



**Intel® Active Management  
Technology  
Setup and Configuration Service  
Version 3.3**

**Installation and User Manual**

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## Chapter 1

# SETUP AND CONFIGURATION SERVICE OVERVIEW

This section contains:

- “Introduction to Intel SCS” on page 2
- “Setup and Configuration Process” on page 3
- “Intel AMT SCS Functional Flow” on page 5
- “Setup and Configuration Operational Overview” on page 6
- “The SCS Database” on page 10
- “SCS and Active Directory Tasks and Permissions” on page 12
- “Intel AMT Device Configuration Information” on page 14

## Introduction to Intel SCS

The Intel® Active Management Technology (Intel® AMT) Setup and Configuration Service (Intel SCS or SCS) provides an enterprise with the tools to set up and configure Intel AMT devices.

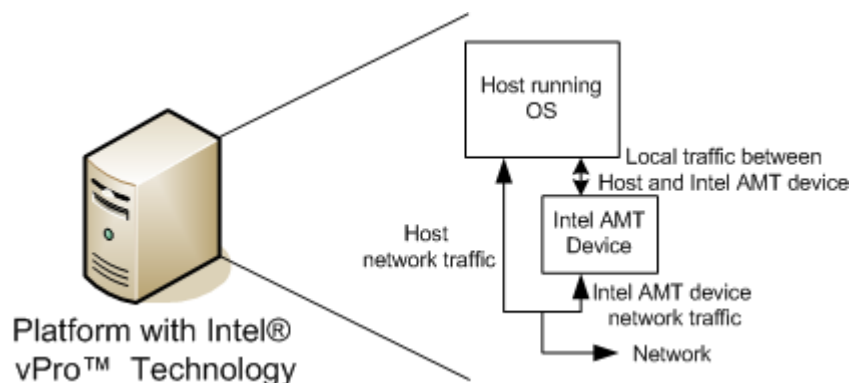
Intel AMT is an integral part of Intel® vPro™ and Intel® Centrino® Pro processor technology. Intel AMT enhances the ability of IT organizations to manage enterprise computing facilities. Intel AMT operates independently of the platform processor and operating system. Remote platform management applications can access Intel AMT securely even when the platform is turned off, as long as the platform is connected to line power and to a network.

Intel AMT can:

- discover platform assets using data retained in non-volatile storage
- heal systems remotely even when the operating system is down
- protect against malicious software attacks by making it easier to keep software and virus protection consistent and up-to-date across the enterprise
- limit the effect of “malware” and platform misuse by containing outbreaks and software tampering on the managed client, isolating the infected network element from the rest of the network

The platform can be viewed as having two separate elements:

- a host processor running a general purpose operating system such as Windows\* XP
- an Intel AMT device operating independently of the host. The Intel AMT firmware executes on the Intel® Management Engine (Intel® ME).



When an Intel AMT enabled platform is delivered, the Intel AMT device is present but disabled. The Intel AMT device must undergo setup and configuration before it is operational. In Enterprise environments, the setup and configuration must be done over the network interface.



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*In addition to the term “Setup and Configuration,” the process of enabling an Intel AMT device is also called “provisioning.”*

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The Intel AMT Setup and Configuration Service performs all the necessary steps to make an Intel AMT device operational. This includes Intel AMT Release 2.0 and later releases. Once the Intel SCS has been installed and its database has been loaded with initial data, setup and configuration starts when an Intel AMT device sends a message called a “Hello” message to the SCS. The SCS and the Intel AMT device communicate securely as the SCS generates and sends the device:



- certificates from a public key infrastructure (PKI)
- access control lists (ACLs)
- other setup parameters, as defined in a **profile** of setup and configuration information specific to the platform or to a family of platforms

The SCS also registers the Intel AMT device in Active Directory and in its own secure database. The SCS is used for various maintenance functions, such as updating passwords and ACLs, and keeps logs of all performed transactions.

The SCS components can be distributed across several platforms. It is recommended, for performance reasons, to configure a distributed installation except for demo purposes or for small enterprise installations.

It is possible to have multiple instances of the SCS installed across an enterprise, but there is only one SCS database for the enterprise.

The major elements of the SCS are:

- a Windows service (the SCS Main Service)
- a secure database
- a SOAP API
- a console application (the Intel SCS Console)




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### **Intended Use of this Manual**

*The Intel AMT SCS is provided to ISVs as a binary executable. The source code of the SCS Console is included in the product distribution, as well as a description of the SOAP API. ISVs are expected to add value to the Console or to create their own equivalent using the API. The Intel AMT SCS will not be provided to end users directly by Intel. Rather, it will be part of an ISV's product offering, either stand-alone or embedded in a management console product. This manual is designed to be used by ISVs to learn about the SCS and its components. The manual can also be used as a basis for creating end user documentation for IT staff.*

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## **Setup and Configuration Process**

For setup and configuration to proceed, the SCS database and server require preparation, as well as the platform containing the Intel AMT device. Once the preparation is complete, connecting the platform to the network starts the setup and configuration process.

### **SCS Database Preparation**

Before setup and configuration can begin, the SCS server database must be configured with basic information:

- SCS service configuration parameters
- Profiles that define the setup parameters for the Intel AMT-enabled platforms to be configured
- Entries identifying each Intel AMT device to be configured, with a link to a profile
- A list of valid TLS-PSK keys that match what is installed on the Intel AMT devices awaiting configuration.

At this point, the SCS service waits for a configuration request from an Intel AMT device.

### **Preparation of Platform Containing Intel AMT Device**

An Intel AMT Release 2.0/2.1/2.5 device must have its MEBx password changed from the default

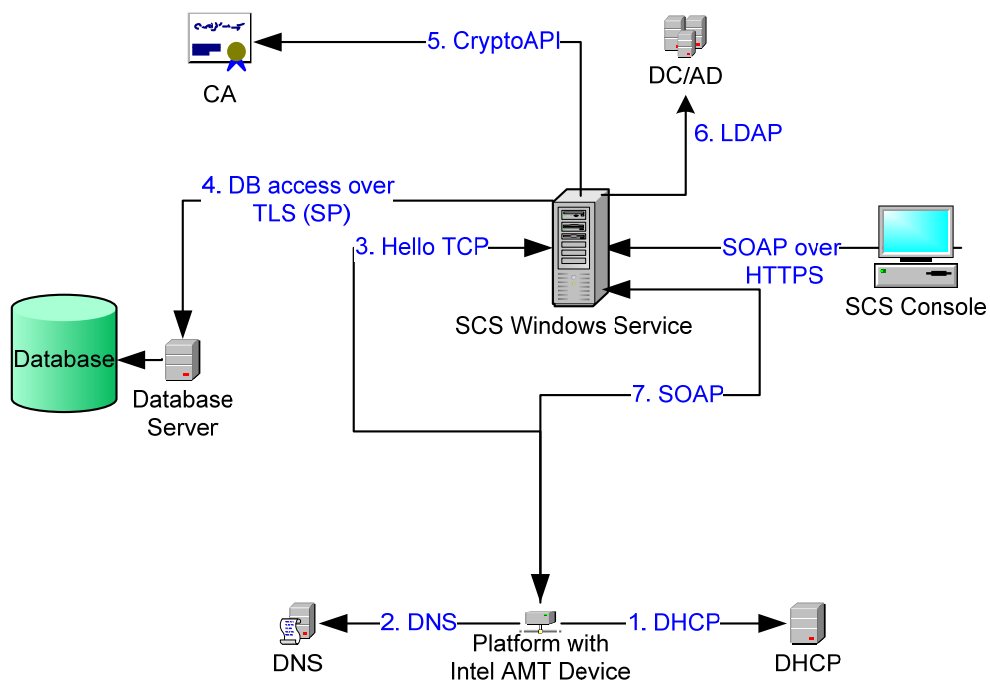
password. A TLS-PSK key and identifier must be loaded into the device. The values are entered manually by the IT administrator through the BIOS extension, or the administrator can use a USB key with values exported from the SCS; or the values may have been preloaded by an OEM. This is the minimum requirement, although other parameters may be required. See “Intel AMT Preparation” on page 56 for more information. The platform can now be connected to a network in common with the SCS server.

An Intel AMT Release 2.2/2.6/3.0 device can be connected to the network without a password change or entry of any parameters to the BIOS extension, using a mechanism called “Remote Configuration”. See “Remote Configuration” on page 62.

Intel AMT devices configured by the SCS receive their IP addresses from a DHCP server. The SCS does not support static IP addresses.

## Setup and Configuration Steps

The following diagram illustrates the major setup and configuration steps. The numbered steps are described below.



1. An Intel AMT device that is ready for setup requests an IP address from a DHCP server.
2. The device performs a DNS lookup with the default SCS service server name.
3. The Intel AMT device sends a TCP/IP “Hello” message.
4. Based on the UUID in the “Hello” message, the SCS service searches the database to locate the Profile and host name to be used to setup and configure the device. If the SCS is configured to do so, it may execute a script to acquire the necessary parameters from sources outside the database, and then store the information in the database.
5. The SCS service requests a certificate for the device from a Certificate Authority server. This step is optional. It is required for installations using Transport Layer Security (TLS) and Mutual TLS.
6. The Intel AMT device is defined as an AMT object in the Active Directory domain controller, when integration with Active Directory is enabled.
7. The SCS service completes setup and configuration using SOAP commands.

All critical parameters are kept in the secure database. The Administrator configures the SCS service, defines profiles, updates individual device parameters, and so on from the

Intel SCS Console. The console communicates only with the SOAP API, which queries and updates the database. All instances of the SCS service poll the database periodically or query and update the database as needed as part of the setup and configuration process. All of the above steps are described in this guide.

