployed in a server-gateway with bridged interface configuration, you need to configure one adapter as a LAN interface, another as a WAN interface, and a third as a bridged interface to the WAN interface of the firewall. For this setup, the server requires a minimum of three NICs.

Enter Local Networking Parameters
- Enter the local IP address for this server, or select from the default parameters provided. The address must be entered in IPv4 format.
- Enter the subnet mask for the local network, or accept the default.

These settings provide information about the internal network so that the server can communicate with other machines on the local network.

If the server is being installed into an existing network, choose an address that is not in use by any other computer on the network.

Note: If you are installing servers at multiple sites within the organization, use different network addresses for each site. This simplifies later troubleshooting and VPN setups.

If the server will be operating in a server-only configuration, and there are other servers on the network, obtain an IP address that is unused in the local network. If your network uses a DHCP server, this address must also be outside of the scope of your DHCP pool.
Enable IPv6 Protocol

- Click **No** to limit the server to IPv4 addresses. Continue with the next configuration step “Select WAN Adapters”.

  OR

- Click **Yes** to enable the server to be programmed with both IPv6 and IPv4 addresses. You are then prompted to enter an IPv6 address for the LAN interface.

**Note:** If the LAN interface does not have an IPv6 address, this field can be left blank. However, some applications (such as MBG) require entry for IPv6 operation.

In addition to the LAN interface, you can configure IPv6 addresses for the WAN interface and gateway. This enables you to deploy MSL in a network environment that supports a mixture of IPv4 and IPv6 network protocols, and to access MSL via its IPv6 interfaces.

The following table lists the options supported by IPv6 in the current release:

<table>
<thead>
<tr>
<th>OPTION</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server Manager access</td>
<td>- Use https://&lt;IPv6address&gt;/server-manager.</td>
</tr>
<tr>
<td>System Monitor access</td>
<td>Use https://&lt;IPv6address&gt;/monitor.</td>
</tr>
<tr>
<td>LAN interface configuration</td>
<td>Support for one IPv6 address only (i.e. you cannot configure any additional LAN interfaces with an IPv6 address at this time). Bonding is supported.</td>
</tr>
<tr>
<td>WAN interface configuration</td>
<td>Support for one IPv6 static address. Bonding is supported. (DHCP/PPPoE with IPv6 is not supported at this time.)</td>
</tr>
<tr>
<td>Trusted Networks</td>
<td>IPv6 network addresses are supported.</td>
</tr>
<tr>
<td>SSH access</td>
<td>IPv6 access supported.</td>
</tr>
<tr>
<td>Review Configuration</td>
<td>Displays IPv6 configuration.</td>
</tr>
<tr>
<td>Remote Management access</td>
<td>IPv6 access supported.</td>
</tr>
<tr>
<td>Default Gateway</td>
<td>IPv6 network addresses are supported.</td>
</tr>
</tbody>
</table>

Other options, such as backup/restore, port forwarding, Email, DHCP, Hostnames and addresses and domains are not supported.

Select WAN Adapters

MSL automatically detects any remaining unconfigured Ethernet adapters and displays them here. If your server requires Internet access, you must configure a WAN (external) adapter. If you configure more than one adapter as "WAN", they will be bonded together to present a virtual single interface.

If your server will be operating in a server-only configuration, you don’t need to configure a WAN adapter. Press the space bar to clear the selection and proceed to “Select Gateway IP Address”.

If you still have unconfigured adapters at this time, MSL prompts you to configure them as LAN or bridged interfaces. Press **Yes** to configure the remaining adapter(s) or press **No** to leave them unconfigured.
External Interface Configuration

If you have selected an adapter to act as a WAN interface, specify how the WAN adapter will be configured according to your connection setup:

<table>
<thead>
<tr>
<th>YOUR SETUP:</th>
<th>CHOOSE OPTION:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Modem and your ISP has supplied an account name</td>
<td>1. Use DHCP and send account name.</td>
</tr>
<tr>
<td>Cable modem and your ISP has supplied an Ethernet address</td>
<td>2. Use DHCP and send Ethernet address.</td>
</tr>
<tr>
<td>Residential ADSL</td>
<td>3. Use PPP over Ethernet</td>
</tr>
<tr>
<td>You have a static IPv4 address.</td>
<td>4. Use static IP address.</td>
</tr>
<tr>
<td>If the server supports IPv6, you may also have a static IPv6 address.</td>
<td></td>
</tr>
</tbody>
</table>

If you select Option 4:
- Enter the IPv4 address that this server will use to access the Internet.
- Enter the subnet mask.
- If prompted, enter the IPv6 address that this server will use to access the Internet.

Select Gateway IP Address

For Internet access:
- Enter your default gateway (router) IPv4 or IPv6 address.

Note: The option to select the Gateway IP Address does not appear if you have configured an external interface (WAN).

Select Additional Static IP Address

If you selected External Interface Configuration option 4 (static IP address), you are prompted to enter an additional IP address and subnet mask now. This option provides a second IP for those applications, like Audio, Web and Video Conferencing, which require two different addresses on the same server.

Configure DNS

Select a DNS server option:
- To resolve all names locally, do not enter a Corporate DNS server address, and then click Next.
  — OR —
- To resolve names using a mix of local and remote resources, enter the Corporate DNS server address, click Next, select localhost, and then click Next. The localhosts file will resolve names for the local domain (the one configured on the MSL server) while the corporate DNS server will handle all other name resolutions.
  — OR —
- To resolve names using only the corporate DNS server, enter the Corporate DNS server address, click Next, select corporate, and then click Next. The corporate DNS server will resolves names for all domains.
Although the MSL server contains a fully functional DNS server, if your network already contains a DNS server you should use it for name resolution.

If you enter a Corporate DNS server address, you must use the Domains panel of the server manager to configure the domain lookups that will be handled by the DNS server (see page 87 for more information).

You have now provided all information required for MSL configuration.

Activate/Reboot

When you have entered all configuration information, you are prompted to activate your changes. Click Yes to activate changes.

After activation, you are prompted to enter the Application Record ID number. You can enter it now to initiate registration of your licenses or you can bypass this screen and enter it via the server manager later. Note: Some applications must supply this number to acquire licenses from the AMC before they can be installed. (For example, NuPoint UM when installed as part of the MiCollab.)

At the Do you wish to install blades from CD/DVD? prompt, check your application documentation for instructions:

- Click Yes to install application CD/DVDs. Your application documentation will supply instructions for this step.
- Click No to skip this step and complete the boot process.
UPGRADING MSL SOFTWARE

Mitel Standard Linux provides an upgrade path for most software versions. If you have previously installed a server and now want to upgrade, you can do so while preserving configuration data using one of the following procedures:

- Upgrade with CD/DVD/USB—page 29
- Upgrade with ServiceLink—page 29
- Upgrade with Remote Fresh Install Blade—page 30

UPGRADE WITH CD/DVD/USB MEDIA

You can download the MSL operating system software as an ISO file from Mitel Online, and then copy it to physical media for installation on the server. You can then use it to perform either a "minor" or "major" software upgrade:

- **Minor software upgrade:** If you are performing a minor software upgrades (for example, upgrading from 9.x to 9.x) you can simply insert the media into the server, boot from the appropriate drive, and select the "upgrade" option during the installation process. Although configuration and application data is maintained, a backup is recommended.

- **Major software upgrades:** If you are performing a major (for example, upgrading from MSL 9.x to MSL 10.x) you must perform a fresh software. This entails backing up the database, installing the new MSL version from a CD/DVD or USB flash, and then restoring the database.

For more information on upgrading with CD/DVD/USB, see Install the MSL Software.

---

Note:

- Ensure that your current software applications are compatible with the new MSL version and that they support the Upgrade option.
- You cannot change the primary domain name during an upgrade.

If the MSL server was not shut down cleanly before attempting an update, you may see an error message such as "One or more of the file systems for your Linux system was not unmounted cleanly". You will not be able to proceed with an upgrade. (You could proceed with a clean install but you would lose your configuration data.) If you want to upgrade and keep existing configuration data, terminate the current upgrade attempt, reboot the MSL server, and then shut it down cleanly. Proceed with the upgrade.

UPGRADE WITH SERVICELINK

The ServiceLink update option is the easiest way to upgrade MSL; it is available in the Blades panel on the server manager. For more information, see Upgrade the MSL Blade.
Note that some applications do not support this option, and that it is not available for major upgrades (for example, upgrading from MSL 9.x to MSL 10.x). If the ServiceLink update option update is not visible on the Blades panel, then you cannot use it for your implementation.

**UPGRADE WITH REMOTE FRESH INSTALL BLADE**

You can upgrade a physical servers running MSL 9.3 or later to MSL 10 or later without the need for physical media or console access.

Note: The RFI blade requires sufficient disk space for a backup. If your system has insufficient disk space, the blade will not be listed on the Blades panel.

To perform a remote fresh install:

1. Perform a backup through the server manager (this step is optional but recommended). See **Backup** on page 49.
2. In the server manager, under ServiceLink, click **Blades** and then click **Update List**.
3. Locate the **Remote Fresh Install** blade and click **Install** link beside it.
4. Accept the software license agreements when prompted. The system automatically backs up the database, installs the software, and restores the database. After this process is complete, you are prompted to reboot the server.
5. In the server manager, under Administration, click **Shutdown or reconfigure**, select **Reboot** and then click **Perform**.
6. When the reboot is complete, log back in to the server console and confirm that the configuration data has been restored. If there is a problem, restore from the backup. See **Restore on an Operational System** on page 99.
7. Select the option to **Register for Service Link** to perform a sync with the AMC.
8. Reinstall your application software. See **Installing Software Blades** on page 32.

**Upgrade from a Previous Version and add RAID1**

If you enabled software mirroring with a previous version of the software, you can upgrade without problems, provided an upgrade path is available. However, if you are upgrading a previous version of the software that was not installed with software mirroring, and you now want to use software mirroring, perform these steps:
• Perform a backup through the server manager.
• Install the second disk and perform a fresh install of MSL.
• Restore the backed up configuration through the server console.
INSTALLING SOFTWARE BLADES

Software application blades can be installed in one of three ways:

- Using a CD/DVD-ROM at the server console (for example, MiCollab)
- Using a CD/DVD-ROM at the server manager Blades panel (for example, standalone NuPoint UM)
- Via the AMC (for example, standalone Mitel Border Gateway)

The documentation supplied with your software application contains installation instructions.

SECURITY SOFTWARE PATCH INSTALLATION

Periodically, you will be informed by Mitel Product Support that a software patch is available which addresses a security vulnerability. You can download and install the patch from the Blades panel.
VIRTUALIZATION

OVERVIEW

A variety of MSL-based applications, including MiCollab, NuPoint UM, MiCollab Client and MiVoice Border Gateway, can be run as virtual appliances in a VMware vSphere or Microsoft Hyper-V environment. For a list of supported applications, please refer to the Virtual Appliance Deployment Guide available at Mitel Online.

Requirements for Virtual Deployments

- For a list of supported servers, refer to the hardware compatibility guides provided by VMware and Microsoft.
- For information concerning hardware and software requirements, deployment considerations, supported features, and configuration guidelines, refer to the Virtual Appliance Deployment Guide available at Mitel Online.
- For additional product-specific restrictions and requirements, plus host and storage performance guidelines, refer to the Mitel application-specific Engineering Guidelines documentation available at Mitel Online.

Software for Virtual Deployments

**VMware**

For virtual deployments in a VMware environment, MSL software is packaged with the application software and delivered as an OVA file which can be installed on a vSphere client using the Deploy OVF Template wizard. OVA files for the various applications can be downloaded from Mitel OnLine.

Software updates can be delivered in one of three ways:

- ServiceLink updates through the MSL Server Manager Blades panel (for most applications except MiCollab)
- MSL Server Console Update option (for MiCollab only)
- Deploy a new OVA image (for all applications)

**Hyper-V**

For virtual deployments in a Hyper-V environment, you use the same MSL and application ISO images as for installing during the physical procedures, but you must still purchase the virtual version of the license for the Mitel products.

Software updates are also handled like a physical implementation. For minor release and service pack upgrades, use the Blades panel. For major releases, you must perform a fresh install and restore a product-specific backup. Prior to performing an upgrade, you can clone the virtual appliance or take a snapshot to serve as a backup.

Licensing for Virtual Deployments

When a virtual appliance is powered up, you are prompted to enter your Application Record ID (ARID), just as it would with a physical server. When the AMC receives a virtual appliance ARID, it responds with a Globally Unique Identifier (GUID) for the appliance. The GUID is stored in the database of the virtual appliance and used when performing regular synchronization with the AMC.
If a virtual appliance is upgraded by deploying a new OVA, MSL backup and restore procedures must be used to maintain the GUID and to ensure continued synchronization with the AMC. If the GUID is not maintained, you will need to contact the AMC and have it reset.

The GUID in the virtual environment serves an equivalent purpose to the Hardware ID in the physical environment.

**Note:** The server hosting the virtual appliance must have continuous Internet access (for both licensing and for application use).

### VMWARE IMPLEMENTATIONS

**VMWare: Installation**

Installation consists of the following tasks:

1. Collect site information
2. Create Application Record
3. Download .ova file from Mitel OnLine
4. Deploy the virtual appliance
5. Configure MSL
6. Configure the application

**Note:** Steps 1-2 and 5-6 are the same for both physical and virtual installations and will not be repeated in this procedure.

**Download the OVA File**

Download the applicable .ova file from Mitel OnLine:

1. Launch a web browser on the vSphere Client PC.
2. Log in to Mitel OnLine.
3. Click Technical and then click Software Downloads.
4. Click the appropriate application name and version for the software you want to install.
5. Review the application Release Notes.
6. Click the appropriate link to download the .ova file.
7. If you agree to the software disclaimer, click "I agree [Download using Software Download Manager]". (On initial use, you will have to install the Download Manager application.)
8. Save the .ova file to a folder on the vSphere Client PC.

**Note:** Some applications, such as NuPoint Unified Messaging, require installation of additional .iso files for optional software.

**Deploy the Virtual Appliance in VMware**

The .ova file you downloaded from Mitel OnLine contains the MSL operating system, the application software, and VMware Tools (a suite of utilities to enhance performance).
To deploy the virtual appliance on a vSphere host:

1. Launch the vSphere Client on the network PC:
   - Click Start > All Programs.
   - Click VMware > VMware vSphere Client.
   - Enter the hostname or IP address of the Hypervisor ESX/ESXi host server.
   OR
   - Enter the hostname or IP address of the vCenter Server.
   - Enter your username and password.
   - Click OK.

2. In the vSphere Client application, **click File > Deploy OVF Template**. (The .ova file you downloaded is a template file in OVF format.)

3. In the Deploy OVF Template screen, specify the storage location of the .ova file you downloaded.

4. Specify the Source Location for the OVF template file (.ova file extension):
   - To deploy from a file on the local PC or from a network share, click **Browse** and navigate to the file.
   - To deploy from a URL (if the file is on the Internet or is accessible through a web browser) enter the URL of the file location.

5. Click **Next**. The **OVF Template Details** screen appears. The information shown is derived from the .ova file to provide a “check” for correct application and version. Note that the **Download size** is only an estimate until a deployment configuration is selected later in the process.

6. Click **Next**. The **End User License Agreement** screen appears.

7. Click **Accept** to accept the end-user license agreement, and then click **Next**. The **Name and Location** screen appears.

8. Enter a meaningful name for the virtual appliance, or accept the default name, and then click **Next**. The **Deployment Configuration** screen appears.

9. Select the resource profile that best matches your site. For example, MiCollab offers “Small Business” for up to 150 users, “Mid-Range” for up to 2500 users, or “Enterprise Multi-application” for up to 5000 users. Your selection determines the hardware resource requirements. Click **Next**. The following three steps are dependent on your configuration.

10. If you are using the optional vCenter Server, select the appropriate Host/Cluster for this deployment and then click **Next**.

11. If you are using the optional vCenter Server, select the appropriate Resource Pool for this deployment and then click **Next**.

12. If multiple Datastores are available, select the Datastore for the vNuPoint instance, and then click **Next**. The **Disk Format** screen appears.

