

vPro Setup and Configuration for the dc7700 Business PC with Intel vPro Technology



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Introduction

The HP Compaq dc7700p Business PC uses Intel vPro technology to simplify PC management and reduce IT-related expenditures. Intel vPro technology is a combination of Active Management Technology (AMT) and Intel Virtualization Technology (VT), which allows for improved management of PC systems and enhanced security. This white paper assumes some basic knowledge of Intel AMT and Intel VT.

AMT provides Out-of-Band (OOB) remote access to a system regardless of the system power state or operating system condition as long as the system is connected to a power source and a network. AMT is a hardware and firmware platform resident solution relying upon the Management Engine (ME) within the Intel Q965 GMCH chipset.

HP Compaq dc7700p Business PCs initially shipped with AMT 2.0. AMT 2.1 is an important update that provides support for the Microsoft Vista operating system as well as power efficiencies. HP has updated this white paper to include the new features of AMT 2.1.

Please refer to www.hp.com for other white papers and technical information regarding new HP Compaq dc7700p Business PCs and new Intel vPro technology.

AMT Setup and Configuration

AMT must be set up and configured in a system before use. AMT setup sets up the system for AMT mode and enables network connectivity. This setup is generally performed only once in the lifetime of a system. When AMT is enabled, it can be discovered by management software over a network.

AMT Setup can be accomplished in one of two modes:

- Small Medium Business (SMB) mode
- Enterprise mode (default)

AMT Configuration sets up all other AMT options not covered in AMT Setup, such as enabling the system for Serial-Over-LAN (SOL) or IDE-Redirect (IDE-R). Settings modified in the configuration phase can be changed many times over the course of a system's life span. Changes can be made to the system locally or through a management console.

AMT System Phases

An AMT system can be in one of three phases in regards to its current stage of AMT Setup and Configuration, as follows:

- Factory
- In-Setup
- Operational

The Factory phase is the initial stage in which the system has been built from the factory and no AMT Setup and Configuration has been done. The only way to access AMT in Factory phase is through the MEBx. This phase will end for SMB mode systems after changing the default password. Enterprise mode systems also require that you set the Provisioning ID (PID) and Provisioning Passphrase (PPS).



The In-Setup phase is the next stage and is where most AMT options are set. This can be a manual or automated procedure with a Setup and Configuration Server.

The Operational phase is the final stage in which AMT is fully setup and configured in the system and ready for normal use.

SMB Mode - AMT Setup and Configuration with MEBx

SMB mode is for customers who do not have ISV management consoles, or the necessary network and security infrastructures to use encrypted Transport Layer Security (TLS). SMB mode AMT set up and configuration is a manual process done through the Intel ME BIOS Extension (MEBx).

SMB mode is the easiest to implement since it does not require much infrastructure, but is the least secure since all network traffic is not encrypted. HP recommends using this process only in a closed network.

NOTE: The MEBx is an option ROM module that is provided to HP by Intel to be included in the HP system BIOS. The MEBx is not HP-specific and contains options that are not used by HP. If an option is not used by HP, ignore it and do not modify from its default state.

Password Guidelines

MEBx passwords must meet minimum criteria. These restrictions are enforced by the MEBx to reduce vulnerability of passwords to a dictionary attack.

Passwords must:

- Be between 8 and 32 characters long.
- Contain both upper and lower case Latin characters (e.g. A, a, B, b).
- Have at least one digit character (e.g. 0, 1, 2, ... 9).
- Have at least one 7-bit ASCII non-alphanumeric character with an ASCII value between 33d and 126d that is not part of the invalid character list below.

Examples of valid characters include:

- Exclamation !
- At @
- Number #
- Dollar \$
- Percent %
- Caret ^
- Asterisk *

The underscore '_' is considered alpha-numeric.

The following characters are not allowed:

- Quotation mark "
- Apostrophe '
- Comma ,



- Greater than >
- Less than <
- Colon :
- Ampersand &
- Space

BIOS Prerequisite

This white paper is for use with HP Compaq dc7700p Business PCs. For best performance and to take advantage of AMT 2.1 features, insure the PCs have a BIOS revision of at least version 2.09 and a ME firmware of at least 2.1.0.1031.

You must update the system BIOS and the ME firmware individually. Updating the ME firmware will clear AMT settings and the system will have to be set up and configured again.

For information about upgrading an HP dc7700p Business PC from AMT 2.0 to AMT 2.1, see the *HP Compaq Business PC with vPro Technology AMT 2.1 Firmware Update* white paper, which includes detailed instructions about how to update the system BIOS and ME firmware. This white paper is available at www.hp.com.

SMB Mode - AMT Setup and Configuration Steps

When going through the options in the MEBx for the first time (Factory phase), the default settings are in place. This white paper details HP-recommended settings for options, some of which may be the same as the default selection. Even though the default setting is set and used for certain options, it is good practice to double-check important options.

1. Press **Ctrl-P** during POST to enter Manageability Engine BIOS Extension (MEBx) Setup. You can display this option only during POST if set in F10-Setup.

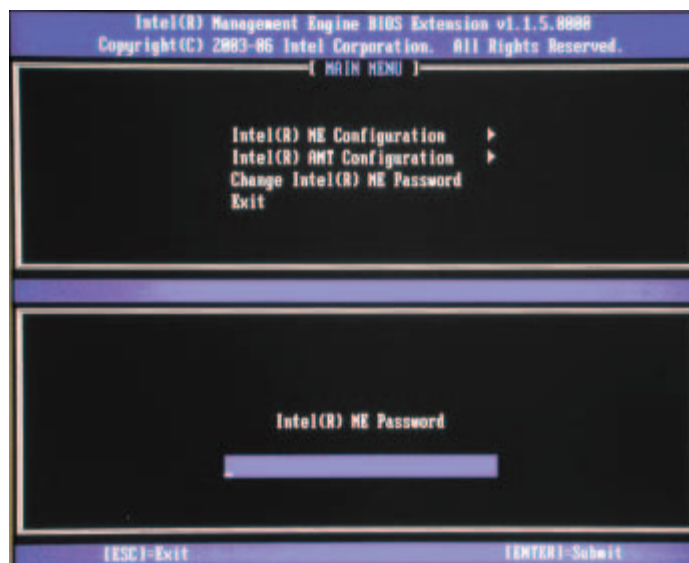


Figure 1 Intel MEBx Password Screen

2. Type the default password, which is **admin**. Passwords are case-sensitive.
NOTE: You must change the default password before making changes to the MEBx options.
3. Change the MEBx password. The new password must meet the Strong Password criteria defined in the Password Guidelines Section. Type the password twice for verification.
 Change the password to establish AMT ownership. The system will go from Factory phase to In-Setup phase. The ME and AMT options within the MEBx are accessible and you can access the system using the AMT WebGUI.
4. Select the Intel ME Platform Configuration. A window displays indicating that the system resets after configuration.
5. Select **Y**. ME platform configuration allows IT personnel to configure ME features such as AMT/ASF selection, power options, firmware update capabilities, and so on.



