Configuring and Using AMT on TS140 and TS440

Lenovo ThinkServer TS Series Servers

Lenovo Enterprise Product Group

Version 1.0

September 17, 2013

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Contents

Overview

The ThinkServer TS140 and TS440 are Lenovo's latest tower servers that use Intel AMT technology to enable robust back office systems management, and reduce related IT expenses. AMT provides hardware-based out-of-band (OOB) remote access to the system regardless of the state of the operating system or the power state of the server as long as the system has AC power and is connected to a network.

This paper describes how to enable and configure AMT for management on the TS140 and TS440. Features of AMT are also demonstrated for some typical management scenarios using a sampling of commercially or publically available tools.

Lenovo makes no recommendations or endorsements of the tools mentioned in this document used to demonstrate features of AMT.

Enabling and Configuring AMT on TS140 and TS440

AMT is disabled when the TS140 and the TS440 are shipped from the factory. Before management applications can access AMT in the server, AMT must be enabled and configured with various settings such as network configuration and security parameters. The setup of AMT is generally performed only once in the lifetime of the system. Subsequent changes to the AMT configuration can be made locally or remotely through a management console.

There are several methods available to configure AMT including:

1. Manual Configuration – Configuration is done locally by entering the BIOS and Management Engine BIOS Extension (MEBx) setup screens. This method is appropriate for those customers who do not have Systems Management consoles or the necessary network and security infrastructures to use encrypted Transport Layer Security (TLS) required for Remote server-based configuration. Additionally, all features of AMT will be available when configuring manually, and User Consent[1] is not required for KVM remote control, IDE Redirect, Serial-over-LAN, and boot options (i.e. force PXE, force local CD\DVD boot, etc.).
2. Host Based Configuration – This method uses an application running locally on the server to set up and configure AMT for use. The AMT configuration program must be run locally on each server, but it does not require manually accessing the BIOS screens. This method meets the needs of many IT environments that prefer to push an agent to the platform to perform initialization, and avoid the complications of a networked setup and configuration server. The problem with this approach is that User Consent is mandatory for KVM remote control, IDE Redirect, Serial-over-LAN, and boot options (i.e. force PXE, force local CD\DVD boot, etc.). This is not an appropriate use model for servers, so it will not be described in this paper.

[1] User Consent is the requirement that an end user, physically located at the remote computer, must acknowledge and enable a remotely initiated connection. This is a setting used for the AMT features of Remote KVM, IDE Redirection, Serial Over LAN, etc.

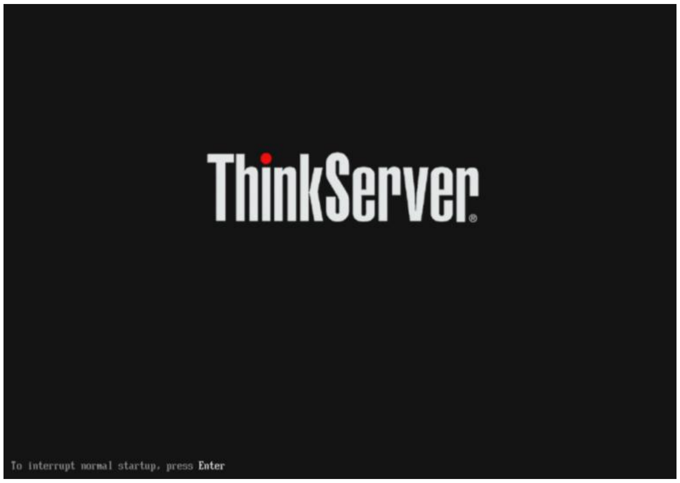
3. Remote Configuration – Known as Enterprise Mode Setup, this method is for customers who have the necessary infrastructure (a Provisioning Server) that makes a secure connection to AMT in the server, and then downloads the configuration data into AMT during the setup process. This capability is often included in ISV Systems Management console applications such as LANDesk Management Suite, Microsoft SCCM, and Symantec Notification Server. Using a Provisioning Server, AMT configuration is performed automatically and remotely. Configuration using this method is beyond the scope of this paper. Please consult with your managed service provider or ISV for more information.
4. "One-Touch" Provisioning Using USB Key – This method uses the Intel Setup and Configuration Service (Intel SCS) to create a bootable USB key that automates the manual configuration of each AMT system. The SCS tool generates a configuration profile and required security information needed to configure AMT, and stores it on a bootable USB key. The server is booted from the key to complete the BIOS setup. Using this method does not require user consent. The functionality associated with Intel SCS is typically provided to customers as features in third party management software. Intel also offers the SCS available from their website. Use of SCS is beyond the scope of this paper. See the references section for more information.

This paper demonstrates configuring AMT using method 1 (Manual Configuration). Settings required for basic operation are shown. Other settings should not be changed from their defaults without understanding the potential implications.

Provisioning AMT on TS140 and TS440 Using Manual Configuration Method

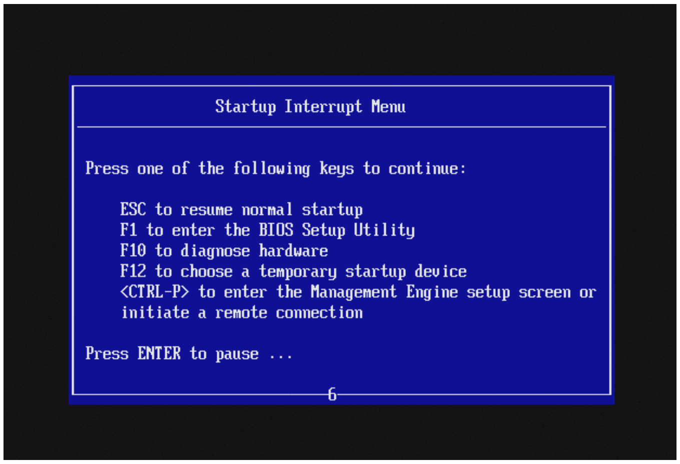
Steps shown in this procedure are the same for the TS140 and the TS440 unless otherwise noted.

1. Power on the server.
2. Press the Enter key to bring up boot options.



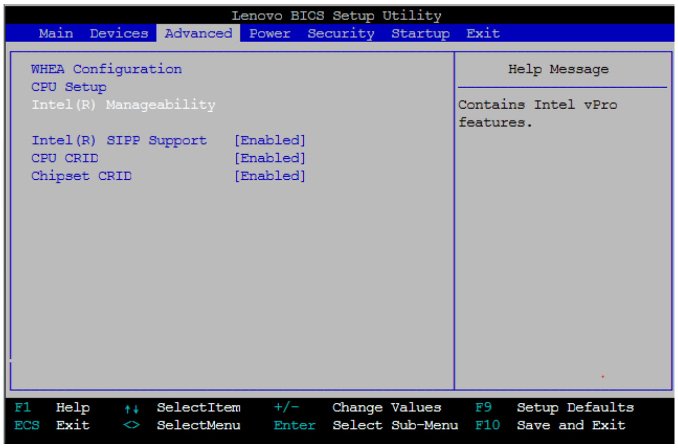
```
To interrupt normal startup, press Enter
```

3. Press the **F1** key to enter the BIOS Setup Utility.



```
                    Startup Interrupt Menu

Press one of the following keys to continue:

    ESC to resume normal startup
    F1 to enter the BIOS Setup Utility
    F10 to diagnose hardware
    F12 to choose a temporary startup device
    <CTRL-P> to enter the Management Engine setup screen or
    initiate a remote connection

Press ENTER to pause ...
                               6
```

4. In the BIOS Setup Utility, navigate to the "Advanced" tab and select "Intel (R) Manageability."

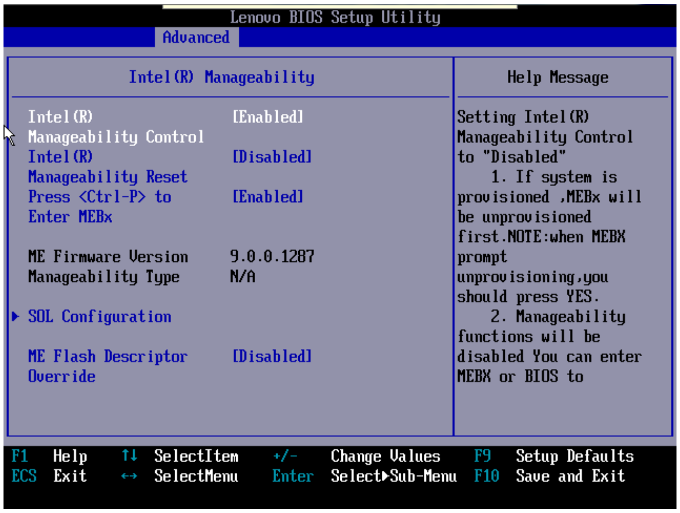


```
                  Lenovo BIOS Setup Utility
   Main  Devices  Advanced  Power  Security  Startup  Exit

  WHEA Configuration                          Help Message
  CPU Setup
  Intel(R) Manageability                  Contains Intel vPro
                                          features.
  Intel(R) SIPP Support   [Enabled]
  CPU CRID                [Enabled]
  Chipset CRID            [Enabled]

F1   Help  ↑↓  SelectItem  +/-    Change Values    F9   Setup Defaults
ECS  Exit  <>  SelectMenu  Enter  Select Sub-Menu  F10  Save and Exit
```

5. Set "Intel Manageability Control" to Enabled. If this is set to Disabled, then AMT will not be functional.

   Ensure "Press <Ctrl-P> to Enter MEBx" is enabled, otherwise the AMT configuration screens cannot be launched.

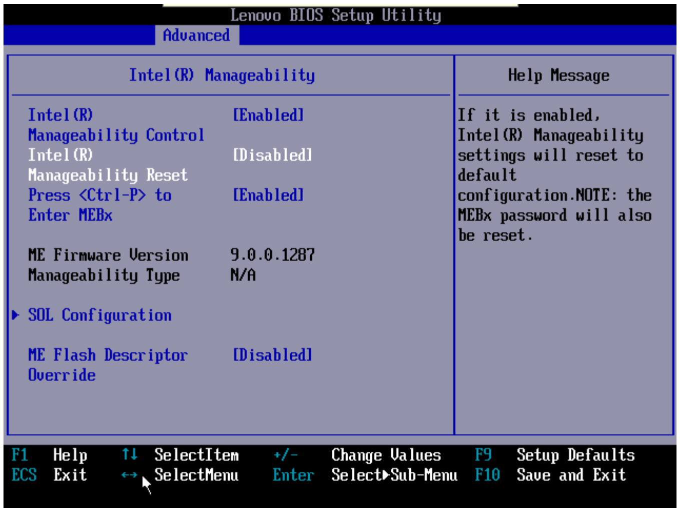
   Select SOL Configuration.
   Console Type should be VT100+ (the default setting).



```
                    Lenovo BIOS Setup Utility
                 Advanced

         Intel(R) Manageability              Help Message

  Intel(R)                 [Enabled]    Setting Intel(R)
  Manageability Control                 Manageability Control
  Intel(R)                 [Disabled]   to "Disabled"
  Manageability Reset                       1. If system is
  Press <Ctrl-P> to        [Enabled]    provisioned ,MEBx will
  Enter MEBx                            be unprovisioned
                                        first.NOTE:when MEBX
  ME Firmware Version      9.0.0.1287   prompt
  Manageability Type       N/A          unprovisioning,you
                                        should press YES.
▶ SOL Configuration                         2. Manageability
                                        functions will be
  ME Flash Descriptor      [Disabled]   disabled You can enter
  Override                              MEBX or BIOS to

F1   Help  ↑↓  SelectItem  +/-    Change Values    F9   Setup Defaults
ECS  Exit  ↔   SelectMenu  Enter  Select▶Sub-Menu  F10  Save and Exit
```

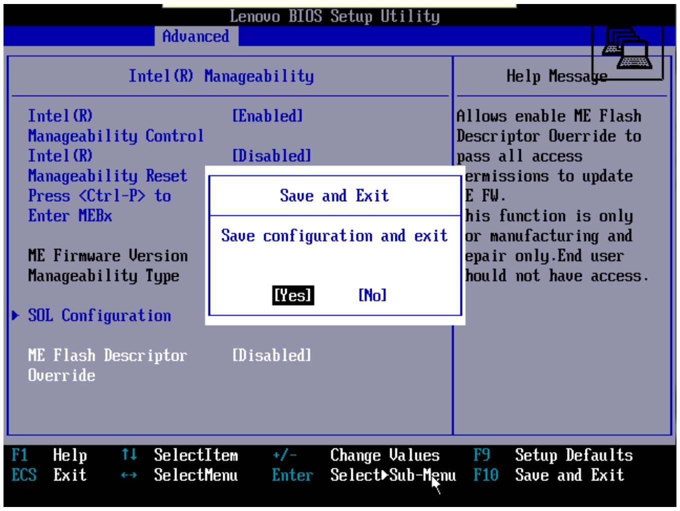
Optionally, (NOT required if server is being configured for first time), set "Intel Manageability Reset" to Enabled.

This is a "momentary" switch that when set to Enabled, will clear out any stored AMT provisioning information on the next boot, then be reset to Disabled (see "*Unprovisioning AMT*" for more information).



```
                         Lenovo BIOS Setup Utility
                  Advanced
        Intel(R) Manageability                    Help Message

  Intel(R)                 [Enabled]          If it is enabled,
  Manageability Control                       Intel(R) Manageability
  Intel(R)                 [Disabled]         settings will reset to
  Manageability Reset                         default
  Press <Ctrl-P> to        [Enabled]          configuration.NOTE: the
  Enter MEBx                                  MEBx password will also
                                              be reset.
  ME Firmware Version      9.0.0.1287
  Manageability Type       N/A

▸ SOL Configuration

  ME Flash Descriptor      [Disabled]
  Override

F1  Help   ↑↓ SelectItem   +/-   Change Values     F9  Setup Defaults
ECS Exit   ↔  SelectMenu   Enter Select▸Sub-Menu   F10 Save and Exit
```

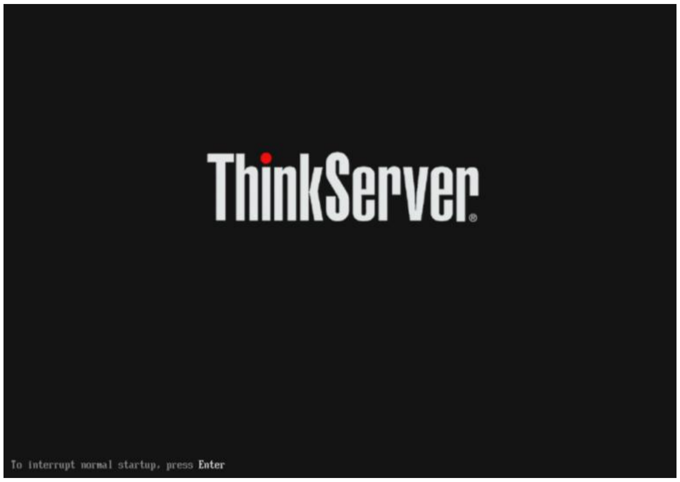
6. To accept the changes press **F10** and select "Yes" when prompted to Save Configuration and Exit.



```
                         Lenovo BIOS Setup Utility
                  Advanced
        Intel(R) Manageability                    Help Message

  Intel(R)                 [Enabled]          Allows enable ME Flash
  Manageability Control                       Descriptor Override to
  Intel(R)                 [Disabled]         pass all access
  Manageability Reset    ┌─────────────────────┐ermissions to update
  Press <Ctrl-P> to      │    Save and Exit    │E FW.
  Enter MEBx             ├─────────────────────┤his function is only
                         │Save configuration and exit│or manufacturing and
  ME Firmware Version    │                     │epair only.End user
  Manageability Type     │   [Yes]     [No]    │hould not have access.
                         └─────────────────────┘
▸ SOL Configuration

  ME Flash Descriptor      [Disabled]
  Override

F1  Help   ↑↓ SelectItem   +/-   Change Values     F9  Setup Defaults
ECS Exit   ↔  SelectMenu   Enter Select▸Sub-Menu   F10 Save and Exit
```

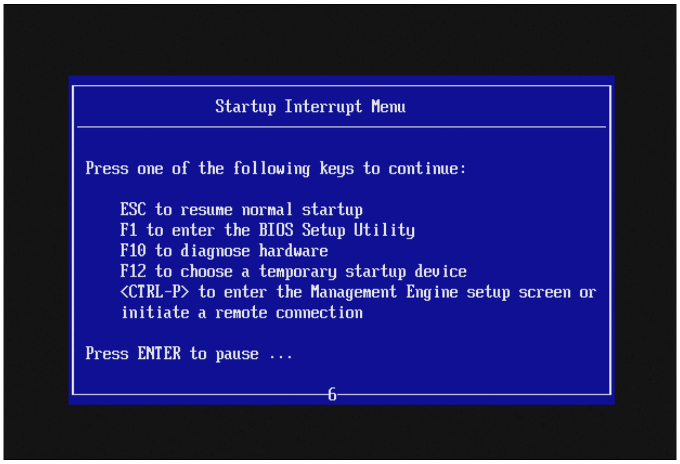
7. The server will soon restart itself.

   At the prompt, press the ENTER key to bring up the boot options.



To interrupt normal startup, press Enter

8. At the prompt, press the **CTRL and P** keys to enter the “Management Engine setup screen.”

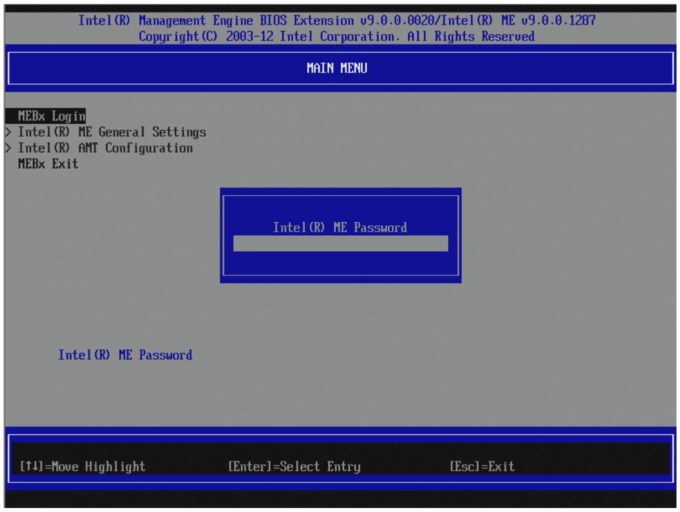


```
Startup Interrupt Menu

Press one of the following keys to continue:

    ESC to resume normal startup
    F1 to enter the BIOS Setup Utility
    F10 to diagnose hardware
    F12 to choose a temporary startup device
    <CTRL-P> to enter the Management Engine setup screen or
    initiate a remote connection

Press ENTER to pause ...
                          6
```

9. The first time AMT is setup, the “Intel Management Engine Password” must be changed.

   To do this, select the “MEBx Login” option, and press ENTER.