13. In the Disk Format screen, select a provisioning format:
   - Thick provision Lazy Zeroed
   - Thick provision Eager Zeroed
   - Thin provision

   Click **Next**. The **Network Mapping** screen appears.
14. Configure the network mapping. (This screen is only displayed if the network defined in the OVF template does not match the name of the template on the host to which you are deploying the virtual application.) The required settings are dependent on your deployment configuration:

- **Network Edge (Server-Gateway) Mode**: In this configuration mode, the server functions as a firewall/Internet gateway with two Ethernet interfaces. One interface is connected to the internal network (LAN) while the other is connected to the external network (Internet). Select the destination LAN and WAN networks for the OVF template. These are the “Associated Networks” that are assigned in the LAN and WAN IP Pools. You must assign the LAN and WAN destinations to different networks.

- **LAN Only (Server-only) Mode**: In this configuration mode, the server is only connected to the internal network (LAN). For this mode, only select a destination LAN network for the OVF template.

- **LAN (Optional)**: This interface can be used to connect a management application or to route the SIP Proxy to an isolated SIP Proxy network.

Contact your Data Center administrator for more details on which Network Mapping to use.

15. Click Next. If you are deploying on vCenter, the Properties screen appears. You can use this screen to configure the MSL operating system parameters. Complete the fields in this screen using the information that you have collected. Mandatory fields are highlighted with a red border.

- You must specify both the LAN IP and WAN IP addresses. Otherwise, the virtual appliance will not power on. If you are deploying the virtual machine in LAN only (server-only) mode set the WAN IP address to 0.0.0.0.

- For Network Edge deployments, ensure that the LAN IP and WAN IP addresses are on different subnets and the Gateway IP address is on the subnet of the WAN IP address.

- You can only use this screen to set the LAN IP and WAN IP addresses for the initial deployment of the appliance. After initial boot-up, you must use the MSL server console interface to modify the LAN IP or WAN IP addresses.

16. Click Next. The Deploy OVF Template Ready to Complete screen appears.

17. If you are using the optional vCenter Server and you are installing MiCollab with Voice, you are prompted to enter MSL configuration information such as the Admin password and networking properties. (Other applications will take advantage of this feature in future releases.)

18. Click Next to display your deployment settings.

19. Review the information and then click Finish. vSphere deploys the virtual appliance on the server. A progress bar is displayed.

20. When deployment is complete, click Close. The new virtual machine appears in the inventory list in the left-hand pane.

**Power On the Virtual Appliance**

1. In the vSphere client, right-click the virtual appliance name and then click **Power > Power On** (or click the Power On icon ).

2. Right-click the virtual appliance name again and click Open Console. The MSL server console opens and displays the MSL boot up screens.
3. Application configuration and any additional MSL configuration (if required) is performed in exactly the same way as for a physical server installation.

VMware: Access the Server Manager and Update the Admin Password

For increased server access security when installing virtual appliances, users will be prompted to change the administrator password the first time they use the MSL server manager to access the system. This update ensures that the original password information stored in the virtual appliance cannot be used to access the server.

1. **Power On the Virtual Appliance** (see above).
2. Access the MSL server manager:
   - Open a web browser on the local network.
   - Enter the following URL: `http://<IP_address_of_MSL_server>/server-manager`.
3. The Change Account Password dialog appears. Enter your old and new passwords, verify your new password, and then click **Change Password**.

   **Note**: If desired, you can cancel out of the dialog and use the original administrator password to access MSL. However, the next time you log in through the server manager, you will again receive a prompt to update the password.

VMWare: Backup

To back up the VMware virtual appliance, use the same methods that you would use for a physical server. An MSL backup is required if you are deploying a new OVF, or if you are migrating from a physical to a virtual deployment.

Most application-specific backups, such as the NuPoint UM backup procedure, are also supported. (Note that the NuPoint UM backup does not back up MSL configuration or ARID information. See the NuPoint documentation for backup instructions.)

VMware also supplies optional backup tools including:

- vStorage API for Data Protection (vADP): APIs that third-party backup utilities can use to backup/restore from a central backup server
- VMware Data Recovery: a vCenter plug-in that enables disk-based backup and restore

   **Note**: VMware snapshots are not supported as a backup method.

All virtual appliances can also be backed up by exporting an OVF template of the virtual appliance. The template is a copy of the virtual appliance in .ova format. To restore the virtual appliance, you deploy the exported OVF file to the vSphere platform.

Check the training material and/or documentation for your application to see which methods are supported/recommended.

**Export an OVF Template**

To export an OVF Template:

1. In the vSphere client, right-click the virtual appliance name and select **Shutdown Guest**.
2. Click **File > Export > Export OVF Template**.
3. Enter the name of the OVF template file and the directory where you want to save it.
4. Select one of the following options:
   - **Physical Media (OVA)**: to export a single .ova file (recommended)
   - **Web**: exports multiple files

5. Select one of the following Format options:
   - **Single File (OVA)**: to export a single .ova file (recommended)
   - **Folder of Files (OVF)**: exports multiple files

6. Click **OK**. MSL automatically configures the NIC address for the new virtual machine.

   **Note:** For virtual machines with multiple NICs, automatic NIC addressing is not guaranteed. If your virtual machine has multiple NICs and does not function correctly after the OVF export, we suggest that you select the server console option “Configure this Server” to manually configure the NIC addresses.

### VMWare: Upgrade

When a new version of the software and/or MSL is available, several upgrade methods are available. A major release is one where the main release number changes (for example, Release 9.x to Release 10.x.)

For upgrades within the same major release, you can use the following MSL server manager upgrade methods:

- For MiCollab: use the “Install Applications” option in the MSL server manager. (Note: Some applications may require additional software to be installed from a DVD.)
- For most other applications: Use the Blades panel in the MSL server manager.

When you are upgrading to a new major release,

- Back up the current system.
- Deploy a new virtual appliance with the new .ova file and then restore backup data.

For either of these methods, before you upgrade, you must:

- Apply the appropriate upgrade license
- Ensure that your virtual machine has the required resources for the new release
- Check your application documentation for restrictions or conditions

### Upgrade with a New OVA File

This task list presents the general steps required to upgrade your virtual machine. For detailed instructions, refer to the Installation and Maintenance Guide for your application. This method ensures the latest virtual appliance configuration updates and VMware Tools version.

To upgrade a virtual appliance using new .ova file:

1. Ensure that the upgrade license has been applied to the Application Record for this deployment.
2. Download the new .ova file and any optional software files from Mitel OnLine and store on a network drive or on the vSphere Client PC.
3. Back up the current configuration and application data to a network drive or on the vSphere client PC.
4. Deploy the new .ova file.
5. When prompted to “Restore from Backup?”, select Yes and then select “Restore from Network Share”.

6. When the restore is complete, select Reboot.

7. For multi-NIC systems, test network and, if required, update the MSL configuration with the NIC addresses for the new virtual appliance.

8. Install any optional software (like NuPoint UM language prompts).

**Note:** Unless steps are taken to preserve them, log and core files from the original virtual appliance will not be present in the upgraded appliance.

VMWare: Convert from Physical to Virtual

This task list presents the general steps required to upgrade your virtual machine. For detailed instructions, refer to the Installation and Maintenance Guide for your application.

**Note:**
- Ensure that conversion is supported for your deployment configuration BEFORE you begin.
- Conversion requires a service outage and should be scheduled for off hours.

To convert from physical to virtual:

1. Purchase the required “Server to Virtual” licensing and apply it to the Application Record. Make a note of your Application Record ID.

2. If you are converting from MSL 9.2 to 9.3 or later, request a reset of the Hardware ID. (Not required for conversion between two 9.3 or later systems.)

3. Download the latest .ova file from Mitel OnLine.

4. Deploy the virtual appliance but do not power it up.

5. Back up the physical server using the method recommended in the application documentation.

6. Shut down the physical server, launch the vSphere Client, and power up the virtual appliance.

7. Open the virtual appliance console and, when prompted to “Restore from Backup?”, select Yes.

8. If converting from MSL 9.2, when the restore is complete, access the MSL server manager and click Status. Deactivate and reactivate the ServiceLink so it matches the new AMC GUID. (This step is not required for conversion between two systems that are both running MSL 9.3 or later.)

**HYPER-V IMPLEMENTATIONS**

Deploying Hyper-V involves creating a Virtual Machine (VM) with the correct resource allocation to support the installation of the particular Mitel virtual application. This section provides an overview of the steps for creating the Hyper-V virtual machine on which you can install the Mitel virtual applications. For detailed instructions, refer to the Virtual Appliance Deployment Guide available at Mitel Online.
Limitations

- Hyper-V virtual machines that run Mitel Standard Linux (MSL) do not support connection of USB devices. Accordingly, the MSL software installation must be performed from the CD/DVD-ROM drive.
- Mitel software must be installed using traditional physical ISO images available from Mitel OnLine. OVA images cannot be used. After creating the virtual machine, use the ISOs to install the MSL operating system and application software as you would on a physical system.
- Once the software has been installed and licensed, Hyper-V must maintain online connectivity to the AMC and is subject to the same Sync Expiry rules in place for VMware-based deployments.
- To achieve the same performance as VMware, a Hyper-V virtual machine requires twice as many virtual processors.

Hyper-V: Installation

Installing the Mitel application on Hyper-V consists of the following tasks:

1. Create the virtual environment.
2. Install and configure Mitel Standard Linux (MSL) on the virtual machine.
3. Install the Mitel virtual application on the virtual machine.

Create the Virtual Environment

When configuring the virtual environment, adhere to the following guidelines:

- Configure the Guest Hardware with the number of processors, amount of memory and disk size specified in the Virtual Appliance Deployment Guide and the Engineering Guidelines for the application you are installing.
- Recommended settings:
  - Select CentOS Linux 6 (32 bit) as the operating system.
  - Set Virtual Machine Type to Generation 1.
  - Set the CPU priority to High for the voice-sensitive Mitel applications. Lower settings can be used for the other applications.
  - Connect a new Virtual Hard Disk (fixed and correct size).
  - Add the disk to the IDE Device.
- Configure an additional NIC if the Mitel application is being deployed in server-gateway mode. See the Virtual Appliance Deployment Guide for details.
- Before starting the virtual machine and before MSL is installed, modify the Virtual Machine to match resource requirements specified in the Virtual Appliance Deployment Guide for the application you are installing. For example, allocate four vCPUs to a MiCollab implementation.

Hyper-V: Install Mitel Standard Linux

Installing the MSL operating system in Hyper-V is identical to installing it on a physical server. The only limitation is that you can mount the ISO image from a network drive or CD/DVD, but not from a USB device. For instructions, see Install MSL Software.
**Hyper-V: Install the Mitel Application**

Installing Mitel virtual applications in Hyper-V is very similar to installing on a physical server. For Hyper-V installations, you use the same MSL and application ISO images as for installing during the physical procedures, but you must still purchase the virtual version of the license for the Mitel products. Optional application software can be installed from the Blades panel of the MSL server manager or from an ISO image.

Refer to the installation documentation for the specific Mitel product on Mitel OnLine for detailed instructions for installing the appliance on a physical server.

**Hyper-V: Upgrade**

Hyper-V virtual machines are upgraded similarly to physical servers. You will need to upgrade MSL and the application together. You can clone or snapshot the VM as a backup before upgrading.

- For minor release and service pack upgrades, use the Blades panel.
- For major releases, perform a fresh install and restore a product-specific backup.
SERVER ADMINISTRATION AND MAINTENANCE

There are two ways to perform server administration, depending on the function you want to perform.

- **Server Manager**: a web-based control panel for performing such tasks as installing applications, configuring the server and its optional features, and managing available services.

- **Server Console**: a text-based control panel built into the MSL server and used for performing functions like reconfiguring network parameters (changing server configuration, for example), testing Internet access, and managing disk redundancy. (See page 93.)

SERVER MANAGER

The server manager is accessed using a web browser on the local network by visiting the URL: http://<IP_address_of MSL server>/server-manager.

**Note:**
- Remote access to the server manager is only possible via an encrypted connection, using SSL (https).
- By default, the server manager is accessible only from the local network. To extend access privileges to other networks, you must program them. Do this while you are physically connected to the local network. For details, see Remote Management on page 62 and Networks page 64.
- You should allow access only from local and remote management networks, not from the public network (entire Internet). For details, see SSH Settings on page 63.

**TIP:** If you cannot see the MSL server manager login screen and you have set up Remote Access as instructed, you may need to check the security settings in Internet Explorer. MSL requires the Meta Refresh option to be enabled (default).

To check Meta Refresh:

1. In Internet Explorer, click **Tools > Internet Options**.
2. On the Security tab, click Custom Level…
3. Scroll down to the **Miscellaneous** section and ensure that **Allow META REFRESH** is enabled.
4. Click **OK** to exit.

When the page opens, enter the user name “admin” and the system password, then click **OK**.

The server manager appears, as shown in

![Figure 5](image-url). Descriptions of each menu item follow the image.
Welcome to the server manager

This server is a very secure, reliable and cost-effective platform for an expanding range of business applications and services. For information about the specific applications available for this platform, please contact your authorized reseller.

To perform a system administration function, click one of the links in the menu on the left of your screen.

---

**Figure 5. Server Manager**

**THE SERVER MANAGER MENU**

<table>
<thead>
<tr>
<th>SECTION</th>
<th>MENU ITEM</th>
<th>USE THIS OPTION TO...</th>
<th>FOR MORE INFO, SEE PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ServiceLink</td>
<td>Blades</td>
<td>view current list of blades and install/cache/upgrade/remove links</td>
<td>45</td>
</tr>
<tr>
<td>Install Applications</td>
<td></td>
<td>• select the PBX Type with which the MiCollab server will interact (upon first accessing the screen)</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• view current list of MiCollab applications, services and security patches</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• install new software and upgrade existing software</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>See the MiCollab online help for more information.</td>
<td></td>
</tr>
<tr>
<td>Status</td>
<td>view ServiceLink status for this server provided by the AMC</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>Administration</td>
<td>Web Services</td>
<td>MSL includes a Representational state transfer (REST) API that supports the features and functions currently available in the traditional Mitel administrative interfaces. Do not update the settings on this panel.</td>
<td>52</td>
</tr>
<tr>
<td>Backup</td>
<td>backup server configuration data (and application data)</td>
<td>49</td>
<td></td>
</tr>
<tr>
<td>SECTION</td>
<td>MENU ITEM</td>
<td>USE THIS OPTION TO…</td>
<td>FOR MORE INFO, SEE PAGE</td>
</tr>
<tr>
<td>---------</td>
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</tr>
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<td></td>
<td>View log files</td>
<td>view or download log files generated by the services running on this server</td>
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<td>Event viewer</td>
<td>view the current alarm status of the system and a list of recent events</td>
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<tr>
<td></td>
<td>System information</td>
<td>view (and control view access) of networking parameters, server, and domain information</td>
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<td>System monitoring</td>
<td>view (and control view access) for system monitoring</td>
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<td></td>
<td>System users</td>
<td>add, edit, or delete user accounts for users who may access the MSL server</td>
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</tr>
<tr>
<td></td>
<td>Shutdown or reconfigure</td>
<td>reboot, reconfigure, or shutdown your system</td>
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</tr>
<tr>
<td>Security</td>
<td>Remote Access</td>
<td>review and configure remote access settings (for example, PPTP and SSH)</td>
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</tr>
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<td></td>
<td>Port forwarding</td>
<td>use to modify your firewall rules to provide port forwarding (For server-gateway configurations only.)</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>Web Server Certificate</td>
<td>use to install third-party security certificate on server (example: certificate purchased from company like VeriSign), and to export the certificate and private key files for use on another server</td>
<td>65</td>
</tr>
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<td></td>
<td>Certificate Management</td>
<td>Manage client certificate signing requests.</td>
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<td>Configuration</td>
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<td>manage/configure the MSL DHCP server</td>
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<td>Date and Time</td>
<td>enable/configure network time server</td>
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<td>Hostnames and Addresses</td>
<td>view/add hostnames if using the MSL server as a DNS server.</td>
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<td>Domains</td>
<td>view/manage virtual domains and corporate DNS settings.</td>
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<td>configure SNMP support for remote management/monitoring</td>
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<tr>
<td></td>
<td>Ethernet Cards</td>
<td>configure the speed and duplex settings for the Network Interface Cards</td>
<td>91</td>
</tr>
<tr>
<td>SECTION</td>
<td>MENU ITEM</td>
<td>USE THIS OPTION TO…</td>
<td>FOR MORE INFO, SEE PAGE</td>
</tr>
<tr>
<td>---------</td>
<td>-----------</td>
<td>----------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Review configuration</td>
<td>view networking parameters, server, and domain information</td>
<td>92</td>
<td></td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>Support and licensing</td>
<td>view the MSL License Agreement (EULA)</td>
<td>-</td>
</tr>
<tr>
<td>Help</td>
<td>access online help for MSL configuration</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

**Blades**

You can use the Blades panel to install, upgrade or remove an application or service that is running on MSL, install a security patch, or upgrade MSL itself.