## ***Intel AMT SCS Functional Flow***

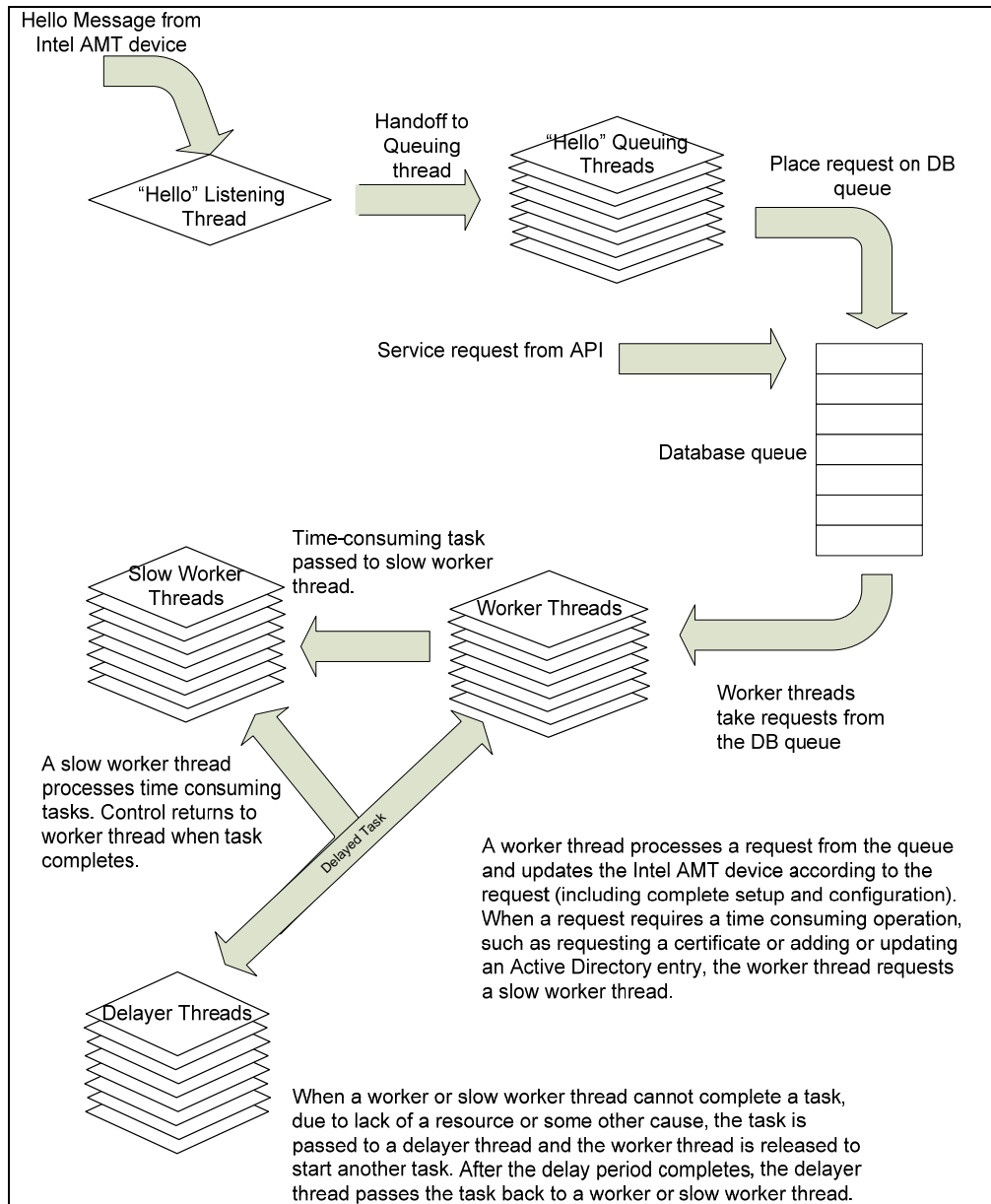
The SCS is designed to perform setup and configuration of multiple Intel AMT devices simultaneously. All requests to the SCS for service are maintained in a queue in the SCS database. A “thread” performs the processing for each portion of a task. A single thread waits for “Hello” messages from Intel AMT devices. This thread passes the message to a queuing thread, which then adds this request for setup and configuration to the database queue. Requests via the SOAP API to perform an update to an Intel AMT device are added to the queue directly by the API.

Worker threads in the SCS poll the queue for tasks. A worker thread will perform all steps required for setup and configuration except those that are relatively time consuming, such as a request to a Certificate Authority for a certificate or a request to add an entry to Active Directory. These tasks are handed off to a slow worker thread. If a task cannot be completed due to unavailability of a resource (for example, configuration cannot proceed because there is no profile associated with an Intel AMT device that sent a “Hello” message), the task is passed to a delayer thread to wait for a defined period before retrying. As processing for requests completes, threads are freed up to process subsequent requests.

The SCS logs all transactions so that if the service is interrupted, the service can recover partially completed tasks.

IT administration can configure the number of worker and slow worker threads, the queue size, and various times to maximize performance of the SCS. In an enterprise installation that has the potential of many Intel AMT devices requesting setup simultaneously, the number of worker threads can be increased, consistent with the number of processors and the amount of memory installed in the server platform. See “Defining General Parameters” on page 78 for the tuning parameters accessible from the SCS Console.

The figure below presents a simplified flow within the SCS.



SCS Operational Flow

## Setup and Configuration Operational Overview

The primary purpose of the Intel SCS is to deliver the Intel AMT Setup and Configuration settings to the Intel AMT devices. Intel AMT devices can be located on, for example, a desktop computer, a mobile computer, or a workstation.

This process includes pre-setup and configuration; setup and configuration; integration with Active Directory, gathering security information, and maintenance.

### Pre-Setup and Configuration

Intel SCS generates data used to configure Intel AMT devices. This data includes:

- PPS, PID and MEBx password generation
- USB key file containing a list of PPS, PID and MEBx password sets

Remote configuration does not use these values.

## Setup and Configuration

Intel SCS delivers initial values to Intel AMT devices. Before Setup and configuration begins, administrators add these initial values to the database. The administrator enters the values into Profiles, or into descriptions of individual Intel AMT devices, or the information is generated automatically. The information includes:

- Administrator account credentials (Username and password)
- Access control list (ACL) entries for Digest and/or Kerberos user accounts
- Networking settings (Host Name and domain name)
- RSA key pair and X.509 certificate for TLS (TLS Certificate and RSA private key) (automatic)
- Pseudo Random Number Generator (PRNG) value
- Intel AMT Kerberos secret key (generated automatically), SPNs, operational parameters
- Time and date (automatic)
- Trusted root certificates (Mutual TLS)
- Trusted domain name suffixes (Mutual TLS)
- Certificate Revocation Lists (CRLs)
- Power-policy options
- Replacement PID/PPS
- Wireless Profiles
- 802.1x Profiles
- NAC Profiles
- Third-party data storage parameters (not implemented in this release)

The information is used to communicate securely with an Intel AMT device to configure it and to create an Active Directory entry.

## Integration with Active Directory

Intel SCS integrates the Intel AMT device with Microsoft Active Directory by creating a directory entry based on the Intel-Management-Engine class. The SCS installation includes scripts used by the enterprise administrator to:

- Extend the Active Directory schema to support the Intel-Management-Engine class
- Populate the Intel-Management-Engine attributes

During **setup**, Intel SCS:

- Creates an Active Directory object representing the Intel AMT device
- Creates an attribute for connecting the AD computer object to the AMT object.

## Gathering Security Information

Intel SCS collects required operational security parameters.

- As part of setting up the SCS, the administrator defines Active Directory users and permissions for those administrators and operators that will work with Intel SCS. The administrator uses scripts to define the necessary groups and users within Active Directory, and then uses the SCS User commands to define which users have specific permissions to operate the service.
- When TLS is enabled, the SCS interfaces with the Microsoft Certificate Authority to obtain a TLS certificate each time it sets up an Intel AMT device.

## Management and Maintenance

Intel SCS also facilitates life cycle management and maintenance operations. These daily tasks can include:

- Entering the properties of new Intel AMT devices, such as the UUID, FQDN, profiles, and AD Organizational Unit (required for adding new Intel AMT-enabled platforms)
- Generating a dataset of PID/PPS/password data for export to a USB key
- Importing TLS-PSK lists from an OEM
- Handling certificate expirations and certificate renewals
- Delivery of Certificate Revocations Lists (CRL)
- Updating local account passwords
- Checking the logs
- Handling exceptions
- Doing ad-hoc configuration operations (Single Intel AMT device / All Intel AMT devices):
  - Performing un-provisioning
  - Performing re-provisioning
  - Updating system clock
- Doing daily database backup

In addition to these tasks, certain maintenance tasks that enhance the security of the Intel AMT devices can be performed automatically. These include:

- Reissuing digital certificates before they expire
- Updating passwords
- Updating random number generator seeds
- Synchronizing the system clock
- Performing re-configuration periodically to ensure that all Intel AMT devices have the latest profile information

## Configuring Intel AMT in a Secure Environment

Intel AMT supports Transport Layer Security (TLS) for secure communications between Intel AMT devices and management console applications. Use of TLS is recommended in an Enterprise environment. TLS is a protocol intended to secure and authenticate communications across a public network by using data encryption. It depends on the existence of a public key infrastructure (PKI).

A PKI enables users of an unsecured network to securely and privately exchange information through the use of an asymmetric public and private cryptographic key pair. The key pair is obtained and shared through a trusted authority, known as a Certificate Authority (CA). The CA generates digital certificates that can identify an individual or an organization. The PKI includes directory services that can store and, when necessary, revoke the certificates.