   Type the default initial password: *admin* and press ENTER.

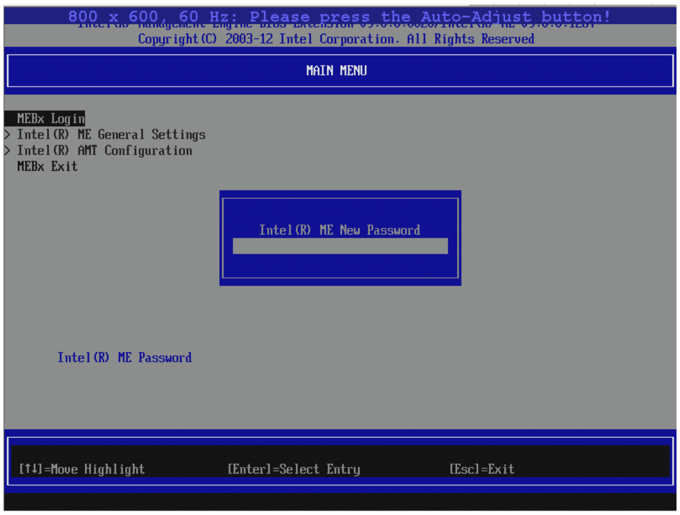


```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

MAIN MENU

  MEBx Login
> Intel(R) ME General Settings
> Intel(R) AMT Configuration
  MEBx Exit

                Intel(R) ME Password

Intel(R) ME Password

[↑↓]=Move Highlight        [Enter]=Select Entry        [Esc]=Exit
```

10. You will then be prompted to enter a new password.

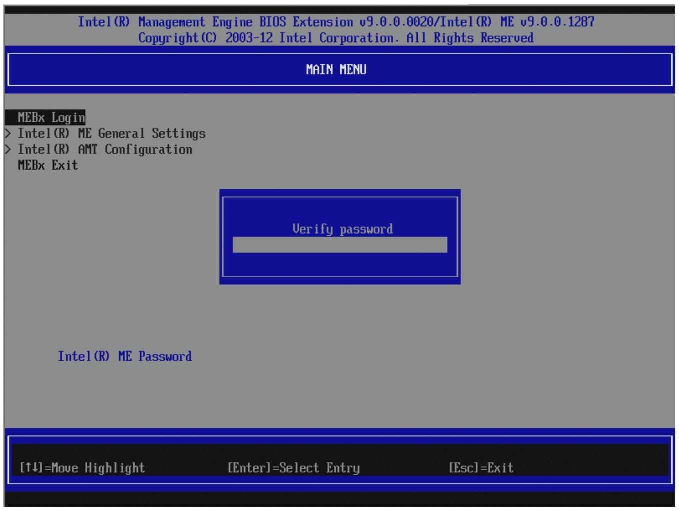
    The new password must meet the criteria defined in the section “Password Guidelines” in the Appendices.

    This password will also be used to authenticate access from the AMT Web interface.



```
800 x 600, 60 Hz: Please press the Auto-Adjust button!
Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

MAIN MENU

  MEBx Login
> Intel(R) ME General Settings
> Intel(R) AMT Configuration
  MEBx Exit

                Intel(R) ME New Password

Intel(R) ME Password

[↑↓]=Move Highlight        [Enter]=Select Entry        [Esc]=Exit
```

Retype the password for verification and press ENTER when complete.



```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
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MAIN MENU

  MEBx Login
> Intel(R) ME General Settings
> Intel(R) AMT Configuration
  MEBx Exit

                    Verify password

Intel(R) ME Password

[↑↓]=Move Highlight         [Enter]=Select Entry         [Esc]=Exit
```
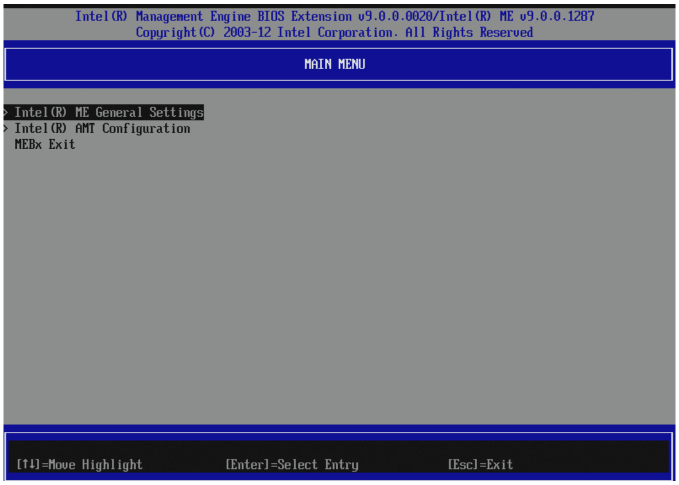

11. Once the new password has been created, you will return to the main menu.

    This is the main screen where changes to the Management Engine general settings, and the Intel (R) AMT configuration can be made.

    Select “Intel ME General Settings.”



```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
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MAIN MENU

> Intel(R) ME General Settings
> Intel(R) AMT Configuration
  MEBx Exit

[↑↓]=Move Highlight         [Enter]=Select Entry         [Esc]=Exit
```
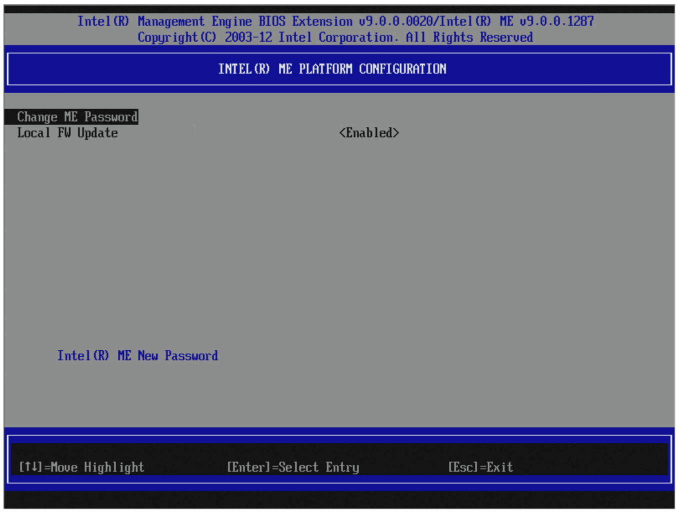

12. This screen presents the option to change the Management Engine password. This can be ignored as you have just reset the ME Password.

    Press “ESC” to go back to the previous screen.



```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
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INTEL(R) ME PLATFORM CONFIGURATION

Change ME Password
Local FW Update                              <Enabled>

Intel(R) ME New Password

[↑↓]=Move Highlight         [Enter]=Select Entry         [Esc]=Exit
```
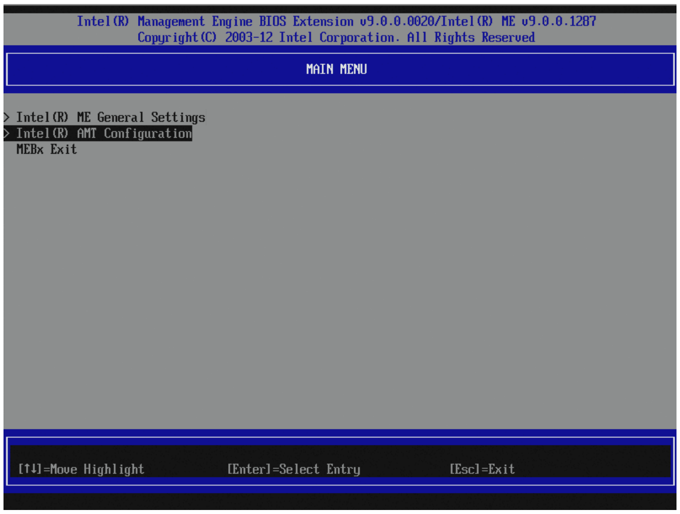

13. Select “Intel AMT Configuration” and press ENTER. The AMT Configuration menus are displayed.

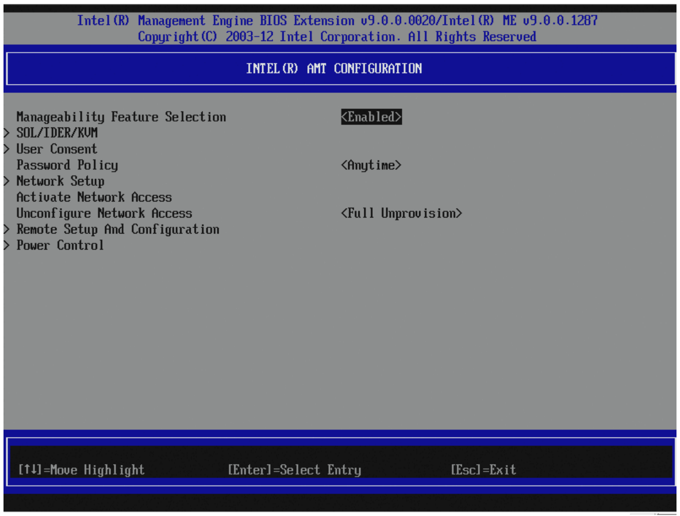


```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

MAIN MENU

> Intel(R) ME General Settings
> Intel(R) AMT Configuration
  MEBx Exit

[↑↓]=Move Highlight        [Enter]=Select Entry        [Esc]=Exit
```

14. Select “Manageability Feature Selection.”

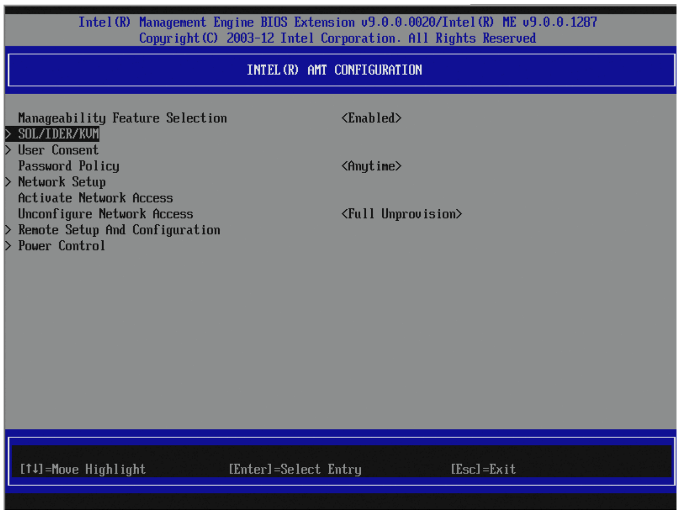
    Ensure this is enabled.

    When the Manageability Feature Selection is enabled, the Intel ME manageability feature menu will be shown. Leaving it disabled means that manageability will not be functional.



```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

INTEL(R) AMT CONFIGURATION

  Manageability Feature Selection              <Enabled>
> SOL/IDER/KVM
> User Consent
  Password Policy                              <Anytime>
> Network Setup
  Activate Network Access
  Unconfigure Network Access                   <Full Unprovision>
> Remote Setup And Configuration
> Power Control

[↑↓]=Move Highlight        [Enter]=Select Entry        [Esc]=Exit
```

15. Select “SOL/IDER/KVM.”



```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
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INTEL(R) AMT CONFIGURATION

  Manageability Feature Selection              <Enabled>
> SOL/IDER/KVM
> User Consent
  Password Policy                              <Anytime>
> Network Setup
  Activate Network Access
  Unconfigure Network Access                   <Full Unprovision>
> Remote Setup And Configuration
> Power Control

[↑↓]=Move Highlight        [Enter]=Select Entry        [Esc]=Exit
```
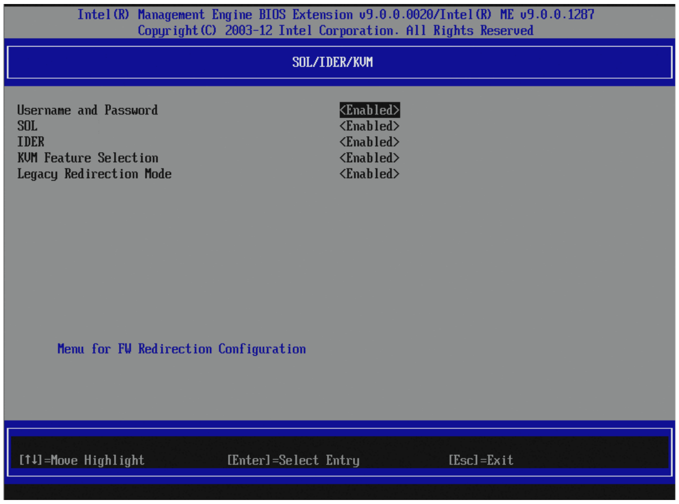

16. Select “Username and Password” and set to Enabled.



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Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
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SOL/IDER/KVM

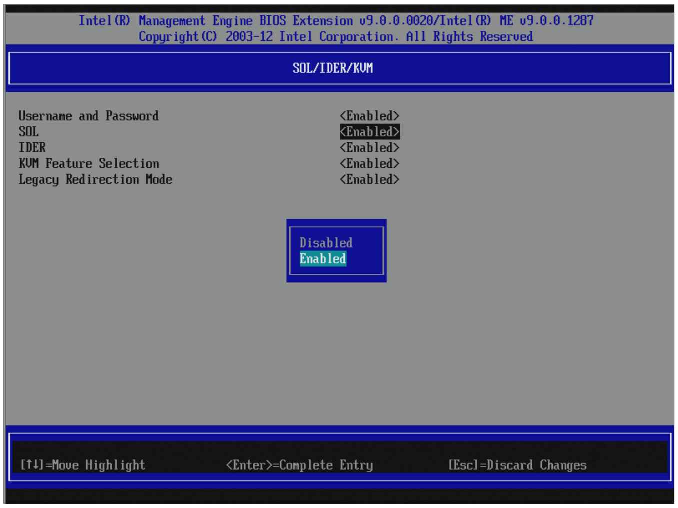
Username and Password                                <Enabled>
SOL                                                  <Enabled>
IDER                                                 <Enabled>
KVM Feature Selection                                <Enabled>
Legacy Redirection Mode                              <Enabled>

Menu for FW Redirection Configuration

[↑↓]=Move Highlight       [Enter]=Select Entry        [Esc]=Exit
```

17. Select “SOL” and set to Enabled.

    SOL (Serial over LAN) allows a remote console to view “non-graphical” interfaces remotely. These interfaces include BIOS Setup, boot screens, and DOS, but they will not display Windows or Linux screens.



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Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
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SOL/IDER/KVM

Username and Password                                <Enabled>
SOL                                                  <Enabled>
IDER                                                 <Enabled>
KVM Feature Selection                                <Enabled>
Legacy Redirection Mode                              <Enabled>

                                             Disabled
                                             Enabled

[↑↓]=Move Highlight       <Enter>=Complete Entry      [Esc]=Discard Changes
```
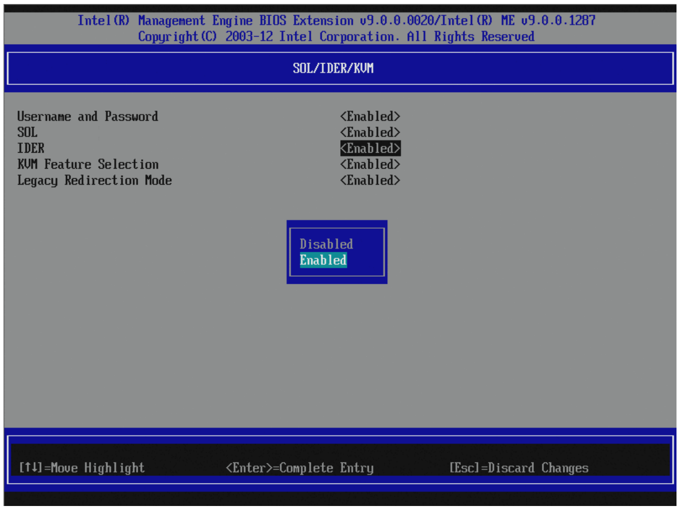

18. Select “IDER” and set to Enabled.

    IDER (Integrated Drive Electronics Redirect) allows a remote console to redirect a CD, floppy diskette, or USB key to a file on the network, and be used remotely by the AMT system. IDER also allows the server to be booted by a management console from a remote disk image.



```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
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SOL/IDER/KVM

Username and Password                                <Enabled>
SOL                                                  <Enabled>
IDER                                                 <Enabled>
KVM Feature Selection                                <Enabled>
Legacy Redirection Mode                              <Enabled>

                                             Disabled
                                             Enabled

[↑↓]=Move Highlight       <Enter>=Complete Entry      [Esc]=Discard Changes
```
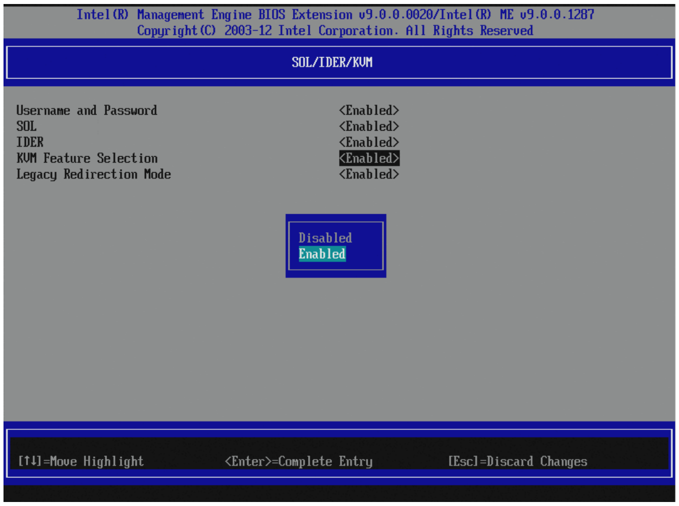