You can download and install a software blade in a single step, or you can download it for installation at a later time. The first option ties up your computer for a short period of time. The second option, which is known as “caching,” enables you to initiate the download and then use your computer for other purposes.

**Note:** Some applications may alter the behavior of the Blades panel. For example, in MiCollab deployments, the Blades panel is replaced by the Install Applications panel, which you can use to install and upgrade MiCollab applications and security patches. For more information, refer to the MiCollab online help.
For information about configuring and using application software blades, refer to the documentation for each application.

**Install, Upgrade, Cache or Remove a Blade**

To install/upgrade/cache/remove a blade:

1. In the server manager, under ServiceLink, click **Blades**. The currently cached list of blades is displayed.

2. Click **Update List** to ensure an up-to-date listing. (Note: If the AMC sync process is disabled, the blades list will not be refreshed. The listing will show only installed blades, blades from CD/DVD, and entries from the last sync.)

3. Do one of the following:
   - To install a new blade immediately, click the **Install** link beside it.
   - To download a blade for installation at a later time, click the **Cache** link beside it. Complete the installation process by clicking the **Install** or **Upgrade** link.
   - To upgrade a blade, click the **Upgrade** link beside it.
   - To delete a blade, click the **Remove** link beside it.

4. Reboot the server (if required for the application blade).

Each software blade modifies the server manager navigation menu to allow you access to application configuration pages. For details, consult the documentation provided with each application blade.

**Note:**

- You can also install blades from a CD/DVD. If you have an application distributed in this way, insert the disc before loading the blades panel, or click **Update List** after inserting the disc.
- If the blade does not have an upgrade link, then you are already running the latest software version or the application does not support ServiceLink upgrades.
Upgrade the MSL Blade

To upgrade MSL:

1. In the server manager, under ServiceLink, click Blades.
2. Click Update List to ensure an up-to-date listing. Newer MSL versions are listed as ServiceLink blades and include an Upgrade link.
3. Do one of the following for the MSL version you want to install:
   - To download the blade for installation at a later time, click the Cache link beside it. Complete the process by clicking the Upgrade link.
   - To upgrade a blade immediately, click the Upgrade link beside it.

**Note:**
- If Mitel Standard Linux does not have an upgrade link, then you are already running the latest software version.
- If you previously used the CD/DVD upgrade method to upgrade the server, you may experience difficulty when using ServiceLink to upgrade to a later release due to accumulated driver modules. To avoid a “hang” condition during the upgrade, do the following:
  - Log in to the server as “root.”
  - At the Linux prompt, type `rpm -qa | grep kmod-gfs`. MSL displays all the driver module versions. Example output:
    - `kmod-gfs-PAE-0.1.34-2.el5`
    - `kmod-gfs-PAE-0.1.31-3.el5`
  - If there are multiple modules, delete all of them except the most recent one (the first module listed) using the `rpm -e` command. Example input:
    - `rpm -e kmod-gfs-PAE-0.1.31-3.el5`
  - You may now upgrade MSL by accessing the Blades panel and clicking the upgrade link.

Status

This panel provides updated ServiceLink status information for this server. Status information is downloaded from the Applications Management Center (AMC) to the server as part of the synchronization protocol.

You must activate ServiceLink before you can view status information.

Online Activation

To activate ServiceLink online:

1. Obtain an Application Record ID (or service account ID) from your authorized reseller.
2. Under ServiceLink, click Status.
3. Enter your Application Record ID.
4. If the Internet is accessed via a proxy, enter:
   - Address of proxy
   - TCP port used to connect to proxy
Note: The proxy server must be configured to forward TCP packets on the incoming port to the AMC address (sync.mitel-amc.com) on port 22.

5. Click **Activate**.

   Once ServiceLink is activated, the message, “sync completed successfully” is displayed. The system automatically resynchronizes with the AMC on a regular basis. If this process fails, a Major alarm is generated. To clear the alarm, you must successfully synchronize with the AMC.

**Offline Activation**

The following procedure describes how to perform offline activation from the server manager using a maintenance PC.

If your MSL server has a USB drive, you may also perform offline activation from the server console. See Offline Sync with the AMC on page 95 for details.

When an offline system is upgraded to MSL 9.3 or later, it will receive a Major alarm indicating that the automatic synchronization process has failed. To disable auto-synchronization and prevent further alarms, re-do the Offline Activation procedure. The original alarm can then be cleared manually.

To activate ServiceLink offline:

1. Obtain an Application Record ID (or service account ID) from your authorized reseller.
2. In the server manager of the maintenance PC, under **ServiceLink**, click **Status**.
3. Enter your **Application Record ID** (also called Service account ID).
4. Select **Enable offline license generation**.
5. Click **Activate** to request an offline licensing file.
6. The Operation status report page is displayed. Click **Download license request file**.
7. In the file download dialog, click **Save** and save the zip file to a portable storage device on the maintenance PC.
8. Remove the portable storage device and go to an Internet-connected PC.
9. On the Internet-connected PC, extract the contents of the zip file to a temporary folder.
10. Open the folder and double-click the **sync.bat** file to execute handshake and synchronization with the AMC.
    
    Synchronization occurs with the AMC and the sync.bat file creates a license.zip file containing license files from the AMC. (If you receive a security warning during this process, click **Run**.)
11. Save the **license.zip** file to the portable storage device.
12. Remove the storage device from the Internet-connected PC and return to the maintenance PC. Insert the storage device in the maintenance PC.
13. In the server manager of the maintenance PC, under **ServiceLink**, click **Status**.
15. In the file upload dialog, browse to the **license.zip** file that was created by executing the sync.bat file, then click **Save** to select the file to be uploaded.
16. Click **Upload license file** to install the synchronized license key file and activate the purchased options.

**Note:** If at a later time you wish to use online activation, click **Status** under **ServiceLink** and then click **Disable offline license generation**. Then see **Online Activation** on page 47.

Deactivation

In case of hardware replacement, you need to deactivate ServiceLink.

**Note:** You will need to reset your hardware ID and re-enter your Application Record ID before you can re-activate.

To deactivate ServiceLink:

1. Under ServiceLink, click **Status**.
2. Click the **here** link to access the deactivation screen.
3. Click **Deactivate**.

Backup

There are two methods for backing up system data:

- The server manager offers the **Backup** option to back up data to a local workstation, or to configure and/or schedule backups to a Microsoft or Linux network file server.
- The server console provides the **Perform Backup** option to back up to a USB device or to a Microsoft or Linux network file server – see **Perform Backup** on page 95 for more information on the server console option.

**Backup to Desktop Option**

To back up system and application data to a local workstation:

1. Under Administration, click **Backup**.
2. Select the **Backup to desktop** option and then click **Perform**. MSL prepares the system for backup.
3. The Backup to desktop screen is displayed with your estimated backup size. Ensure that your browser and target file system support downloads of this size and then click **Begin Download**.
4. When prompted to Open or Save, click **Save**.
5. In the file download window that appears, name the file, select the location on the desktop where the file will be saved and then click **Save**. A confirmation message is displayed. After saving, you can copy the backup file to a CD/DVD or USB storage device, if required. (CD/DVD or USB storage is required for future restore operations.)

**Note:**

- “Backup to desktop” saves all of the data to a single, large compressed file and is therefore limited by the file system and browser of the client operating system. For example, if you are backing up data to a Windows client that uses the FAT file system (the default for many older versions of Windows), you are limited to a maximum file size of 2 GB; Internet Explorer 6 and 7 are limited to 4GB file size. Newer Windows operating systems that use the NFTS file system have a much
larger capacity. If the backup file exceeds the maximum file size of the client operating system, it will not be properly restored. For this reason, we recommend that you use the **Verify Backup File** option in the MSL server console to ensure the backup was successful.

- Do not click Back on the browser when a backup is in progress. Doing so will not terminate the backup, and the system will be unable to inform you when the action is complete.

### Configure Backup to Network File Server Option

Use this option to configure/schedule your system backup to Network File Server. Two file-sharing protocols are supported:

- SMB/CIFS (typically used for Windows servers)
- SFTP (typically used for for Linux servers, including MSL)

**Note:**

- You can only have one backup scheduled on the server. To cancel an existing backup schedule, select **Disabled** and then click **Save**.
- If you are backing up to an MSL server, configure it to accept access from the backup server. See [Networks](#) for details.

To schedule backups to a network file server:

1. Under Administration, click **Backup**.
2. From the **Select an action** list, click **Configure network backup**.
3. Click **Perform**.
4. Configure the server where the backup file will be stored.

**Note:** If you are backing up to an MSL server, enter its IP Address and the Username/Password of the "root" user. Leave the remaining fields blank.

- Enter the **IP address** of the file server where the backup will be stored.
- Enter the **Username** to use when connecting to the backup server.
- Enter the **Password** to use when connecting to the backup server. Available storage space is displayed.
- Enter the **Domain** or **Workgroup** name of the server. (For example, mitel.com.)
- Enter the **Sharename** of the shared folder where the backup file will be stored. (For example, "Backups".) The shared folder must have permissions set to "Full Control".

**Note:** The domain/workgroup and sharename are not required for SFTP backups. If a sharename is entered, the backup utility will first try to connect to the server/shared folder as an SMB/CIFS resource. If the connection fails, it will then try to connect using SFTP.

- Enter the **(Optional) Sub Directory** where the backup will be stored. If you leave this field blank, the file will be stored at the root of the shared folder. Spaces and multi-level directory names are permitted; for example, "MSL backup" and "MSL backups/2011/October" are valid sub directory names.

5. Select the **Maximum number of backup files to keep** (1-999) on the server (default is 5). When the number of stored files reaches this maximum count, the oldest version is deleted.
6. Select the frequency with which you want to perform backups (Daily, Weekly, Monthly, Never). Backup file names will include timestamps in the format: mlsserver_<hostname>_yyyy-mm-dd_hh-mm.tgz
   - To disable regularly scheduled backups, click Disabled.
   - For Daily backups, select a time of day (hour, minute, AM/PM)
   - For Weekly backups, select a time of day, and day of the week
   - For Monthly backups, select a time of day, and day of the month
   - For immediate backup file creation, proceed to the next step.

7. To test your backup configuration, or to run an immediate backup, click Backup Now.

Note: The Backup Now button displays only if you have entered a valid configuration.

8. Click Save to save the schedule information.

If the scheduled backup fails, an alarm is raised and can be seen in the Event Viewer panel.

View Log Files

The messages log file is where most of the system services write log messages. You can view log files to assist in troubleshooting.

To view log files:
1. In the server manager under Administration, click View Log Files.
2. Select a log from the dropdown list (for example "messages"). With no filter options entered, you will see the entire log file.

3. Enter text in the Filter Pattern box to view only the lines of the log file containing that text. Check the Regular expression box if you want to apply the filter in the format of a regular expression.

4. Enter text in the Highlight Pattern box to view the lines of the log file containing that text displayed in bold type. Check the Regular expression box if you want to apply the filter in the format of a regular expression.
Note:
- The two filter options can be used together.
- The filters are case sensitive.
- The filters are not applied when you Download the log file.
- A regular expression is a string that describes or matches a set of strings, such as particular characters, words, or patterns of characters, according to certain syntax rules. See Event Viewer on page 54 for details and examples.
- The system automatically updates the list every 5 seconds with any new logs.

5. From the Operation list, select View or Download and click Next.

Web Services
Mitel Standard Linux includes a Representational state transfer (REST) API that provides a secure web services framework using the OAuth 1.0 protocol. This "Web Services" interface is intended to support the features and functions currently available in the traditional Mitel administrative interfaces.

By default, the Web Services panel includes a single registered web services client for Oria, a web-based customer provisioning application. Do not change this configuration in any way. Do not modify the existing consumer information or tokens, and do not attempt to add a new consumer. You can use the Web Services panel for one purpose only: to enable/disable the interface.

Configure MSL Web Services
This interface permits configuration of MSL’s web services interface, and the clients that are permitted to use it.

Web service status: Enabled
Access URL: https://<hostname>:<IP address>/mslrest

Below you will find the registered consumers of this web service. These are vendors of web service clients, not active clients themselves. For registered clients, see further below in the table entitled ‘Final Results’. Add a new consumer.

<table>
<thead>
<tr>
<th>Active</th>
<th>Name</th>
<th>Consumer ID</th>
<th>Shared secret</th>
<th>RSA certificate (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>Oria</td>
<td>d86bf0d00d6107f64603d1056b0e6106f</td>
<td>4972d73026d6107f64603d1056b0e6106f</td>
<td>Modify</td>
</tr>
</tbody>
</table>

The following table shows the list of approved tokens, representing an approved client for this web service.

<table>
<thead>
<tr>
<th>Consumer</th>
<th>Token ID</th>
<th>Secret</th>
<th>Expiry</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oria</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The following table shows the list of temporary tokens. These tokens, if approved, can be used for the client to fetch its final tokens, used for day-to-day authentication. These tokens require administrator intervention to permit access. If you do not wish to permit access to the client responsible for the request, you may either reject the token, or wait for it to expire.

Figure 8. Logs and Diagnostic Data
To enable/disable the MSL Web Services interface:

1. In the server manager under Administration, click Web services.
2. Under Manage web service availability, click **Start** to enable or **Stop** to disable the web services interface.

Collect Logs and Diagnostic Data

This utility allows system-level logs to be collected for the server platform and then saved to another location such as your local PC. Logs can be selected for collection from specific applications.

### Collect log files & diagnostic data

This panel allows you to collect some detailed information about the hardware and setup of your Mitel Standard Linux server. The information is collected in an archive and is stored on the server for 72 hours. You can download this information to send to a customer support representative.

Mitel will use this information for diagnostic purposes ONLY and it will be considered confidential information.

This process may take some time to complete. Once you have pressed the 'Start' button you can leave this page and return to it later to download the archive file.

No changes will be made to your system.

You can select one or more categories to include in the collection:

- Core dump files
- MyVoice Border Gateway

![Start button](image)

**Figure 9. Logs and Diagnostic Data**

To collect and save log files:

1. In the server manager under Administration, click **View Log Files**.
2. Under Collect log files & diagnostic data, select which categories you wish to collect. To minimize the size of the log file, uncheck categories you do not require.
3. Click **Start**. A progress indicator appears while the logs are being collected.

**Note:** The log collection process can take a few minutes. You can navigate to other screens without interrupting the process.

4. When the log collection process finishes, the indicator changes to "Complete / 100%" and the archived log file is listed on the screen. Depending on which type of web browser you are using, a copy of the file will be downloaded automatically or you will be prompted to save it.

5. You can manage the list of archived log files as follows:
   - To save a file, click **Save** (or respond to the prompt), navigate to the location you wish to store the file, and then click **Save**. A tar file with the filename "sosreport-<file>-tar.bz2" is saved to the specified folder.
   - To delete a file, click **Delete**, and then click **OK**. The archived log file is deleted from the server.

After saving an archived log file, send it to Mitel Product Support for analysis.

**Note:**

- Archived log files are automatically deleted from the server after 72 hours.
- You can also manage the archived log files from the MSL shell. The files are located on the server in `/var/cache/e-smith/logcollector`.  

Event Viewer

MSL monitors system status every 60 seconds and stores the information in a log file. Some applications, like Mitel Border Gateway, allow you to view events from the past hour, 24 hours, or 7 days. For detailed information about log information, refer to the MSL online help.

You can access the Event Viewer from the Server Manager menu or by clicking the Alarm Status button located the header bar. The Alarm Status button indicates the severity level of the most serious system alarm. For example, if the system has a service-affecting fault, the label will display "Minor" with a yellow background.

### Event log

This page shows the current alarm state for the system, followed by a number of events recorded depending on the current age setting for the page. To filter the list to various categories, see the widget below. By default changes to the start and end times will be ignored. You must select the "Manual" checkbox next to the timeframe to make that boundary persistent. If the current alarm state is showing anything but "Cleared", you can clear the state using the "Clear alarm" button, which will also send a trap to any configured traps to that effect. Note that the text filter will filter on the following columns: "Application", "Event type", "Value" and "Description".