Figure 2 Intel ME Platform Configuration screen

6. Select **Intel ME State Control**, and then select **Enabled**.
 Default Setting = Enabled, Recommended Setting = Enabled
 This option enables or disables the ME and is used for diagnostic purposes. If there is a problem that affects the ME, it can be removed from the system to eliminate it from the suspect list until root cause is found.
 Note that if the ME is disabled, then all AMT and ASF functions are also disabled. The system will not be remotely manageable.
7. Select **Intel ME Firmware Local Update Qualifier**, and then select **Always Open**.
 Default Setting = Always Open, Recommended Setting = Always Open
 This option sets the policy on allowing the MEBx to be updated locally. By default, the system BIOS allows for an unlimited number of local ME firmware updates. However, the administrator can modify the local update setting with this ME firmware Local Update Qualifier.

"Always Open" is the default and allows for as many local updates as the system BIOS allows, which is unlimited.

Choosing **Never Open** or **Restricted** adds the Intel ME Firmware Local Update option, which can be set to Enable or Disable. By default it is Disabled. This option, along with the Qualifier, dictates whether ME local updates are allowed. "Never Open" ignores what is set in the system BIOS and follows the Intel ME Firmware Local Update option.

"Restricted" ignores what is set in the system BIOS and allows local ME firmware updates until the ME is configured.

	Never Open	Restricted
ME Firmware Local Update Enabled	Local ME firmware updates allowed.	Local ME firmware updates allowed.
ME Firmware Local Update Disabled	Local ME firmware updates NOT allowed.	Local ME firmware updates allowed only until the ME is configured.

8. Skip **LAN Controller**.

Default Setting = Enabled, Recommended Setting = Enabled

This option enables or disables the Intel 82566DM NIC. If you need to disable the NIC, the ME management mode must be set to **None** before the MEBx allows you to proceed. This ensures that the ME is not in the middle of a transaction when the NIC is disabled. Disabling the NIC will cause the system to lose all remote management capabilities. There is no F10 Setup option to disable the NIC in the HP Compaq dc7700p Business PC. This is a departure from previous HP Compaq systems such as the dc7600.

Note that the HP Compaq dc7700 Business PC with ASF does have the NIC disable option in F10 and not in the MEBx.

9. Select **Intel ME Features Control**.

a. Select **Manageability Feature Selection**.

Default Setting = Intel AMT, Recommended Setting = Intel AMT

This option sets the platform management mode: None, Intel AMT, or ASF.

By default, HP Compaq dc7700p Business PCs are set to **Intel AMT**, and ASF is an available option. HP Compaq dc7700 Business PCs are locked to ASF and cannot be changed to AMT. The **None** option is also available to HP Compaq dc7700 Business PCs.

Note that setting the **None** option will disable all remote management capabilities.

i. Select **Intel AMT**.

ii. Select **Return to previous menu**.





Figure 3 Intel ME Features Control Screen with AMT selected

b. Skip **Intel Quiet Systems Technology**.

Default Setting = Disabled, Recommended Setting = Disabled

Intel Quiet System Technology is used for fan speed control. It is not used on the HP Compaq dc7700 systems because the HP system BIOS already implements excellent fan speed controls.

c. Select **Return to the previous menu**.

10. Select Intel ME Power Control.



Figure 4 Intel ME Power Control Screen

a. **Select ME State upon Initial Power-On**, and then select **On**.

Default Setting = Off, Recommended Setting = On

This option sets the behavior of the ME when the system comes out of a G3 state (Mechanical Off - power outage or power cord removed). If set to **ON**, the ME will try to automatically power up the system and obtain memory. Use this option with the ME ON Host Sleep States option.

By default this option is set to **OFF** because of E-Star power regulatory requirements. HP recommends setting this option to **ON** to allow the ME to re-initialize after G3 exit.

If this option is left in the **OFF** state, then remote management capabilities are lost after G3 exit and remain lost until the system has entered the S0 (System On) state.

Table 1: System Behavior after G3 Exit

ME State upon Initial Power-ON	ME ON in Host Sleep State	Host Behavior
On	Always	System will wake after G3 exit
On	Never, S3, S3+S4	System will not wake after G3 exit
Off	Always, Never, S3, S3+S4	System will not wake after G3 exit

b. **Select ME ON in Host Sleep States**, and then select **Always**.

Default Setting = Never, Recommended Setting = Always

This option sets the ME power policy when the system is in a sleep state (Sx).

Table 2: ME Power State During Host Sleep State

ME ON in Host Sleep State	Host Power State	ME Power State
Always	S0	M0
Always	S3, S4, S5	M1
Never	S0	M0
Never	S3, S4, S5	Moff
Standby (S3)	S0	M0
Standby (S3)	S3	M1
Standby (S3)	S4, S5	Moff
Standby (S3) + Hibernate (S4)	S0	M0
Standby (S3) + Hibernate (S4)	S3, S4	M1
Standby (S3) + Hibernate (S4)	S5	Moff

If the settings for steps 10a and 10b are **ON** and **ALWAYS**, the ME will automatically wake the system and obtain system memory after a G3 exit. Steps 10a and 10b work in combination because 10b dictates if the ME is active during S5, which could be the state of the system after G3 exit. If the ME is not active in S5, then it will not try to re-initialize itself after G3 exit.



Systems with **After Power Loss** set to **ON** in F10 BIOS will remain ON and proceed to boot to the operating system. Systems with **After Power Loss** set to OFF in F10 BIOS will shut down after the ME obtains system memory.

This option must be set to **Always** for Wake-On-ME to function.

See [“Appendix B: Power / Sleep / Global States Explained” on page 29](#) for an explanation of sleep/power states and an example reading of the ME Power State During Host Sleep State chart.