19. Select "KVM Feature Selection" and set to Enabled.

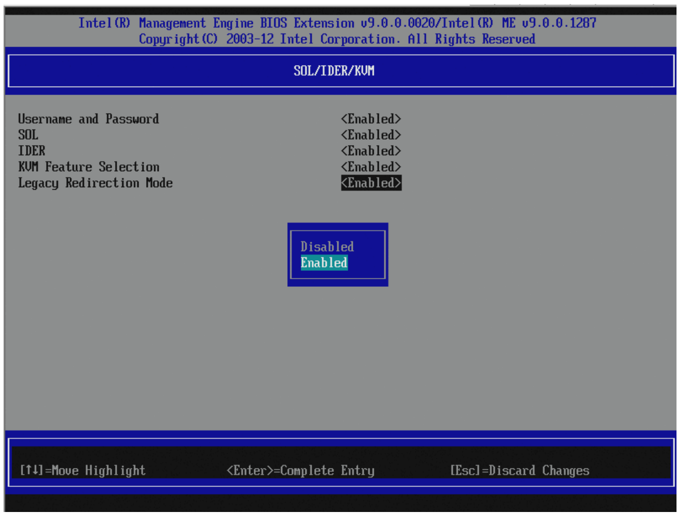
    KVM (Keyboard, Video, and Mouse) enables a remote console to control the server system with keyboard and mouse, and see the video as if locally present at the machine.



```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

                                 SOL/IDER/KVM

Username and Password                                   <Enabled>
SOL                                                     <Enabled>
IDER                                                    <Enabled>
KVM Feature Selection                                   <Enabled>
Legacy Redirection Mode                                 <Enabled>

                                  Disabled
                                  Enabled

[↑↓]=Move Highlight     <Enter>=Complete Entry     [Esc]=Discard Changes
```

20. Select "Legacy Redirection Mode" and press Enter to confirm the message displayed.

    Legacy Redirection Mode controls how the redirection works. If set to disabled, the console needs to open the redirection ports before each session. This is meant for enterprise consoles and new SMB consoles that support opening the redirection ports. Old SMB consoles (before Intel AMT 6.0) which do not support opening the redirection ports function need to manually turn on the redirection port through this MEBX option.



```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
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                                 SOL/IDER/KVM

Username and Password                                   <Enabled>
SOL                                                     <Enabled>
IDER                                                    <Enabled>
KVM Feature Selection                                   <Enabled>
Legacy Redirection Mode                                 <Enabled>

                                  Disabled
                                  Enabled

[↑↓]=Move Highlight     <Enter>=Complete Entry     [Esc]=Discard Changes
```
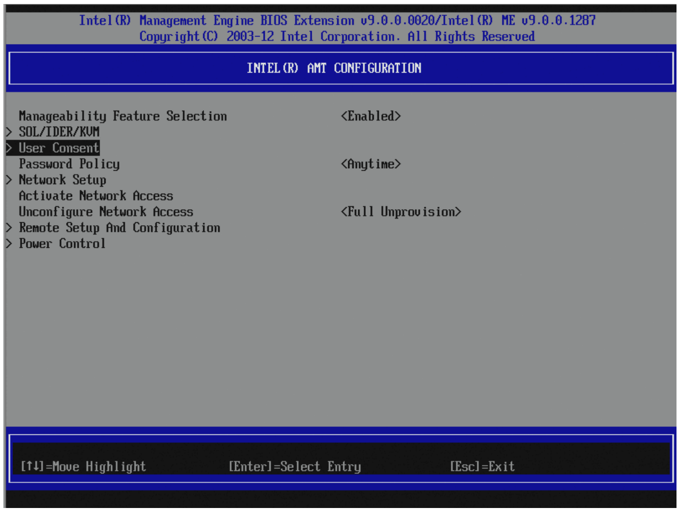

The following options can be selected:

- Disabled – legacy redirection Mode is disabled (default).
- Enabled – the port is left open at all times when redirection is enabled in the MEBX. It is the same as what used to be SMB mode in previous versions of AMT. Old (before Intel AMT 6.0) SMB consoles will need this mode in order to succeed opening redirection sessions.

21. Press ESC to return to the previous screen.

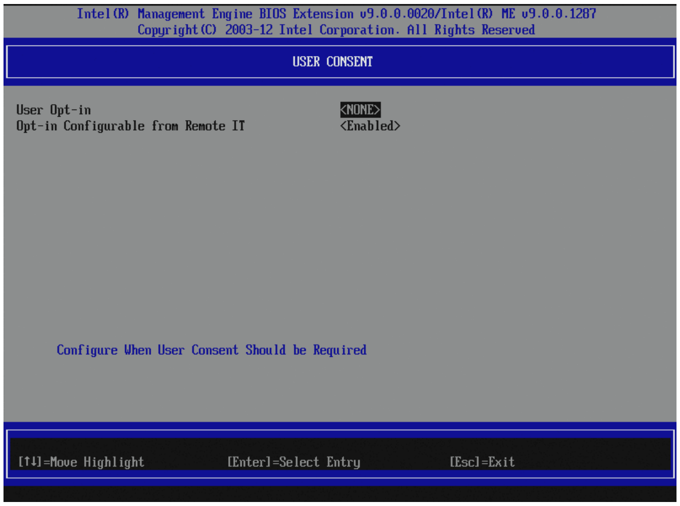
    Select “User Consent” and press Enter.



```
  Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
          Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

                          INTEL(R) AMT CONFIGURATION

  Manageability Feature Selection                <Enabled>
> SOL/IDER/KVM
> User Consent
  Password Policy                                <Anytime>
> Network Setup
  Activate Network Access
  Unconfigure Network Access                     <Full Unprovision>
> Remote Setup And Configuration
> Power Control

[↑↓]=Move Highlight          [Enter]=Select Entry          [Esc]=Exit
```

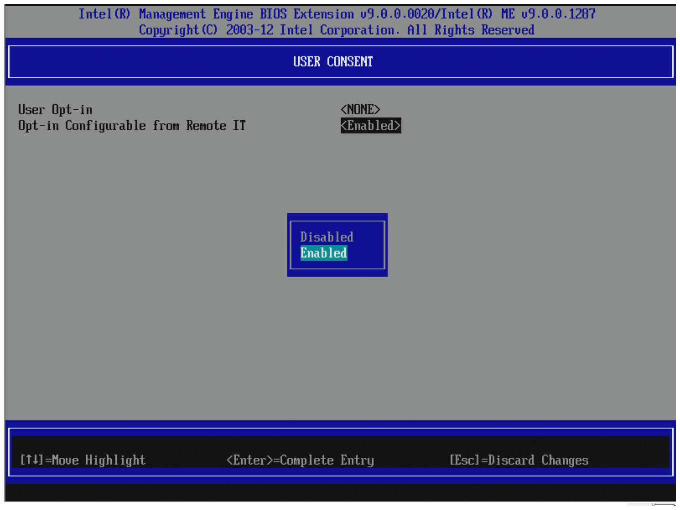
22. Select “User Opt-in,” and set to “None.”

    Setting User Opt-in to None, will enable remote management access at all times without requiring a local user to grant permission. This is desirable for servers.



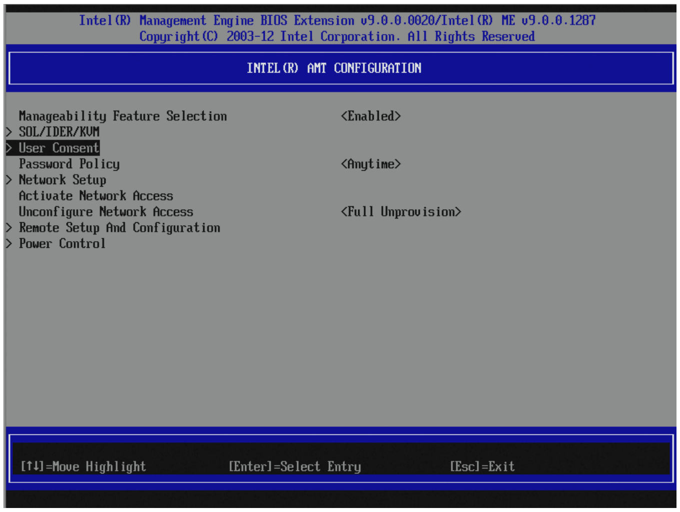
```
  Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
          Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

                               USER CONSENT

User Opt-in                                      <NONE>
Opt-in Configurable from Remote IT               <Enabled>

      Configure When User Consent Should be Required

[↑↓]=Move Highlight          [Enter]=Select Entry          [Esc]=Exit
```

23. Select “Opt-in Configurable from Remote IT” and select “Enable.”



```
  Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
          Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

                               USER CONSENT

User Opt-in                                      <NONE>
Opt-in Configurable from Remote IT               <Enabled>

                                            Disabled
                                            Enabled

[↑↓]=Move Highlight          <Enter>=Complete Entry          [Esc]=Discard Changes
```

24. Press Esc to return to the previous screen.



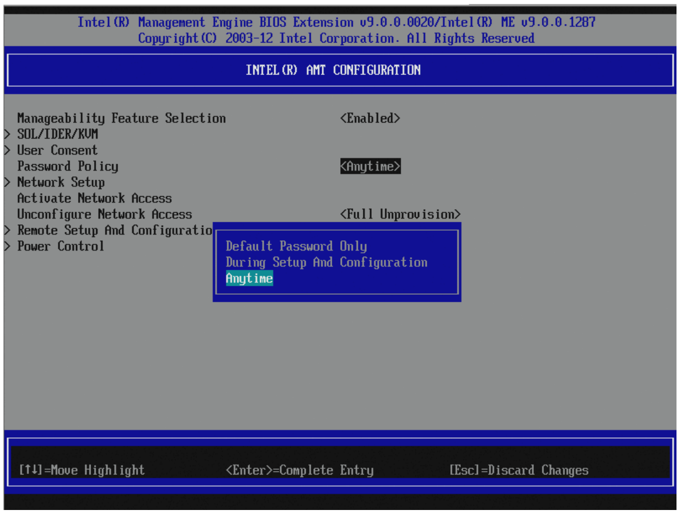
```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
          Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

                          INTEL(R) AMT CONFIGURATION

  Manageability Feature Selection                  <Enabled>
> SOL/IDER/KVM
> User Consent
  Password Policy                                  <Anytime>
> Network Setup
  Activate Network Access
  Unconfigure Network Access                       <Full Unprovision>
> Remote Setup And Configuration
> Power Control

 [↑↓]=Move Highlight          [Enter]=Select Entry          [Esc]=Exit
```

25. Select “Password Policy,” press ENTER, and select “Anytime.”

    There are two passwords for the firmware.

    The Intel MEBX password is the password that is entered when a user is physically at the system.

    The network password is the password that is entered when accessing an Intel ME enabled system through the network (e.g. the Web User Interface).

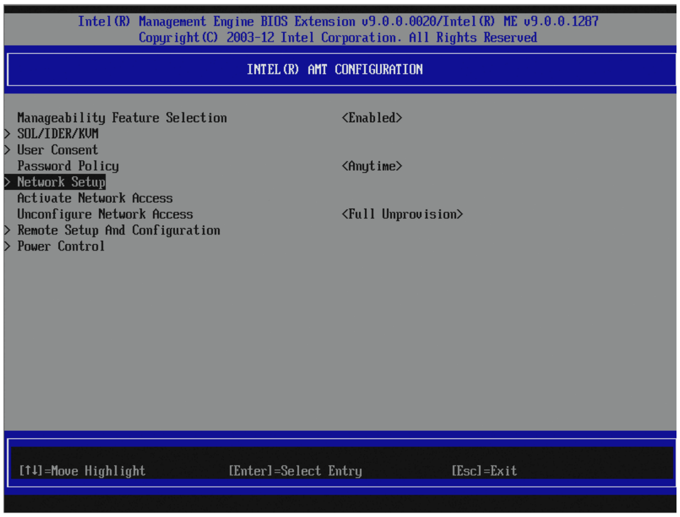


```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
          Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

                          INTEL(R) AMT CONFIGURATION

  Manageability Feature Selection                  <Enabled>
> SOL/IDER/KVM
> User Consent
  Password Policy                                  <Anytime>
> Network Setup
  Activate Network Access
  Unconfigure Network Access                       <Full Unprovision>
> Remote Setup And Configuratio
> Power Control              Default Password Only
                             During Setup And Configuration
                             Anytime

 [↑↓]=Move Highlight       <Enter>=Complete Entry       [Esc]=Discard Changes
```

By default, both passwords are the same until the network password is changed. Once changed over the network, the network password will always be kept separate from the local Intel MEBX password. This option determines when the user is allowed to change the Intel MEBX password through the network. The Intel MEBX password can always be changed via the Intel MEBX user interface.

- **Default Password Only** – The Intel MEBX password can be changed through the network interface if the default password has not been changed yet.
- **During Setup and Configuration –** The Intel MEBX password can be changed through the network interface during the setup and configuration process but at no other time. Once the setup and configuration process is complete, the Intel MEBX password cannot be changed via the network interface.
- **Anytime –** The Intel MEBX password can be changed through the network interface at any time.

26. Select “Network Setup.”

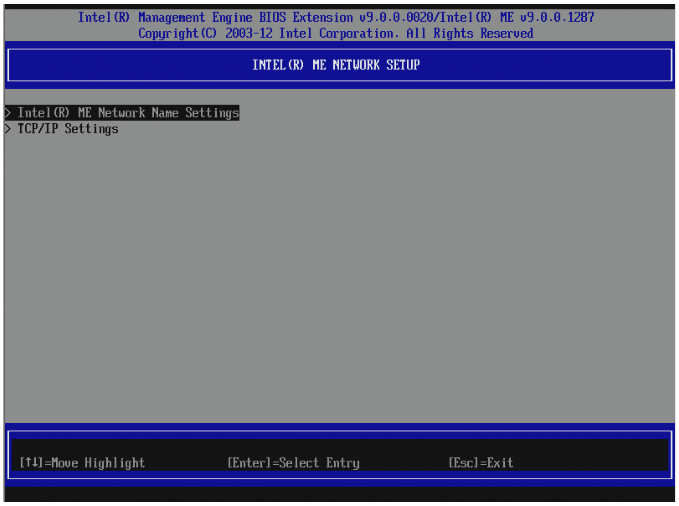


```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
        Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

                        INTEL(R) AMT CONFIGURATION

  Manageability Feature Selection                <Enabled>
> SOL/IDER/KVM
> User Consent
  Password Policy                                <Anytime>
> Network Setup
  Activate Network Access
  Unconfigure Network Access                     <Full Unprovision>
> Remote Setup And Configuration
> Power Control

[↑↓]=Move Highlight        [Enter]=Select Entry        [Esc]=Exit
```

27. Select “Intel ME Network Name Settings.”

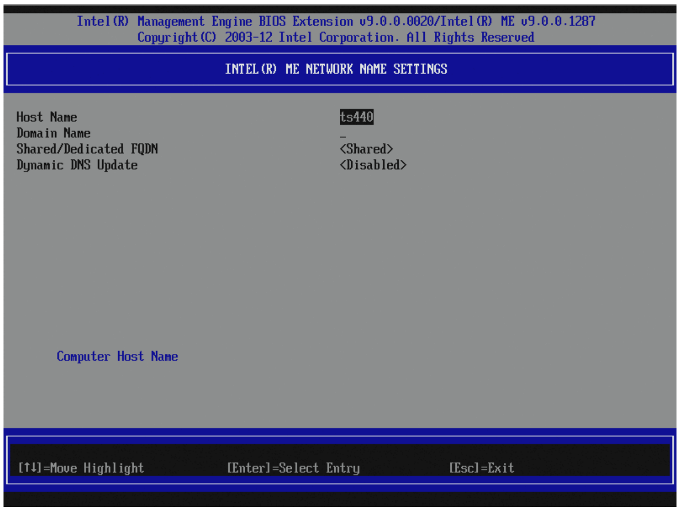
    This will allow configuration of the following items:

    - Host Name
    - Domain Name
    - Shared/Dedicated FQDN
    - Dynamic DNS Update



```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
        Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

                        INTEL(R) ME NETWORK SETUP

> Intel(R) ME Network Name Settings
> TCP/IP Settings

[↑↓]=Move Highlight        [Enter]=Select Entry        [Esc]=Exit
```

28. Select “Host Name.”



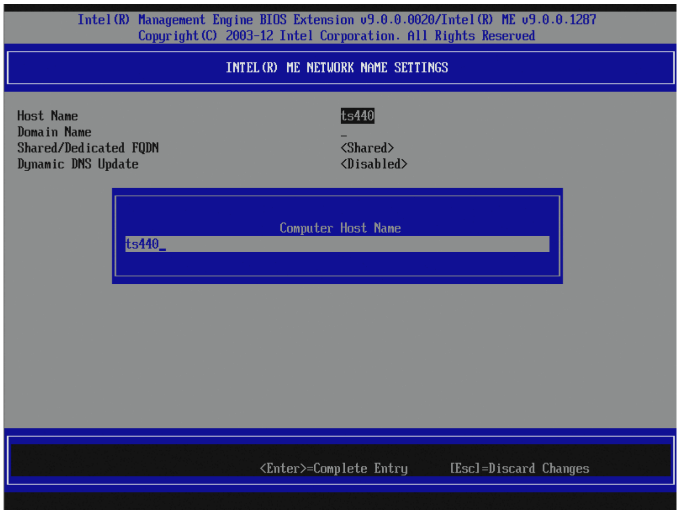
```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
        Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

                     INTEL(R) ME NETWORK NAME SETTINGS

  Host Name                                     ts440
  Domain Name                                   _
  Shared/Dedicated FQDN                         <Shared>
  Dynamic DNS Update                            <Disabled>

       Computer Host Name

[↑↓]=Move Highlight        [Enter]=Select Entry        [Esc]=Exit
```

29. Type the “Computer Host Name” and press ENTER.

    In this example, we use “ts440.”