The SCS SOAP API requires a certificate so it can be hosted by the Microsoft Internet Information Server (IIS). This is necessary even in environments when TLS will not be used. If TLS will be used with Intel AMT devices, then there must be access to the Microsoft Certificate Authority as the SCS requires it to enroll for certificates on behalf of each Intel AMT device.

The Microsoft CA can be installed as Stand-alone CA or as an Enterprise CA. An Enterprise CA can be configured only in conjunction with Active Directory. A Stand-alone CA can operate with or without Active Directory, but if Active Directory is not

present, there can be only one SCS instance and the Stand-alone CA must be installed on the same platform as the SCS.

A PKI may have a hierarchy of Certificate Authorities, with subordinate CAs and a root CA. This is beyond the scope of this discussion. IT personnel who manage a facility that depends on PKI need in-depth knowledge of PKI protocols and supporting tools. The installation example later shows how to install a single tier Enterprise or Stand-alone CA.

## Support for Wireless Environments and Wired 802.1x

Intel AMT Releases 2.5 and 2.6 run on mobile platforms. The SCS configures Intel AMT devices with these versions so that they can receive management traffic over wireless links. The SCS supports defining wireless profiles and 802.1x profiles. Intel AMT Releases 2.5, 2.6 and 3.0 also support wired 802.1x links. See page 94 for wireless profile and 802.1x profile definition using the SCS console. Setup of wired 802.1x profiles and wireless profiles that authenticate using 802.1x is permitted only if the SCS is configured to integrate with Active Directory.

The SCS has been tested with the Cisco\* Aironet 1200 Access Point and the following Radius servers (authentication with EAP-GTC is for wired 802.1x only):

- Cisco ACS: With 802.1x EAP-TLS, EAP-PEAP, EAP-FAST/GTC, EAP-FAST/TLS and EAP-FAST/MS-CHAPv2
- Funk Odyssey: With 802.1x EAP-TLS, EAP-PEAP and EAP-TTLS
- Meetinghouse Aegis: With 802.1x EAP-GTC and EAP-TLS
- Microsoft IAS: With 802.1x EAP-TLS

## Protecting Against Platforms Masquerading as an Intel AMT Device

The SCS starts its setup and configuration process upon receipt of a “Hello” message from an Intel AMT device. If the SCS receives a request from an Intel AMT device that is recorded in the database as having completed setup, the request will be ignored. This protects against a rogue platform masquerading as an Intel AMT device waiting for setup. If the Intel AMT device was reset to the Factory Setup (pre-provisioning) state by an application other than the SCS or by entering an **Un-provision** command using the ME BIOS extension (see the MEBx menu on page 59), then the device must be removed from the SCS database before setup can take place. See “Delete AMT” on page 112 to do this using the SCS Management Console.

## The SCS Database

A Setup and Configuration Domain has only one SCS database. This supports deployment of a platform containing Intel AMT in any segment of the enterprise, which may be an entire enterprise network or a subset of it. Both the Setup and Configuration Service and the SOAP API access the database directly. Thus all SCS service instances share a common set of service configuration parameters. This localizes the impact of changes in database components.

The database stores configuration data that includes:

- Shared objects that are generated, stored, and organized as Profiles before they are requested. Profiles contain values such as:
  - An Access Control List, that is, a list of authorized Intel AMT device users and their privileges in accessing device capabilities
  - Trusted root certificates
  - Kerberos options
  - TLS and mutual authentication settings
  - Power-saving options
  - Wireless profiles
  - 802.1x profiles
- Per-Intel AMT device data objects defined before configuration can start. The data in these objects includes:
  - Administrator password
  - Host name, TLS settings, UUID
  - A link to one of the Profiles
- Logs of all transactions performed by the SCS, including transactions in progress and any detected errors.
- A queue containing operations used to configure Intel AMT devices.

The Intel AMT database requires Microsoft\* SQL Server 2000, Microsoft SQL Server 2005, or Microsoft SQL Server 2005 Express Edition (SQL Server Express).



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*The database contains sensitive secrets, such as passwords and keys. If this data is compromised, it can result in major security problems for the enterprise. Make certain that access to the database is controlled, by limited permissions, a strong password and by limited physical access to the database server and the database itself.*

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## Considerations

For optimal performance, the Intel SCS must have adequate access to the database. These issues must be taken into consideration:

- If the database is accessed via a WAN, ensure that the areas of the database used by the Intel SCS are accessible from all installations of the SCS.
- Ensure that there is adequate bandwidth to access the database.
- The location of the database can affect performance. Attempt to locate the database at a central site.
- The database must be reliably available, so techniques such as replication, clustering, and backup and restore should be used.



## ***Database Security***

Because the data in the database is extremely sensitive, it is recommended that the connection to the database be secure. See “Enable SQL Server and Windows Authentication Mode” step 8 on page 27 for the steps required to configure a secure database connection. Also, consider the use of disk volume encryption. Limit access to physical copies of the database.

Database stored procedures may be executed only by the users that have appropriate permissions to use them. There are two types of database users, Windows Service users and API users. The console application defines SCS users and user permissions that are saved in the database.

Where possible, limit the network connectivity to the database server. Limit it, for example, to those servers that need to connect to it, i.e., those servers hosting instances of the SCS. Use a separate physical LAN or a dedicated VLAN to establish isolation.

## ***Backup & Restore***

We recommend that an Administrator perform a daily backup of the Intel SCS database. The default name of the Intel SCS database is “IntelAMT.” Be sure that the backup is stored securely, preferably encrypted.

## SCS and Active Directory Tasks and Permissions

Interaction between Management Console applications and the Intel AMT API is optionally authenticated with the Integrated Windows Authentication mode via the API authentication mechanisms.

The Active Directory (AD) service is used optionally to authenticate between ISV management console applications and Intel AMT devices. To enable use of AD, the following tasks have to be completed by an enterprise administrator:

- Create instances of Intel-Management-Engine, which is the special class added to the AD schema each time the SCS completes setup and configuration of an Intel AMT device. These instances are called “AMT objects.”
- Periodically change the password of these objects automatically.
- Delete an AMT object when it is no longer needed.

To enable Intel AMT use of AD, the following permissions have to be granted to user accounts associated with the SCS (This is the user account entered when the SCS service is started, as defined during installation on page 40):

- “Create/Delete Intel-Management-Engine objects” permission in the relevant Organization Unit (OU) where objects are created.
- Full Control over Intel-Management-Engine objects

One way to do this is by using the “Delegate Control Wizard of the Active Directory Users and Computers” MMC. See “Give the SCS User Permission to Create/Delete AMT Objects” on page 45 for a procedure for doing this.



*In an installation with multiple AD domains and multiple instances of the SCS running and sharing the same database, each SCS user account needs permission to create and delete AMT objects in all domains. Perform the delegate control process for each user account in every domain serviced by an instance of the SCS.*

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### Active Directory Schema

The Intel SCS installation contains an .LDF AD schema extension definition and a script that is used to extend the Active Directory schema for Intel AMT.

For more information, see “Active Directory (AD) and Changes to the AD Schema” on page 37.

### AMT Object

The Intel SCS Active Directory BuildSchema script, when executed by the user with Enterprise Admin permissions, creates the new object class **Intel-Management-Engine**. Objects created with this class, called **AMT objects**, are used to represent the Intel AMT device itself.

For more information, see “Active Directory (AD) and Changes to the AD Schema” on page 37.

## ***Computer Object***

Deploying a platform containing Intel AMT creates a new object in the AD which identifies the host on the Intel AMT enabled platform. This occurs independently of the Intel AMT setup process, and happens when the host joins the local domain.

For more information, see “Active Directory (AD) and Changes to the AD Schema” on page 37.

## Intel AMT Device Configuration Information

The SCS needs identification information for each Intel AMT device to know its FQDN, which Profile to use and where to put the AMT object in Active Directory. The identifying parameter for a device and the platform that it is on is the platform UUID. Entering the information manually in an enterprise environment is not practical on a large scale. Also, the FQDN will change as a machine is moved around in the enterprise and assigned to different individuals. The SCS supports multiple methods for loading configuration information, each with its uses, advantages and disadvantages.

### **Source of Configuration Information: Database or Script**

The SCS can be configured to locate Intel AMT device configuration information in one of two ways: either from within the SCS database or via a script. When the SCS receives a “Hello” message from a device it will look in the SCS database for a configuration entry matching the UUID in the “Hello” message. If there is no match, and there is no script, the SCS will revisit the queued “Hello” message periodically to see if an entry was added to the database. If the script option was selected, the SCS will activate a script to find the necessary information, given the UUID and the source IP in the “Hello” message. When the SCS receives the configuration from the script, it stores the information in the database.

### **Adding device information to the SCS database manually**

This is the simplest approach but it is the most difficult for IT personnel. They have to manually enter the UUID along with the other parameters into the New Intel AMT table. The SCS Console has a page that supports this method. See “Configuration Parameters per Device” on page 106.

### **Adding device information to the SCS database using the SOAP API**

The SOAP API has a method called `AddServiceNewAMTProperties` that adds an entry to SCS database table. An external management console can acquire the platform information using scripts, its own database, or a local agent, and pass the information to the SCS either before or after the Intel AMT device starts sending “Hello” messages.

### **Remote Configuration Tool**

The Remote Configuration Tool (RCT) is a client-based tool that captures platform information and sends it directly to the SCS. See page 66.

### **Scripting Option**

This option acquires the configuration information using a script if the required parameters are not in the New Intel AMT database table. The SCS runs a script that retrieves the parameters from an external source

The SCS distribution and documentation include sample scripts and directions for several of these options. See “Using a Script to Import Intel AMT Configuration Properties” on page 127.