See [“Appendix C: Wake-On-ME Explained” on page 30](#) for an explanation of Wake-On-ME.

c. Skip **LAN Power Well**.

Default Setting = WOL_EN Pin, Recommended Setting = WOL_EN Pin

This option defines which power well is connected to the NIC. This option in the HP Compaq dc7700 Business PC is defined by hardware routing and is not subject to firmware or software change.

d. Skip **ME Visual LED Indicator**.

Default Setting = Off, Recommended Setting = Off

This option enables or disables the LED indicator on a system board to indicate an active ME. The purpose of this option is to warn that the ME and memory subsystem is powered and you must remove AC power before removing DIMMs. The HP Compaq dc7700p does not implement the ME LED. There is a separate Vaux LED located next to the DIMM slots that also indicates a powered system board.

e. Select **Return to previous menu**.

11. Return to previous menu to exit the MEBx Setup and save AMT configuration. The system will display an Intel ME Configuration Complete message and reboot.

After the ME Configuration is complete, you can configure the AMT on the next boot.

12. Press **Ctrl-P** during POST to enter MEBx Setup again.
13. Type the MEBx password.

14. Select **Intel AMT Configuration**.



Figure 5 Intel AMT Configuration screen

15. Select **Host Name**, and then type a host name.

Default Setting = IntelAMT, Recommended Setting = User Dependent

NOTES: Spaces are not accepted in the host name. Make sure there is not a duplicate host name on the network. You can use host names in place of the system's IP for any applications requiring the IP address.

16. Select **TCP/IP**.

a. Select **Disable Network Interface**, and then select **N**.

Default Setting = Network Interface Enabled, Recommended Setting = Network Interface Enabled

If the network is disabled, then all remote AMT capabilities are disabled and TCP/IP settings are not necessary.

This option is a toggle, and the next time you access it you are prompted with the opposite setting.

b. Select **DHCP Disable**, and then select **Y**.

Default Setting = DHCP Enabled, Recommended Setting = User Dependent

You can use DHCP if it is available. If you use DHCP, then steps 16c through 16g are not necessary. Otherwise, the system administrator will have to configure TCP/IP settings.

For the purpose of this white paper, DHCP is disabled so steps 16c through 16g can be illustrated. Step h will appear for both DHCP and Static configurations.

- c. Select **IP Address**, and then type a static address.

Default Setting = 10.0.0.2, Recommended Setting = Network Dependent

Example: 192.168.0.1

Make sure all AMT systems have a unique static IP address if more than one system is on the same network. Multiple systems sharing the same static IP address can lead to network collisions, which will cause the systems to not respond correctly.

- d. Select **Subnet Mask**, and then type a subnet mask.

Default Setting = 255.255.255.0, Recommended Setting = Network Dependent

Example: 255.255.255.0

- e. Select **Default Gateway Address**, and then accept the default and press **Enter**.

Default Setting = 0.0.0.0, Recommended Setting = Network Dependent,

Leave as 0.0.0.0 if this option is not needed.

- f. Select **Preferred DNS Address**, and then accept the default value and press **Enter**.

Default Setting = 0.0.0.0, Recommended Setting = Network Dependent

Leave as 0.0.0.0 if this option is not needed.

- g. Select **Alternate DNS Address**, and then accept the default value and press **Enter**.

Default Setting = 0.0.0.0, Recommended Setting = Network Dependent

Leave as 0.0.0.0 if this option is not needed.

- h. Select **Domain Name**, and then type a domain name

Default Setting = none, Recommended Setting = Network Dependent

The domain name is blank by default. If not populated, then the default domain of "Provisionserver" is used when connecting to a Setup and Configuration Server.

If the name of the S&CS is not "Provisionserver" and the domain name is blank, then an alias must be set up in the DHCP server to redirect the connection for "Provisionserver" to the proper S&CS domain name.

If the **Domain Name** field is populated, that is the domain used. However, if there is no response after four DNS queries to the named domain, then that domain name is no longer used and the default "Provisionserver" is used.

17. Skip **Provisioning Server**.

Default Setting = 0.0.0.0, Recommended Setting = Network Dependent

This option is used in Enterprise mode when an Intel AMT Setup and Configuration (Provisioning) server is available. This option disappears once SMB mode is set in step 18.



18. Select Provision Model.

- a. Change to **Intel AMT 1.0 Mode**, and then select **N**.

Default Setting = Intel AMT 2.0 Mode, Recommended Setting = Intel AMT 2.0 Mode

This option is a toggle, and the next time you access it you are prompted with the opposite setting.

- b. Change to **Small Business**, and then select **Y**.

Default Setting = Enterprise, Recommended Setting = SMB

This option is a toggle, and the next time you access it you are prompted with the opposite setting.

Notice that the Provisioning Server, Set PID and PPS, and Set PRTC options are no longer available once the system is in Small Business mode. These options are used in Enterprise Mode.

- c. Select **Return to previous menu**.

19. Skip Un-Provision. This option returns the system to factory defaults. See [“Return to Default” on page 23](#) for more information about unprovisioning.

20. Skip VLAN.

Default Setting = Disabled, Recommended Setting = User Dependent

This option enables or disables VLAN support. If VLAN is enabled, then you must provide the VLAN tag (label) (1-4094).

VLAN support is not necessary for AMT or Virtual Appliances. If enabled, it allows the grouping of systems from different networks into one virtual network.

21. Select SOL/IDE-R.

- a. Select **Y** in the message window.

- b. Select **Username and Password**, and then select **Enabled**.

Default Setting = Enabled, Recommended Setting = Enabled

This option allows users and passwords to be added from the WebGUI. If the option is disabled, then only the administrator has MEBx remote access.

- c. Select **Serial Over LAN**, and then select **Enabled**.

Default Setting = Enabled, Recommended Setting = Enabled

This option enables/disables Serial Over LAN (SOL) functionality.

- d. Select **IDE Redirection**, and then select **Enabled**.

Default Setting = Enabled, Recommended Setting = Enabled

This option enables/disables IDE Redirection (IDE-R) functionality.

22. Select Remote Firmware Update, and then select Enabled.

Default Setting = Enabled, Recommended Setting = Enabled

This option enables/disables the ability to remotely update the ME firmware.