The system uses the following alarm states:

- **Cleared** (green): No alarms have been raised since the alarms were last cleared.
- **Minor** (yellow): Indicates a fault which affects service to a user or users. This may result in a major degradation in service and requires attention to minimize customer complaints.
- **Major** (orange): Indicates a fault which will cause a major degradation in service and requires attention as soon as possible.
- **Critical** (red): Indicates a total loss of service which demands immediate attention.
- **Warning** (blue): Indicates an "information only" alarm.

**Note:**
- Some applications do not support Event Viewer.
- Some deployments may display a Critical alarm after initial installation. Follow the instructions below to clear the alarm.
View Application Event Logs

To view application event logs:

1. To access the Event Viewer, do one of the following:
   - Under Administration, click Event viewer.
   - Click the Alarm Status button.

2. Select the number of events that you want to display per page from the Events per Page drop-down menu.

3. The Boundary dates and times are set automatically by the system. To set non-default values:
   - Under Start and/or End, click the Manual box.
   - Enter a new Date (YYY-MM-DD) and/or Time (HH:MM:SS).

4. Select the alarm Severity filter. All logs with the selected alarm severity or higher will be displayed.

5. In the Text filter field, enter any text that you want the logs to be filtered against. Only logs that contain the specified text will be displayed. The filter is applied against the log data in the "Application", "Event type", "Value" and "Description" fields.

6. Check the Regular expression box if you want to apply the text filter in the format of a regular expression. A regular expression (abbreviated as regexp, regex, or regxp) is a string that describes or matches a set of strings, such as particular characters, words, or patterns of characters, according to certain syntax rules.

A regular expression is written in a formal language that can be interpreted by a regular expression processor, a program that either serves as a parser generator or examines text and identifies parts that match the provided specification.

Regular expression examples:
/a/  Exact match of the character "a".
/^a/  Exact match of the character "a" at the beginning of a line.
/a$/  Exact match of the character "a" at the end of a line.
/.a/  Match any character that precedes the character "a" (wildcard).

7. Select the Show Cleared Events box if you want to view both cleared and new events. Clear the box if you only want to view new events.

8. Check the Auto Reload box if you want the system to automatically reload the events each time you open the page.

9. Click Reload. The event logs are displayed.

10. Click Clear alarms to clear the alarms.

Note: Severity of "Indeterminate" indicates an "information only" alarm.

Clear Alarms

- To clear all alarms, click the Clear alarms button.
- To clear an individual alarm, click Clear for the item.
System Information
Access this screen to obtain the following:

- System Vital Information - hostname, IP address, kernel version, etc.
- Network Usage Information - network interface throughput.
- Hardware Information - server manufacturer/model, number of processors/model, CPU speed, cache size, etc.
- Memory Usage - size and usage of random-access memory.
- Mounted Filesystem - list of the mounted partitions.

To view system information for your server:

- Under Administration, select System Information to view System Vital, Network Usage, Memory Usage, Mounted Filesystem, and Hardware Information.

System Monitoring
Viewing monitoring graphs can help you analyze the system's performance.

To enable access to the System Monitor display:

1. Under Administration, select System monitoring.
2. In the Access to system monitor display list, select one of the following to enable System Monitoring:
   - Private – allows access to your private network including networks that you have configured in the "Remote Access" panel
   - Public – allows access from anywhere
   - Disabled – to disable access
3. Click Save to save your selection.
4. Click System monitor display to view system information graphs. Click on the graphs for more detailed system information.

*Note:* Traffic Analysis graphs are available only if SNMP is enabled.

To view the System Monitor display in the server manager:

1. Under Administration, click System monitor.
2. Click System Monitor Display. Your system graphs appear. Click any graph for detailed information.

To view the System Monitor display in a web browser:

1. Open a web browser on the local network (if private access is enabled) or the Internet (if public access is enabled).
2. Enter the system monitor URL: https://<IP_address_of MSL server>/monitor/

System Users
You can add, modify, lock, or remove user accounts for VPN client access. When you create a new system user account, the account is locked. You must reset the password to enable the access for the account.
To add a system user account for VPN client access:

1. Under Administration, click **System Users**.
2. Click **Add user account**.
3. Enter the **Account name**, **First name**, and **Last name**. The account name should contain only lower-case letters, numbers, hyphens, periods, underscores and should start with a lower-case letter. For example "betty", "hjohnson", and "mary-jane" are all valid account names, but "3friends", "John Smith", and "henry:miller" are not.
4. (Optional) Update the directory information (Department, Company, etc.).
5. Set **VPN Client Access** to **Yes**.
6. (Optional) Select **Group memberships**.
7. Click **Add**.
8. Click **Reset Password** and reset the password for the account. Passwords must be at least 7 characters long and must contain:
   - upper case letter
   - lower case letter
   - number
   - non-alphanumeric character
9. From the list of users, you can modify or remove a user account (by clicking **Modify** or **Remove** next to the user name), or set the user's password. User accounts are locked out and cannot be used until you set the initial password for each account.

**Disabling User Accounts**

When an account is disabled, the user will no longer be able to access server resources such as the VPN. To re-enable the user account, reset the password using the **Reset password** link in the System Users panel.

**Changing User Passwords**

Administrators can change user and/or administrator passwords by using the **Reset password** link for that user’s account on the Users panel. This entry overrides any previous
password entered. Passwords can contain any combination of printable characters, including upper- and lowercase letters, numbers, and punctuation marks.

**Note:** There is no way to recover a forgotten password for a user. If this occurs, a new password must be set.

Digital VPN Certificates for System Users

For increased security, you can use SSL client certificates to authenticate VPN connections. To implement this feature for a user, you must download a certificate from MSL, import the certificate to the user's computer, and then set up the user's VPN connection.

*Downloading the Certificate from MSL*

Use this procedure to download the user’s digital certificate from MSL, the certificate authority (CA).

To download a certificate from MSL:
1. Log in to the server manager remotely from a Windows PC.
2. In the server manager under Administration, click **System Users**.
3. Find an existing user (or set up a new user and reset the password).
4. Click **Download VPN certificate**.
5. Click **Save** or **Save as** and save the file to a location on your computer.

*Importing the Certificate*

Use this procedure to import the user’s digital certificate to the user’s computer.

**Note:** The following procedure outline how to import a certificate to Internet Explorer in a Microsoft Windows environment. For instructions to perform these procedures on a different browser, refer to your product documentation.

To import a certificate to the user's computer:
1. In Internet Explorer, click **Tools > Internet Options**.
2. On the Content tab, click **Certificates**.
3. Click **Import**.
4. The Certificate Wizard opens. Click **Next**.
5. Browse to the location of the stored certificate file.

**Note:** The file may not be visible until you specify files with extension .pfx or .p12.

6. Click **Next**.
7. In the Password dialog, click **Next** to continue. Do not enter a password for the private key.
8. In the Certificate Store dialog, select **Automatically select the certificate store based on the certificate type**.
9. Click **Next**. If Windows prompts you for confirmation to install the certificate, click **Yes**.
10. Click **Finish** to complete the certificate import.
Setting Up the VPN Connection

Setting up a VPN connection on the user's computer is a two-step process. First you create the VPN connection, then you configure it with the digital certificate.

Note: The following procedures outline how to create and configure a VPN connection in Microsoft Windows 7. For instructions to perform these procedures in another operating system, refer to your product documentation.

To create a VPN connection on the user's computer:

1. Click Start > Control Panel > Network and Sharing Center.
2. Click Set up a new connection or network.
3. In the Connection Option list, select Connect to a Workplace.
4. Select No, create a new connection if prompted, and then click Next.
5. Select Use my Internet connection.
6. Enter the server IP address or host name.
7. Enter a name for your VPN connection.
8. Select Don't connect now; just set it up and then click Next.
9. Enter your user name. Password is not required if you are using certificate for authentication.
10. Click Create and then click Close.

To configure a VPN connection on the user's computer:

1. Click Start > Control Panel > Network and Sharing Center.
2. In the left-hand menu, click Change adapter settings.
3. Right-click your VPN name and then click Properties.
4. On the Networking tab, select Internet Protocol Version 4 and then click Properties.
5. Click Advanced.
6. Clear the Use default gateway on remote network check box.
7. Click OK twice to return VPN Connection Properties dialog.
8. On the Security tab, in the Type of VPN list, select Point to Point Tunneling Protocol (PPTP).
10. In the EAP list, select Microsoft: Smart Card or other certificate.
11. Click Properties.
12. Under "When connecting" select Use a certificate on this computer and then select User simple certificate selection.
13. Choose whether to validate the server certificate. When selected, Windows prompts users to confirm that they're connecting to the correct server and that the certificate is valid. If you choose to enable validation, clear the Connect to these servers check box.
14. Click OK until you return to the Control Panel > Network Connections dialog.
15. Right-click on your VPN name and then click Connect.
Shut Down or Reconfigure

If you need to shut down or reboot the server, use the **Shutdown or reconfigure** panel to ensure that the shutdown sequence occurs gracefully, preserving all configuration and information on the server.

![Shutdown or reconfigure panel](image)

**Figure 12. Shutdown or reconfigure**

- **Reboot**: reboots the server after graceful shutdown.
- **Reconfigure**: reafirms all settings (forced reset – may be requested by Product Support).
- **Shutdown**: turns off the server for service outage or scheduled down time.

Click **Perform** and then confirm your selection. Click **Yes** to initiate the action or click **No** to return to cancel the action.
Remote Access

MSL provides several ways to access the underlying operating system, either from a computer on the internal network or from a computer outside the site on the Internet. You can also access the computer network securely from a remote computer. All of these operations are configured using the Remote Access panel in the server manager.

The Point-to-Point Tunneling Protocol (PPTP) is used to create client-to-server Virtual Private Networks (VPNs).

The IP addresses for PPTP clients are allocated from within the local subnet range managed by the DHCP server. The addresses are taken from the last portion of the range, and the number used depends on the “Number of PPTP clients” that you program.

For example, if you program “10” as the “Number of PPTP clients” for local subnet 192.168.1.10 to 192.168.1.100, then the last ten addresses in the range (.11 to .100) will be allocated to PPTP clients for VPNs.
If necessary, you can increase the total number of addresses available to all clients by modifying the local subnet range. For details see DHCP on page 78.

To enable VPN access:

1. Under PPTP Settings in the Remote Access panel, enter the Number of PPTP clients that will be allowed to connect to the server simultaneously. This can be the total number of remote PPTP clients in the organization, or, if you have a slow connection to the Internet and do not want all of those PPTP clients to connect at the same time, enter a lower number here. Enter 0 to deny PPTP connections.

2. Click Save. The server is now ready to accept PPTP.

To connect using PPTP:

1. Install the protocol on each remote Windows client - Click Network Control Panel (you may need to have the original Windows installation CD/DVD available). Client PCs should be rebooted if prompted.

2. Create new connections - In the Dial-Up Networking panel, enter the external IP address of the server to which you want to connect.

When you are finished, initiate a PPTP connection by double-clicking the appropriate icon in the Dial-Up Networking window. When you open the Network Neighborhood window, the server workgroup is listed there.

---

**Note:** Establish the connection to the Internet before you initiate the PPTP connection. This may involve double-clicking one Dial-Up Networking icon to start the Internet connection, then double-clicking a second icon to start the PPTP connection. To shut down, disconnect the PPTP connection first, then disconnect from the ISP.

---

**WARNING:** To protect the network, MSL enforces the use of 128-bit encryption for PPTP connections. If you are unable to establish a PPTP connection to the server, visit http://windowsupdate.microsoft.com/ and download the appropriate update. The contents of the page will appear differently depending upon the version of Windows you are using. You may need to search for Virtual Private Networking or a Dial Up Networking 128-bit encryption update. You may need to install the 40-bit encryption update first, and then install the 128-bit encryption update. Note that with Microsoft's ActiveUpdate process, if you are not presented with the choice for this update, it may already be installed in your system.

---

**Remote Management**

- Enter the Network IP address and subnet mask to enable remote management.

Remote management allows hosts on the specified IPv4 or IPv6 remote network(s) to access the server manager of your MSL server. To limit access to the specified host, enter a subnet mask of 255.255.255.255 for IPv4 networks or a CIDR prefix of /128 for IPv6 networks. Using 255.255.255.255 or /128 allows access from a specific host or limits access to a specific host.) If your mask allows a range of IP addresses, any hosts within that range can access your server manager using HTTPS. (See also Networks.)
Secure Shell Settings

Use the Secure Shell Settings section to control SSH access to your server.

**WARNING:** Before allowing secure shell access to the server using standard passwords, please ensure you set a secure admin/root password on the server. With a weak password, an internet-facing server can be compromised very quickly.

**About SSH (Secure Shell)**

SSH (secure shell) provides a secure, encrypted way to log in to a remote machine across an IPv4 or IPv6 network, or to copy files from a local machine to a server. Programs such as telnet and FTP transmit passwords in plain, unencrypted text across the network or the Internet. SSH provides a secure way to log in or copy files. For more information about SSH Communications Security and its commercial products, visit [http://www.ssh.com/](http://www.ssh.com/).

OpenSSH, included with MSL, is a version of the SSH tools and protocol. The server provides the SSH client programs as well as an SSH server daemon and supports the SSH2 protocol.

To configure the Secure Shell Settings:

1. **Select an access option:**
   - **No Access** – (Default) SSH access not allowed.
   - **Allow access only from trusted and remote management networks** – This option enables you to access the server from trusted local networks and remote management networks. To add a remote management network, see Remote Management.
   - **Allow public access (entire Internet)** – This option enables you to access the server from anywhere on the Internet. It is selectable only if you have configured a strong SSH (admin) password. If you have weak password and attempt to select this option, you will receive the following warning: “The system administration password is set to a weak value. The “Allow public access” option in the form below will remain disabled until the system administration password has been reset to a strong value.”

   **Note:** The public setting should only be enabled by experienced administrators for remote problem diagnosis and resolution. We recommend leaving this parameter set to “No Access” unless you have a specific reason to do otherwise.

2. **Program the configuration options:**
   - **Allow administrative command line access over secure shell** - This allows someone to connect to the server and log in as “root” with the administrative password. The user has full access to the underlying operating system. This can be useful if someone is providing remote support for the system, but in most cases we recommend setting this to No.
   - **Allow secure shell access using standard passwords** - If you choose Yes, users will be able to connect to the server using a standard user name and password. This may be a concern from a security point of view, in that someone wishing to break into the system could connect to the SSH server and repeatedly enter user names and passwords in an attempt to find a valid combination. A more secure way to allow SSH access is called RSA Authentication and involves the copying of an SSH key from the client to the server.

3. **Click Save.**
Using an SSH Client

Once SSH is enabled, you can connect to the server by launching the SSH client on the remote system. Ensure that it is pointed to the external domain name or IP address for the server. In the default configuration, you will be prompted for your user name. Enter “admin” and the administrative password. The interface opens in the server console. From here you can change the server configuration, access the server manager through a text browser or perform other server console tasks.

Note: By default, only two user names can be used to log in remotely to the server: “admin” (to access the server console and server manager) and “root” (to use the Linux shell). Regular users are not permitted to log in to the server.

Obtaining an SSH Client

A number of different free software programs provide SSH clients for use in a Windows or Macintosh environment. Several are extensions of existing telnet programs that include SSH functionality. Two different lists of known clients can be found online at http://www.openssh.com/windows.html and http://www.freessh.org/.

A commercial SSH client is available from SSH Communications Security at: http://www.ssh.com/products/ssh/download.html. Note that the client is free for evaluation, academic and certain non-commercial uses.

Port Forwarding

Port Forwarding allows you to modify your firewall rules so that the port you select is opened and forwarded to another port on another host. This is typically done to provide network services from a server inside of your private LAN, permitting incoming traffic to directly access one of your private hosts.

WARNING: Misuse of this feature can compromise the security of your network.

To create a port forwarding rule:

2. Click Create Portforwarding rule.
3. In the Protocol field, select the traffic to which you want to apply the rule (TCP or UDP).
4. In the Source Port(s) field, enter the number of the port that is to be forwarded.
5. In the Destination Host IP Address, enter the IP address of the machine to which the traffic from the Source Port is to be forwarded.
6. In the Destination Port(s) field, enter the port on the Destination Host to which the traffic is to be forwarded.
7. To enable Secure Network Address Translation, select SNAT.
8. Click Next.
9. To remove a port forwarding rule, select the appropriate line in the rule table and click the Remove link.

Note: Port forwarding is not available in a server-only configuration.
Web Server Certificates

About SSL Certificates

An SSL certificate authenticates the identity of a web site and encrypts information passed between the web server and the web client using Secure Sockets layer (SSL) technology.