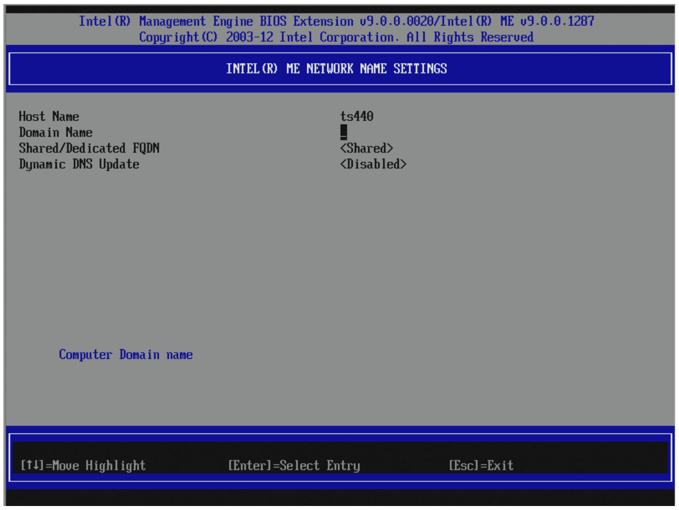
    The following important considerations apply:
    1. In DHCP mode, the computer name must match the computer name given in Windows.
    2. In Static IP mode, the computer name can be different than the computer name defined in the operating system.

       However, you may need to update your DNS so that the name is reachable on your network.



```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

INTEL(R) ME NETWORK NAME SETTINGS

Host Name                                   ts440
Domain Name                                 _
Shared/Dedicated FQDN                       <Shared>
Dynamic DNS Update                          <Disabled>

Computer Host Name
ts440_

<Enter>=Complete Entry     [Esc]=Discard Changes
```

30. Select “Domain Name.”



```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
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INTEL(R) ME NETWORK NAME SETTINGS

Host Name                                   ts440
Domain Name                                 █
Shared/Dedicated FQDN                       <Shared>
Dynamic DNS Update                          <Disabled>

Computer Domain name

[↑↓]=Move Highlight        [Enter]=Select Entry        [Esc]=Exit
```
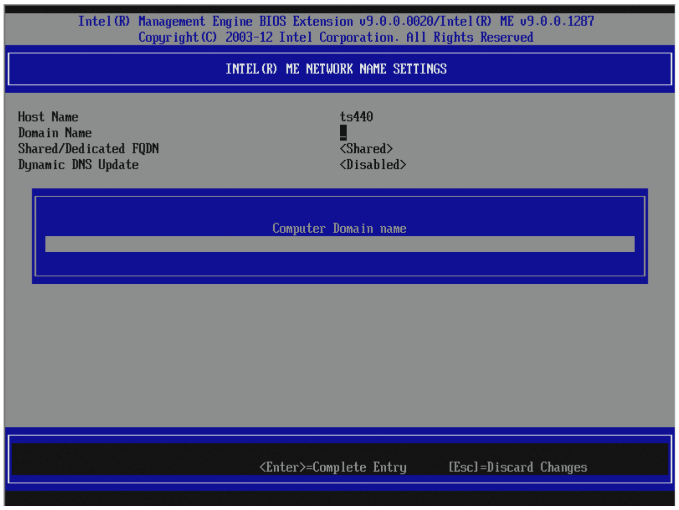

31. If you would like to append your domain name, type the “Computer Domain name” and press ENTER.

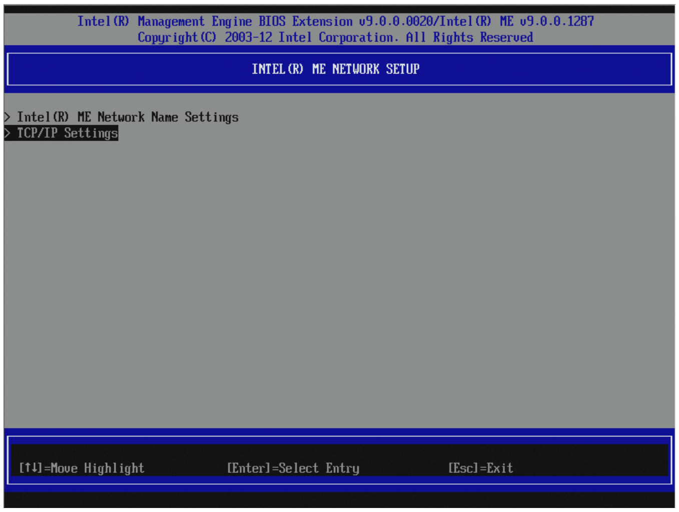
    In this example, it is left blank.



```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

INTEL(R) ME NETWORK NAME SETTINGS

Host Name                                   ts440
Domain Name                                 █
Shared/Dedicated FQDN                       <Shared>
Dynamic DNS Update                          <Disabled>

Computer Domain name

<Enter>=Complete Entry     [Esc]=Discard Changes
```

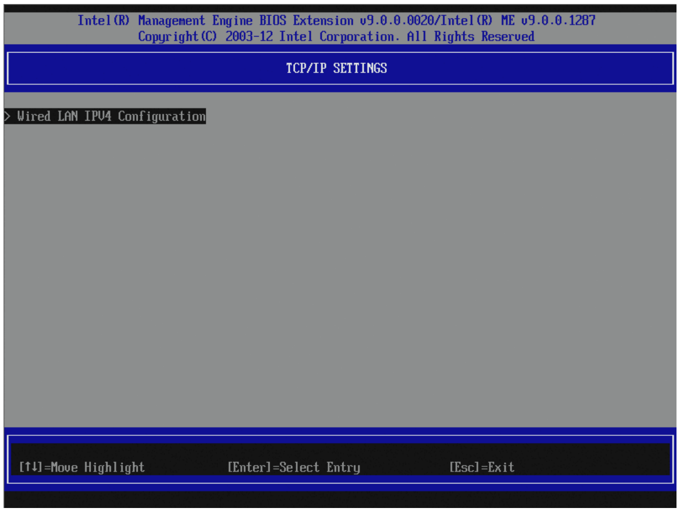
32. Press ESC to return to the previous screen.

    Select “TCP/IP Settings.”



```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

INTEL(R) ME NETWORK SETUP

> Intel(R) ME Network Name Settings
> TCP/IP Settings

[↑↓]=Move Highlight          [Enter]=Select Entry          [Esc]=Exit
```

33. Select “Wired LAN IPV4 Configuration.”

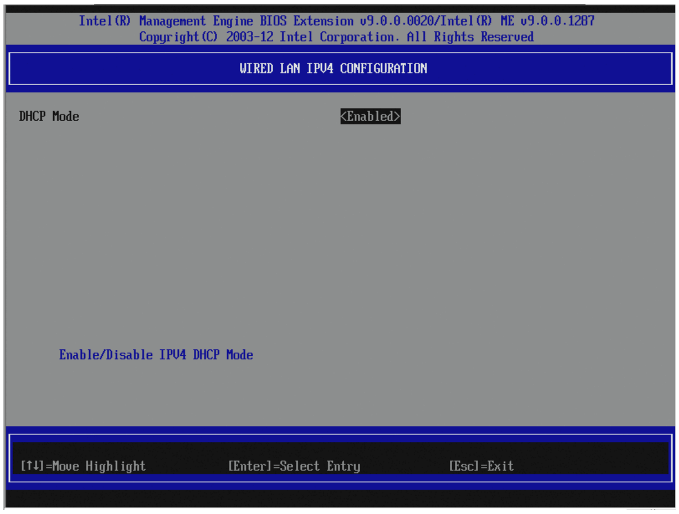


```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

TCP/IP SETTINGS

> Wired LAN IPV4 Configuration

[↑↓]=Move Highlight          [Enter]=Select Entry          [Esc]=Exit
```

34. Select “DHCP Mode.” DHCP is enabled by default.

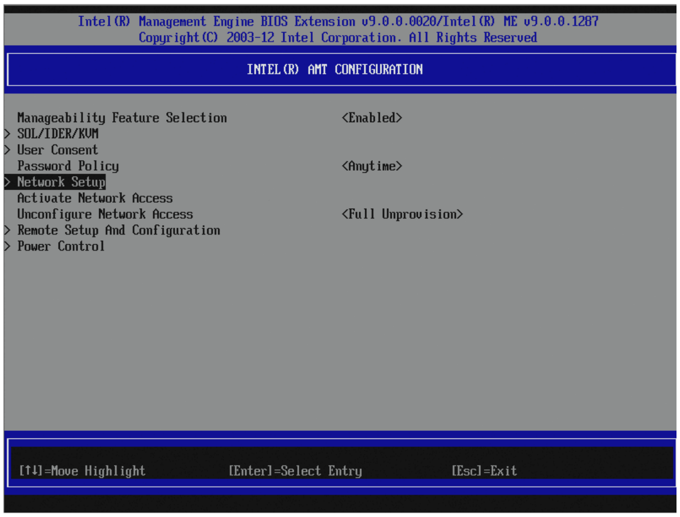
    If DHCP is disabled, additional configuration information will be required. Enter the following information in the configuration screens that will become available:

    1. Static IP address to be used
    2. Subnet mask address
    3. Default Gateway Address
    4. Preferred DNS Address
    5. Alternate DNS Address



```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

WIRED LAN IPV4 CONFIGURATION

DHCP Mode                                  <Enabled>

    Enable/Disable IPV4 DHCP Mode

[↑↓]=Move Highlight          [Enter]=Select Entry          [Esc]=Exit
```

35. Press ESC three times to return to the main screen.



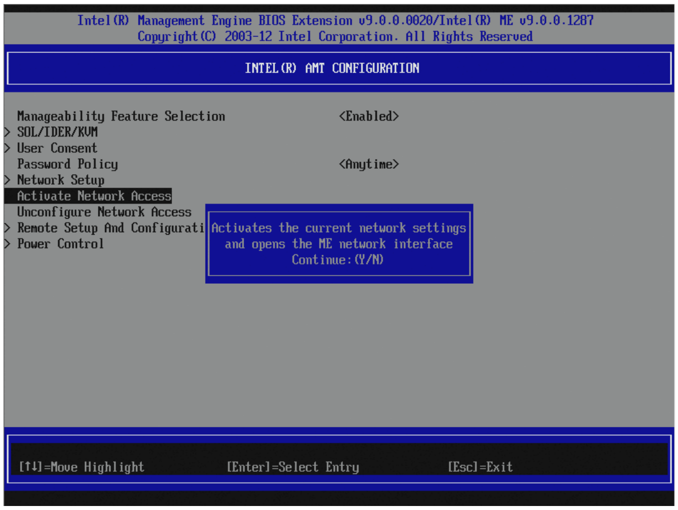
```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

INTEL(R) AMT CONFIGURATION

  Manageability Feature Selection                   <Enabled>
> SOL/IDER/KVM
> User Consent
  Password Policy                                   <Anytime>
> Network Setup
  Activate Network Access
  Unconfigure Network Access                        <Full Unprovision>
> Remote Setup And Configuration
> Power Control

[↑↓]=Move Highlight          [Enter]=Select Entry          [Esc]=Exit
```

36. Select “Activate Network Access.”

    Type Y to confirm the selection when prompted.

    Activate Network Access causes the Intel ME to transition to the POST provisioning state if all required settings are configured.

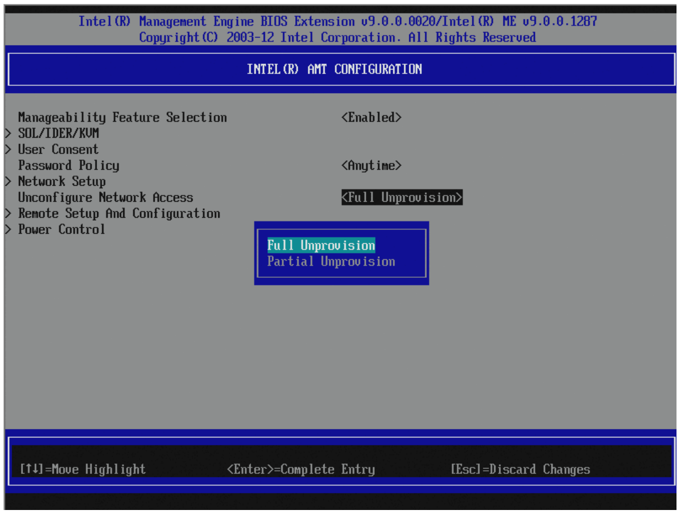
    Without this step AMT will not function properly.



```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

INTEL(R) AMT CONFIGURATION

  Manageability Feature Selection                   <Enabled>
> SOL/IDER/KVM
> User Consent
  Password Policy                                   <Anytime>
> Network Setup
  Activate Network Access
  Unconfigure Network Access
> Remote Setup And Configurati Activates the current network settings
> Power Control                 and opens the ME network interface
                                         Continue:(Y/N)

[↑↓]=Move Highlight          [Enter]=Select Entry          [Esc]=Exit
```

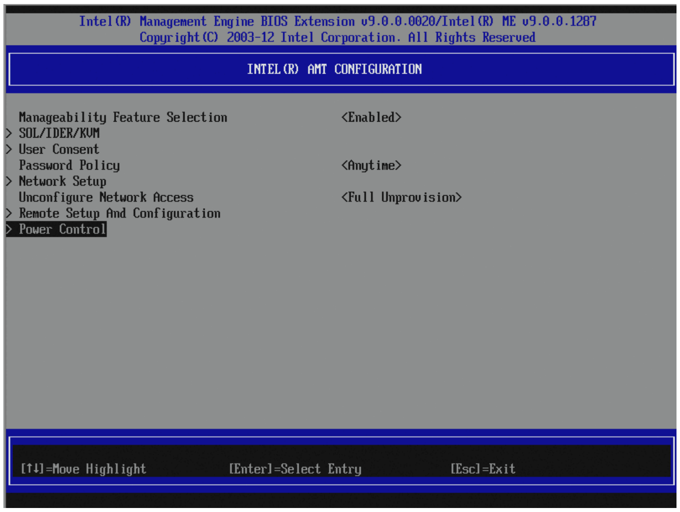
After Network Access is Activated, this menu item will change to “Unconfigure Network Access.”

If “Unconfigure Network Access” is selected, this will cause the ME to transition to the pre-provisioning state.



```
Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

INTEL(R) AMT CONFIGURATION

  Manageability Feature Selection                   <Enabled>
> SOL/IDER/KVM
> User Consent
  Password Policy                                   <Anytime>
> Network Setup
  Unconfigure Network Access                        <Full Unprovision>
> Remote Setup And Configuration
> Power Control
                                       Full Unprovision
                                       Partial Unprovision

[↑↓]=Move Highlight          <Enter>=Complete Entry          [Esc]=Discard Changes
```

37. Select "Power Control," and press ENTER.

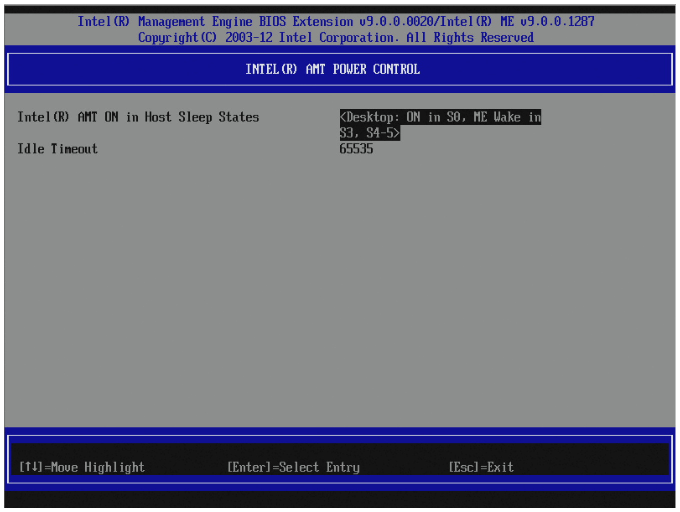


```
   Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
           Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

                           INTEL(R) AMT CONFIGURATION

 Manageability Feature Selection                  <Enabled>
> SOL/IDER/KVM
> User Consent
 Password Policy                                  <Anytime>
> Network Setup
 Unconfigure Network Access                       <Full Unprovision>
> Remote Setup And Configuration
> Power Control

 [↑↓]=Move Highlight          [Enter]=Select Entry          [Esc]=Exit
```

38. Select "Desktop: ON in S0, ME Wake in S3, S4-5" by selecting the correct item and pressing ENTER.

The selected power package determines when the Intel ME is turned ON, and will enable remote power control of the server.

Press ESC to return to the ME Platform Configuration screen.

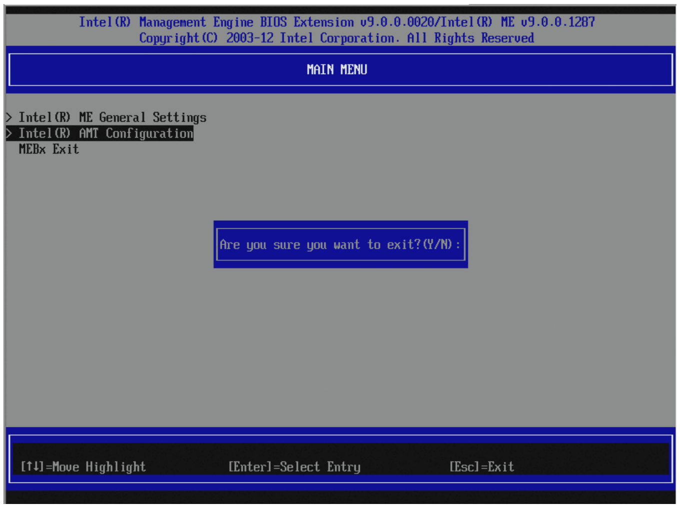


```
   Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
           Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

                           INTEL(R) AMT POWER CONTROL

 Intel(R) AMT ON in Host Sleep States             <Desktop: ON in S0, ME Wake in
                                                  S3, S4-5>
 Idle Timeout                                     65535

 [↑↓]=Move Highlight          [Enter]=Select Entry          [Esc]=Exit
```

39. To return to the previous menu press ESC.

Press Y to confirm Exit.

The system will restart and the settings will be in effect.