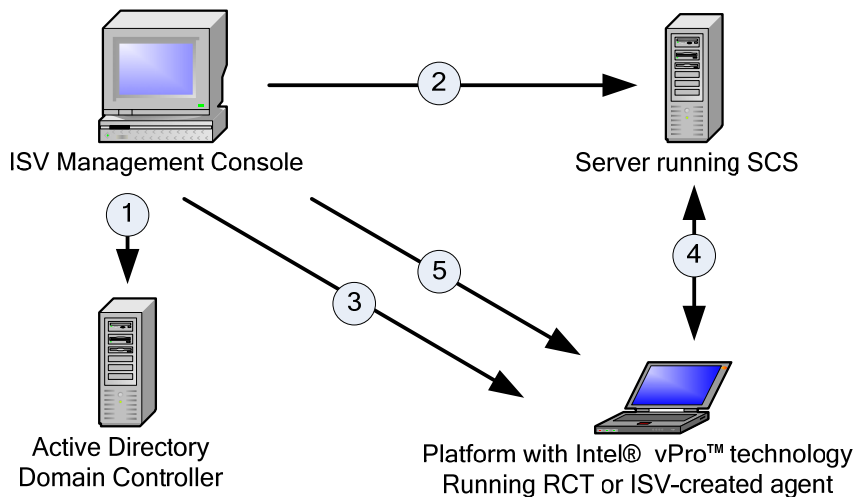
## Information for ISVs

The following information is intended to aid developers of consoles that will work in conjunction with the SCS in an enterprise environment with consoles from other vendors.

### Remote Configuration Tool Ecosystem

The Remote Configuration mechanism uses the Remote Configuration Tool or an equivalent ISV-developed agent to locally initiate the remote configuration process (see page 62). In an Enterprise deployment, when there is a critical mass of platforms with Intel AMT, configuring many platforms to take advantage of Intel AMT is a more global task for the IT group. The group has to plan deployment of Intel AMT, deciding on which platforms to enable the Intel AMT capability.

Assume that there is a management console that has the task of managing platforms – their presence, their identity, and their current state. This might be tied to Active Directory or some other database used to track an organization’s computing assets. The following steps generally describe the flow of preparing for and deploying a number of Intel AMT devices.



The Management Console first builds a list of platforms to configure – all the platforms in a building, on one floor of a building, a campus, a department, etc. the diagram above shows the steps that follow.

1. The Management Console puts the list of platforms in an Active Directory group that has the SCS Configuration Client role assigned to it (see page 103).
2. The Management Console sends configuration authorization for the platforms on the list to the SCS, using the “authorize” SOAP API. Each platform can be identified with the platform FQDN or the platform UUID.
3. The Management Console sends the RCT or other local agent to each platform on the list. The agent executes under the Local System account on each platform.
4. The agent starts the remote configuration flow. This results in the platforms sending “Hello” messages to the SCS. The SCS performs setup and configuration of the platforms. By using the “authorization required” option means that platforms are configured only when the IT group is ready.
5. A while later (for example, after three hours or the next day), the Management Console checks on which platforms were configured by attempting discovery of the platforms. If setup and configuration of some of the platforms did not complete,

it may be necessary to restart the RCT or agent sequence as the Intel AMT network interface may have closed. The Management Console re-initiates the agent to start the process again.

Using the SOAP API, the Management Console can query the SCS for a list of configured platforms to identify those that did not complete the setup and configuration sequence.

## ***Management Console Co-existence Issues***

A typical Enterprise installation that takes advantage of Intel AMT's capabilities will depend on management consoles from different vendors to accomplish mutually independent tasks. All consoles need to know the platforms within their scope that have Intel AMT configured. Some of these consoles will use the SCS as database that identifies the Intel AMT-based platforms and their state. The SCS in this context serves as a discovery engine.

A different class of consoles, usually only one console in the enterprise, will have setup and configuration responsibility and tell the SCS which platforms to set up. This console should be aware of the other type of console that interacts with the SCS on a read-only basis.

The SCS configuration parameters can be changed by any user with administrator role permissions. The general settings are global for all parts of an SCS installation sharing a database. This can be multiple instances of the server, and also multiple instances of the SCS console or an ISV console that communicates with the SOAP API. The IT organization must establish a policy that determines which console is responsible for setting the SCS parameters.

Don't assume that the Management Console and the SCS execute on the same platform.

# ENVIRONMENT PREREQUISITES AND INSTALLATION

This section contains:

- “System Requirements” on page 18
- “Environment Overview” on page 20
- “Environment Prerequisites” on page 22
  - “.NET Framework 2.0” on page 22
  - “Microsoft SQL Server Express” on page 23
  - “Internet Information Services (IIS) 6.0” on page 27
  - “Microsoft Certificate Authority” on page 29
- “Active Directory (AD) and Changes to the AD Schema” on page 37
- “Installation of the SCS Server Components” on page 39
- “Installing the Intel AMT Management Console” on page 50
- “Post Installation Operations” on page 51

## System Requirements

In a typical installation, components of the Intel AMT Setup and Configuration Service (SCS) can be installed on more than one computer or on the same computer, depending on the enterprise requirements. This section lists the system requirements for the computers supporting various components of the SCS.




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*If Active Directory is not used, the Certificate Authority must be installed on the same platform as the SCS. The database must be accessible and the database credentials known to the person installing the Intel SCS.*

---

**Table 1: Requirements for Computer Running the SCS Windows Service, the SOAP API, and the IIS**

Platform Processor	Dual Core Intel® Xeon™ Processor 5XXX series
Memory	2 to 4 GB RAM
Operating System	Windows Server 2003 with Service Pack 1
Hard Disk	525 MB
Platform	.NET Framework 2.0 Internet Information Services (IIS) 6.0
Networking	PCI-X 10/100/1000T

**Table 2: Requirements for Computer Running SQL Server**

PC Processor	Intel® Pentium® III processor - 600 MHz minimum 1 GHz or faster is recommended
Memory	192 MB minimum 512 MB or more is recommended
Operating System	Windows Server 2003 with Service Pack 1
Hard Disk	525 MB
Platform	.NET Framework 2.0
Networking	Minimum Ethernet 10BASE-T



**Table 3: Requirements for Computer Running the Console**

PC Processor	Intel Pentium 4 processor or higher (or compatible)
Memory	256 MB minimum
Operating System	Windows 2000, XP, or 2003
Hard Disk	80 MB
Platform	.NET Framework 2.0
Networking	Minimum Ethernet 10BASE-T
USB ports	For export of security keys
Internet Browser	Microsoft IE 5.5 or 6

The following Microsoft system patches should be applied to the appropriate operating systems for interactions with Intel AMT systems to operate properly:

**Table 4: Required System Patches**

<b>Operating System</b>	<b>Patch ID and Link</b>
Windows Server 2003	<b>KB889388</b> ( <a href="http://support.microsoft.com/kb/889388">http://support.microsoft.com/kb/889388</a> )
Windows Server 2003 and XP	<b>KB908209</b> ( <a href="http://support.microsoft.com/kb/908209">http://support.microsoft.com/kb/908209</a> )
Windows Server 2003 and XP	<b>KB899900</b> ( <a href="http://support.microsoft.com/kb/899900">http://support.microsoft.com/kb/899900</a> )

## Environment Overview

The Intel SCS includes several components. They can be installed on a single computer or on separate computers.

In addition, the environment must include several pre-installed and configured Microsoft components.

### **Description of Intel SCS Components**

The following are components of the Intel SCS.

#### **Main Service**

This is the software component that processes Setup and Configuration Service requests from Intel AMT devices and is implemented as a Windows Service. For complete details, see “Setup and Configuration Operational Overview” on page 6.

#### **SOAP API**

This is the Application Programming Interface (API) that Independent Software Vendors (ISVs) use to create and productize a User Interface. It is used by the SCS Console to interact with the Main Service indirectly via the database server.

#### **Database Server**

This is the repository that stores the Setup and Configuration data, organized according to the SCS database schema, and installed as a database instance in Microsoft SQL Server.

#### **Administrative Tools**

##### **Active Directory Schema**

These are scripts that extend the Active Directory schema for Intel AMT. See “Active Directory (AD) and Changes to the AD Schema” on page 37 and the script description on page 125.

### **Intel SCS Console**

The Intel SCS Console is an application that is installed separately from the SCS. It is an open application that uses the SCS SOAP API to manage the SCS and the SCS database. The source is distributed with the SCS. An ISV can take the source, add value to it and integrate it into a Management Console product.

### **List of Required Microsoft Components**

The following Microsoft components must be installed and configured for the Intel SCS to function.

- .NET Framework 2.0 is a prerequisite for the installation of SQL Server or SQL Server Express, the Intel SCS Main Service, and the SCS console.
- Either Microsoft SQL Server 2005 or Microsoft SQL Server 2005 Express Edition (SQL Server Express) is required. This manual describes installation of the Express edition, but if the full edition is exists, it may be used. The Express Edition is a data management product for embedded application clients, light Web applications, and local data stores.
- Intel SCS requires that Microsoft’s Internet Information Services 6.0 (IIS 6.0) be installed and configured. IIS is Microsoft’s HTTP server. IIS adds full HTTP capability to the Windows operating system. IIS should be installed before the Certificate Authority is installed.
- If Transport Layer Security (TLS) is required in an installation, then Intel SCS requires that Microsoft’s Certificate Authority (CA) be installed.

Microsoft's Active Directory (AD) is a directory service that is integrated with Windows 2003 Server. AD is an optional environment pre-requisite. Intel SCS uses AD for:

- Kerberos authentication using AMT objects
- User lists

The Intel AMT installation adds a script that extends the AD schema for Intel AMT and that creates several new attributes.