A default self-signed SSL certificate is provided with the MSL server at no additional cost. You can instruct remote users to install this certificate in their workstations in order to prevent the “Certificate Error: Navigation Blocked” message from appearing when they attempt to log in to the MSL Server Manager.

For enhanced security and ease of use, purchase a signed SSL certificate from a third-party Certificate Authority (CA) such as Entrust or GoDaddy. This involves generating a certificate signing request (CSR) on the MSL server and submitting it to the CA. The CA will then return a package containing your web server certificate, plus any intermediate certificates that are required to maintain the certificate key chain. As with the self-signed SSL certificate, a third-party SSL certificate enables remote users to log in to the MSL Server Manager without receiving an error message. It also allows MiCollab Mobile Client users to establish connections and receive their deployment configurations.

![Figure 14. Web Server Certificate](image)
Using Third-Party SSL Certificates

To enable remote client stations to log in and MiCollab Mobile Client users to establish connections, purchase an SSL certificate from a third-party Certificate Authority and then import it onto the MSL server.

If you have an MSL application server deployed in LAN mode with an MBG / Web Proxy server in the demilitarized zone (DMZ) or network edge, your remote clients will connect to the MSL server through the MBG / Web Proxy server. For this configuration, purchase an SSL certificate for the MBG / Web Proxy server and then share the certificate and private key file with the LAN-based MSL servers.

If you have MSL application servers deployed in LAN mode behind a corporate firewall, your remote clients will connect to the MSL servers through the firewall. For this configuration, purchase a unique SSL certificate for each MSL server.

Supported Formats

You can import third-party SSL certificates in either PEM or PKCS#12 format:

- **PEM** certificates typically have extensions such as .pem, .crt, .cer, and .key. They are Base64 encoded ASCII files and contain "-----BEGIN CERTIFICATE-----" and "-----END CERTIFICATE-----" statements. Server certificates, intermediate certificates, and private keys can all be put into the PEM format. Apache and similar servers use PEM format certificates. Several PEM certificates, including the private key, can be included in a single file, one below the other, but most platforms, such as Apache, expect the certificates and private key to be in separate files.

- **PKCS#12** or PFX format is a binary format for storing the server certificate, any intermediate certificates, and the private key in one encryptable file. PFX files usually have extensions such as .pfx and .p12. PFX files are typically used on Windows machines to import and export certificates and private keys.

MSL supports the SHA-2 cryptographic hash function, along with variants such as SHA-256.

Configuration Example

The illustration, below, demonstrates the five basic steps that must be completed to implement a third-party SSL certificate when you have an have an MSL application server in LAN mode with an MBG / Web Proxy on the network edge. First, generate the certificate signing request (CSR) on the MBG / Web Proxy. Second, submit the CSR to the CA, complete the online registration forms and purchase your web server certificate and intermediate certificates. Third, install the certificates on the MBG / Web Proxy (the MSL server that was used to generate the CSR). Fourth, download the certificates and private key from the MBG / Web Proxy. Fifth, install the certificates and private key on the MSL application server.
Figure 15. Web Server Certificate – Configuration Example

Generate a Certificate Signing Request (CSR) and Purchase the SSL Certificate

You need a certificate signing request (CSR) in order to purchase an SSL certificate from a third-party Certificate Authority (CA).

To generate a CSR and purchase the third-party SSL certificate:

1. Log into the MSL Server Manager.
3. Select Generate a new Certificate Signing Request (CSR), and then click Perform.
4. Enter the information required to generate a certificate signing request (CSR). If you have previously generated a CSR, the previously entered values are displayed. Beginning with Release 9.1.24, CSRs are generated with 2048-bit keys.

**Note:** When completing the fields, capitalize the first letter only (for example Ontario, not ONTARIO).

<table>
<thead>
<tr>
<th>FIELD NAME</th>
<th>ENTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country Name (2 letter code)</td>
<td>2 letter code of your country</td>
</tr>
<tr>
<td>State or Province Name</td>
<td>full name of your state or province</td>
</tr>
<tr>
<td>Locality Name</td>
<td>name of your city, town, or village</td>
</tr>
</tbody>
</table>
5. Check to ensure that you have entered all the required information correctly before you generate the CSR. If you need to make changes, regenerate the file. Do NOT modify the text of the generated file in a text editor such as Notepad.

6. Click **Generate Certificate Signing Request**. The system generates a CSR file.

7. Copy the text of the CSR file.

8. Access the web site of a Certificate Authority and purchase a certificate. You will be prompted to do the following:
   a. Select the number of domains you wish to protect:
      - **Single domain**: Select this option if your implementation has one MSL server on a single domain (eg. www.domain.com and domain.com).
      - **Multi-domain**: Select this option if your implementation has multiple MSL servers on a specific number of domains (eg. www.domain.com and domain.com, plus three sub-domains).
      - **Multi-domain and wildcard**: Select this option if your implementation has multiple MSL servers with a large number of sub-domains (eg. eg. www.domain.com and domain.com, plus an unlimited number of sub-domains).
   b. Enter your account and contact details in the CA web form:
      - **Login Name** and **Password**.
      - **Name**, **Email Address**, and **Telephone Number**.
      - **Organization Name** and **Address**.
      - **Domain Name**.
      Note: Some CAs may prompt you to enter the Subject Alternate Names (SANs) or wildcard domain in this step. For more information on these entries, see below.
      - **Web Server Software**.
      Note: Select Apache. Other options are not supported on the MSL platform.
      - **Hashing Algorithm**.
   c. Paste the text of the CSR file into the CA web form.
   d. If you have purchased a certificate for multiple domains or a wildcard domain, enter the following in the CA web form:
      - **Subject Alternate Name** (SAN): Enter the domain name for each service (or "virtual host") in the LAN that you want to include in this certificate. For example, if your deployment includes a number of MSL application servers on the LAN, you would enter the FQDN of each server such as micollab.mitel.com, mivb.mitel.com, and micollabclient.mitel.com. If these addresses are not configured correctly, remote client access to the LAN-based services will be
denied.

Note: You can also enter an IP address as a SAN if your users are accessing an MSL application server from the internal network rather than through the MBG / Web Proxy. Typically, you would do this for testing purposes or to enable direct access from the LAN.

- **Wildcard**: To consolidate your domain and unlimited sub-domains into a single SSL certificate, enter a wildcard domain name. For example, if your deployment includes numerous MSL application servers on the LAN (eg. MiCollab, MiVoice Business, MiCollab Client, MiCollab Unified Messaging, generic MSL, and Oria), you can include them all by entering an FQDN such as *.mitel.com.

9. Complete the purchase transaction. The Certificate Authority will do the following:

- Send you the certificate files. These include your SSL server certificate and, if required, intermediate certificates. An intermediate certificate is a subordinate certificate issued to establish a certificate chain that begins at the CA's trusted root certificate, carries through the intermediate and ends with your own SSL server certificate. Some CAs provide a single intermediate certificate while others provide multiple intermediate certificates. There should be no need to open and inspect the files, provided that they are in the correct format and that the intermediate certificates have been bundled into a single file by the CA. Consult the documentation provided by your Certificate Authority for instructions to obtain, unzip and identify exactly which files you need to use.

**Note**: If the CA requires you to open a number of intermediate certificates and assemble them into a single bundled file, perform this task with a text editor that employs Unix line formatting. Do not use an editor that employs Windows line formatting such as Notepad.

The intermediate certificate is required for MiCollab Mobile Client deployments; without it, client connections will fail and users will be unable to download their deployment configurations.

- Contact the administrator for the domain used in a CSR. The administrator is identified using information supplied when your organization originally registered its internet FQDN.

10. Upload the certificate files to a location that is accessible to the MSL server.

**Installing a Third-Party Certificate on the MSL Server**

Use the following procedure to install the certificate files that you received from the Certificate Authority onto the MSL server that generated the CSR.

To install the SSL certificate files on the MSL server:

11. Log into the MSL Server Manager for the system that was used to generate the CSR.


13. Select Upload and install a web server certificate, and then click Perform.

14. Select the SSL certificate:

- Beside the **SSL Certificate** field, click **Browse**.
- Navigate to the SSL certificate, select it and click **Open**.

15. If you also received an Intermediate SSL certificate, select it as well:

- Beside the **Intermediate SSL Certificate** field, click **Browse**.
- Navigate to the Intermediate SSL certificate, select it and click **Open**.
Note: In some cases, the CA will provide multiple intermediate certificates. Consult the CA’s documentation to determine which of these certificates you should use and, if necessary, how to assemble them into a single bundled file.

The intermediate certificate is required for MiCollab Mobile Client deployments; without it, client connections will fail and users will be unable to download their deployment configurations.

16. Click **Install Web Server Certificate**.

**Installing a Third-Party Certificate on other MSL Servers**

If your deployment includes LAN-based MSL application servers accessed via an MBG / Web Proxy server, use the following procedure to install the certificate files on them. This is a two-step process. First, you must download the web server certificate, intermediate certificates (if installed), and private key file corresponding to the SSL server certificate from the MBG / Web Proxy. Second, you must upload these files to the LAN-based MSL server.

**Download certificates**

To download the SSL certificate files from the MBG / Web Proxy:

1. Log into the MSL Server Manager for MBG / Web Proxy (the system that was used to generate the CSR)
2. Log into the MSL Server Manager for the system that was used to generate the CSR.
4. Select **Download the current web server certificate**, and then click **Perform**.
5. Click **Save**, navigate to the location you wish to store the file, and then click **Save**. The downloaded file is in ZIP format. It includes the web server certificate, intermediate certificates (if installed), and private key file.
6. Unzip the files and upload them to a location that is accessible to the other MSL servers in your network.

**Note**: Exercise caution when transferring your certificate files and private key to the other system. If your private key is stolen, it can be used to establish fraudulent connections to your applications. For optimum security, delete the files from any media they are stored on as soon as you have completed the upload process.

**Upload certificates**

To upload the SSL certificate files to a LAN-based MSL server:

1. Log into the MSL Server Manager for a LAN-based MSL server.
2. Select **Upload and install a web server certificate**, and then click **Perform**.
3. Select the SSL certificate:
   - Beside the **SSL Certificate** field, click **Browse**.
   - Navigate to the SSL certificate, select it and click **Open**.
4. If you also received an Intermediate SSL certificate, select it as well:
   - Beside the **Intermediate SSL Certificate** field, click **Browse**.
   - Navigate to the Intermediate SSL certificate, select it and click **Open**.
5. Import the private key pair created on the other MSL server:
• Beside the SSL Private Key field, click Browse.
• Navigate to the SSL Private Key file, select it and click Open.

6. Click Install Web Server Certificate.

7. Restart the server to ensure all components and services that require the certificate are informed of the certificate’s presence.

8. To prevent fraudulent use of your certificates, delete the certificate and private key files from any media they are stored on.

Verifying the Installed Certificate

To download the installed certificate:

1. Log into the MSL Server Manager
3. Verify that the certificate name and issuer are displayed on the page.

Currently Installed Web Server Certificate

If a web server certificate is currently installed on the server, the details are listed as follows:

<table>
<thead>
<tr>
<th>FIELD NAME</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issuer</td>
<td>Lists the following information for the certificate authorization company that issued the certificate: C: country code (2-letter ISO country code) ST: state or province L: locality name (for example: city name) O: name of the certificate authorization authority; “XYZ Corporation” is the name that appears for Mitel self-signed certificates. OU: name of the organizational unit CN: server hostname Authority/emailAddress: email address of the Certificate Authority</td>
</tr>
<tr>
<td>Subject</td>
<td>Lists the following information for the certificate holder: C: country code (2-letter ISO country code) ST: state or province L: locality (for example, city name) O: organization name (your company name) OU: organizational unit (for example, department name) CN: MSL server hostname</td>
</tr>
<tr>
<td>Not before</td>
<td>Date and time when the certificate takes effect.</td>
</tr>
<tr>
<td>Not after</td>
<td>Date and time when the certificate expires.</td>
</tr>
</tbody>
</table>

Installing the Default Self-Signed Certificate on Local Workstation

A default self-signed SSL certificate is provided with the MSL server at no additional cost. Remote users can add it to their local workstations. This prevents the "Certificate Error: Navigation Blocked" message from appearing when the users attempt to log in to the MSL Server Manager.

The self-signed SSL certificate has the following disadvantages:
The protection supplied by the self-signed SSL certificate is somewhat lower than that of a third-party SSL certificate.

The self-signed SSL certificate can only be used to prevent the “Certificate Error: Navigation Blocked” message. For MiCollab Mobile Client deployments, you must purchase and install a third-party SSL certificate. If you fail to do this, your MiCollab Mobile Client users will not receive their deployment configurations and will be unable to establish connections.

The following procedure applies to Internet Explorer 11. For other browser versions refer to the browser help.

Note: If you are using Windows Vista or Windows 7, you will need to run Internet Explorer as an administrator to install the security certificate. To do this, right-click on the Internet Explorer icon and select the option to run as Administrator. This task needs to be done even if you are logged in as an administrator.

To install the default self-signed certificate on a local workstation:

1. Open Internet Explorer.
2. When you attempt to access the MSL Server Manager login page, a “Certificate Error: Navigation Blocked” page is displayed. The warning states "There is a problem with this web site's security service".
3. Click the "Continue to this website" link to proceed to the MSL login page.
5. Click View Certificates.
6. Click Install Certificate.
7. Click Next to navigate through the Certificate Import Wizard windows.
8. Accept the default, "Automatically select the certificate store based on the type of certificate," and click Next.
9. Click Finish on the Completing the Certificate Import Wizard window.
10. Click Yes on the Root Certificate Store window to add the certificate to the Root Store.
11. Click OK to close each window you have opened during this procedure.

Client Certificate Management

To securely authenticate client connections, some applications may request a security certificate signed by the MSL server using a Mitel Certificate Authority (CA). You can manage Certificate Signing Requests (CSRs) and issued certificates using the Certificate Management panel.
To approve a CSR:

1. Under **Security**, click **Certificate Management**. Certificate requests waiting for approval appear under the heading **Queued CSRs**.

2. Click the **Certificate ID** link.

3. After confirming the requester, do one of the following:
   - Click **Cancel** to return to the Certificate Management main screen without approving/rejecting the request
   - Click **Reject** to reject the CSR. The requester will be notified of the rejection
   - Click **Approve** to approve the CSR

To revoke an approved CSR:

Generated certificate numbers are unique. If you need to re-issue a certificate for a specific requester (for example, in the case of hardware failure or theft), then you must first revoke the existing certificate.

**Note:** Do not use this option to disable a set.

1. Under **Security**, click **Certificate Management**. Approved CSRs appear under the heading **Approved Certificates**.

2. Click the **Certificate ID** link and then click **Revoke**. The requester can now make another request.

**Note:** The MSL server is limited to accepting 50 concurrent CSRs.
Networks

Grant Access Privileges to Trusted Local Networks

By default, several MSL services, including server manager access, SSH and system monitoring, are accessible only from computers that are located on the same network where the MSL server is installed. If you need to manage the server from a different subnet on the LAN, then you must configure the other subnet as a "Trusted Network." This configuration opens the firewall and allows access to the services on the MSL server.

Example of Default Routing Configuration

In the example illustrated below, the LAN interface of the MSL server has an IP address of 10.36.20.20. Accordingly, the server will accept traffic only from the 10.36.20.x network while blocking traffic from all other subnets on the LAN.

Figure 17. Default Routing Configuration
Example of Trusted Network Configuration

In the example illustrated below, the MSL server has been configured an IP address of 10.36.20.20 on its LAN interface and with a "trusted network" of 10.34.20.0/255.255.255.0. Accordingly, the server will accept traffic from both the 10.36.20.x and 1034.20.x subnets.

Figure 18. Routing Configuration with Trusted Network

Note:
- If only one network is being serviced by the server, you do not need to add any information here.
- If your server has an IPv6 address configured on its LAN interface, then you can extend privileges to IPv6 networks as well as IPv4 networks.
- Depending on the architecture of your network infrastructure, the instructions for configuring the clients on an additional network may be different than the following instructions. For more information about adding networks, contact your authorized Mitel Reseller.
- To control access to the server from computers on remote networks, see Remote Management and Secure Shells Settings.
- You can also use the server console to show, add, and delete trusted local networks.
To extend privileges to one or more additional networks:

1. Click **Add a new trusted network**.

2. In the **Network Address** field, enter the IPv4 or IPv6 address of the network to designate as "local".

3. In the **Subnet mask or network prefix length** field, enter the dot-decimal subnet mask or CIDR network prefix to apply to the Network Address. If this field is left blank, the system assigns a network prefix length of /24 for IPv4 networks or /64 for IPv6 networks.