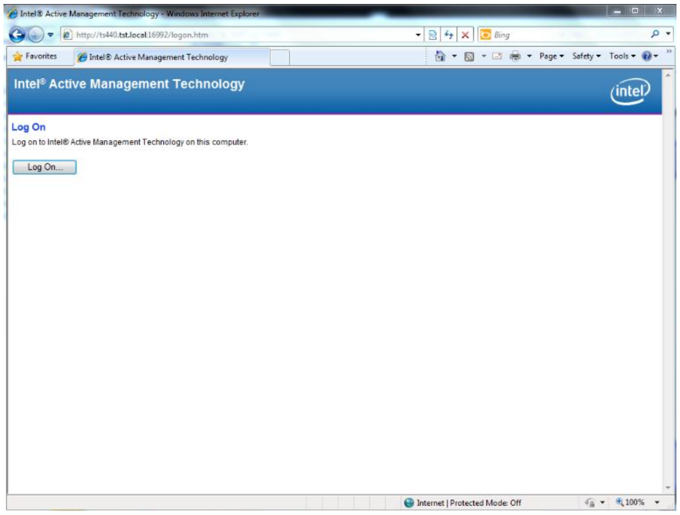
```
   Intel(R) Management Engine BIOS Extension v9.0.0.0020/Intel(R) ME v9.0.0.1287
           Copyright(C) 2003-12 Intel Corporation. All Rights Reserved

                                   MAIN MENU

> Intel(R) ME General Settings
> Intel(R) AMT Configuration
 MEBx Exit

                          Are you sure you want to exit?(Y/N):

 [↑↓]=Move Highlight          [Enter]=Select Entry          [Esc]=Exit
```

AMT Configuration with Web Interface

After the AMT system is enabled and configured, it is accessible through the AMT Web Interface. Elements of the configuration can be changed through this interface.

1. Insure power is applied to the server.
2. Open a Web browser.
3. Connect to the IP address specified in the MEBx and port of the AMT system.
   - The default port is 16992
   - If DHCP was used, the IP address is the same as the NIC IP address.
   - You can also connect to the host name if it has been configured.
4. The following web page is displayed. Press **Log On** to request logon and provide the user name and password.

   The default user name is **admin** and the password is what was set during AMT Setup in the MEBx configuration.


Intel® Active Management Technology - Windows Internet Explorer

http://ts440.tst.local:16992/logon.htm

Intel® Active Management Technology

Log On

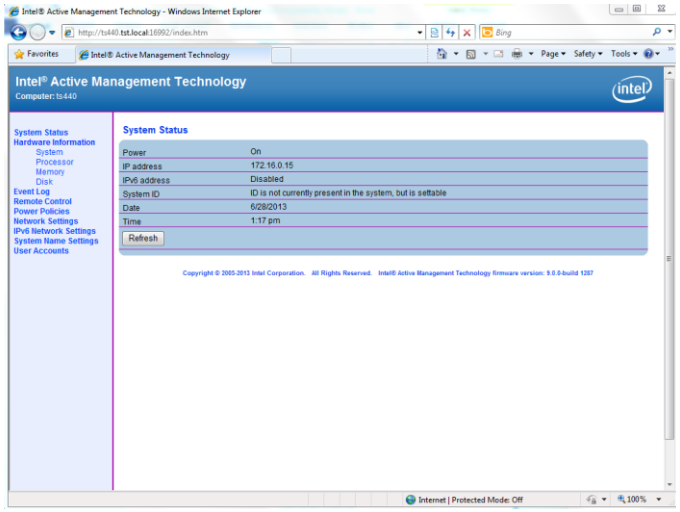
Log on to Intel® Active Management Technology on this computer.

Log On...

Bing
Favorites
Intel® Active Management Technology
Page
Safety
Tools
intel
Internet | Protected Mode: Off
100%

5. The following high-level screen is displayed.

   The following properties are configurable from the Web Interface and are accessed from the menu items on the left of the web page:
   - Power Policies
   - Network Settings
   - IPv6 Settings
   - System name Settings
   - User Accounts


Intel® Active Management Technology - Windows Internet Explorer

http://ts440.tst.local:16992/index.htm

Intel® Active Management Technology

Computer: ts440

System Status
Hardware Information
System
Processor
Memory
Disk
Event Log
Remote Control
Power Policies
Network Settings
IPv6 Network Settings
System Name Settings
User Accounts

System Status

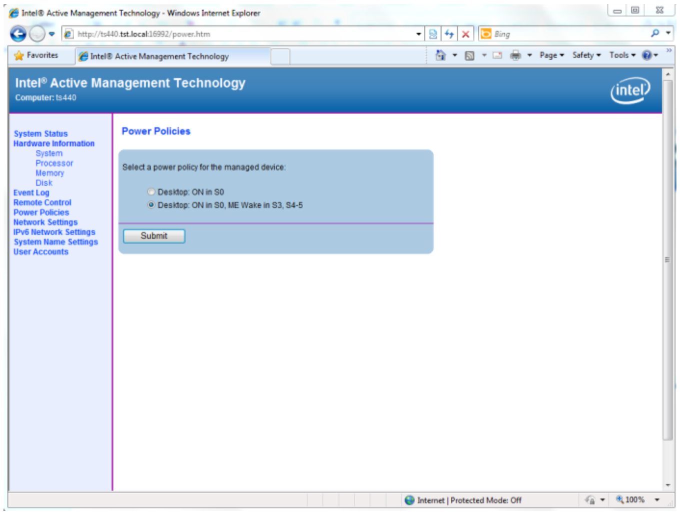
Power	On
IP address	172.16.0.15
IPv6 address	Disabled
System ID	ID is not currently present in the system, but is settable
Date	6/28/2013
Time	1:17 pm

Refresh

Copyright © 2005-2013 Intel Corporation. All Rights Reserved. Intel® Active Management Technology firmware version: 9.0.0-build 1287

Bing
Favorites
Intel® Active Management Technology
Page
Safety
Tools
intel
Internet | Protected Mode: Off
100%

6. The Power Policies Settings page allows the configuration of the power settings of the management engine on the server. This will allow the user to determine which power states the ME is activated. These settings are the same as the settings in the MEBX Power Control menu.



Power Policies

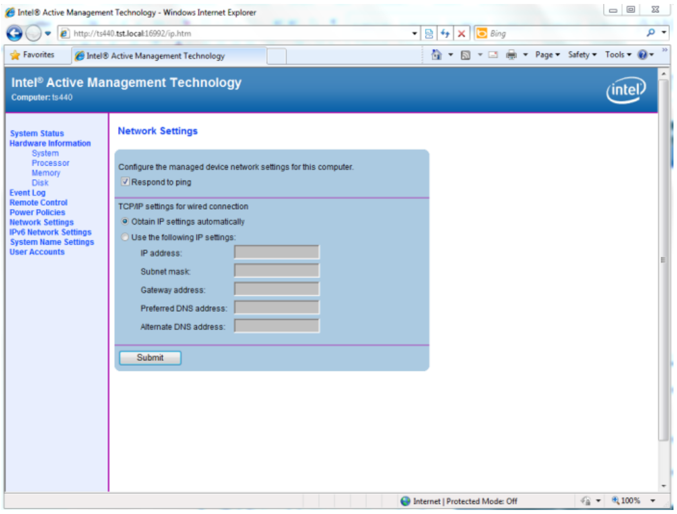
Select a power policy for the managed device:

○ Desktop: ON in S0

● Desktop: ON in S0, ME Wake in S3, S4-5

7. Network Settings - The Network Settings page allows the configuration of the IP settings for an AMT system.

   Obtain IP settings automatically: If this option is selected, AMT will get an IP address from a network DHCP server. This option requires that the server's operating system is configured to use DHCP, and the network has both a DHCP server to provide the IP address, and a DNS server that can resolve the IP address provided to the client Computer host name.



Network Settings

Configure the managed device network settings for this computer.

☑ Respond to ping

TCP/IP settings for wired connection

● Obtain IP settings automatically

○ Use the following IP settings:

IP address:

Subnet mask:

Gateway address:

Preferred DNS address:

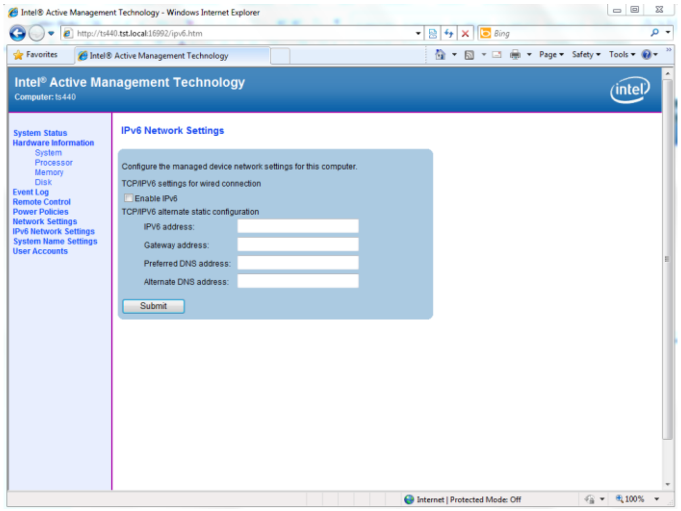
Alternate DNS address:

   Use the following IP settings: Selecting this option overrides DHCP usage. AMT will use the IP settings (IP address, Subnet mask, etc.) specified here.

   By default, these fields show the current settings (set using the Intel ME BIOS Extension screen).

   Respond to ping: Configures AMT to respond to an IP ping. If this is unchecked, then AMT will not respond to ping.

8. IPv6 Network Settings – not used in this example.



IPv6 Network Settings

Configure the managed device network settings for this computer.

TCP/IPV6 settings for wired connection

□ Enable IPv6

TCP/IPV6 alternate static configuration

IPV6 address:

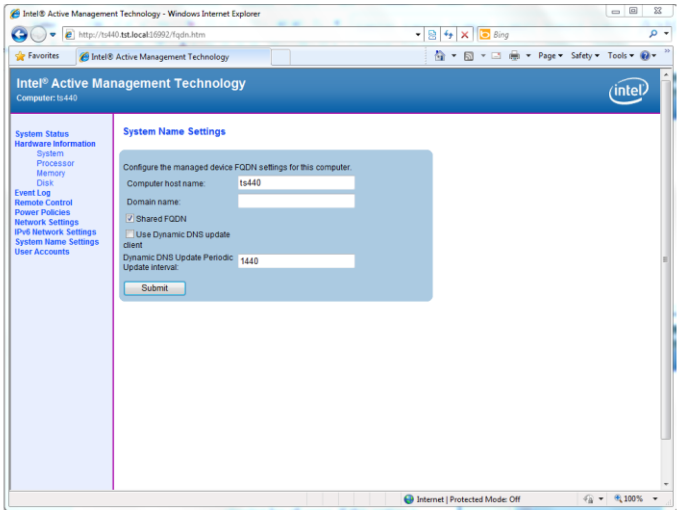
Gateway address:

Preferred DNS address:

Alternate DNS address:

Submit

9. System Name Settings - Computer host name: This is the name that is used to browse to the system, and is set in the Intel ME BIOS extension screen.



System Name Settings

Configure the managed device FQDN settings for this computer.

Computer host name: ts440

Domain name:

☑ Shared FQDN

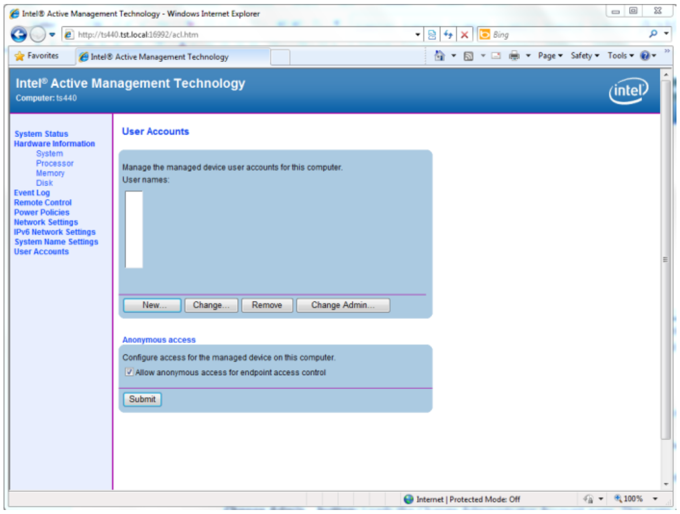
□ Use Dynamic DNS update client

Dynamic DNS Update Periodic Update interval: 1440

Submit

10. User Accounts and Passwords – The ***User Accounts*** page allows creating, modifying and deleting user accounts. User accounts with limited access rights can be set up using this page. A particular user account can also be given limited access, and such a user will see a padlock icon on the links to the pages that the account cannot access.

    Anonymous access allows limited viewing for all users. If this option is enabled, the user will not need to login to view the Web UI page.



Intel® Active Management Technology - Windows Internet Explorer

http://ts440.tst.local:16992/acl.htm

Intel® Active Management Technology
Computer: ts440

User Accounts

Manage the managed device user accounts for this computer.
User names:

Anonymous access

Configure access for the managed device on this computer.
☑ Allow anonymous access for endpoint access control

Internet | Protected Mode: Off

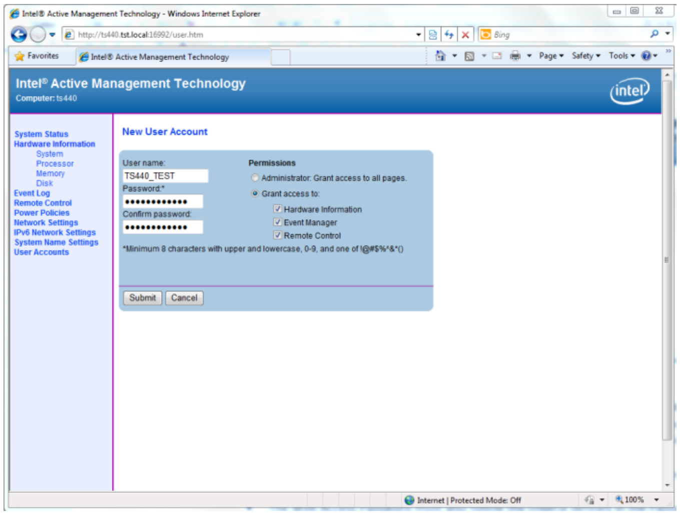
Allow anonymous access for endpoint access control – This option allows user notification service to get status without providing a username and password. If the box is not checked, a username and password must be supplied.

User names: Lists the user accounts that have been created by the administrator.
New…* button*: Loads the New User Account page and allows the administrator to create a new account.
Change…* button*: Loads the Change User Account page, showing the settings for the selected account.
Remove* button*: Loads the Remove User Account page, which prompts to remove the selected account.
***Change Admin…* button:** Loads the Change Administrator Account page. This page allows the Administrator’s password to be changed.
***Submit* button:** Submits changes for Anonymous access check boxes.

The ***New/Change User Account*** page allows the administrator to add a new account or change an existing account name or permissions.

The ***Permissions*** show the various pages a particular user account can access. A particular user account can be either given:

- Administrator rights – By selecting ***Administrator: Grant access to all pages***, where all pages are accessible.
- Access to restricted pages – By selecting Grant access to and checking the boxes for which access is to be given.



Intel® Active Management Technology - Windows Internet Explorer

http://ts440.tst.local:16992/user.htm

Intel® Active Management Technology
Computer: ts440

New User Account

User name: TS440_TEST
Password:* ••••••••••••
Confirm password: ••••••••••••

Permissions
○ Administrator: Grant access to all pages.
● Grant access to:
☑ Hardware Information
☑ Event Manager
☑ Remote Control

Minimum 8 characters with upper and lowercase, 0-9, and one of !@#$%^&()

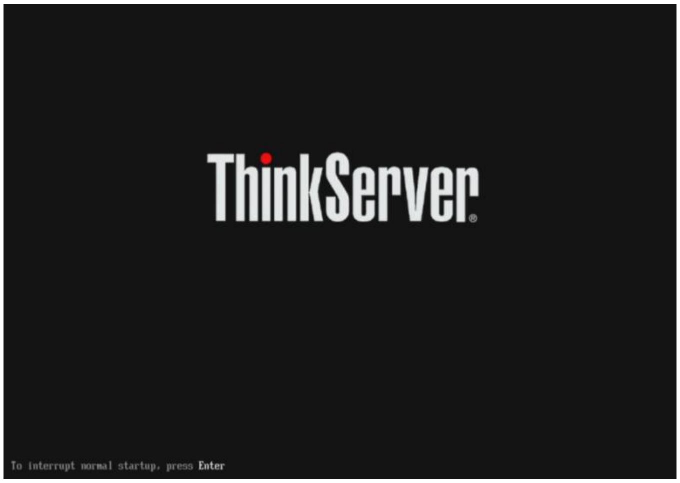
Note that the password to remotely access an AMT system can be changed in the Web interface. Changing the password in the Web interface results in two passwords. The new password works only for the Web interface. You cannot change the MEBx password from the Web Interface. You must keep track of both passwords to access the system remotely and locally.

- The MEBx password always works with a Web interface accessing the system remotely as long as a Web Access Password is not set within the Web interface.
- The Web Access Password must also follow the criteria defined in the Password Guideline Section

Unprovisioning AMT

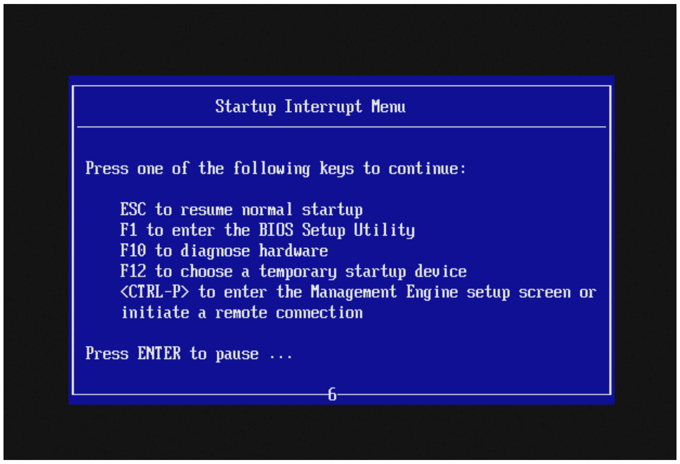
AMT functionality can be reset to factory defaults or disabled through the BIOS Setup Utility.