## Environment Prerequisites

This section details the environment required by the various Intel AMT Setup and Configuration Service components. The section “System Requirements” on page 18 specifies which components require which environment elements.

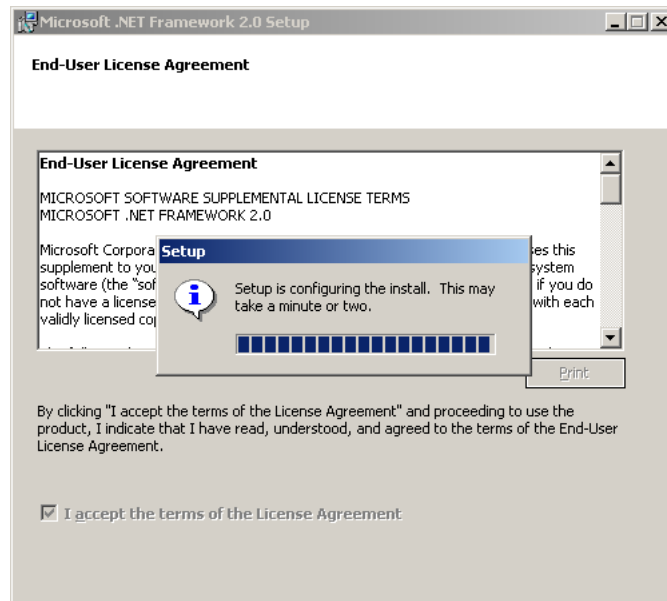
### **.NET Framework 2.0**

.NET Framework 2.0 is a prerequisite for the installation of both SQL Server Express and the Intel SCS Windows Service. For summary information about .NET Framework and a download link, see:

<http://www.microsoft.com/downloads/details.aspx?familyid=0856eacb-4362-4b0d-8edd-aab15c5e04f5&displaylang=en>

To install .NET Framework 2.0:

1. Install the Windows Installer 3.0 or later, if it is not already installed. See <http://www.microsoft.com/downloads/details.aspx?familyid=5FBC5470-B259-4733-A914-A956122E08E8&displaylang=en>
2. Ensure that all instances of Microsoft Internet Explorer are closed.
3. Double-click the installation file named dotnetfx.exe. The installation files are extracted and the Welcome to Setup screen is displayed.
4. Click **Next**. The End-User License Agreement is displayed.
5. Select the **I accept the terms** checkbox and click **Install**. A message is displayed indicating that “Setup is configuring the install.”



Setup then installs the components. An installation progress bar is displayed. Installation may take a few minutes. Upon completion, the Setup Complete screen is displayed.

6. Click **Finish**.

## Microsoft SQL Server Express

Microsoft SQL Server 2005 Express Edition (SQL Server Express) is a data management product for embedded application clients, light Web applications, and local data stores. Designed for easy deployment and rapid prototyping, SQL Server Express is available at no cost.



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*There are various editions of Microsoft SQL Server. For an overview, see: <http://www.microsoft.com/sql/prodinfo/features/compare-features.msp>  
This manual only describes installation of the Express edition. An Enterprise solution will require the full SQL Server 2005 or SQL Server 2000 application.*

---

For detailed information about SQL Server Express and a download link, see:

<http://www.microsoft.com/downloads/details.aspx?familyid=220549b5-0b07-4448-8848-dcc397514b41&displaylang=en>

For summary information about SQL Server Express and a download link, see:

<http://msdn.microsoft.com/vstudio/express/sql/download/>

To install the SQL Server 2005 Express Edition:

1. Ensure that .NET Framework is installed.
2. Ensure that the server meets the system requirements listed in Table 2: , “Requirements for Computer Running SQL Server” on page 18.
3. Double-click the installation file named sql expr. exe. The installation files are extracted and the Installation Options screen is displayed.
4. Select **Install SQL Server 2005 Express Edition** and click **Next**. The End-User License Agreement is displayed.
5. Select the **I accept the licensing terms** checkbox and click **Next**. A message is displayed indicating that “Setup is configuring the install.” The Installing Pre-requisites screen is displayed.
6. Click **Install**. Setup installs the necessary components. A message is displayed indicating that “The required components were installed successfully.”
7. Click **Next**. The Welcome to the Microsoft SQL Server Installation Wizard screen is displayed.
8. Click **Next**. The System Configuration Check screen is displayed and the Wizard inspects the system.



---

*If the Wizard detects problems, it will display the status of the problem and, possibly, a message. The status “Warning” will usually allow the installation to continue. However, the status Error indicates that the installation cannot continue. View the accompanying message and click Exit. Then, correct the error and try again.*

---

9. If all checks are successful, click **Next**. The Registration Information screen is displayed.
10. Enter your name and the company name.
11. Select or clear the **Hide advanced configuration options** checkbox. When the checkbox is cleared, the Instance Name, Service Account, User Instances, and Collation can also be configured.

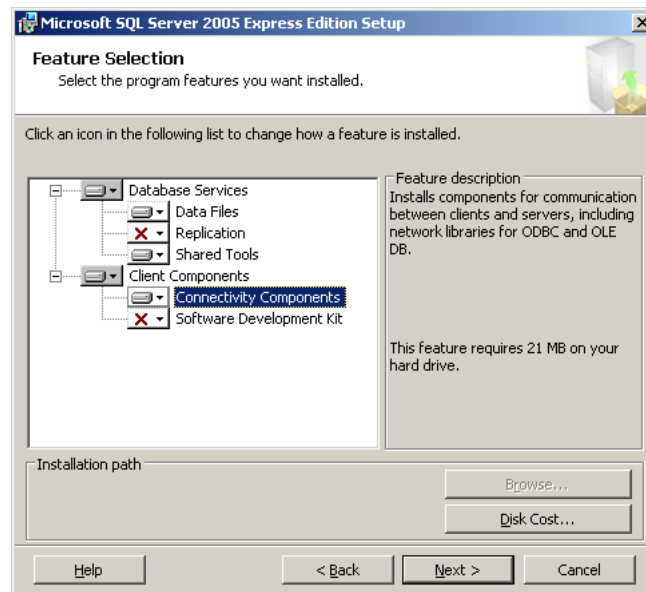


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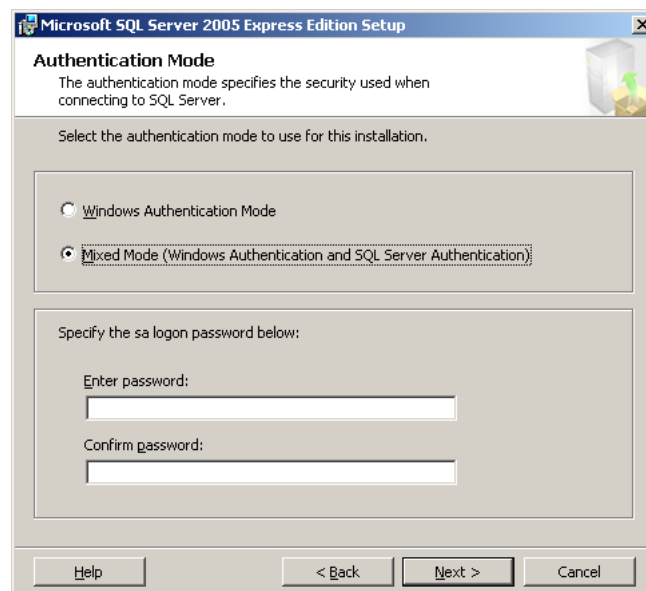
Select the “Hide advanced configuration options” checkbox and accept the default settings. This manual does not document the advanced configuration options.

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- Click **Next**. The Feature Selection screen is displayed.



- As pictured above, select the following features. For each feature, select the **Will be installed on local hard drive** option:
  - Data Files
  - Shared Tools
  - Connectivity Components
- Click **Next**. The Authentication Mode screen is displayed.

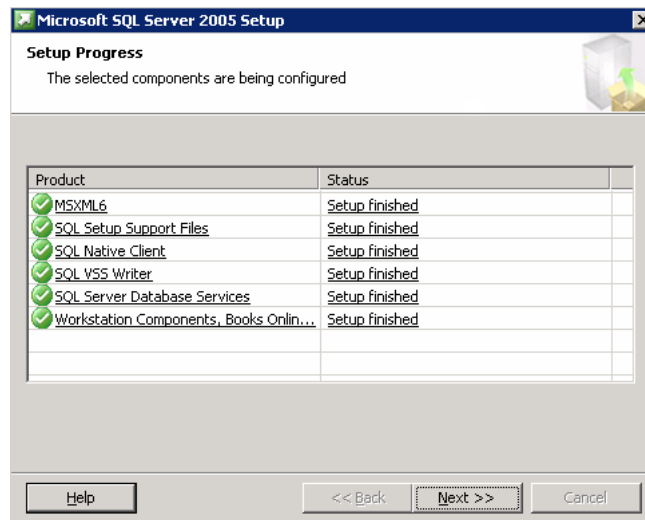


- Select **Mixed Mode**.
- Enter the **sa logon password** (sa is the default SQL server Login ID), confirm the entry, and click **Next**. This password will be used by any application to log in to the SQL service. This same password is entered when the SCS is installed and provides

another level of security.

The Error and Usage Report screen is displayed.

17. Select or clear the error handling options and click **Next**. The Ready to Install screen is displayed.
18. Click **Install**. The Setup Progress screen is displayed.