4. In the **Router** field, enter the IP address of the router you will use to access the newly-added network.

5. Click Add.

---

**Note:** When you add or change trusted local network information, updates to the permissions files may take up to 15 seconds. If you attempt to access the server manager interface from a newly added trusted local network before the permissions have been updated, you will receive a "403: Forbidden" error message.

---

### Add Network Routes

Use this procedure to add new routes to the MSL server's routing table. This configuration opens the firewall and enables traffic to flow to/from remote servers but does not grant access to the MSL services (as would adding a trusted network).

---

**Note:**
- The additional network routes are firewalled.
- Adding additional network routes is an advanced option and should only be used if you have a thorough understanding of both routing and your network topology.

To add additional network routes:
1. Click **Add a new network route**.

2. In the **Network Address** field, enter the IPv4 or IPv6 address of the network route.

3. In the **Subnet mask or network prefix length** field, enter the subnet mask or CIDR prefix to apply to the Network Address. If this field is left blank, the system assigns a network prefix length of /24 for IPv4 networks or /64 for IPv6 networks.

4. In the **Router** field, enter the IP address of the router you will use to access the newly-added network.

5. Click **Add**.

**Email Settings**

To configure email settings:

1. Click the **Change** button beside the setting you want to change.

2. Configure one or more of the following settings and then click **Save**:

   - **SMTP Server**: The server can deliver outgoing messages via a corporate or Internet service provider's SMTP server, or can deliver messages directly to their destination by looking up mail exchanger records in DNS. If you are using a specific SMTP server, specify its hostname or IP address in this field. Otherwise, leave this field blank. Click **Save** to access other SMTP Server settings.

     - **Destination Port for Outbound SMTP**: If you have specified a Server to use for outbound SMTP, select one of the following:
       - SMTP Port 25 (use cleartext; default)
       - SMTP port 587 (TLS encryption)
       - SMTP Port 465 (SSL encryption).

     - **Mail Server User ID**: If you are using secure SMTP (port 465 or 587), enter the user ID required by the SMTP server. This ID must be configured and licensed in the SMTP server.

     - **Mail Server Password**: If you are using secure SMTP (port 465 or 587), enter the password required by the SMTP server. This password must be configured in the SMTP server.

   - **SMTP email injection restrictions**: This setting controls which networks will be allowed to send mail through this server via SMTP. Choose from one of the following three settings:

     - **Localhost only** – accept email only from applications installed on the server (default setting).

     - **Accept only from trusted networks** – accept email from trusted local networks that are directly connected to the LAN. (These networks are on the same subnet as the server’s private interface.)

     - **Accept from anywhere** - accept all email.

   - **Forwarding address for administrative email**: By default, email to the administrator is sent to the user "admin" at the domain name configured on the server. You can override the default by entering an email address in this field.

   - **E-mail sent for events**: Select the system events for which you want to receive email notifications — Cleared, Indeterminate, Warning, Minor, Major, Critical. By default, Major and Critical are preselected.
Google Apps

When Mitel Standard Linux applications such as NuPoint UM and MiCollab Client require access to user-generated data that is stored in Google Gmail or Google Calendar, they must meet Google's authentication requirements. Google grants access only when the following conditions are met:

- the application provides its authentication information, and
- the user consents to allow the application to view the account information

All applications that access Google must be registered through the Google APIs Console and must configure access using the Open Standard for Authentication 2.0 (OAuth 2.0) protocol. OAuth 2.0 allows users to share specific data with applications (for example, contact lists) while keeping their usernames, passwords, and other information private. With OAuth 2.0, user data is protected using access tokens. Applications that use OAuth 2.0 require an authorization code generated in MSL.

OAuth 2.0 is a relatively simple protocol. To begin, you register your application with Google in order to create a client ID. Then your client application requests an access token from the Google Authorization Server, extracts a token from the response, and sends the token to the Google API that you want to access.

When you create a client ID, you must specify the type of application it is for. For integration with Mitel applications, two options are available:

- **Installed Application** - Select this option if the application is to be installed on a mobile device, tablet or computer. The registration process results in a client ID and a client secret, which you embed in the source code of the application. MiCollab Client requires this configuration.

- **Service Accounts** - Select this option if the application employs server-to-server interactions, such as those between a web application and Google Cloud Storage. MiCollab Audio, Web and Video Conferencing and NuPoint Unified Messaging require this configuration.

Configure OAuth 2.0 for Installed Applications

Use this procedure to configure a secure connection between integrated applications such as MiCollab Client and Google Apps such as Google Contacts or Google Calendar using the OAuth 2.0 protocol.

If OAuth 2.0 authorization is successful then Google will grant an access token to the MiCollab application on the Mitel Standard Linux server. These tokens can be re-issued when they expire or if the project is changed in any way.

Create an API Project and Client ID on the Google Authorization Server

Note: The following instructions are provided as a guide only. For up-to-date instructions, refer to the Google online help.

Log In to the GoogleApis Console:


b. Enter the domain administrator Email and password.

1. Create the Project:
   c. Click the Create project button or, if you already have other projects, select Create from the drop-down menu.
d. If prompted, enter the name for the project (for example, "Mitel NuPoint Advanced UM") and click **Create Project**.

2. Select Services for the Project:
   a. Select the **Services** tab.
   b. Under **All Services**, use the screen tools to select the Service (such as Calendar API) you wish to support. After selecting a service, its status changes to "On." Multiple services can be selected.

3. Create a Client ID and Secret (Register the Application):
   a. Select the **API Access** tab.
   b. Click **Create an OAuth 2.0 client ID**.
   c. In the Create Client ID dialog, enter the following:
      - **Product name**: Name of the MiCollab application.
      - **Product logo**: Optional graphic file (.jpg or .png.) identifying the application.
   d. Click **Next** and do the following:
      - Select **Installed application** as the Application type.
      - Select **Other** as the Installed application type.
   e. Click **Create client ID**. Your OAuth 2 credentials (unique client ID and matching secret) are displayed under **Client ID for installed applications**. Record your Client ID and matching secret.

**Generate an Authorization Code**

This procedure involves copying your OAuth 2.0 credentials (client ID and matching secret) from the Google APIs console to MSL, which generates an authorization code and then grants an access token. MiCollab employs the access token to integrate with Google services.

Generate the Authorization Code:

   a. Log in to the MSL Server Manager as "admin".
   b. In the navigation tree, under **Configuration**, click **Google Apps**.
   c. Select the **Installed Applications** tab.
   d. Under **Step 2**, copy and paste the following from the Google APIs console:
      - Product Name
      - Client ID
      - Client secret
   e. Click **Save and Generate Authorization Code**. Remain on the Installed Applications tab in the MSL Server Manager.

1. Grant the Access Token:
   a. Under **Step 3** on the Installed Applications tab, copy and paste the authorization code.
   b. Click on the URL provided to submit the authorization code. You may be required to sign in.
   c. Click **Continue** and then click **Allow Access**. This will grant the access token for services when MSL makes a request for it. After the access token is generated, the panel displays its current status (access token ID and expiry time in seconds).
Not:

- The access token is valid only for the set of operations and resources described in the token request. For example, if an access token is issued for the Google Calendar API, it will not grant access to the Google GMail API.
- If you regenerate the client ID and secret, you must then regenerate the authorization code in MSL.
- If an access token expires or you wish to change the list of supported services, you can repeat the procedures to Create an API Project and Generate an Authorization Code.
- OAuth 2.0 data is not included in system (MSL) backups. Accordingly, if you perform a backup and restore procedure, you must then re-enter the OAuth 2.0 data in order to restore the Google Apps integration.

**Configure OAuth 2.0 for Service Accounts**

Use this procedure to configure a secure connection between Mitel applications such as NuPoint UM and Google Apps such as Google Calendar using the OAuth 2.0 protocol.

With this type of server-to-server interaction, the application has to prove its own identity but end users do not need to be involved.

**Create API Project and Client ID on the Google Authorization Server**

*Note:* The following instructions are provided as a guide only. For up-to-date instructions, refer to the Google online help.

1. Log In to the Google Apps Console:
   - To access the Google API console, open a web browser and navigate to https://code.google.com/apis/console.
   - Enter the domain administrator Email and password.
2. Create the Project:
   - Click the Create project button or, if you already have other projects, select Create from the drop-down menu.
   - If prompted, enter the name for the project (for example, "Mitel NuPoint Advanced UM") and click Create Project.
3. Select Services for the Project:
   - Select the Services tab.
   - Under All Services, use the screen tools to select the Service (such as Calendar API) you wish to support. After selecting a service, its status changes to "On." Multiple services can be selected.
4. Create the Service Account with Client ID:
   - Select the API Access tab.
   - Click Create an OAuth 2.0 client ID....
   - In the Create Client ID dialog, enter the following:
     - **Product name**: Name of the MAS application.
     - **Product logo**: Optional graphic file (.jpg or .png.) identifying the application.
   - Click Next and select Service account as the Application type.
   - Click Create client ID. Google generates your public-private key pair, and shares the
private key with you. Copy it for use in the next procedure.

f. Click **Download private key** to download the PKCS #12 private key file to your computer, and then close the dialog.

g. Under **Service Account**, click **Download JSON** to download the JavaScript Object Notation file to your computer.

**Note:** Store the private key and JSON file in a safe location. You will require them to establish your credentials to MSL.

5. **Manage API Client Access (API Scopes):**

Once a service account is created, you must enable the scope of access for a client ID.

a. Copy the client ID from the service account (see previous procedure).

b. To access the Google Admin console, open a web browser and navigate to admin.google.com.

c. Enter the domain administrator **Email** and **password**.

d. Click **Security**.

e. Click **Advanced settings**.

f. Under **Authentication**, click **Manage OAuth Client access**.

g. On the Manage API client access panel:

- Paste the client ID in the **Client Name** box.
- Enter the following in the **One or More API Scopes** box:
  - To support Google calendar integration (for the Google-MiCollab Audio, Web and Video Conferencing gadget), enter: https://www.google.com/m8/feeds, https://www.googleapis.com/auth/calendar
  - To support Gmail integration (for NuPoint Advanced UM), enter: http://mail.google.com/
- Click Authorize.

The client ID now has access to resources in the specified domains.

6. **Upload Credentials to MSL:**

This procedure involves uploading your OAuth 2.0 credentials (JSON Service Account ID and private key) from your computer to MSL. MiCollab employs these credentials to integrate with publicly available Google Apps.

a. Log in to the MSL Server Manager as "admin".

b. In the navigation tree, under **Configuration**, click **Google Apps**.

c. Select the **Service Account** tab.

d. Under **Configuration**, upload the following files from your computer:

- Service Account ID (.json file)
- Private Key (.p12 file)

e. Click **Upload Credentials**.

f. Confirm that the Client ID, Email address, and Private Key are correct by comparing them to the corresponding fields in the Google API project.

g. Click **Apply**. It is now possible to configure a secure connection to publicly-available Google Apps using the OAuth 2.0 protocol for the Service Account client ID.
Note:

- You can generate another private-public key pair and then upload the private key to the Service Account in MSL.
- OAuth 2.0 data is not included in system (MSL) backups. Accordingly, if you perform a backup and restore procedure, you must then re-enter the OAuth 2.0 data in order to restore the Google Apps integration.

DHCP

Use the DHCP panel to configure and manage the behavior of the internal DHCP server.

Note: Do not enable the internal DHCP server if another DHCP server exists on the network.

Figure 20. DHCP Settings

To enable DHCP:

1. On the DHCP Service tab, click **Edit**.
2. Click **Enable DHCP Service** to enable the internal DHCP server. Note: Do not enable this server if a DHCP server already exists on the network.
3. Click **Allow BootP** to allow network clients to obtain IP addresses using the Bootstrap Protocol.
4. Click **Update** to enable the settings.

To disable DHCP:

1. On the DHCP Service tab, click **Edit**.
2. Clear **Enable DHCP Service** to disable the internal DHCP server.
3. Click **Update** to enable the settings.
DHCP Configuration

To add a subnet:

1. On the Subnets tab, click Add subnet.
2. In the Name field, enter the name to apply to this subnet.
3. In the Subnet IP address, enter the IP address.
4. In the Subnet Mask field, enter the mask to apply to this IP address.
5. (Optional) In the Router field, enter the IP address of the router used to access the subnet.
6. Click Save.

To remove a subnet:

1. On the Subnets tab, click the Remove link associated with the subnet you want to remove.
2. Click Delete.

To add a subnet range:

Note: If you enable DHCP and add a subnet, you must then provide a subnet range.

1. On the Subnets tab, click Add range.
2. Select a subnet from the Subnet drop-down list.
3. In the Range start field, enter the IP address at which to start the range of IP addresses available for assignment.
4. In the Range end field, enter the IP address at which to end the range.
5. In the Lease time field, enter the number of seconds to hold DHCP leases or accept the default setting.
6. Click Save.

To remove a subnet range:

1. On the Subnets tab, click the Remove link associated with the subnet range you want to remove.
2. Click Delete.

To add a Static Host:

1. On the Static Hosts tab, click Add Host.
2. In the Hostname field, enter a name for the static host. (For example, host.mitel.com)
3. In the Host IP field, enter the static IP address of the host.
4. In the MAC address field, enter the MAC address of the host.
5. In the Client ID (type, value) field, select a type and enter a corresponding value.
6. Click Save.

To remove a static host:

1. On the Static Hosts tab, click the Remove link associated with the host you want to remove.
2. Click Delete.
To add DHCP Options:

1. On the Options tab, click **Add option**.
2. In the **Scope** field, select the scope to which to apply this option. (Global, Subnet, Range, or Host)
3. Select the **option type** for this option (Standard, Vendor, or Site-local).
4. Do one of the following:
   - For **Standard** options, select an option number from the list.
   - For **Vendor** options, select a vendor option from the list.
   - For **Site-local** options, enter an option number between 224 and 254.
5. Click **Next**.
6. Configure the DHCP option as required.
7. Click **Save**.

To view the state of all dynamic leases:

- On the **Lease View** tab, click **Refresh** to see the most recent version of the list.

To remove a DHCP option:

1. On the Options tab, click the **Remove** link associated with the option you want to remove.
2. Click **Delete**.

**Date and Time**

Use the Date and time panel to manage configure server date and time. You can use a network time server or you can set the date and time manually. A time server is a device on the Internet that communicates the time to other computers over the Internet using the Network Time Protocol (NTP). Many organizations provide Internet time servers for free.
Figure 21. Setting Date and Time

To configure a network time server:

1. In the **Set system Time Zone** list, select your time zone.
2. Select **Configure Network Time Server**.
3. Enter the **domain name** or **IP address** of the NTP Server.
4. Click **Save**.

For more information about using a network time server, visit [http://www.ntp.org/](http://www.ntp.org/). You can also find a list of publicly available time servers at [http://support.ntp.org/bin/view/Servers/WebHome](http://support.ntp.org/bin/view/Servers/WebHome). You should always use a secondary time server (also called a stratum 2 server) to lighten the load on the primary time servers.

To set the date and time manually:

2. In the **Set system Time Zone** list, select your time zone.
3. Select **Set Date and Time** and enter month, day, year, hours and minutes information.
4. (Optional) Select **Enable System Clock Adjustment** to adjust system time gain rate.
5. Click **Save**.

**Note:** The server manager will reset the time automatically during daylight savings time.

To switch from a Network Time Server to a manual configuration:

1. Click Disable Network Time Server and then click Save.
2. Enter time zone, date, and time information.
3. Click **Save**.

**Note:** A reboot may be required to update any running applications with new date/time information.

To verify that your network time protocol server is set up properly:

1. After you have saved the hostname or IP address of a new Network Time Server, click the **Query** button to issue the `ntpq -c peers Linux` command.

The command results are displayed for the NTP server (or for a list of servers if a pool is referenced by the specified hostname or IP address).