1. Power on the server.
2. Press the Enter key to bring up boot options.



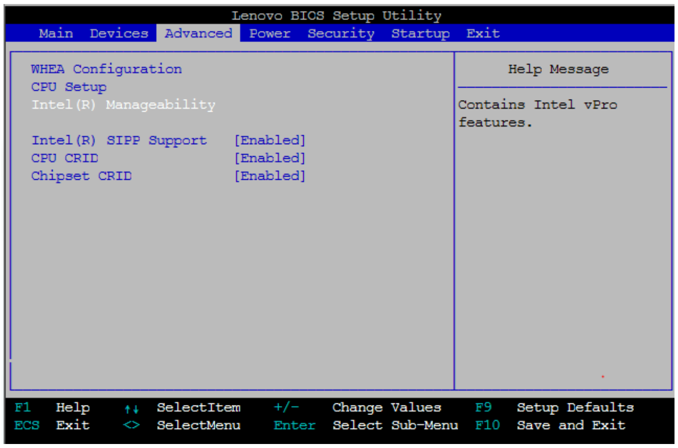
To interrupt normal startup, press Enter

3. Press the F1 key to enter the BIOS Setup Utility.



```
Startup Interrupt Menu

Press one of the following keys to continue:

    ESC to resume normal startup
    F1 to enter the BIOS Setup Utility
    F10 to diagnose hardware
    F12 to choose a temporary startup device
    <CTRL-P> to enter the Management Engine setup screen or
    initiate a remote connection

Press ENTER to pause ...
                              6
```

4. In the BIOS Setup Utility, navigate to the “Advanced” tab and select “Intel (R) Manageability.”

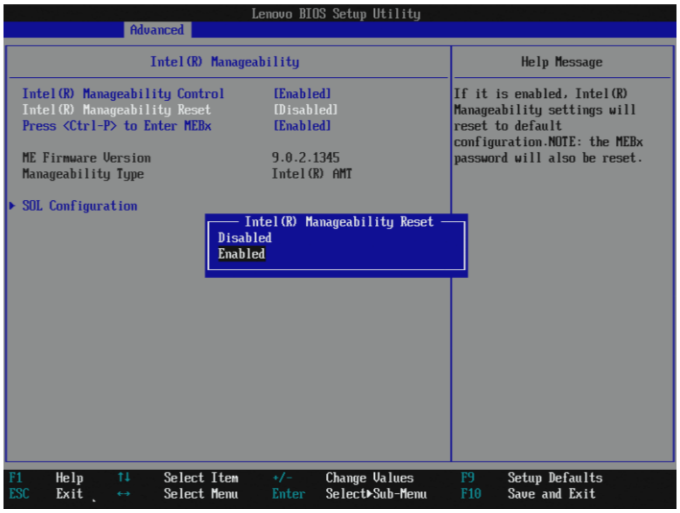


```
Lenovo BIOS Setup Utility
  Main  Devices  Advanced  Power  Security  Startup  Exit

WHEA Configuration                          Help Message
CPU Setup
Intel(R) Manageability                      Contains Intel vPro
                                            features.
Intel(R) SIPP Support    [Enabled]
CPU CRID                 [Enabled]
Chipset CRID             [Enabled]

F1   Help   ↑↓  SelectItem   +/-    Change Values     F9   Setup Defaults
ECS  Exit   <>  SelectMenu   Enter  Select Sub-Menu   F10  Save and Exit
```

5. Select “Intel Manageability Reset” and select “Enabled.”

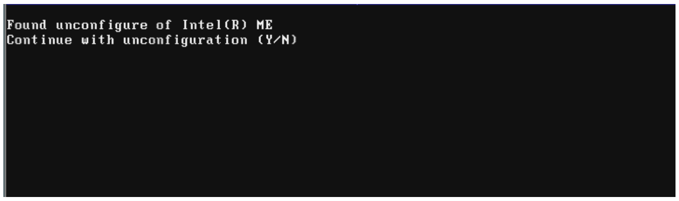
   Press F10 to save and exit BIOS Setup.

   Select ‘Y’ when prompted to “Save Configuration and Exit.”



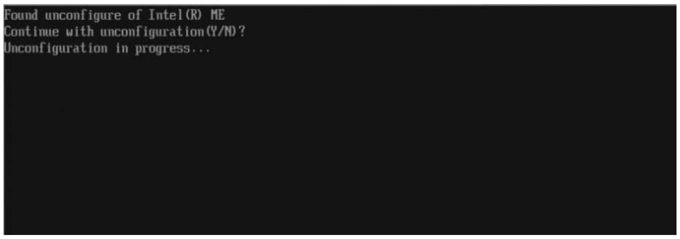
```
Lenovo BIOS Setup Utility
          Advanced

        Intel(R) Manageability                     Help Message

Intel(R) Manageability Control   [Enabled]      If it is enabled, Intel(R)
Intel(R) Manageability Reset     [Disabled]     Manageability settings will
Press <Ctrl-P> to Enter MEBx     [Enabled]      reset to default
                                                configuration.NOTE: the MEBx
ME Firmware Version              9.0.2.1345     password will also be reset.
Manageability Type               Intel(R) AMT

▸ SOL Configuration
                 ─ Intel(R) Manageability Reset ─
                 Disabled
                 Enabled

F1   Help   ↑↓  Select Item   +/-    Change Values    F9   Setup Defaults
ESC  Exit   ↔   Select Menu   Enter  Select▸Sub-Menu  F10  Save and Exit
```

6. When the system reboots, the following prompt will be displayed. Select ‘Y' to unconfigure AMT.



```
Found unconfigure of Intel(R) ME
Continue with unconfiguration (Y/N)
```

The system will unconfigure AMT and then reboot.



```
Found unconfigure of Intel(R) ME
Continue with unconfiguration(Y/N)?
Unconfiguration in progress...
```

Using AMT to Manage TS140 and TS440

AMT has broad industry support, and the TS140 and TS440 can be managed using many ISV management suites, the integrated Web User Interface, and other third party commercially available tools.

If you already have an existing management framework to manage Intel vPro-compliant desktop PCs and Notebooks in your organization, then it is likely you will be able to use the same infrastructure to manage the ThinkServer TS140 and TS440 servers as they use the same underlying, compatible management technology.

In addition, typical remote infrastructure management tools used by Managed Service Providers (MSPs) natively support Intel AMT systems management technology (e.g. Kaseya, Level Platforms, etc.). If any of these tools are used in your organization, then they can also be used to manage the ThinkServer TS140 and TS440.

Consult the documentation for your existing management tools or your service provider to determine what is possible. A discussion about using these tools is out of scope for this document.

In the following sections, we show examples of how AMT's capabilities can be used to support various common system management tasks.

Basic Management Using the AMT Web Interface

A web browser can be used to access AMT's web interface in the TS140 and TS440 to perform basic management tasks including:

- View the system status
- View the hardware installed in the system
- View, start/stop, and clear the event log
- Remotely power the computer on or off
- View and manage system power policies
- View and manage AMT network parameters
- View and manage AMT user accounts

Accessing the Web U/I

1. Web access is automatically enabled as soon as you finish the server configuration steps. The AMT systems management interface can be accessed remotely by entering the IP address of the server with port number 16992 into the address bar of a web browser. For example:

   http://172.16.5.201:16992

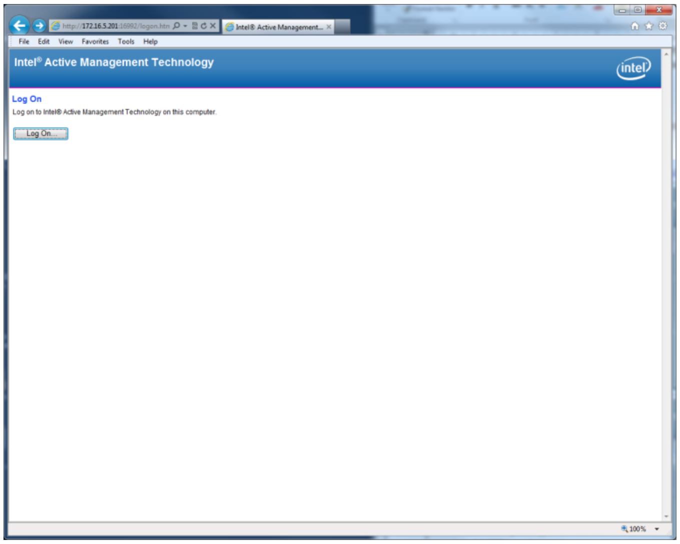
   The AMT interface can also be addressed using the device's fully qualified domain name (FQDN). For example:

   http://computername.domain.com:16992

2. After entering the address, the browser displays the following web page. Press the "Log on" Button.

   After the Log on button is clicked, enter the user credentials for the Web U/I.

   Log in by entering 'admin' (case sensitive) in the User name box, and enter the same password in the Password box that was previously setup in the Intel ME BIOS Extension settings. Press on OK.

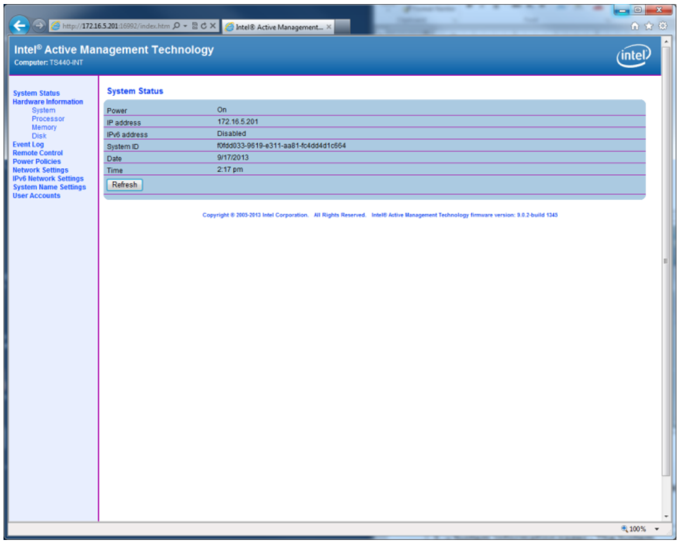

http://172.16.5.201:16992/logon.htm
Intel® Active Management...
File
Edit
View
Favorites
Tools
Help
Log On...
100%

Intel® Active Management Technology

Log On

Log on to Intel® Active Management Technology on this computer.

3. If the login has been successful, then the System Status page will be displayed. The System Status page shows the current status of the system. This page displays the Power state, IP address and other basic system information. The AMT device Host Name appears in the top banner section of the web page under Computer. This was set in the Intel MEBX settings.



Intel® Active Management Technology

Computer: TS440-INT

System Status

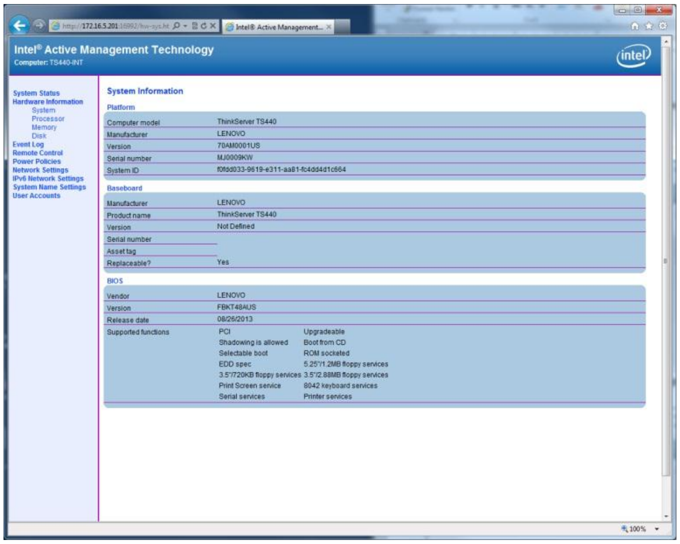
Power	On
IP address	172.16.5.201
IPv6 address	Disabled
System ID	f0fdd033-9619-e311-aa81-fc4dd4d1c664
Date	9/17/2013
Time	2:17 pm

Copyright © 2005-2013 Intel Corporation. All Rights Reserved. Intel® Active Management Technology firmware version: 9.0.2-build 1345

Using the Web U/I

The navigation bar, on the left of the web page, provides links that allow navigating to the individual AMT management pages.

1. System Information pages - The System Information page displays information on the:
   - Platform: The Platform table shows system-wide hardware information, including Computer model, Manufacturer, Version, Serial number, and System ID.
   - Baseboard: The Baseboard table section shows Manufacturer, Product name, Version, Serial number, Asset tag and a "Replaceable?" item with Yes or No.
   - BIOS: The BIOS table section shows Vendor, Version, Release date and Supported functions. The Supported functions item shows a list of all supported functions.



System Information

Platform

Computer model	ThinkServer TS440
Manufacturer	LENOVO
Version	70AM0001US
Serial number	MJ0009KW
System ID	f0fdd033-9619-e311-aa81-fc4dd4d1c664

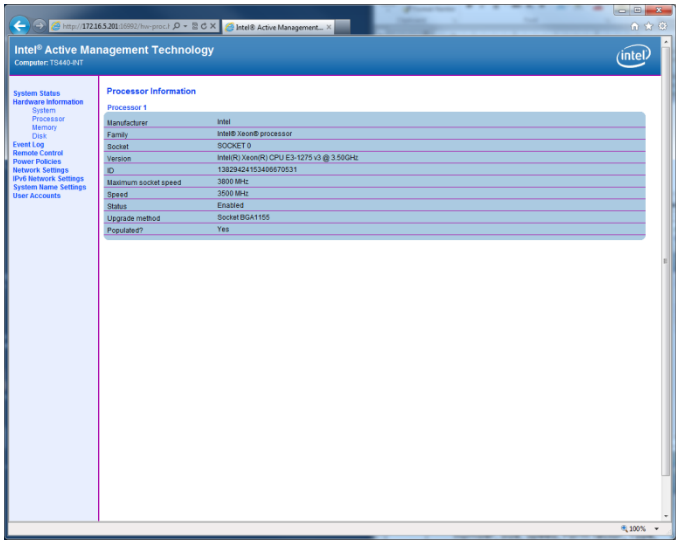
Baseboard

Manufacturer	LENOVO
Product name	ThinkServer TS440
Version	Not Defined
Serial number	
Asset tag	
Replaceable?	Yes

BIOS

Vendor	LENOVO	
Version	FBKT48AUS	
Release date	08/26/2013	
Supported functions	PCI	Upgradeable
	Shadowing is allowed	Boot from CD
	Selectable boot	ROM socketed
	EDD spec	5.25"/1.2MB floppy services
	3.5"/720KB floppy services	3.5"/2.88MB floppy services
	Print Screen service	8042 keyboard services
	Serial services	Printer services

2. The Processor Information page shows information about the CPU installed in the server.

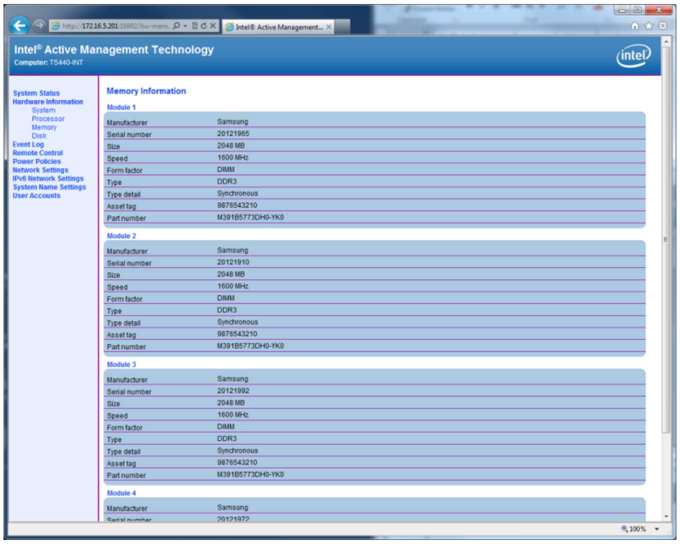


Processor Information

Processor 1

Manufacturer	Intel
Family	Intel® Xeon® processor
Socket	SOCKET 0
Version	Intel(R) Xeon(R) CPU E3-1275 v3 @ 3.50GHz
ID	13829424153406670531
Maximum socket speed	3800 MHz
Speed	3500 MHz
Status	Enabled
Upgrade method	Socket BGA1155
Populated?	Yes

3. The Memory Information page displays a Module # heading for each memory module installed in a socket and gives details on that particular memory module, including Manufacturer, Serial number, Size, Speed, Form factor, Type, Type detail, Asset tag and Part number. Also, for sockets without installed memory, the Module # heading and 'Not Installed' is displayed.