23. Select **Idle Timeout**.

Default Setting = 0x1, Recommended Setting = 0x1

This option sets the timeout value for Wake-On-ME.

The default timeout value is 0x1 from the factory, but 0x0 if CMOS is cleared. A value of 0x0 means the Wake-On-ME feature is disabled and the ME will not go to sleep when not being used in a non-active system. HP recommends a setting of 0x1, which allows the ME to go to sleep after 1 minute of inactivity.

The timeout value can be set in both decimal and hexadecimal notation and is in units of minutes. It must be set to a non-zero value for the ME to take advantage of Wake-On-ME. Hexadecimal settings are preceded by a "0x", so one minute is "0x1".

This value is not used when the system is in an active state - S0.

This value is used only if the ME On in Host Sleep State setting is set to Always. See ["Appendix C: Wake-On-ME Explained" on page 30](#) for an explanation of Wake-On-ME.

24. Select **Return to previous menu**.

25. Select **Exit**, and then select **Y** to exit the MEBx Setup and save settings.

The system displays an Intel ME Configuration Complete message, and then the system reboots.

After the system reboots, it changes from In-Setup phase to Operational phase, and AMT is fully operational. Once in Operational phase, you can remotely manage the system through the Intel AMT WebGui or ISV remote console and you can provide the system to the end-user for regular use.

After an AMT system is configured, it displays its status and shows that the AMT tables are valid on every boot.

```
Intel(R) Management Engine BIOS Extension v1.1.5.0000
Copyright(C) 2003-06 Intel Corporation. All Rights Reserved.

Intel(R) AMT enabled - Firmware version 2.0.0.1067
Intel(R) AMT is configured and running
Inventory Update

Field Replaceable Unit List:
  Intel(R) AMT Table Valid

Media List:
  Intel(R) AMT Table Valid

SMBIOS Table:
  Intel(R) AMT Table Valid

ASF Table:
  Intel(R) AMT Table Valid

Intel(R) ME Configuration Complete
```

Figure 6 Intel AMT Enabled and Configured - ME configuration complete

Intel AMT WebGUI

The Intel AMT WebGUI is a Web browser-based interface for limited remote system management.

The WebGUI is often used as a test to determine if AMT Setup and Configuration was performed properly on a system. A successful remote connection between a remote system and the host system running the WebGUI indicates proper AMT Setup and Configuration on the remote system.

The AMT WebGUI is accessible from the following Web Browsers:

- Microsoft Internet Explorer 6 SP1 or newer
- Netscape Navigator 7.1 or newer
- Mozilla Firefox 1.0 or newer
- Mozilla 1.7 or newer

Limited remote system management includes:

- Hardware inventory
- Event logging
- Remote system reset
- Changing of network settings
- Addition of new users and passwords
- Updating ME firmware

WebGUI support is enabled by default for SMB Setup and Configured systems. WebGUI support for Enterprise Setup and Configured systems is determined by the Setup and Configuration Server.

Connecting with the Intel AMT WebGUI - SMB Example

1. Power on an AMT system that has completed AMT Setup and Configuration.
2. Execute a Web browser from a separate system - a Management computer on the same subnet as the AMT computer.
3. Connect to the IP address specified in the MEBx and port of the AMT system.
 - a. By default, the port is 16992.
 - b. If DHCP was used, then use the Fully Qualified Domain Name (FQDN) for the ME. The FQDN is the combination of the hostname and domain.

Example A: `http://192.168.0.1:16992`

Example B: `http://intelamt.intel.com:16992`

The Management computer makes a TCP connection to the AMT system and accesses the top level AMT-embedded Web page within the Management Engine of the AMT system.



4. Type the user name and password. The default username is **admin** and the password is what you set during AMT Setup in the MEBx.

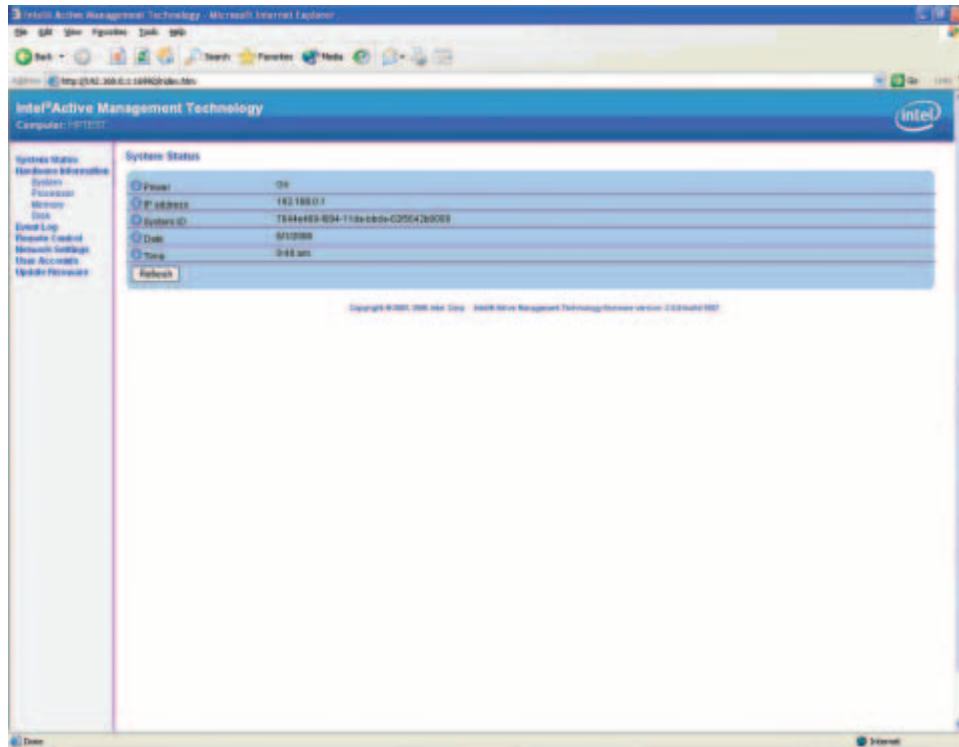


Figure 7 Intel AMT WebGUI Screen

5. Review system information and/or make any necessary changes.

NOTE: You can change the MEBx password for the remote system in the WebGUI.

Changing the password in the WebGUI or a remote console results in two passwords. The new password, known as the “remote” MEBx password, only works remotely with the WebGUI or remote console. The local MEBx password used to locally access the MEBx is not changed. The user has to remember both local and remote MEBx passwords to access the system MEBx locally and remotely.