**NTP Server Query results for: centos.pool.ntp.org**

<table>
<thead>
<tr>
<th>remote</th>
<th>refid</th>
<th>st</th>
<th>when</th>
<th>poll</th>
<th>reach</th>
<th>delay</th>
<th>offset</th>
<th>jitter</th>
</tr>
</thead>
<tbody>
<tr>
<td>205.189.158.228</td>
<td>INIT.</td>
<td>16</td>
<td>u</td>
<td>1024</td>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>192.75.12.10</td>
<td>INIT.</td>
<td>16</td>
<td>u</td>
<td>1024</td>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>208.80.96.70</td>
<td>INIT.</td>
<td>16</td>
<td>u</td>
<td>1024</td>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>127.127.1.0</td>
<td>LOCL.</td>
<td>10</td>
<td>30</td>
<td>54</td>
<td>377</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**Query Command Results**

2. After a few minutes, press **Query** again. An * appears in front of one of the NTP servers.
The * indicates that the system time is being synchronized with the NTP server.

### NTP Server Query results for: centos.pool.ntp.org

<table>
<thead>
<tr>
<th>remote</th>
<th>refid</th>
<th>st</th>
<th>t</th>
<th>when</th>
<th>poll</th>
<th>reach</th>
<th>delay</th>
<th>offset</th>
<th>jitter</th>
</tr>
</thead>
<tbody>
<tr>
<td>205.189.158.228</td>
<td>.INIT.</td>
<td>16</td>
<td>u</td>
<td>-</td>
<td>1024</td>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>192.75.12.10</td>
<td>.INIT.</td>
<td>16</td>
<td>u</td>
<td>-</td>
<td>1024</td>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>205.80.96.70</td>
<td>.INIT.</td>
<td>16</td>
<td>u</td>
<td>-</td>
<td>1024</td>
<td>0</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>*127.127.1.0</td>
<td>.LOCL.</td>
<td>10</td>
<td>l</td>
<td>30</td>
<td>64</td>
<td>377</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

### Query Command Results

The following table provides the meaning of the command output:

<table>
<thead>
<tr>
<th>COMMAND OUTPUT</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>remote</td>
<td>The hostnames or IP addresses of the remote NTP servers to which the system can be synchronized (based on the pool of available NTP servers). The character that precedes the hostname or IP address indicates the following: * indicates that the system time is being synchronized with the NTP server. # indicates that the host is selected for synchronization, but distance from the host to the server exceeds the maximum value. o indicates that the host is selected for synchronization, and the PPS signal is in use. + indicates the host included in the final synchronization selection set. x indicates that the host is the designated false ticker by the intersection algorithm. . indicates that the host is selected from the end of the candidate list. - indicates a host discarded by the clustering algorithm. blank indicates a host is discarded due to high stratum and/or failed sanity checks.</td>
</tr>
<tr>
<td>refid</td>
<td>The current source of the synchronization for the remote host.</td>
</tr>
<tr>
<td>st</td>
<td>The stratum used by the remote host. The lower the number, the closer you are to the time source. Stratum 16 indicates that the system is not synchronized with a time server.</td>
</tr>
<tr>
<td>t</td>
<td>The type of clock used on the NTP server (L stands for local clock; u for an Internet clock).</td>
</tr>
<tr>
<td>when</td>
<td>The number of seconds since the last poll.</td>
</tr>
<tr>
<td>poll</td>
<td>The number of seconds used between two polls.</td>
</tr>
<tr>
<td>reach</td>
<td>The number of times the other NTP server has been contacted successfully.</td>
</tr>
<tr>
<td>delay</td>
<td>Indicates the time, in milliseconds, between an NTP request and the answer.</td>
</tr>
<tr>
<td>offset</td>
<td>The difference in milliseconds between the time on your local computer and that on the NTP server.</td>
</tr>
<tr>
<td>jitter</td>
<td>The error rate in your local clock, expressed in milliseconds.</td>
</tr>
</tbody>
</table>
Hostnames and Addresses

Use this page to manage hostnames and their corresponding IP addresses for the internal DNS server. If you have programmed an IP address into the DNS forwarding address on the Domains page, then MSL forwards DNS requests to that external IP address for resolution and ignores any entries on this page. To disable DNS forwarding, enter an empty string as the DNS Forwarder address.

To add a hostname/address listing to the file:
1. Under Configuration, click Hostnames and Addresses.
2. Click Add Hostname.
3. Enter the Hostname. The hostname must start with a letter or number and must contain only letters, numbers, and hyphens.
4. From the Domain list, select the domain where this host resides. (This list is populated by entries made on the Domains page.)
5. In the Location list, select visibility (Local, Remote, Self).
6. Click Next.
7. Confirm the details and then click Add.

To edit the location of a hostname:
1. Under Configuration, click Hostnames and Addresses.
2. In the current list of hostnames, click the Modify link that corresponds to the hostname you want to modify.
3. Edit Location and then click Next.
4. Confirm the details and then click Save.

To remove the hostname of a network device:
1. Under Configuration, click Hostnames and Addresses.
2. In the current list of hostnames, click Remove in the Action column.
3. Click Remove.

Domains

This form allows you to configure other virtual domains in the network. You can also define a Domain Name Service (DNS) to be associated with the MSL server, if required (also called a “DNS Forwarder” address).
Figure 23. Domains

To configure a virtual domain:

1. Under Configuration, click **Domains**.
2. Click **Add Domain**.
3. Enter the **Domain Name** and a brief description.
4. In the **Domain DNS Servers** field, select how this is resolved:
   - Resolve locally
   - Internet DNS servers
   - Corporate DNS servers
   The default will be correct for most networks.
5. Click **Add**.

DNS Forwarder

If you want to override the internal DNS server in the MSL server, you can enter the IP address of the preferred DNS server here.

1. Under Configuration, click **Domains**.
2. Click **Modify Corporate DNS settings**.
3. Enter the **Primary corporate DNS server** IP address. You can also enter a **Secondary corporate DNS** server address if applicable.

**Note:** Do not enter the address of your ISP’s DNS servers because the MSL server is capable of resolving all Internet DNS names without this additional configuration.
4. Click **Save**.
**Note:** By default, the MSL server uses itself as a DNS resolver and cache. When resolution is required, MSL first checks the DNS settings to see if you have overridden the default by programming a forwarder. If not, MSL then checks your Hostnames and Addresses entries to see if the requested host name is listed there. If not, MSL proceeds to access DNS root servers on the Internet for resolution.

### Simple Network Management Protocol (SNMP)

MSL supports Simple Network Management Protocol (SNMP) for retrieval of network information and statistics. Enabling SNMP allows access to the following options:

- System Monitoring subsystem for monitoring link use
- Remote access to System Monitoring. For reports, SNMP creates the following URL:
  ```
  https://<server IPv4 address>/monitor/
  ```

**Note:** The default access for this URL is "disabled".

To enable SNMP:

1. Access the server manager.
2. Under Configuration click **SNMP**.
3. In the **Service Status** list, select **Enabled** to support SNMPv1, SNMPv2c, and SNMPv3.

### SNMP Configuration Options

Use the following options to configure SNMP on the SNMP page of the server manager:

**SNMPv2c community string for read-only access** - a string that your SNMPv2c clients will use to monitor the server. The default string is “public”. For security, choose a string other than the default.

**SNMPv2c network access setting** – controls remote access. Choose from one of the following four settings:

- **Localhost only** – the default setting.
- **Immediate local network only** – allows access to trusted local networks that are directly connected to the LAN. (These networks are on the same subnet as the server’s private interface.)
- **All configured trusted networks** – allows access to all networks that are configured in the “Networks” panel. These networks may not be on the same subnet as the server (that is, they may be attached via a router).

**SNMPv3 settings** – To facilitate SNMPv3 communication, you must add a user account to the MSL server that matches an account on the SNMP manager. This "User-based Security Model" (USM) enables unique authentication and encryption settings to be configured for each account. See **Adding an SNMPv3 User Backups** on page 90.

**System Contact Address** – the email address or user name of a local user responsible for MSL. The default is the Admin forwarding address for the Email service, or, if not set, the local admin account.

**System Location** – a string that identifies the location of the system.

**Vital Process Monitoring** – enable this option to monitor processes like the web server or mail server.
**Monitor Disk Usage** – enable this option to monitor disk space usage on your server’s root partition.

**Diskspace Threshold** – a percentage of remaining disk space that, when reached, reports its value at the Object ID indicated in the panel. Enter a numerical value between 0 and 100 followed by the % sign, or enter an absolute value in bytes. The default value is 5%.

**Monitor CPU usage** – enable this option to monitor the server’s use of the CPU.

**One minute CPU threshold, Five minute CPU threshold, and Fifteen minute CPU threshold** – enter server load average thresholds for each time period or leave these set to the default values of 5, 4 and 3 respectively. (You can think of load average as a percentage of system utilization. For example: a load average of 2.5 during one minute of operation means the CPU was overloaded by 250% for that particular minute. A fifteen minute load average of .5 would mean that the CPU had a 50% load; in other words, it was only busy for half of the time.)

**Trap community string** – a string used when sending trap messages. Leave this field blank to make the string default to the one entered in the “Community string for read-only access” field.

**Trap host or address** – an IP address, or addresses, where trap messages will be sent. Leave this field blank to prevent the transmission of traps.

**SNMPv2c Trap community string** – Enter the trap community string to use when sending trap messages. If you do not enter a trap community string, the community string for read-only access will be used.

**SNMPv3 Trap username** – Enter the SNMPv3 trap user name to use when sending trap messages. If you leave this field blank, SNMP traps will be sent using SNMP v2c.

**Download Mitel Enterprise MIBs** – download the Mitel MIBs if you want to import them into your own network management software. Note: The MIB files are zipped and in UNIX file format.

**Add an SNMPv3 User**

If you implement support for SNMPv3, you must add at least one user account that matches an account on the SNMP manager. As part of this configuration, you can enable authentication and encryption.

To add an SNMPv3 user:

1. Access the server manager.
2. Under Configuration click SNMP.
3. Under SNMPv3 Settings, click Configure SNMPv3 Users.
4. Type a User Name (also known as “securityname”) for the SNMPv3 user.
5. Select the **Authentication Type** that matches SNMP manager/agent configuration:
   - MD5
   - SHA1
   - None (no authentication)
6. If you selected an Authentication Type, enter an **Authentication Password** (also known as “authentication passphrase”) at least eight characters long.
7. Select the Privacy Protocol that matches SNMP manager/agent configuration:
8. If you selected a Privacy Protocol, enter a **Privacy Password**.

9. If the SNMP manager requires a hard-coded **Engine ID**, enter it here. Otherwise, leave this field blank and the SNMP manager will discover the Engine ID automatically.

10. Complete the following fields as required and then click **Add**.

### Configure Network Interface Card Settings

This panel allows you to configure the speed and duplex settings for the Network Interface Cards (NIC) that have been enabled in the server. MSL supports the following combinations of NICs:

- a "Local" adaptor for connection to the Local Area Network (Server-only mode) or
- a "Local" adaptor for connection to the Local Area Network AND a "WAN" adapter for connection to the Wide Area Network (Server-gateway mode) or
- a "Local" adaptor for connection to the Local Area Network AND a "WAN" adapter for connection to the Wide Area Network AND a "WAN" adapter bridged to the WAN interface of the firewall (Server-gateway with bridged interface mode).

**Note:** For virtual deployments, the fields are read-only. You cannot configure the settings from this page.

To configure the Speed and Duplex settings of a NIC:

1. Under Configuration, click **Ethernet Cards**.
2. Set the Auto Configuration field to **Off**, and then click **Save**.
3. Set the **Speed** and **Duplex** parameters, and then click **Save**.

**Note:** Speed and Duplex are read only if the Ethernet card does not support multiple options.

All other settings are read only. See the following table for descriptions of the settings.

<table>
<thead>
<tr>
<th>SETTING</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link detected</td>
<td>Yes: NIC is connected to the network. No: NIC is not connected to the network.</td>
</tr>
<tr>
<td>IP Address</td>
<td>IP Address assigned to the Network Interface Card</td>
</tr>
<tr>
<td>Netmask</td>
<td>Netmask assigned to the Network Interface Card</td>
</tr>
<tr>
<td>MAC Address</td>
<td>Media Access Control address of the Network Interface Card</td>
</tr>
<tr>
<td>Driver</td>
<td>Driver (for example: tg3) of the Network Interface Card.</td>
</tr>
<tr>
<td>Speed</td>
<td>Data transfer rate. Available settings depend on the Ethernet card; only supported settings are displayed.</td>
</tr>
<tr>
<td>Duplex</td>
<td>Half-duplex: uses only one wire pair with a digital signal running in both directions on the wire. Full-duplex: uses two pairs of wires to establish a point-to-point connection between the transmitter of the transmitting device and the receiver of the receiving device. Full-duplex data transfer provides faster data transmissions than half duplex.</td>
</tr>
</tbody>
</table>
Auto Negotiation is an Ethernet process that allows two connected devices to choose common transmission parameters, such as speed, duplex mode, and flow control. During this process, the connected devices first share these parameters and then choose the fastest transmission mode they both support. Select On to apply Auto Negotiation; select Off to configure the Speed and Duplex settings.

**Review Configuration**

The Review Configuration section of the server manager summarizes how the server is configured. This is the data entered during the installation process and possibly changed later through the server console or the server manager. You can print this report, but you cannot make changes from this screen.

![Review Configuration](image)

**Figure 24. Review Configuration**
THE SERVER CONSOLE

You can also perform basic MSL configuration using the Server Console. The server console provides basic, direct access to the server. Most server console operations are also available from the server manager.

Figure 25. The Server Console

From the Server Console you can see the following information and perform the following tasks:

<table>
<thead>
<tr>
<th>OPTION:</th>
<th>USE THIS OPTION TO:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check status of this server</td>
<td>view uptime information about the server.</td>
</tr>
<tr>
<td>Configure this server</td>
<td>view and modify the configuration information entered during installation (Ethernet cards, IPv4 and IPv6 address information, DHCP, DNS, domain names, etc.).</td>
</tr>
<tr>
<td>Test Internet access</td>
<td>test your connection by contacting Mitel Corporation via Internet</td>
</tr>
<tr>
<td>Register for Service Link</td>
<td>activate ServiceLink on the AMC via text mode browser; (normally you would use the web-based server manager)</td>
</tr>
<tr>
<td>Media Check Mitel CD/DVD</td>
<td>test a Mitel application CD/DVD (supported only for applications that have embedded checksum values.)</td>
</tr>
<tr>
<td>Install application blades from CD/DVD</td>
<td>install application software blades from CD/DVD. Your application documentation specifies when to use this option.</td>
</tr>
<tr>
<td>Reboot, reconfigure, or shut down the server</td>
<td>reboot or shut down the server. Configuration settings in effect at the time of reboot are re-applied.</td>
</tr>
<tr>
<td>Manage disk redundancy</td>
<td>manage configuration of redundant (RAID1) disks.</td>
</tr>
<tr>
<td>Offline Synch with the AMC</td>
<td>use for AMC activation at sites where the MSL server does not have direct Internet access. (Note: You will need</td>
</tr>
<tr>
<td>OPTION:</td>
<td>USE THIS OPTION TO:</td>
</tr>
<tr>
<td>-----------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Manage trusted networks</td>
<td>show, add, or delete &quot;trusted network&quot; access privileges to additional IPv4 and IPv6 networks. <strong>Note:</strong> For security, we recommend that you be as precise as possible when granting access (for example, enter the IP address of a specific PC or subnet).</td>
</tr>
</tbody>
</table>
| Access server manager | access the server manager using a text-based browser. This is the same interface to which you can connect remotely using a web browser; this option allows you to perform server manager functions directly from the server console. Use the keyboard arrow keys to navigate the pages. Type 'q' (for quit) to exit the text-based browser. **Note:** most applications can **not** be managed using the text-mode browser.  
The server uses a text-based browser called "ELinks" to access the web-based server manager. ELinks information is available at [http://elinks.or.cz/about.html](http://elinks.or.cz/about.html). Note that for security reasons some ELinks features are disabled when you are browsing from the server console (such as the ability to specify an external URL). |
| View support and licensing information | display the licensing terms. |
| Perform backup | back up configuration information to a USB device or a network file server. For more information see Performing Backups on page 95. |
| Verify a backup file | verify previous backup files. For more information, see Verify Backup on page 97. |
| Restore from backup | restore backup files from a network share, removable device, or another running server. For more information, see Restore Configuration Information on page 97. |
| Exit from the server console | exit from the Server Console. |
OFFLINE SYNC WITH THE AMC

If the MSL server is not directly connected to the Internet, you can still perform an activation using the “Offline Sync with the AMC” option. This option allows you to:

- copy Application Record information to a portable storage device
- insert the storage device in an intermediate PC and use it to connect to the AMC and send/receive activation information
- use the storage device to update the MSL server with the received activation information

When an offline system is upgraded to MSL 9.3 or later, it will receive a Major alarm indicating that the automatic synchronization process has failed. To disable auto-synchronization and prevent further alarms, re-do the Offline Sync procedure. The original alarm can then be cleared manually.