Memory Information

Module 1

Manufacturer	Samsung
Serial number	20121965
Size	2048 MB
Speed	1600 MHz
Form factor	DIMM
Type	DDR3
Type detail	Synchronous
Asset tag	9876543210
Part number	M391B5773DH0-YK0

Module 2

Manufacturer	Samsung
Serial number	20121910
Size	2048 MB
Speed	1600 MHz
Form factor	DIMM
Type	DDR3
Type detail	Synchronous
Asset tag	9876543210
Part number	M391B5773DH0-YK0

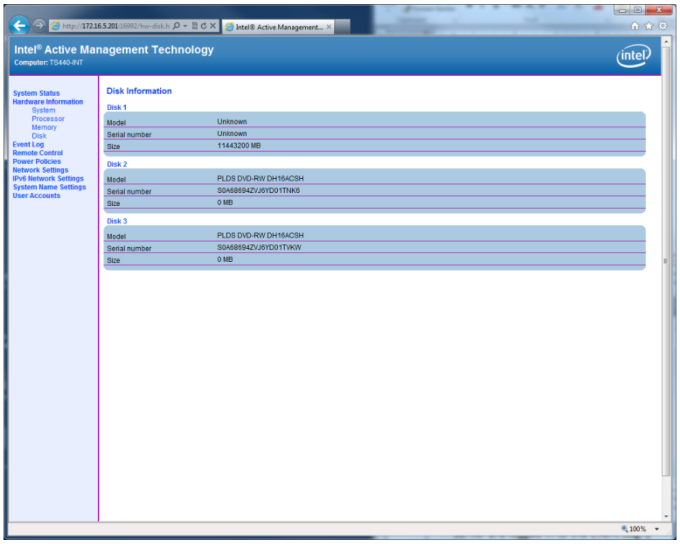
Module 3

Manufacturer	Samsung
Serial number	20121992
Size	2048 MB
Speed	1600 MHz
Form factor	DIMM
Type	DDR3
Type detail	Synchronous
Asset tag	9876543210
Part number	M391B5773DH0-YK0

Module 4

Manufacturer	Samsung
Serial number	20121972

4. The Disk Information page displays the Model, Serial Number and Size of each installed disk on the client system.



Disk Information

Disk 1

Model	Unknown
Serial number	Unknown
Size	11443200 MB

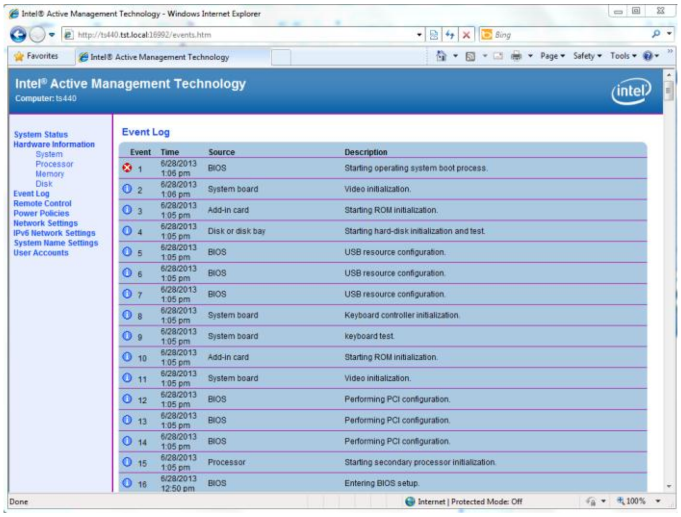
Disk 2

Model	PLDS DVD-RW DH16ACSH
Serial number	S0A68694ZVJ6YD01TNK6
Size	0 MB

Disk 3

Model	PLDS DVD-RW DH16ACSH
Serial number	S0A68694ZVJ6YD01TVKW
Size	0 MB

5. The Event Log page displays the event log. All the events happening on the server are logged in to the Event Log.
   - Start Logging/Stop Logging button: This button starts or stops logging of the events on the system. The text on this button changes according to the available action.
   - Clear Log button: This button clears the log entries, and reloads the page with an empty event log.

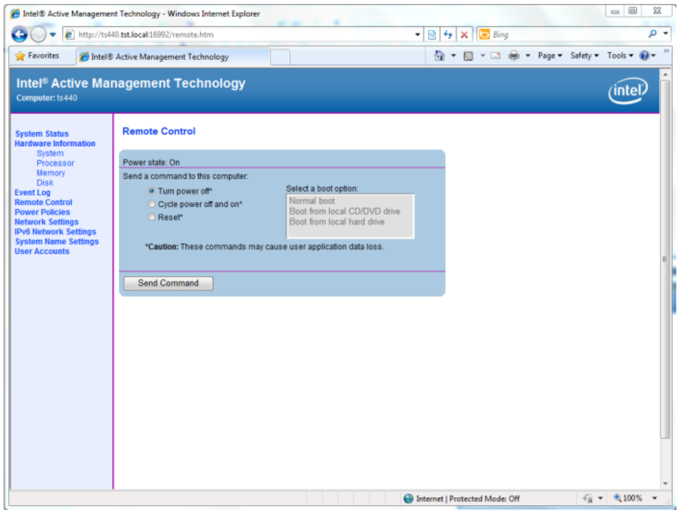


Event Log

Event	Time	Source	Description
✖ 1	6/28/2013 1:06 pm	BIOS	Starting operating system boot process.
ⓘ 2	6/28/2013 1:06 pm	System board	Video initialization.
ⓘ 3	6/28/2013 1:05 pm	Add-in card	Starting ROM initialization.
ⓘ 4	6/28/2013 1:05 pm	Disk or disk bay	Starting hard-disk initialization and test.
ⓘ 5	6/28/2013 1:05 pm	BIOS	USB resource configuration.
ⓘ 6	6/28/2013 1:05 pm	BIOS	USB resource configuration.
ⓘ 7	6/28/2013 1:05 pm	BIOS	USB resource configuration.
ⓘ 8	6/28/2013 1:05 pm	System board	Keyboard controller initialization.
ⓘ 9	6/28/2013 1:05 pm	System board	keyboard test.
ⓘ 10	6/28/2013 1:05 pm	Add-in card	Starting ROM initialization.
ⓘ 11	6/28/2013 1:05 pm	System board	Video initialization.
ⓘ 12	6/28/2013 1:05 pm	BIOS	Performing PCI configuration.
ⓘ 13	6/28/2013 1:05 pm	BIOS	Performing PCI configuration.
ⓘ 14	6/28/2013 1:05 pm	BIOS	Performing PCI configuration.
ⓘ 15	6/28/2013 1:05 pm	Processor	Starting secondary processor initialization.
ⓘ 16	6/28/2013 12:50 pm	BIOS	Entering BIOS setup.

6. The Remote Control page allows the server to be turned off, to power cycle the system off and on, and to reset the system. A boot option, like: Normal boot, boot from local CD/DVD drive, or boot from local hard drive, can be selected through which the server can be booted.

   The remote control interface (all above mentioned remote control commands) is dynamic. Depending on the power state of the system, the applicable remote control commands will be displayed in the WebUI *Remote Control page*. Example: In *Power OFF* state, only *Turn on* command will be displayed. Also depending on the remote command selected, the appropriate boot options will be displayed. Example: When the *Turn power off* command is selected, the boot options will be blocked or grayed out, without being able to select any of them.


Intel® Active Management Technology - Windows Internet Explorer
http://ts440.tst.local:16992/remote.htm
Bing
Favorites
Intel® Active Management Technology
Page
Safety
Tools
intel
Internet | Protected Mode: Off
100%

Intel® Active Management Technology
Computer: ts440

System Status
Hardware Information
System
Processor
Memory
Disk
Event Log
Remote Control
Power Policies
Network Settings
IPv6 Network Settings
System Name Settings
User Accounts

Remote Control

Power state: On

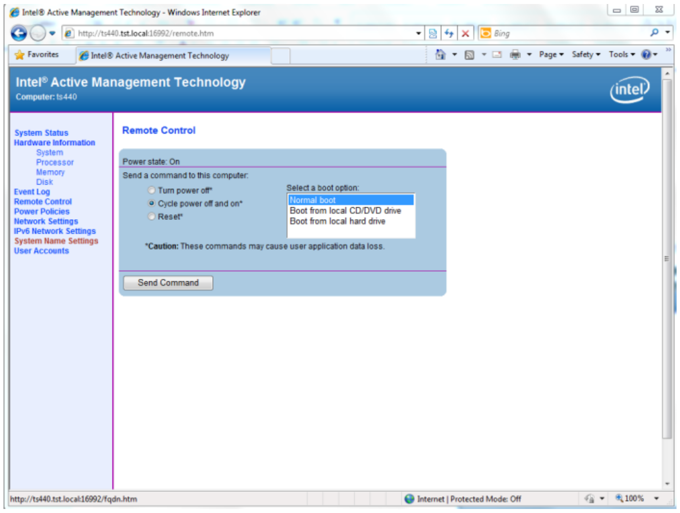
Send a command to this computer:

● Turn power off*
○ Cycle power off and on*
○ Reset*

Select a boot option:
Normal boot
Boot from local CD/DVD drive
Boot from local hard drive

*Caution: These commands may cause user application data loss.

Send Command


Intel® Active Management Technology - Windows Internet Explorer
http://ts440.tst.local:16992/remote.htm
Bing
Favorites
Intel® Active Management Technology
Page
Safety
Tools
intel
http://ts440.tst.local:16992/fqdn.htm
Internet | Protected Mode: Off
100%

Intel® Active Management Technology
Computer: ts440

System Status
Hardware Information
System
Processor
Memory
Disk
Event Log
Remote Control
Power Policies
Network Settings
IPv6 Network Settings
System Name Settings
User Accounts

Remote Control

Power state: On

Send a command to this computer:

○ Turn power off*
● Cycle power off and on*
○ Reset*

Select a boot option:
Normal boot
Boot from local CD/DVD drive
Boot from local hard drive

*Caution: These commands may cause user application data loss.

Send Command

Remote Access using KVM

KVM redirection provides keyboard, video and mouse redirection over IP. This capability enables an IT administrator to use and control a remote managed server as if he was sitting in front of it, and is available with selected CPU SKUs.

AMT also provides console redirection via serial over LAN (SOL), and IDE redirection (IDE-R) over IP.

The SOL feature emulates a serial device to the host platform, while actually sending and receiving the data to and from the management console. This can be used, for example, by the system BIOS to redirect the BIOS data to remote terminal allowing remote configuration and updates of configuration settings.

The IDE redirection feature exposes IDE devices and hard disk images to the server. Mounted IDE-R devices appear in the BIOS boot order and in a host OS. It is possible for example, to install an operating system on a bare metal server using a remotely mounted device.

Many commercially available tools can provide Remote access capabilities to AMT. One such tool is the RealVNC Viewer and RealVNC Viewer Plus from RealVNC. These products provide simple KVM connectivity to the TS140 and TS440, and enable remote control of the servers. See the Appendices for more information.

Intel Manageability Commander

As part of the introduction of AMT technology, Intel provided a range of free tools for use by network administrators and management software developers.

One such tool is the Open Manageability Developer Tool Kit which is a set of community supported tools to help designers, developers and testers understand the benefits of Intel AMT technology. The kit runs on Microsoft* Windows* .NET* 2.0 environment and offers a set of tools that make use of all of the features of Intel AMT through a simple console called Manageability Commander Tool.

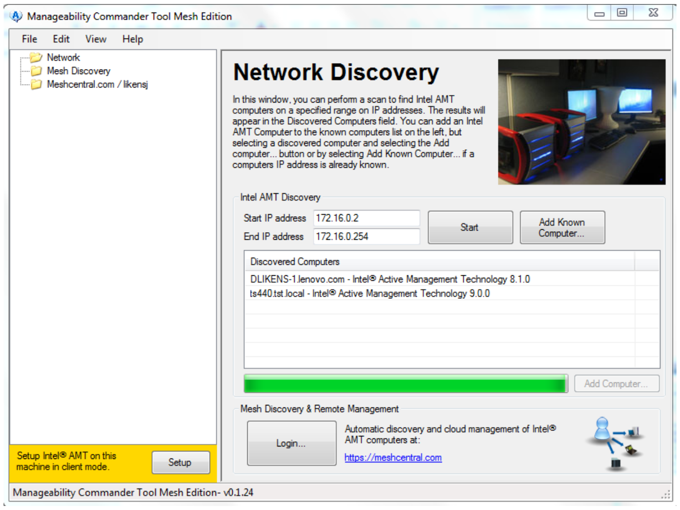
The Manageability Commander Tool provides a simple way to explore and evaluate all the capabilities offered by AMT. The tool demonstrates the ability of AMT to:

- Discover servers
- Change AMT settings of the TS140 and TS440
- Connect remotely to BIOS
- Set network policies
- Check event log
- Subscribe to alerts and monitor sensors
- Create audit policies
- Enable/disable AMT features (opt-in, TLS security, Remote control, etc.)
- Launch remote SOL, and KVM sessions
- Attach remote media with IDE-R

See the Appendices for more information on the Toolkit and Manageability Commander Tool.

Using Intel Manageability Commander

1. After installing the tool, servers can be discovered by scanning for computers within an IP range. Alternately, you can add a known server with its IP address.



Network Discovery

In this window, you can perform a scan to find Intel AMT computers on a specified range on IP addresses. The results will appear in the Discovered Computers field. You can add an Intel AMT Computer to the known computers list on the left, but selecting a discovered computer and selecting the Add computer... button or by selecting Add Known Computer... if a computers IP address is already known.

Intel AMT Discovery

Start IP address 172.16.0.2
End IP address 172.16.0.254

Discovered Computers
DLIKENS-1.lenovo.com - Intel® Active Management Technology 8.1.0
ts440.tst.local - Intel® Active Management Technology 9.0.0

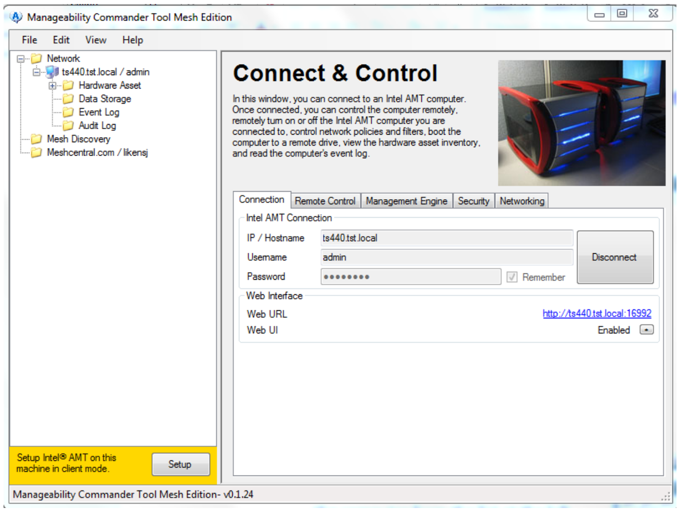
Mesh Discovery & Remote Management

Automatic discovery and cloud management of Intel® AMT computers at: https://meshcentral.com

Setup Intel® AMT on this machine in client mode.

Manageability Commander Tool Mesh Edition- v0.1.24

2. Once a computer is discovered, select the computer from the list at the left, and press CONNECT and enter the logon information.



Connect & Control

In this window, you can connect to an Intel AMT computer. Once connected, you can control the computer remotely, remotely turn on or off the Intel AMT computer you are connected to, control network policies and filters, boot the computer to a remote drive, view the hardware asset inventory, and read the computer's event log.

Intel AMT Connection

IP / Hostname ts440.tst.local
Username admin
Password ●●●●●●●●● ☑ Remember

Web Interface

Web URL http://ts440.tst.local:16992
Web UI Enabled

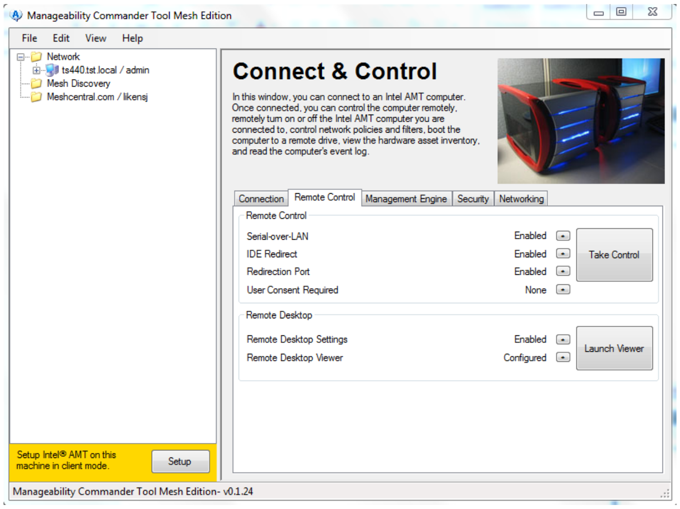
Setup Intel® AMT on this machine in client mode.

Manageability Commander Tool Mesh Edition- v0.1.24

3. After the connection is made, select the remote control tab and click the arrows to open options for the remote control or KVM settings.

Click OK and from the main window select "KVM Viewer Standard Port" to test and make sure the connection can be made.

A new window will open with the remote computer in the window.



Connect & Control

In this window, you can connect to an Intel AMT computer. Once connected, you can control the computer remotely, remotely turn on or off the Intel AMT computer you are connected to, control network policies and filters, boot the computer to a remote drive, view the hardware asset inventory, and read the computer's event log.

Remote Control

Serial-over-LAN Enabled
IDE Redirect Enabled
Redirection Port Enabled
User Consent Required None

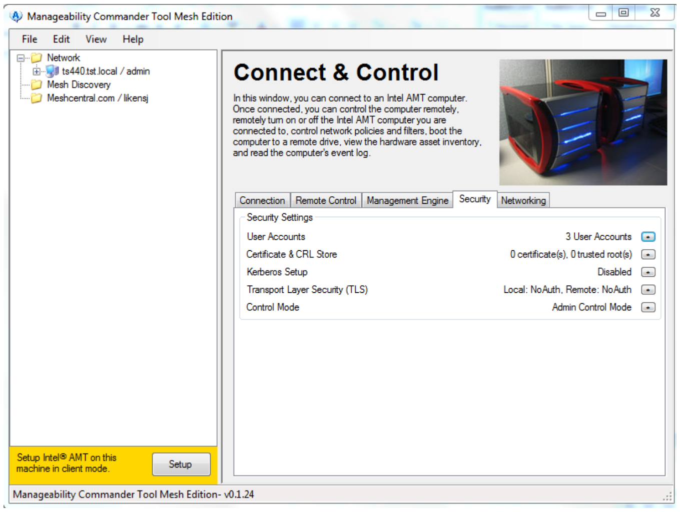
Remote Desktop

Remote Desktop Settings Enabled
Remote Desktop Viewer Configured

Setup Intel® AMT on this machine in client mode.

Manageability Commander Tool Mesh Edition- v0.1.24

4. The Security tab allows you to view and manage user accounts as well as certificates and other setup and configuration features.