19. Click **Next** when the setup is finished.
20. Click **Finish**.

We recommend that the **SQL Server Management Studio Express** tool be installed now, as it is needed for initial setup of the database server. It is a free, easy-to-use graphical management tool for managing SQL Server 2005 Express Edition. Download of this program and installation instructions can be found at:

<http://www.microsoft.com/downloads/details.aspx?familyid=C243A5AE-4BD1-4E3D-94B8-5A0F62BF7796&displaylang=en>

## ***Enable SQL Server and Windows Authentication Mode***

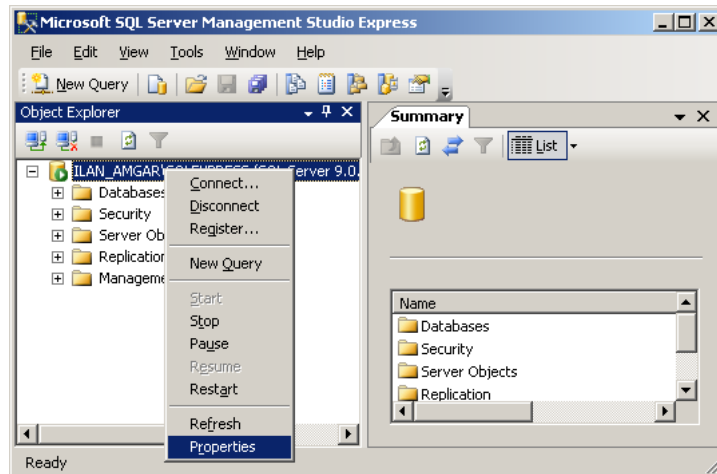
Following installation, enable the SQL Server:

1. Click the Windows **Start** button and click **Programs**.
2. From the **Microsoft SQL Server 2005** program group, select **SQL Server Management Studio Express**. The Connect to Server window is displayed.



3. Enter the Server name if it is not already displayed, select Windows Authentication, and click **Connect**.

- Right-click on the root node. A popup menu is displayed.



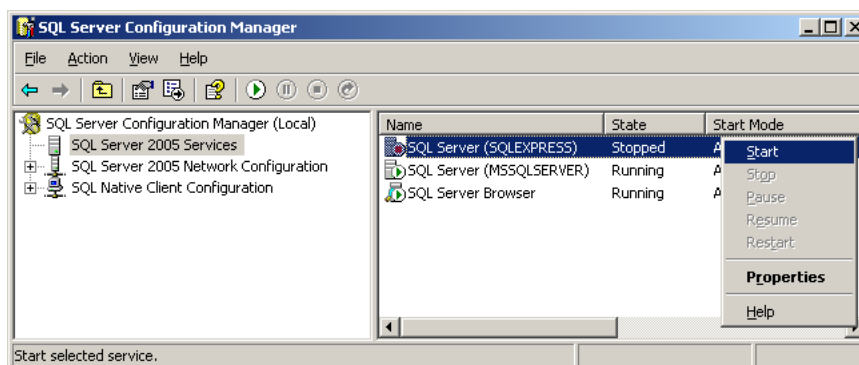
- Select **Properties**. The Server Properties Window is displayed.
- Select the **Security** page.
- In the Server authentication section, select **SQL Server and Windows Authentication mode**.
- Click **OK**.

## SQL Server Verification

To verify that the SQL server is running:

- On the computer where the SQL Server is installed, click the Windows **Start** button and click **Programs**.
- From the **Microsoft SQL Server 2005** program group, select **Configuration Tools > SQL Server Configuration Manager**. The SQL Server Configuration Manager opens.
- From the left pane, select **SQL Server 2005 Services**.
- In the right pane, check the State column and ensure that SQL Server and SQL Server Browser are both running.

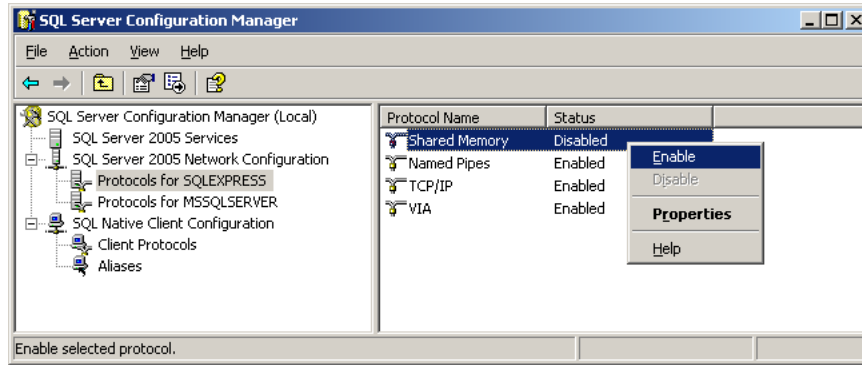
If they are not, select each, right-click, and from the popup menu, select **Start**. It may be necessary the first time after installation to right-click on the server or server browser entry, select **Properties**, select the **Service** tab and change the **Start Mode** to **Automatic**, and then start the server and/or the browser.



- Expand the **SQL Server 2005 Network Configuration** branch.
- Select the **Protocols for SQLEXPRESS** branch.
- Ensure that **Shared Memory**, **Named Pipes**, and **TCP/IP** are enabled.



If they are not, select each, right-click, and from the popup menu, select **Enable**.



8. To enable secured database communication using the internal SQL Server encryption option, right click on **Protocols for SQLEXPRESS** and select **Properties**. Set **ForceEncryption** to **Yes**.
9. Expand the **SQL Native Client Configuration** branch.
10. Select the **Client Protocols** branch.
11. Ensure that **Shared Memory**, **Named Pipes**, and **TCP/IP** are enabled.  
If they are not, select each, right-click, and from the popup menu, select **Enable**.
12. If database service is currently running, restart the service so that the changes take affect. (Right-click on **My Computer**, and select **Manage**. Open the **Services and Applications** element in the control tree and select **Services**. Right-click on **SQL Server (SQLEXPRESS)** and select **Restart**.

## Internet Information Services (IIS) 6.0

Internet Information Services is Microsoft's HTTP server. IIS adds full HTTP capability to the Windows operating system.



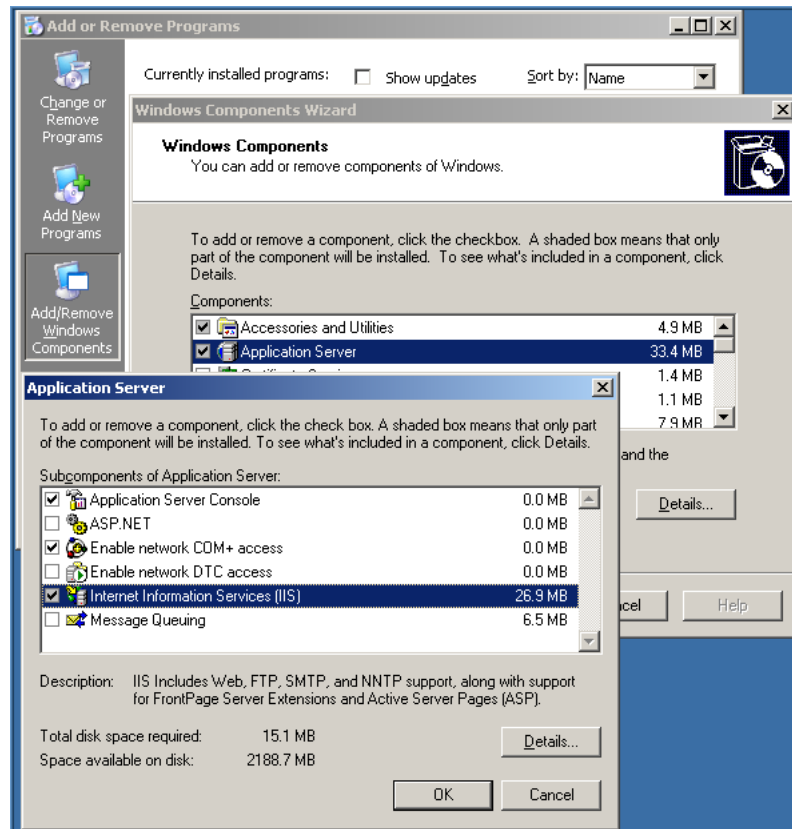
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*Install IIS before installing the Microsoft Certificate Authority on the same server so that Certificate Authority web enrollment can be supported.*

---

If IIS is not already enabled on this platform, enable the service:

1. Click the Windows **Start** button and select **Control Panel**.
2. Double-click **Add or Remove Programs**.
3. From the left panel, click **Add/Remove Windows Components**.

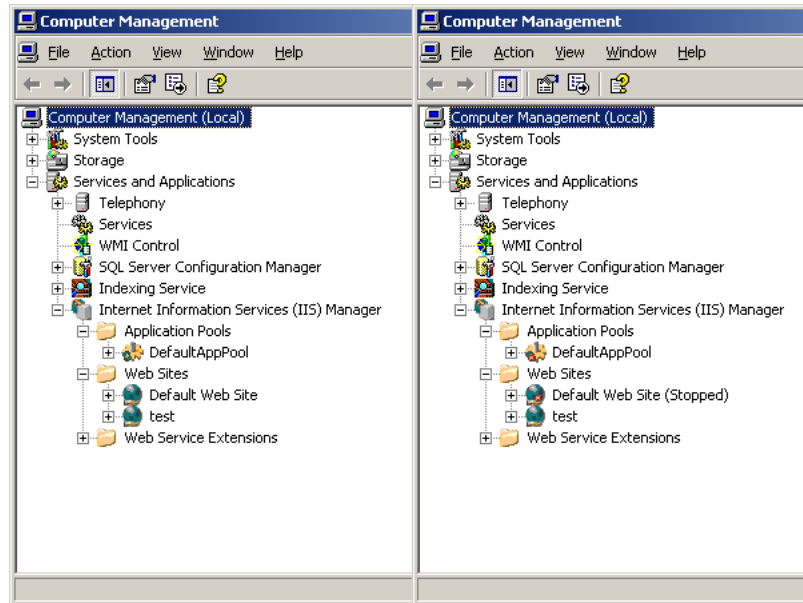


4. Select the **Application Server** checkbox.
5. Click **Details**.
6. Select the **Internet Information Services** checkbox.
7. Click **OK**. IIS installation process begins.
8. Follow the installation wizard instructions and choose the default options.