To perform an offline sync:
1. Access the server console from the server itself or remotely using an SSH client.
2. Log in as "admin".
3. Select the option to perform Offline Sync with the AMC.
4. On the Offline sync screen, select create to prepare the removable storage device for use with offline sync.
5. When prompted, insert a portable storage device and then select Next.
6. When prompted, enter your Application Record ID and then select Next.
7. Insert the storage device in the remote PC and navigate to the storage drive location.
8. Search the main directory for a file called sync.bat and double-click it. A script runs that sends your sync information to the AMC and receives licensekey information in return.
9. To verify the sync, navigate to the sync.log file in the sdata directory of the storage drive location. Double-click sync.log to open and check for “completed successfully” message.
10. Remove the storage device from the remote PC and go to the MSL server.
11. Select the option to perform Offline Sync with the AMC.
12. On the Offline sync screen, select read.
13. When prompted, insert the storage device and select Next. The MSL server reads the activation information from the storage device and signals successful completion.
14. Select the option to Exit from the server console.

You have successfully performed an offline activation.

PERFORMING BACKUPS

You can save your system backup to a USB storage device, (such as a memory stick or hard drive) or to a network file server that supports SFTP (typically Linux, including MSL) or SMB/CIFS (typically Windows). Any USB storage device that is formatted as FAT32 (DOS), EXT3 (Linux), or NTFS (Windows and Linux) is compatible.

Note:
You can also use the server manager Backup option to back up data to your desktop or network file server.

If you are backing up to an MSL server, configure it to accept access from the backup server. See Networks for details.

To perform backup:
1. Access the server console from the server itself or remotely using an SSH client.
2. Log in as "admin".
3. From the console, select the option to Perform backup.
4. Select a destination for the backup file:
   • Backup to a USB device
   • Backup to a network file server

Backing up to a USB Device
1. Select Backup to a USB device.
2. At the prompt, insert the USB device (if not already in place) and click Next. The backup is performed.
3. Enter a name for the backup file and then click Next. The name cannot contain spaces.
4. When the backup is complete, remove the USB device when prompted.
5. Verify that the backup was performed successfully using the Verify Backup File procedure.

Backing up to a Network File Server

Note: If you are backing up to an MSL server, enter its IP address and the username/password of the "root" user. Leave the remaining fields blank.

1. Select Backup to a network file server.
2. Enter the IP address of the file server where the backup will be stored.
3. Enter the domain or workgroup name of the server. (For example, mitel.com.)
4. Enter the name of the shared folder where the backup file will be stored. (For example, "Backups".) The shared folder must have permissions set to "Full Control".
5. Enter the Optional Directory Path where the backup will be stored. If you leave this field blank, the file will be stored at the root of the shared folder. Spaces and multi-level directory names are permitted; for example, "MSL backup" and "MSL backup/2011/October" are valid sub directory names. Dashes (-) are not permitted.
6. Enter the username to use when connecting to the backup server.
7. Enter the password to use when connecting to the backup server. Estimated backup size and available storage space are displayed.
8. Click Proceed. A progress bar indicates backup status. When the backup is complete, file verification is performed automatically.
9. Click Continue.

Note: By default, the backup file is named mslserver.tgz. For MSL Release 9.0 and later, you can change the filename but it must maintain the .TGZ extension. Backup
files created in releases prior to 9.0 are all named `smeserver.tgz`. If you prefer to save incremental backups, you can rename the file each time (for example, JuneBkp.tgz, JulyBkp.tgz, etc.). For MSL Release 9.0 and later, you can store multiple backup files on the same media and MSL will prompt you to select the file to restore. If you store multiple files on the same media, ensure that there is enough free space available before attempting to store another backup.

**VERIFY BACKUP FILE**

When using a pre-existing backup file, it is important to verify the file before starting the restore procedure. If your backup file cannot be verified, then it cannot be used to restore the system.

To verify a backup file:

1. Access the server console from the server itself or remotely using an SSH client.
2. Log in as “admin”.
3. From the console, select the option to **Verify a backup file**.
4. At the prompt, insert your storage medium. (Note: if your USB device was left mounted after your last backup, you must remove it and re-mount it first.)
5. If more than one storage device is connected to your system, select the device that contains the backup file.
6. If more than one backup file is contained on the storage device, select the file you want to verify.
7. Click **OK**. Verification of the file is confirmed. If you receive an error message, you cannot use this backup file for the restore. Check your storage media and try the backup procedure again.

**Note:** Not all USB memory devices are compatible. Our testing with MiCollab applications indicates that the Verbatim, GXT, and Kingston brands consistently work well. See the *MiCollab Engineering Guidelines* for a list of supported USB devices.

**RESTORE CONFIGURATION INFORMATION**

You can restore application and configuration data when you re-install the MSL server software, or on an operational system.

The system backup files can be restored from portable media such as a USB storage device, from a network file server, or from a running server you wish to replace.

**Note:**

- Ensure that your verified backup file has the `.tgz` file extension.
- USB storage devices that are formatted as FAT32 (DOS), EXT3 (Linux), or NTFS (Windows and Linux) are compatible for restore.
- You may receive a Windows popup error message when copying your backup to the formatted USB device. Some Windows security applications on the PC where the backup file is stored may add a data stream to this filename to mark it as a "downloaded" file. This results in an error message warning that the backup file contains more than one data stream. This warning can be safely ignored. Click **Yes** and proceed.
**Restore during MSL Re-installation**

To restore configuration data when you re-install MSL:

1. Copy the backup file to a removable device or network share drive, or arrange access to a running server you wish to replace.
2. Access the server console and log in as “admin”.
3. Re-install MSL software by inserting the MSL software CD or DVD and selecting the option to **Reboot** from the console menu. Your server must be set to boot from the CD-ROM device.
4. During installation, select the option to **Erase all disks and perform fresh install**. When installation is complete, you are prompted to remove the CD/DVD or USB media and then reboot the system.
5. After rebooting the server, you are prompted “Do you wish to restore from backup?” Click **Yes**.
6. Select the location of the backup file:
   - **Restore from removable device**
     If you select this option, you will be prompted to insert the removable device (USB or CD/DVD) containing the backup file. MSL discovers the backup file (or files) and displays them. Select the backup file you wish to restore and follow the prompts to install it.
   - **Restore from network share**
     If you select this option, you will be prompted to select a network interface to use for the restore (LAN or WAN), the address and netmask of the local MSL server, the address, gateway and domain name of the backup server, the folder name containing the backup file, and the username and password required to log in to the backup server. You can restore backups using SMB/CIFS or SFTP.

   **Note:** If you are using SFTP and do not specify a sub-directory for the backups, the file will be stored in the “/” folder by default.

   - **Restore from another running server**
     If you select this option, you will be prompted to pull configuration and application data from an existing physical or virtual server and restore it to a new server. See **Restore from another Running Server**.

7. After responding to all prompts, click **Next** to restore the backup data.
   A progress bar displays while the restore is in progress. When it completes, MSL reboots the server to activate the restored configuration.
8. When the reboot is complete, log back in to the server console.
9. Select the option to **Register for Service Link** to perform a sync with the AMC.

   **Note:** If hardware has been changed/replaced, you will need to deactivate your ServiceLink account, reset your Hardware ID, re-enter your Application Record ID (or service account ID), and then reactivate your ServiceLink account. Use the MSL server manager to complete all steps with the exception of resetting your Hardware ID, which must be done on the AMC. For more information on Hardware IDs, see the online help provided with your AMC account.

10. Reinstall your application software.
Restore on an Operational System

To restore configuration data on an operational system:

1. Copy the backup file to a removable device or network share drive, or arrange access to a running server you wish to replace.

2. Access the server console and log in as “admin”.

3. From the console, select the option to **Restore from backup**.

4. A warning appears, indicating that if you continue the MSL server will reboot and the current application and configuration files will be overwritten. Click **Reboot Now** to continue.

5. After the reboot is complete, select the location of the backup file:
   - **Restore from removable device**
     If you select this option, you will be prompted to insert the removable device (USB or CD/DVD) containing the backup file. MSL discovers the backup file (or files) and displays them. Select the backup file you wish to restore and follow the prompts to install it.
   - **Restore from network share**
     If you select this option, you will be prompted to select a network interface to use for the restore (LAN or WAN), the address and netmask of the local MSL server, the address, gateway and domain name of the backup server, the folder name containing the backup file, and the username and password required to log in to the backup server. You can restore backups using SMB/CIFS or SFTP.
   - **Restore from another running server**
     If you select this option, you will be prompted to pull configuration and application data from an existing physical or virtual server and restore it to a new server. See **Restore from another Running Server**.

6. After responding to all prompts, click **Next** to restore the backup data.

   A progress bar displays while the restore is in progress. When it completes, MSL reboots the server to activate the restored configuration.

7. When the reboot is complete, log back in to the server console and perform a sync with the AMC if necessary.

**Restore from another Running Server**

If you are replacing an existing MSL 9.x server (physical or virtual), you can pull configuration and application data from it while it’s still running and restore the data to a new MSL 10.x or later server. The restore process automatically shuts down the old server.

---

**Note:** This procedure is of particular use for virtual implementations, as it enables users to easily replace an existing virtual machine with a new one. If any problems arise, the original implementation can be restored with minimal downtime.

**Conditions**

- Installing the same ARID on new physical hardware will require a Hardware ID reset.
- If the two servers are on:
  - **connected networks** (i.e. they have the same IP address range and there is no router between them), both servers must have the same subnet mask applied.
- different networks:
  - MSL will request a gateway/router IP address to use for access.
  - When the restore is complete, the new server must be reconfigured for its own network because it will have inherited the network configuration of the original running server.

**WARNING:** Booting up the original server again after the restore procedure will result in IP address conflicts.

**About IP Addressing**

The IP address of the new server must be distinct from the original running server, at least for the duration of the migration.

For example, if the two servers are on a connected network, the new server will need a temporary IP address from the same network range. When the migration is complete, the new server will reboot with the IP address of the old server and will be usable immediately.

![IP Addressing - Two Servers on a Single Network](image)

**Figure 26. IP Addressing — Two Servers on a Single Network**

If the new server is on a different network, it will need a permanent IP address in the range of that network. MSL will prompt you for a gateway IP address that it can use to access the old server. When migration is complete, the new server will reboot with the IP address of the old server, which will not be reachable on the new server’s network. You must select the console option to “Reconfigure this server” and enter the correct IP address (i.e. the same one that was used for the migration).
To restore from another running server:

1. **Install MSL software** on the new server.

2. In the MSL server console of the new server, when prompted to “Restore from backup?”, select **Yes**.

3. When prompted, select **Restore from another running server**.

4. If your system has more than one **network adapter**, select the adapter to use for the restore procedure. (This will usually be the LAN adapter.)

5. Enter the local **IP address** of the new server.

6. Enter the appropriate **subnet mask** for this server.

   **Note:** If the two servers are on the same, connected network, they must have the same subnet mask.

7. Enter the **IP address** of the existing server.

8. If the two servers are on different IP networks, MSL will prompt for the **gateway IP address** to use to access the existing server. (This prompt does not appear if both servers are on the same, connected network.)

9. When prompted, enter the “admin” **password** for the existing server.

10. MSL does the following:
   - Configuration and application data is backed up from the existing server.
11. On the new server, the restore is confirmed. Press Enter to reboot and activate your restored configuration settings.

12. If the two servers are on different networks, reconfigure the new server’s network settings to reflect its network information, rather than the inherited data from the running server.

13. Reinstall application software.

ACCESSING THE LINUX ROOT PROMPT

To perform advanced modifications to the configuration of the server, you can access the Linux operating system underlying MSL software by logging in as user “root”.

**WARNING:** Making changes and customizations to the server from the Linux command prompt may invalidate the support agreement. Contact your Mitel authorized reseller before making any such customizations.

By default, the password for the “root” user is the same as the password used by the “admin” user account. Ensure that you log out from the root account when you are finished.
Note: Remote administrative access is disabled by default and must be specifically enabled through the Remote Access panel of the server manager.

CHANGING THE ADMINISTRATOR PASSWORD

By default, the "admin" and "root" users share a single Administrator password which is set during the initial MSL installation. Use the following procedure to change the "admin" password to a unique value.

Note: Only two user names can be used to log in remotely to the server: "admin" (to access the server console and server manager) and "root" (to use the Linux shell). Regular users are not permitted to log in to the server.

To change the Administrator password for the "admin" user:
1. In the server manager under Administration, click System users.
2. Click the Reset password link associated with the "admin" account (the user name for this account is "Local User").
3. Type the new password in the second field. Passwords must contain at least one upper case letter, one lower case letter, one number, and one non-alphanumeric character, and be at least 7 characters long.
4. Verify the new password by entering it again in the third field.
5. Click Save.

After you change the "admin" password, the system will prompt you for the revised password as soon as you attempt to access another feature in the server manager. When you see the "Authorization Failed" message, click OK, enter the new password, and then press Enter.

RESETTING THE ADMINISTRATOR PASSWORD

If you forget the Administrator password belonging to the "admin" and "root" users, you can reset it with the following procedure.

Note: Only two user names can be used to log in remotely to the server: "admin" (to access the server console and server manager) and "root" (to use the Linux shell). Regular users are not permitted to log in to the server.

To reset the Administrator password for the "admin" and "root" users:
1. Open a terminal session to the server.
2. Physically shut down the server and start it up again.
3. When the GRUB boot loader splash screen appears, press the "a" key.
   The load process stops, enabling you to append arguments to the kernels boot line.
4. In the kernel boot line, type " single" (note the leading space) and then press Enter.
5. When the bash shell prompt appears, do the following:
   - Type " passwd root", enter a new password, and then press Enter.
   - Type " passwd admin", enter a new password, and then press Enter.
Note: Although you can enter unique "root" and "admin" passwords, typically you would enter the same value for both users.

6. Type "exit" and press Enter to resume the boot sequence.
TROUBLESHOOTING

You can use this utility to test RAM memory on a new server, or when debugging a problem server.

To run the memory test (memtest):

1. Configure your system to boot from either the CD/DVD ROM drive or USB drive.
2. Insert the MSL software CD/DVD or USB drive containing MSL software.
3. Reboot the computer. The installation script runs automatically and the MSL Installer dialog appears.
4. Select Memory Test Utility. Diagnostic test results are displayed on screen.
TECHNICAL SUPPORT

If you are a Mitel authorized reseller and require support, call +1-613-271-7614 (in the United States and Canada, call 1-866-472-9999) and ask for technical support. You can also visit our Web site at http://www.mitel.com/. Please have your Application Record ID number ready when you contact support.
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Version 2.0, January 2004
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## GLOSSARY

<table>
<thead>
<tr>
<th>AMC</th>
<th>Applications Management Center</th>
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<tbody>
<tr>
<td>Blade</td>
<td>A software module that can be downloaded from the AMC</td>
</tr>
<tr>
<td>ICP</td>
<td>IP Communications Platform</td>
</tr>
<tr>
<td>ISP</td>
<td>Internet Service Provider</td>
</tr>
<tr>
<td>LDAP</td>
<td>Lightweight Directory Access Protocol</td>
</tr>
<tr>
<td>MiCollab</td>
<td>Prior to Release 8.2, MSL was called “Managed Application Server” or “MAS”. With the Release of 8.2, the name has changed to Mitel Standard Linux. From Release 8.1 to Release 10.1, the MAS acrony referred to the MiCollab product. With the Release of 10.1, MAS was renamed MiCollab.</td>
</tr>
<tr>
<td>MSL</td>
<td>Mitel Standard Linux</td>
</tr>
<tr>
<td>PPTP</td>
<td>Point-to-Point Tunneling Protocol</td>
</tr>
<tr>
<td>RAID1</td>
<td>Disk redundancy</td>
</tr>
<tr>
<td>SCSI</td>
<td>Small Computer Systems Interface</td>
</tr>
<tr>
<td>ServiceLink</td>
<td>A service supplied by the Applications Management Center (AMC) that allows applications and services to be delivered to the MSL server</td>
</tr>
<tr>
<td>SSH</td>
<td>Secure shell. A secure, encrypted way to log in to a remote machine across a network, or to copy files from a local machine to a server</td>
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<tr>
<td>VPN</td>
<td>Virtual Private Network</td>
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