When the MEBx password is initially set in AMT Setup, the password serves as both the local and remote password. If the remote password is changed, then the passwords are out of sync.

The remote MEBx password must follow the criteria defined in the Password Guideline section for a strong password.

6. Select **Exit**.

Enterprise Mode Setup and Configuration

Enterprise mode (for large corporate customers) requires a Setup and Configuration Server (S&CS). A S&CS runs an application over a network that performs AMT set up and configuration. The S&CS is also known as a Provisioning Server as seen in the MEBx. The act of setting up and configuring the AMT is also known as “provisioning.” An S&CS is typically provided by ISVs and is contained within the ISV management console product. Consult with your management console supplier for more information.

Enterprise Mode - AMT Setup and Configuration Steps

The AMT Setup portion for Enterprise mode is the same as SMB mode. Repeat Steps 1 through 15 to perform AMT Setup. This will take the system from Factory Mode to In Setup Mode.

Refer to [“SMB Mode - AMT Setup and Configuration with MEBx” on page 3](#) for examples of MEBx menus and full text. The following are quick steps for AMT Setup:

1. Access the MEBx by pressing **Ctrl-P** during POST.
2. Type the default password, which is **admin**.
3. Change the MEBx password, following strong password guidelines.
4. Select **Intel ME Platform Configuration**.
5. In **Intel ME State Control**, select **Enabled**.
6. In **Intel ME Firmware Local Update Qualifier**, select **Always Open**.
7. Skip **LAN Controller**.
8. Select **Intel ME Features Control**.
 - a. In **Manageability Features Selection**, select **Intel AMT**.
 - b. Skip **Intel Quiet Systems Technology**.
9. Select **Intel ME Power Control**.
 - a. Select **ME State upon Initial Power-On**, and then select **On**.
 - b. Select **ME ON in Host Sleep States**, and then select **Always**.
 - c. Skip **LAN Power Well**.
 - d. Skip **ME Visual LED indicator**.
10. Select **Exit and save**. The system displays the Intel ME Configuration Complete message, and then reboots.

After the system reboots, starting with Step 11 you will set some of the options differently than SMB mode.
11. Press **Ctrl-P** during POST to enter MEBx Setup again.
12. Type the MEBx password.

13. Select **Intel AMT Configuration**. The Intel AMT Configuration screen includes numerous options, which are available by scrolling down the menu.



Figure 8 Intel AMT Configuration Screen



Figure 9 Intel AMT Configuration Screen Continued

14. Select **Host Name**, and then type a host name
Default Setting = IntelAMT, Recommended Setting = User Dependent
Spaces are not accepted in the host name.

15. Select TCP/IP.

- a. Select **Disabling Network Interface**, and then select **N**.

Default Setting = Network Interface Enabled, Recommended Setting = Network Interface Enabled

If network is disabled, then all remote AMT capabilities are disabled and TCP/IP settings will not be necessary. This option is a toggle, and the next time you access it you are prompted with the opposite setting.

- b. Select **DHCP Disable**, and then select **N**.

Default Setting = DHCP Enabled, Recommended Setting = User Dependent

For the purpose of this white paper, DHCP is enabled.

16. Select Provisioning Server.

- a. Type the **Provisioning Server IP**.

Default Setting = 0.0.0.0, Recommended Setting = Network Dependent

- b. Type the **Port**.

Default Setting = 9971, Recommended Setting = S&CS Dependent

This option is used in Enterprise mode when an Intel AMT Setup and Configuration (Provisioning) Server is available. It points to the IP address of the S&CS.

If the IP and port are left as the default, the ME looks for **ProvisionServer** on DNS at port 9971.

Some ISV's may require additional settings, such as the SC&S port number and SC&S IP address. Contact your Management Console ISV for more details.

17. Select Provision Model.

- a. Change to **Intel AMT 1.0 Mode**, and then select **N**.

Default Setting = Intel AMT 2.0 Mode, Recommended Setting = Intel AMT 2.0 Mode

- b. Change to **Small Business**, and then select **N**.

Default Setting = Enterprise, Recommended Setting = Enterprise

- c. Select **Return to previous menu**.

18. Select Set PID and PPS.

Default Setting = None, Recommended Setting = System Dependent

This option is for Provisioning ID (PID) and Provisioning Passphrase (PPS) entry. PIDs are 8 characters and PPS are 32 characters. There are dashes between every set of 4 characters, so including dashes, PIDs are 9 characters and PPS are 40 characters. An S&CS must generate these entries.

The Admin Password, PID, and PPS can be pre-populated by HP during manufacturing. See the OEM TLS-PSK section for details.

- 19. Skip Un-Provision.** This option returns the system to factory defaults. See the Return to Default section for more information about unprovisioning.



20. Skip VLAN.

Default Setting = Disabled, Recommended Setting = User Dependent

This option enables or disables VLAN support. If VLAN is enabled, then the VLAN tag must be provided (1-4094).

21. Select **SOL/IDE-R**, and then select **Y**.

a. A message window indicates that the system resets after configuration.

b. Select **Username and Password**, and then select **Enabled**.

Default Setting = Enabled, Recommended Setting = Enabled

This option allows you to add users and passwords from the WebGUI. If the option is disabled, then only the administrator has MEBx remote access.

c. Select **Serial Over LAN**, and then select **Enabled**.

Default Setting = Enabled, Recommended Setting = Enabled

d. Select **IDE Redirection**, and then select **Enabled**.

Default Setting = Enabled, Recommended Setting = Enabled

22. Select **Remote Firmware Update**, and then select **Enabled**.

Default Setting = Enabled, Recommended Setting = Enabled

This option enables or disables the ability to remotely update the ME firmware.

23. Skip **Set PRTC**.

Default Setting = None, Recommended Setting = Current Date and Time

This option sets the PRTC (Protected Real Time Clock). It is used with TLS mutual authentication, which checks for the client certificate for expiration based on its PRTC. PRTC has a valid date range of 1/1/2004 to 1/4/2021.

24. Select **Idle Timeout**.

Default Setting = 0x1, Recommended Setting = 0x1

This option sets the timeout value for Wake-On-ME.