## IIS Verification

To verify that IIS is running:

1. From the Windows desktop, right-click **My Computer**. A popup menu is displayed.
2. Click **Manage**. The Computer Management Window is displayed.
3. From the left pane, expand the **Services and Applications** branch.
4. Expand the **Internet Information Services** branch.
5. Expand the **Application Pools** branch and ensure that **DefaultAppPool** is in run mode.



If it is stopped, right-click **DefaultAppPool** and, from the popup menu, select Start.

6. Expand the **Web Sites** branch. If **Default Web Site** will be used as the SCS Website, then ensure that **Default Web Site** is in run mode.

If it is stopped, right-click **Default Web Site** and, from the popup menu, select Start.

7. If a website other than Default Web Site will be used, create (right-click on Web Sites) and start that site. If the newly created web site is to use the default port 80, **Default Web Site** must not be started. If the new web site has a dedicated port other than port 80, include the port number with the FQDN when connecting to the web site.

## Microsoft Certificate Authority

Intel SCS requires that Microsoft's Certificate Authority (CA) be installed and configured when TLS will be used in communications with Intel AMT devices. The CA can be either a Stand-alone CA or an Enterprise CA.

The CA should be configured to generate certificates automatically so that the SCS can request a certificate each time it performs a setup of an Intel AMT device. Otherwise, an Administrator will have to intervene each time a device is set up.




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*Microsoft's Enterprise CA requires Microsoft Windows 2003 Enterprise Edition with Service Pack 1.*

*To enable web enrollment for certificates, install IIS **before** installing the CA.*

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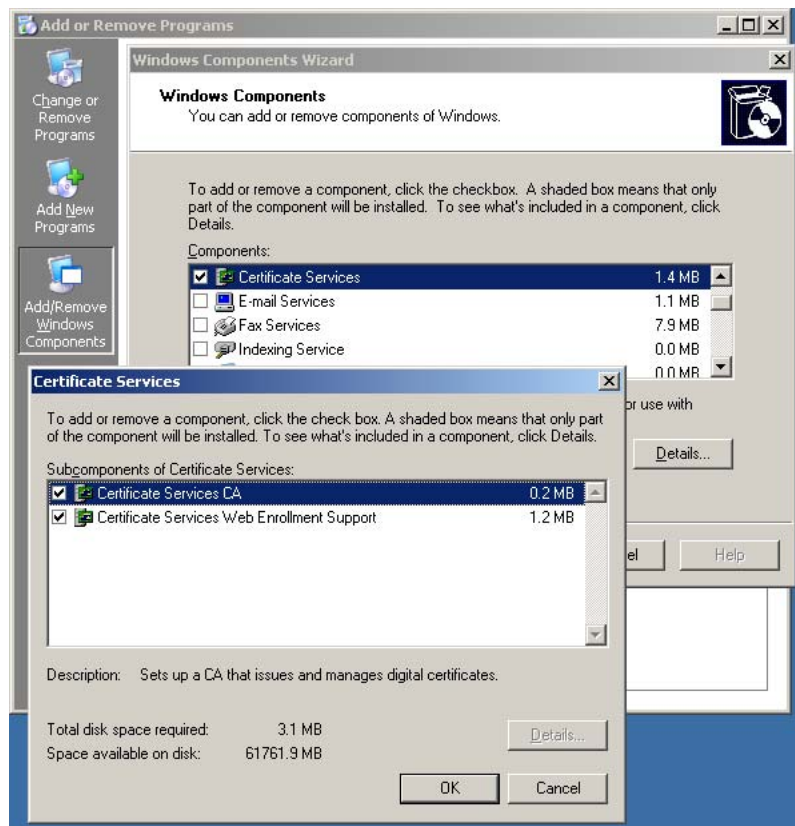
The following prerequisites must be met to install an Enterprise CA:

- The host must be a member of an Active Directory domain. It can be the same host as the domain controller.
- The user performing the installation must be a member of the domain and have sufficient administration privileges (e.g., is a member of the "Domain Admins" group).

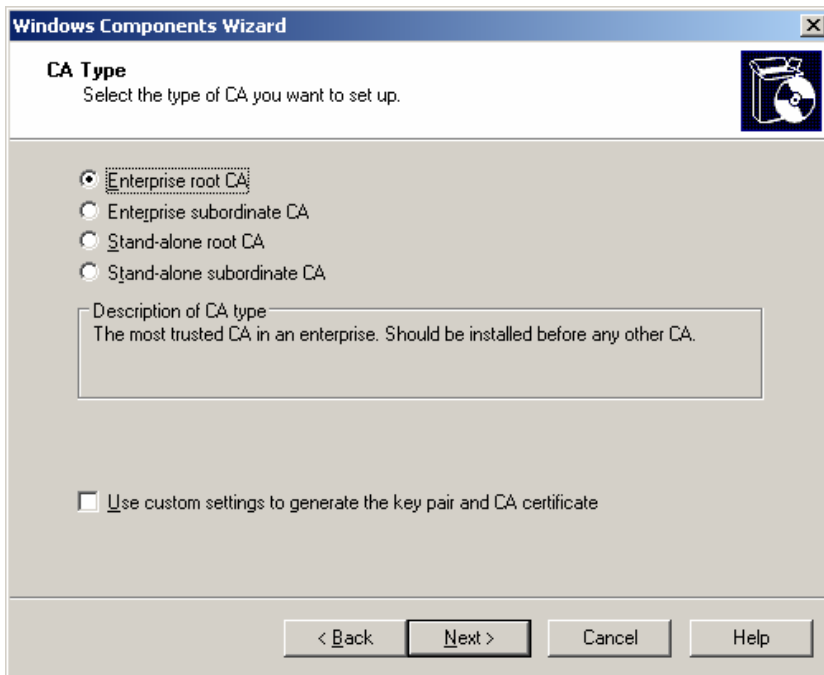
## Installing the Microsoft CA

To install the Microsoft Certificate Authority as a Stand-alone or Enterprise root CA:

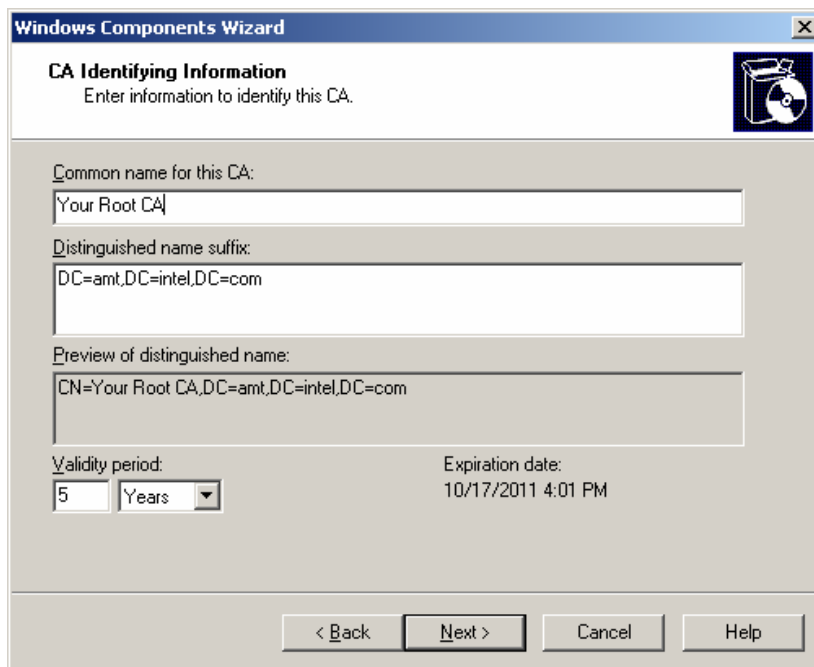
1. Click the Windows **Start** button and select **Control Panel**.
2. Double-click Add or Remove Programs.
3. From the left panel, click Add/Remove Windows Components.



4. Select the **Certificate Services** checkbox. A warning is displayed indicating that the machine name or the domain membership of the machine cannot be changed while it acts as a certificate server. Click **Yes**.
5. Click **Details**.
6. Select both the Certificate Services CA checkbox and the Certificate Services Web Enrollment Support checkbox and click **OK**.
7. Click **Next**. The CA Type screen is displayed.

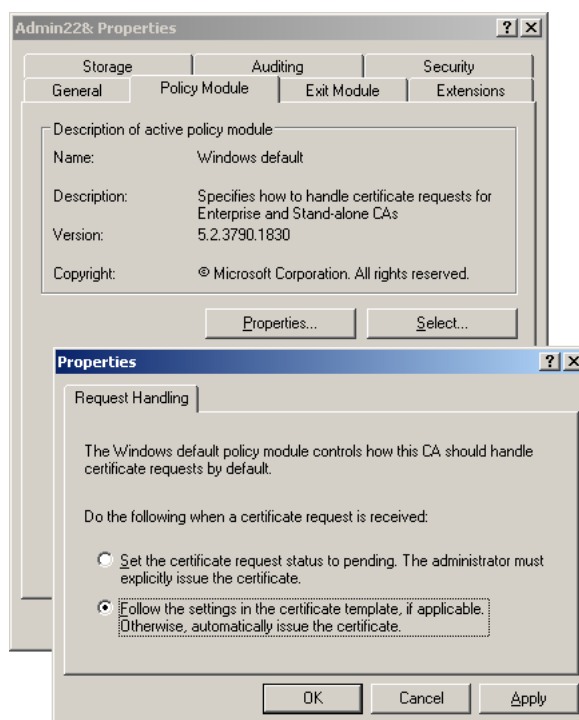


8. Select either Enterprise root CA or Stand-alone root CA and click **Next**. The CA Identifying Information screen is displayed.
9. Enter the CA Identifying Information.