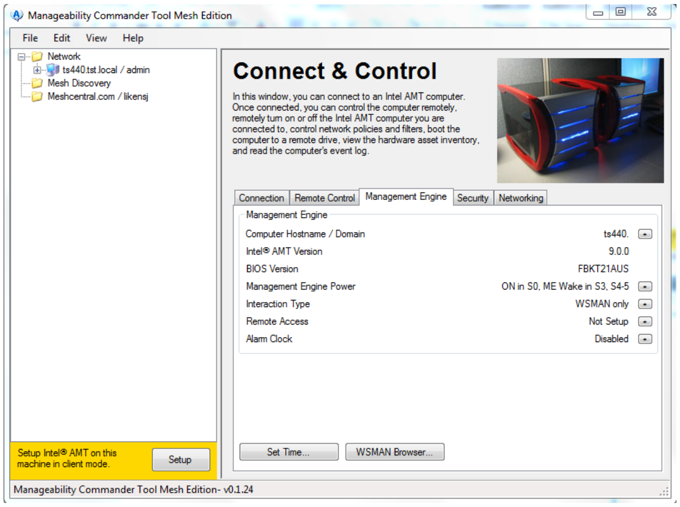

Manageability Commander Tool Mesh Edition
File
Edit
View
Help
Network
ts440.tst.local / admin
Mesh Discovery
Meshcentral.com / likensj
Setup Intel® AMT on this machine in client mode.
Setup
Connect & Control
Connection
Remote Control
Management Engine
Security
Networking
Manageability Commander Tool Mesh Edition- v0.1.24

In this window, you can connect to an Intel AMT computer. Once connected, you can control the computer remotely, remotely turn on or off the Intel AMT computer you are connected to, control network policies and filters, boot the computer to a remote drive, view the hardware asset inventory, and read the computer's event log.

Security Settings

User Accounts	3 User Accounts
Certificate & CRL Store	0 certificate(s), 0 trusted root(s)
Kerberos Setup	Disabled
Transport Layer Security (TLS)	Local: NoAuth, Remote: NoAuth
Control Mode	Admin Control Mode

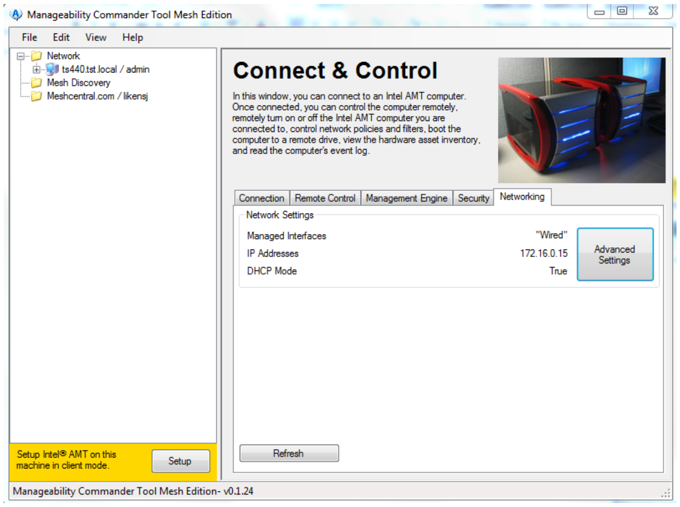
5. From the “Management Engine” tab and the “Networking” tab, AMT settings for the server can be viewed or changed.



In this window, you can connect to an Intel AMT computer. Once connected, you can control the computer remotely, remotely turn on or off the Intel AMT computer you are connected to, control network policies and filters, boot the computer to a remote drive, view the hardware asset inventory, and read the computer's event log.

Management Engine

Computer Hostname / Domain	ts440.
Intel® AMT Version	9.0.0
BIOS Version	FBKT21AUS
Management Engine Power	ON in S0, ME Wake in S3, S4-5
Interaction Type	WSMAN only
Remote Access	Not Setup
Alarm Clock	Disabled

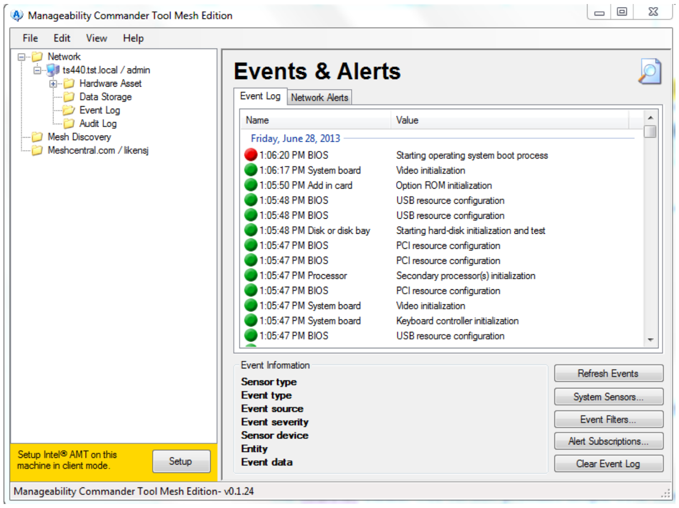


In this window, you can connect to an Intel AMT computer. Once connected, you can control the computer remotely, remotely turn on or off the Intel AMT computer you are connected to, control network policies and filters, boot the computer to a remote drive, view the hardware asset inventory, and read the computer's event log.

Network Settings

Managed Interfaces	"Wired"
IP Addresses	172.16.0.15
DHCP Mode	True

6. Expanding the tree under the managed system enables one to see hardware asset and status information as well as the event log.



Events & Alerts

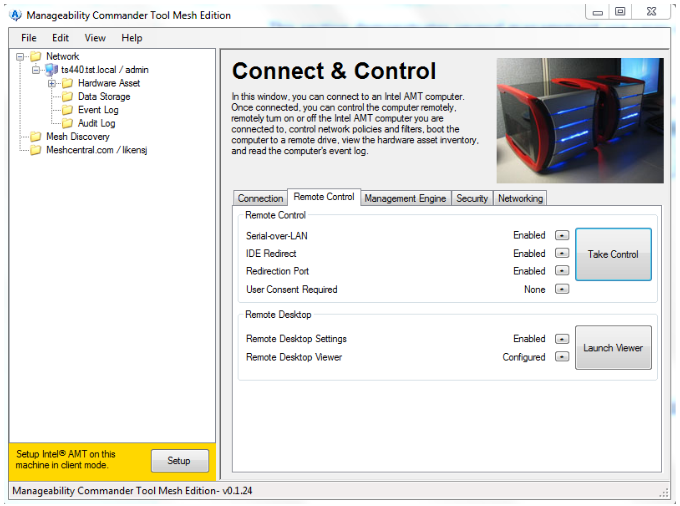
Name	Value
Friday, June 28, 2013	
🟥 1:06:20 PM BIOS	Starting operating system boot process
🟩 1:06:17 PM System board	Video initialization
🟩 1:05:50 PM Add in card	Option ROM initialization
🟩 1:05:48 PM BIOS	USB resource configuration
🟩 1:05:48 PM BIOS	USB resource configuration
🟩 1:05:48 PM Disk or disk bay	Starting hard-disk initialization and test
🟩 1:05:47 PM BIOS	PCI resource configuration
🟩 1:05:47 PM BIOS	PCI resource configuration
🟩 1:05:47 PM Processor	Secondary processor(s) initialization
🟩 1:05:47 PM BIOS	PCI resource configuration
🟩 1:05:47 PM System board	Video initialization
🟩 1:05:47 PM System board	Keyboard controller initialization
🟩 1:05:47 PM BIOS	USB resource configuration

Event Information

Sensor type
Event type
Event source
Event severity
Sensor device
Entity
Event data

Manageability Commander Tool Mesh Edition- v0.1.24

7. The Serial Over LAN (SOL) capability can be demonstrated by clicking Remote Control with SOL Terminal Tool.



Connect & Control

In this window, you can connect to an Intel AMT computer. Once connected, you can control the computer remotely, remotely turn on or off the Intel AMT computer you are connected to, control network policies and filters, boot the computer to a remote drive, view the hardware asset inventory, and read the computer's event log.

Remote Control

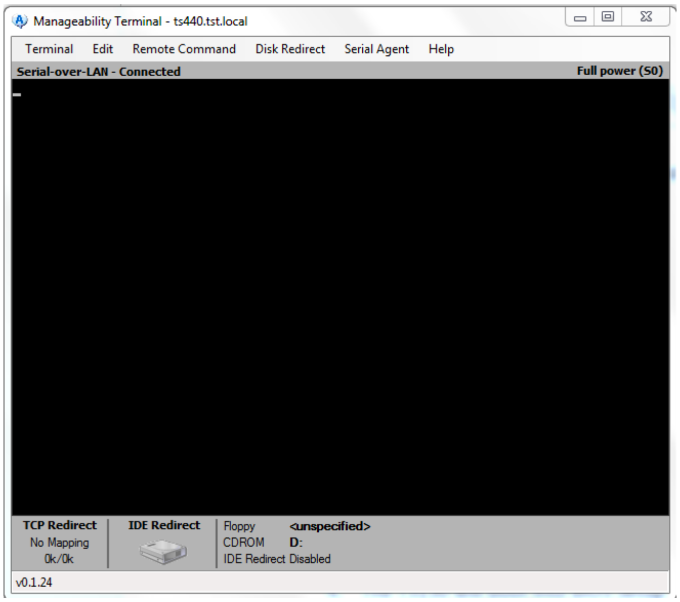
Serial-over-LAN	Enabled
IDE Redirect	Enabled
Redirection Port	Enabled
User Consent Required	None

Remote Desktop

Remote Desktop Settings	Enabled
Remote Desktop Viewer	Configured

Manageability Commander Tool Mesh Edition- v0.1.24

8. BIOS settings can be changed by selecting "Remote Reboot to BIOS Setup" from the Remote Command menu.



Serial-over-LAN - Connected **Full power (S0)**

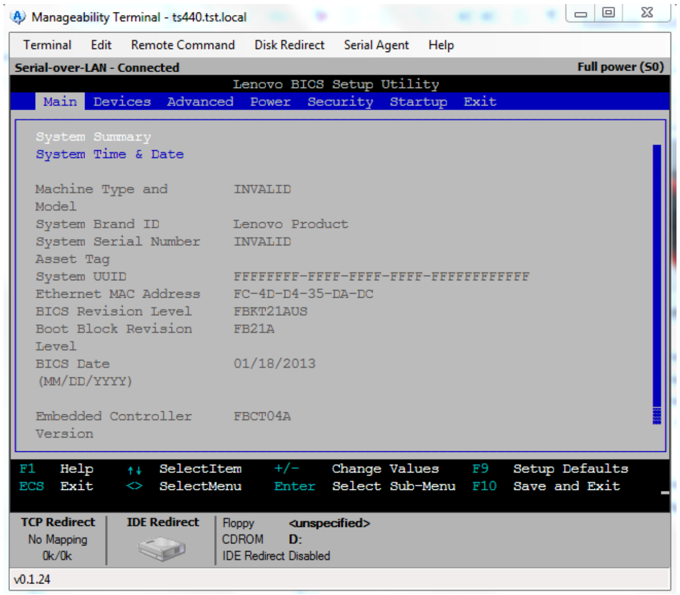
No Mapping
0k/0k

Floppy	<unspecified>
CDROM	D:

IDE Redirect Disabled

v0.1.24

9. The server will boot into BIOS Setup Utility from which settings can be changed and saved.


Manageability Terminal - ts440.tst.local
Terminal Edit Remote Command Disk Redirect Serial Agent Help
TCP Redirect
IDE Redirect
v0.1.24

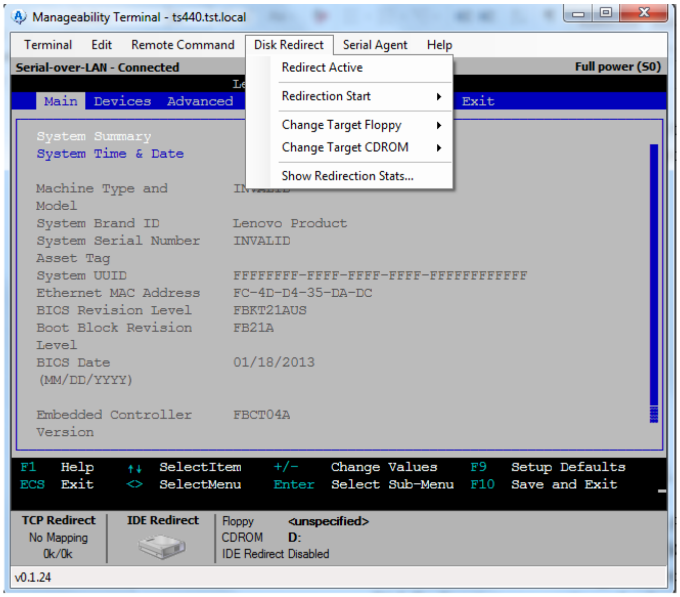
```
Serial-over-LAN - Connected                                    Full power (S0)
                         Lenovo BIOS Setup Utility
   Main  Devices  Advanced  Power  Security  Startup  Exit

  System Summary
  System Time & Date

  Machine Type and          INVALID
  Model
  System Brand ID           Lenovo Product
  System Serial Number      INVALID
  Asset Tag
  System UUID               FFFFFFFF-FFFF-FFFF-FFFF-FFFFFFFFFFFF
  Ethernet MAC Address      FC-4D-D4-35-DA-DC
  BIOS Revision Level       FBKT21AUS
  Boot Block Revision       FB21A
  Level
  BIOS Date                 01/18/2013
  (MM/DD/YYYY)

  Embedded Controller       FBCT04A
  Version

F1   Help   ↑↓  SelectItem   +/-    Change Values     F9   Setup Defaults
ECS  Exit   <>  SelectMenu   Enter  Select Sub-Menu   F10  Save and Exit
```

```
TCP Redirect   IDE Redirect   Floppy   <unspecified>
No Mapping                    CDROM    D:
0k/0k                         IDE Redirect Disabled
```

10. IDE Redirection can also be demonstrated from within the Manageability Terminal tool.

    Select Disk Redirect menu, Change Target CD-ROM, Redirect to Image File and point to a previously created ISO file that contains the boot image. Select the Disk Redirect menu again and select Redirect Active.

    Boot the server from the redirected CD-ROM. Select Remote Command, "Remote Reboot to Redirect CD." In the KVM viewer the progress of the reboot can be seen. From the KVM viewer, the system can be controlled.


Manageability Terminal - ts440.tst.local
Terminal Edit Remote Command Disk Redirect Serial Agent Help
Redirect Active
Redirection Start
Change Target Floppy
Change Target CDROM
Show Redirection Stats...
TCP Redirect
IDE Redirect
v0.1.24

```
Serial-over-LAN - Connected                                    Full power (S0)
   Main  Devices  Advanced                              Exit

  System Summary
  System Time & Date

  Machine Type and          INVALID
  Model
  System Brand ID           Lenovo Product
  System Serial Number      INVALID
  Asset Tag
  System UUID               FFFFFFFF-FFFF-FFFF-FFFF-FFFFFFFFFFFF
  Ethernet MAC Address      FC-4D-D4-35-DA-DC
  BIOS Revision Level       FBKT21AUS
  Boot Block Revision       FB21A
  Level
  BIOS Date                 01/18/2013
  (MM/DD/YYYY)

  Embedded Controller       FBCT04A
  Version

F1   Help   ↑↓  SelectItem   +/-    Change Values     F9   Setup Defaults
ECS  Exit   <>  SelectMenu   Enter  Select Sub-Menu   F10  Save and Exit
```

```
TCP Redirect   IDE Redirect   Floppy   <unspecified>
No Mapping                    CDROM    D:
0k/0k                         IDE Redirect Disabled
```

Conclusion

Intel's AMT technology is a capable management subsystem well suited to the management of the ThinkServer TS class of servers. Broad industry support exists for managing systems with AMT. This paper has demonstrated the management capabilities provided by AMT and how they can enable an IT administrator to effectively manage and support the ThinkServer TS family of servers.

Appendices

Password Guidelines

Characters allowed are 7 bit ASCII characters in the range of 32 to 126 decimal for user name and password.

Password Length: At least 8 characters, and no more than 32.

Password Complexity: Password must include the following:

- At least one digit character (‘0’, ‘1’, … ‘9’)
- At least one 7-bit ASCII non alpha-numeric character (e.g. '!', '$', ';'), but excluding ‘:’, ‘,’ and ‘”’, '<', '>', '&', and space.
- At least one lower-case letter ('a', ‘b’…’z’) and at least one upper case letter ('A', ‘B’…'Z').

Table of Settings used in this Paper

ME General Settings

FW Update Settings: Local FW Update = Enabled

Power Control: Intel ME ON in Host Sleep States = Desktop On in S0, ME Wake in S3, S4-5

Power Control: Idle Timeout = 65535

AMT Configuration Settings

Manageability Feature Selection = Enabled

SOL/IDER/KVM: Username and Password = Enabled

SOL/IDER/KVM: SOL = Enabled

SOL/IDER/KVM: IDER = Enabled

SOL/IDER/KVM: Legacy Redirection Mode = Disabled

SOL/IDER/KVM: KVM = Enabled

User Consent: User Opt-in = None

User Consent: Opt-in Configurable from Remote IT = Enable Remote control of KVM Opt-in Policy

Password Policy = Anytime

Network Setup: Intel ME Network Name Settings: Host Name =

Network Setup: Intel ME Network Name Settings: Domain Name =

Network Setup: Intel ME Network Name Settings: Shared/Dedicated FQDN = Shared

Network Setup: Intel ME Network Name Settings: Dynamic DNS Update = Disabled

Network Setup: TCP/IP Settings:Wired LAN IPV4 Configuration: DHCP Mode = Enabled

Network Setup: TCP/IP Settings: Wired LAN IPV6 Configuration: IPV6 Feature Selection = Disabled

Configure Network Access = Configured

Remote Setup and Configuration: Current Provisioning Mode: PKI

Remote Setup and Configuration: Provisioning Record = not present

Links to AMT management consoles given as examples in this paper

Intel Manageability Commander Toolkit:

http://software.intel.com/en-us/articles/download-the-latest-version-of-manageability-developer-tool-kit

Intel SCS:

http://www.intel.com/content/www/us/en/software/setup-configuration-software.html

RealVNC:

http://www.realvnc.com/

Other AMT Resources

AMT Provisioning:

http://communities.intel.com/docs/DOC-3811

Intel vPro Software:

http://communities.intel.com/docs/DOC-1171

WS-MAN for use with AMT:

http://software.intel.com/en-us/articles/ws-management-and-intel-active-management-technology-a-primer/