The default timeout value is 0x1 from the factory, but 0x0 if CMOS is cleared. A value of 0x0 means the Wake-On-ME feature is disabled and the ME will not go to sleep when not being used in a non-active system. HP recommends a setting of 0x1, which allows the ME to go to sleep after 1 minute of inactivity.

The timeout value can be set in both decimal and hexadecimal notation and is in units of minutes. It must be set to a non-zero value for the ME to take advantage of Wake-On-ME. Hexadecimal settings are preceded by a "0x", so one minute is "0x1".

This value is not used when the system is in an active state - S0.

This value is used only if the **ME On in Host Sleep State** setting is set to **Always**.

See "[Appendix C: Wake-On-ME Explained](#)" on page 30 for an explanation of Wake-On-ME.

25. Select **Return to previous menu**.



26. Select **Exit**, and then select **Y** to exit the MEBx Setup and save settings. The system displays an Intel ME Configuration Complete message and reboots.
27. Turn off the system and remove power. The system is now in In-Setup Mode and is ready for deployment.
28. Plug the system into a power source and connect the network. Use the integrated Intel 82566DM NIC. Intel AMT does not work with any other NIC solution.

When power is reapplied to the system, the system immediately looks for a Setup and Configuration Server. If the system finds this server, the AMT system will send a "Hello" message to the server.

DHCP and DNS must be available for the Setup and Configuration Server search to automatically succeed. If DHCP and DNS are not available, then the Setup and Configuration Server's IP address must be manually entered into the AMT system's MEBx.

The "Hello" message contains the following information:

- PID
- UUID (Universally Unique Identifier)
- IP address
- ROM and firmware version numbers

The "Hello" message is transparent to the end-user. There is no feedback mechanism to tell the user the system is broadcasting the message.

The Setup and Configuration Server uses the information in the "Hello" message to initiate a Transport Layer Security (TLS) connection to the AMT system using a TLS Pre-Shared-Key (PSK) cipher suite if TLS is supported.

The Setup and Configuration server uses the PID to lookup PPS in provisioning server database and uses the PPS and PID to generate TLS Pre-Master Secret. TLS is optional. For secure and encrypted transactions, use TLS if the infrastructure is available. If you do not use TLS, then HTTP Digest will be used for mutual authentication. HTTP Digest is not as secure as TLS.

Setup and Configuration Server logs into AMT system with the user name and password and provisions all required data items:

- New PPS and PID (for future Setup and Configuration)
- TLS certificates
- Private keys
- Current date and time
- HTTP Digest credentials
- HTTP Negotiate credentials

You can set other options depending on S&CS implementation.

The system goes from In-Setup phase to Operational phase, and AMT is fully operational. Once in the Operational phase, you can remotely manage the system and you can provide the system to end-users for regular use.



Setup and Configuration Server Preparation

A Setup and Configuration Server must generate a Provisioning ID (PID) and Provisioning Passphrase (PPS) for each AMT system it will provision. PIDs are 8 characters and PPS are 32 characters. There are dashes between every set of 4 characters, so including dashes, PIDs are 9 characters and PPS are 40 characters. Once these PIDs and PPS are generated, they are added to the Setup and Configuration server's secure PSK (Pre-Shared Key) database. You can transfer this database to another Setup and Configuration server's database.

Provisioning Methods

There are three methods of provisioning a system with Enterprise mode:

- Legacy
- IT TLS-PSK
- OEM TLS-PSK

Legacy

If you want TLS, execute legacy method of AMT set up and configuration on an isolated network separate from the corporate network. An S&CS server requires a secondary network connection to Certification Authority for TLS configuration.

Customers perform legacy AMT set up and configuration. The customer initially receives systems in the Factory phase with AMT disabled. These systems must go through AMT Setup to go from Factory to In-Setup phase. Once the system is in In-Setup phase, the system can continue to be configured manually or be connected to a network where it will connect with an S&CS and begin Enterprise Mode - AMT Configuration.

IT TLS-PSK

IT TLS-PSK AMT Setup and Configuration is usually performed in a company's IT department.

The following are required:

- Setup and Configuration Server
- Network and security infrastructure

AMT systems in the Factory phase are given to the IT department, which is responsible for AMT set up and configuration. The IT department can use any method to enter in AMT setup information, after which the systems will be in Enterprise mode and in the In-Setup phase. An S&CS will need to generate PID and PPS sets.



AMT Configuration must occur over a network. The network can be encrypted using Transport Layer Security Pre-Shared Key (TLS-PSK) protocol. Once the systems connect to an S&CS, Enterprise mode Configuration occurs.

OEM TLS-PSK

OEM TLS-PSK AMT set up and configuration occurs in two stages. The first stage is performed during OEM manufacturing and the second stage at the customer location.

In the first stage, customers purchase systems from HP, which will AMT Setup those systems during manufacturing, bringing them to the In-Setup phase. The new Admin Password, PID, and PSS generated during HP manufacturing are transferred to the customer in a separate and secured fashion. That information, along with the new admin password, is provided to the customer. After manufacturing, the systems are shipped to the customer in the In-Setup state.

Alternatively, the customer can provide HP with their own Administrator password, PID, and PPS to use for the order, which HP will use to bring the systems into the In-Setup phase.

In the second stage, the customer receives the In-Setup systems and the PID, PPS, and password information. The PID, PPS, and password information is integrated into the customer S&CS. The In-Setup systems are then connected to the network and powered on. Enterprise Mode - AMT Configuration occurs. Some ISV's may require additional settings, such as the SC&S port number and SC&S IP address. Contact your Management Console ISV for more details.

During the second stage AMT Configuration, the S&CS will generate a new PID and PPS combination for each of the systems and delete OEM PID/PPS from and Configuration Server database.

HP provides a fee-based customized service that will AMT Setup systems in the factory and securely provide pre-shared keys. HP offers a secured service that will eliminate manual AMT Setup of each unit at the customer site. Contact HP for more information about this valuable service.



Return to Default

Return to Default is also known as Unprovisioning.

An AMT set up and configured system can be unprovisioned using the AMT Configuration Screen and the Un-Provision option.



Figure 10 Intel AMT Unprovisioning Screen

1. Select **Un-Provision.**

a. Select **Full Unprovision**. Full unprovisioning is available for SMB mode provisioned systems. This option returns all AMT Configuration settings to factory defaults, and does not reset ME configuration settings or passwords. Full and Partial unprovisioning is available for Enterprise mode provisioned systems. Partial unprovisioning returns all AMT configuration settings to factory defaults with the exception of the PID and PPS. Partial unprovisioning does not reset ME configuration settings or passwords.

An un-provisioning message displays after about one minute.

After unprovisioning completes, control is passed back to the AMT Configuration screen.

Provisioning Server, Set PID and PPS, and Set PRTC options are available again because the system is set to the default Enterprise mode.

2. Select **Return to previous menu.**

3. Select **Exit, and then select **Y**. The system reboots.**

Full Return to Factory Defaults

You can return all AMT to factory default by clearing CMOS. This includes resetting the password to the default **admin**. However, settings in the ME, such as the ME Power Settings, are not reset. You must manually reset those settings to the default for the system to be in a true factory default state.

You cannot remotely manage the system until it is set up and configured again.

USB Drive Key Set Up and Configuration

You can set up and locally configure password, PID, and PPS information with a USB drive key. This feature allows an IT technician to manually setup and configure systems without the problems associated with manually typing in entries.

The following is a typical USB drive key setup and configuration procedure:

1. An IT technician inserts a USB drive key into a system with a management console.
2. The technician request local setup and configuration records from an S&CS through the console.
3. The S&CS:
 - a. Generates the appropriate passwords, PID, and PPS sets.
 - b. Stores this information in its database.
 - c. Returns the information to the management console.
4. The management console writes the password, PID, and PPS sets to a Setup.bin file in the USB drive key.
5. The technician takes the USB drive key to the staging area where new AMT platforms are located. The technician:
 - a. Unpacks and connects platforms, if necessary.
 - b. Inserts the USB drive key into a platform.
 - c. Turns on that platform.
6. The system BIOS detects the USB drive key.
 - a. If found, the BIOS looks for a Setup.bin file at the beginning of the drive key. Skip to Step 7.
 - b. If no USB drive key or Setup.bin file is found, then boot normally. Ignore Steps 7-11.

7. The system BIOS displays a message that automatic setup and configuration will occur.
 - a. The first available record in the Setup.bin is read into memory. The process:
 - i. Validates the file header record.
 - ii. Locates the next available record.
 - iii. Invalidates current record so it cannot be used again.
 - b. The process places the memory address into the MEBx parameter block.
 - c. The process calls MEBx.
8. MEBx processes the record.
9. MEBx writes a completion message to display.
10. The IT technician powers down the system. The system is now in In-Setup phase and is ready to be distributed to users in an Enterprise mode environment.
11. Repeat Step 5 if necessary (more than one system).

Refer to your management console supplier for more information on USB drive key set up and configuration.

USB Drive Key Requirements

The USB drive key must meet the following requirements to be usable in USB Drive Key Setup and Configuration:

- It must be greater than 16MB.
- The sector size must be 1KB.
- The USB drive key is not formatted to boot.
- The Setup.bin file must be the first file landed on the USB drive key.

Appendix A: Frequently Asked Questions

Q: How can the MEBx be locally accessed?

A: The MEBx can be locally accessed by pressing **CTRL-P** during POST.

Q: Why is the CTRL-P prompt not displayed during POST?

A: By default the CTRL-P prompt is hidden during POST, but it can be display if set in F10 Setup.

Q: What is the default user name and password for the MEBx?

A: The default username and password are both **admin**.

Q: Why does the MEBx not accept my new password?

A: All MEBx passwords, other than the default password, must comply with the strong password guidelines. See the Password Guidelines section for more details.

Q: If the password is not known, how can the system be recovered?

A: Clearing CMOS will reset all AMT options including the password. The password will revert back to the default password of **admin**.

Q: How can all MEBx options be restored to the factory defaults?

A: See Full Return to Factory Defaults section.

Q: What happens if the wrong password is entered incorrectly multiple times?

A: Once the password is entered incorrectly three times, the system will reboot. The user can go back into the MEBx after the reboot and attempt to enter the password again.

Q: Can the WebGUI be used locally to access the MEBx on the system it is running from?

A: No. WebGUI access has to come from an outside network to a specific IP and port. Local access does not originate from an outside network.

Q: Why does a new password set with the WebGUI cannot be used locally in the MEBx?

A: A password set with the WebGUI is a remote password and will only work when accessing the MEBx remotely. It does not work with the MEBx locally. The local password must be used to locally access the MEBx.

Q: Is TLS required?

A: No. TLS is optional.

Q: If TLS is not used, then what is used?

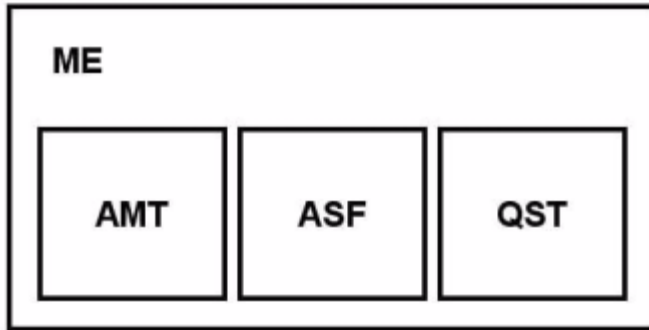
A: HTTP Digest will be used for mutual authentication if TLS is not used.



- Q:** Who provides Setup and Configuration Servers?
- A:** Openview and ISVs such as Altiris provide Setup and Configuration Servers. Check with your management console supplier to see if they offer this service.
- Q:** Can AMT be set for static address and the OS set for DHCP or vice versa?
- A:** No. Although it can be done, this is not a supported setting by Intel and may cause unexpected system behavior.
- Q:** What is the default port used by the Intel WebGUI?
- A:** The Intel WebGUI listens to port 16992.
- Q:** What is the difference between the ME and AMT?
- A:** The ME is the controller that manages AMT along with ASF and QST. Notice that clearing AMT settings does not affect ME settings since the ME is a separate entity.
- Q:** Why did my AMT setting get cleared when upgrading from AMT 2.0 to AMT 2.1?
- A:** Upgrading from AMT 2.0 to AMT 2.1 requires an update to the ME firmware, which will clear AMT settings. The system needs to be set up and configured again.
- Q:** Why does Wake-On-ME not work after the Idle Timeout is set?
- A:** The Wake-On-ME feature only works if the **ME On in Host Sleep State** setting is set to **Always** and the system is fully provisioned.
- Q:** Why does Wake-On-ME not work after CMOS is cleared?
- A:** If CMOS is cleared, then the default Idle Timeout value will be zero. Change to a non-zero value to re-enable Wake-On-ME.
- Q:** Why does going from AMT 2.0 to AMT 2.1 by updating the BIOS and ME firmware not automatically enable Wake-On-ME?
- A:** Updating the ME firmware does not affect the preset system options set previously by an administrator or the factory. Wake-On-ME is a new feature for AMT 2.1 so the **Idle Timeout** field is set to zero in AMT 2.0 systems.

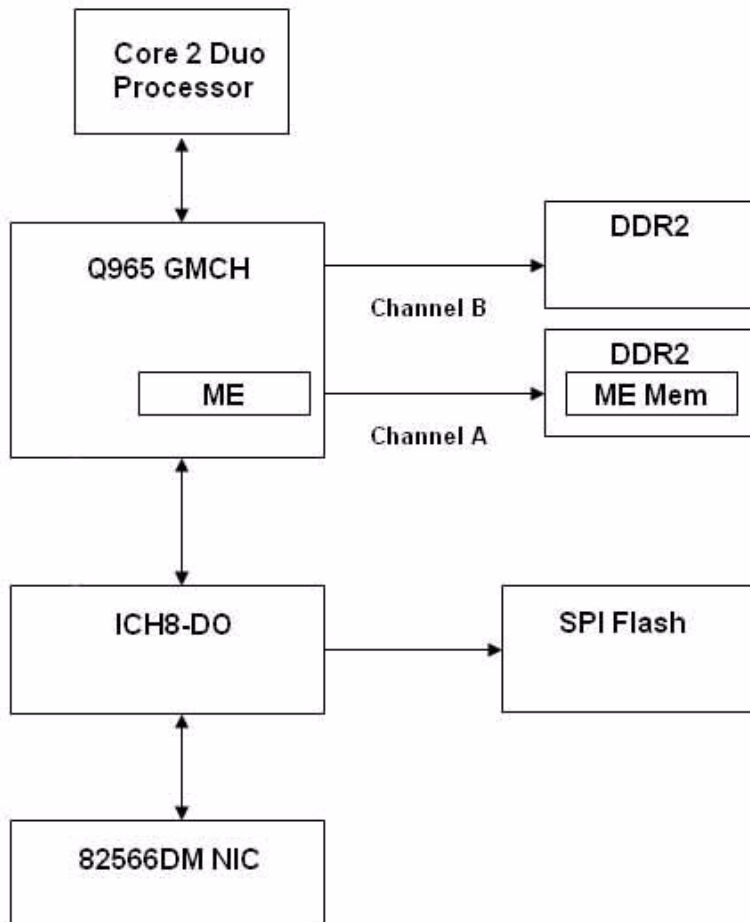
Q: Is a graphical representation of the ME and AMT available?

A: Yes.



Q: Is there a graphical representation of the ME in relation to the system?

A: Yes.



Appendix B: Power / Sleep / Global States Explained

A computer can be in one of several power states under the Advanced Configuration and Power Interface (ACPI) specification. These power states are also known as Sleep (Sx) states or Global (Gx) states.

- **S0** is the ON state. The computer is fully functioning. All system devices and operating system, if available, are running. S0 is also known as G0.
- **S3** is the Standby (Microsoft terminology) or Suspend-to-RAM state. The memory subsystem and Vaux power rail remains powered, while the rest of the system, including the processor, is not powered. When the system resumes from S3, the system context remains intact because system memory was preserved and powered at all times.
- **S4** is the Hibernate (Microsoft terminology) or Suspend-to-Disk state. The system context (memory) is saved to the hard drive as a hibernation file. When the system resumes from S4, the system context is restored from the hibernation file. Vaux remains powered, but all other subsystems including system memory and the processor are not powered.
- **S5** is the Soft Off state. It is identical to S4 with the exception that the system context is not saved. When the system resumes from S5, it powers up and going through POST. S5 is also known as G2.
- **G3** is the Mechanical Off state. All subsystems are not powered in this state. The easiest way to achieve this state is by removing AC power from the system by unplugging the power cord.

The ME has its own power states (Mx) similar to the Sx states:

- **M0** is the ON state for the ME when the system is in S0 state. The ME is fully powered and running.
- **M1** is the ON state for the ME when the system is in a non-S0 state. The ME is fully powered and running.
- **Moff** is the OFF state for the ME. The system is in a non-S0 state.

An example reading of the first row:

ME ON in Host Sleep State	Host Power State	ME Power State
Always	S0	M0
Always	S3, S4, S5	M1
Never	S0	M0
Never	S3, S4, S5	Moff
Standby (S3)	S0	M0
Standby (S3)	S3	M1
Standby (S3)	S4, S5	Moff
Standby (S3) + Hibernate (S4)	S0	M0
Standby (S3) + Hibernate (S4)	S3, S4	M1
Standby (S3) + Hibernate (S4)	S5	Moff

The ME is set to Always, so it remains powered and active in all Sx states. If the system (host) is in S0, then the ME is in the corresponding M0 state. However, if the system is in S3, S4, or S5, then the ME remains active, but is in M1 state. At no time is the ME in the M0ff state when it is set to Always.



Appendix C: Wake-On-ME Explained

Wake-On-ME is a new feature introduced in AMT 2.1. This feature allows the ME to go into a low power state when it is not used. There are four conditions that must be met for Wake-On-ME to function.

- The system must have at least BIOS 2.09 and ME firmware 1031.
- The system is in a sleep state: S3, S4, or S5.
- **ME On in Host Sleep State** setting is set to **Always**.
- **Idle Timeout** setting is set to a non-zero value.

System BIOS 2.09 and ME firmware 1031 are required to enable AMT 2.1 features to the ME.

The system must be in a sleep state (S3, S4, or S5) for Wake-On-ME to function. If the system is running (S5), then the ME is also running.

The **ME On in Host Sleep State** setting must be set to **Always** for the ME to be awake when the system is asleep. The ME counts down from the amount of time set in **Idle Timeout** before it will go to sleep.

Idle Timeout must be set to a non-zero value. If it is set to zero, then the Wake-On-ME feature is disabled and the ME will not go to sleep when not being used.

If CMOS is cleared, then the default Idle Timeout value will be zero. Change to a non-zero value to re-enable Wake-On-ME.

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