- a. Enter the Common Name: The name by which the CA will be known.
- b. Enter the distinguished name suffix: This is the domain suffix of the host. It will be generated automatically in an AD environment. Click **Next**.
10. Choose the default location for the Certificate Database Settings and click **Next**. There may be a message requesting to stop IIS. Click **Yes**.
11. There may be a message saying that ASP has to be enabled to use web enrollment Services. Click on **Yes**. The installation will run to completion.
12. Configure the CA to automatically issue certificates. This option is recommended as it allows the SCS to process Intel AMT device setups automatically without operator intervention.

- a. Click the Windows **Start** button > **Programs**> **Administrative Tools** > **Certificate Authority**. The Certificate Authority Management Console opens.
- b. Right-click on the first sub-branch, which will be the Common Name selected above. A popup menu is displayed.
- c. Click **Properties** and click the **Policy Module** tab.



- d. Click **Properties** and select **Follow the settings in the certificate template, if applicable. Otherwise, automatically issue the certificate.**
- e. Click **OK**, respond to the message, and click **OK**. The Certificate Authority Management Console returns to focus.
- f. Right-click on the Common Name, right-click, and select **All Tasks**> **Start Service**.

## Exporting and Installing the CA Root Certificate

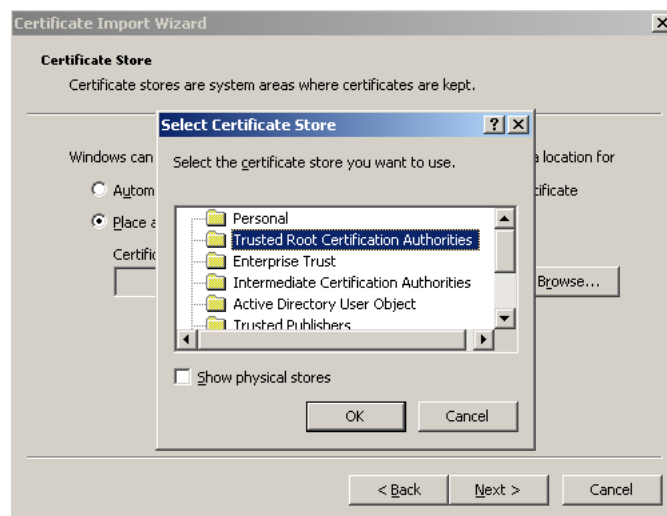
The CA root certificate should be stored locally on any platform that authenticates certificates from this CA. This includes:

- Clients of IIS (if IIS used this CA for its certificate), for example, the SCS Console
- Platforms running Management Console applications that authenticate Intel AMT devices that have TLS enabled in their profile, especially the SCS, when it interacts with Intel AMT devices after setup.
- Intel AMT devices need this certificate for authenticating clients when TLS mutual authentication is used, if this CA was used to issue client certificates. The certificate must be included in the Profile for devices supporting mutual authentication. See “Installing an Intel AMT Client Certificate for TLS Mutual Authentication” on page 36.

The following steps show how to save the certificate as a file, and then install it as a trusted root certificate.

1. Export the CA certificate. There are multiple ways to do this. This procedure describes one of them.

- a. Click the Windows **Start** button > **Programs** > **Administrative Tools** > **Certificate Authority**.
  - b. Right-click on the first sub-branch. A popup menu is displayed.
  - c. Click **Properties** and click the **General** tab.
  - d. Select the certificate and click **View Certificate**.
  - e. Click the **Details** tab and click **Copy to file**.
  - f. Follow the steps in the Wizard: Select an export format (any of the options is acceptable), name the certificate file, and save it in a known location. A message indicates that the export was successful. Click **OK**. The Details tab returns to focus.
  - g. Click **OK** > **OK**. The Certificate Authority Management Console returns to focus.
2. Install the CA root certificate in the certificate store as a trusted root certificate. **This step is not required if the CA is installed on the local platform.**
    - a. Find the certificate. If it was exported directly to another computer, find it on the other computer. If it was exported to a USB key, move it from the USB key to the computer.
    - b. Right-click on the certificate and, from the popup menu, select **Install Certificate**. The welcome screen of the Certificate Import Wizard is displayed. Click **Next**.
    - c. Select **Place all certificates in the following store** and click **Browse**. The Select Certificate Store window opens.



- d. Select **Trusted Root Certification Authorities** and click **OK**.
- e. Click **Next** > **Finish**. A message indicates that the import was successful. Click **OK**.

## Adding the SCS User to the Web Services Template

If the Intel AMT platform will be configured for TLS (see page 84) the SCS will be required to request server certificates for each Intel AMT device. When the SCS works with an Enterprise CA, the SCS user needs to have permission to use the Web Services template for this purpose. Perform the following steps (see “Defining a New Template for an Enterprise CA” on page 130 for additional details):

1. Enter **mmc** in a command window.
2. Press **Ctrl+M** followed by **Alt+D**.

3. Select **Certificate Templates** and click **Add, Close, and OK**.
4. Right click on the relevant template in the list in the right pane (**Web Services**, and repeat for any other templates to be used in this installation) and choose **Properties**.
5. Select the **Security** tab.
6. Add a group or use an existing group that includes the SCS user and check all permissions for it except the **Full control** option.
7. Click **OK**.

## ***Secure the Connection to IIS Using SSL***

Connection to IIS requires a digital certificate. A certificate can be purchased from an outside vendor such as Verisign. If the Microsoft CA was installed because TLS will be used for Intel AMT communications in the enterprise, use that CA as a source for a certificate.

## **Installing a Certificate on IIS**

Each instance of IIS that supports SCS requires a server certificate installed for the website that supports the SCS. This will be either the Default Web Site or another user-specified site (see page 42). The following procedure shows how to create and install a server certificate using a Microsoft CA (either an Enterprise CA or a Stand-alone CA). Perform the following steps on the platform where IIS is installed:

1. Right-click on My Computer and select **Manage**.
2. Expand the **Services and Applications** branch.
3. Open the **Internet Information Services (IIS) Manager** branch.
4. Open **Web Sites**.
5. Right-click on **Default Web Site** (or the user-defined site) and select **Properties**.
6. Select the **Directory Security** tab.
7. Under **Secure Communications**, select **Server Certificate...**
8. The IIS Certificate wizard opens. Click **Next**. Select **Create a new certificate** and click **Next**.

The process proceeds differently depending on the type of CA used.

Perform the following steps to create and install a certificate using an Enterprise CA:

1. Select **Send the request immediately to an online certificate authority** and click **Next**.
2. Proceed through the Wizard, entering the requested parameters:
  - Provide a name for the certificate.
  - Leave the bit length at 1024
  - Enter an organization name and an organizational unit.
  - Enter the platform FQDN as the Common Name.
  - Enter geographical information.



3. On the **Choose a Certificate Authority** pane, select the Enterprise CA from the displayed list.
4. Select **Next** and finish the Wizard. The Enterprise CA will generate the certificate and the wizard will install it.

Perform the following steps to create and install a certificate using a Stand-alone CA:

1. Select **Prepare the request now but send it later** and click **Next**.
2. Proceed through the Wizard, entering the requested parameters:
  - Provide a name for the certificate.
  - Leave the bit length at 1024
  - Enter an organization name and an organizational unit.
  - Enter the platform FQDN as the Common Name.
  - Enter geographical information.
  - Enter a file name and location to store the certificate request.
3. Select **Next** and finish the Wizard.
4. Open the Stand-alone CA from a browser window by entering the URL of the CA.
5. Click **Request a certificate**.
6. Click **Advanced Certificate Request**.
7. Click **Submit a certificate request...** The browser opens a window with a field named **Saved Request** where the text of the certificate request can be pasted.
8. Open the certificate request in a text editor such as Notepad.
9. Select the body of the request, without the Start certificate and End certificate lines.
10. Copy the request body from the text editor and paste it into the Saved Request window. Click **Submit**.
11. Select DER format and **Download Certificate**. Save the resulting certificate.
12. Return to the Default Web Site (or user-defined web site) **Properties>Directory Security>Server Certificate**.
13. Select **Process pending request and install the certificate**.
14. Locate the saved certificate. Select **Next** on the remaining panes and **Finish** to complete certificate installation.

## Installing a CA Certificate to Authenticate IIS

A client application requires a root certificate from the CA that issued the IIS certificate so that it can authenticate IIS. This applies to the platform running the SCS Console application.

Install the CA issuer certificate in the console's trusted root certificate store

- a. Open a web browser.
- b. Enter the address of the CA Server web interface. In the following example, ca\_machine is the host name of the CA Server:  
http://ca\_machine/certsrv
- c. Click **Download a CA certificate, certificate chain or CRL**.
- d. Click **Download CA certificate**.
- e. Click **Save** and save the .cer file in a known location.
- f. Right click on the saved certificate and select **Install Certificate**.
- g. Select **Next** on all options on the Certificate Import Wizard. The wizard will display the default SSL port (443). Select **Next** in this display also.

## Installing an Intel AMT Client Certificate for TLS Mutual Authentication

If TLS Mutual Authentication will be used, issue an Intel AMT client certificate and install the certificate in the certificate store of the service user. This includes the SCS application and any Management Console applications. There are differences in the process when working with a Stand-alone CA and an Enterprise CA. The procedure for an Enterprise CA is described [below](#).

### Creating and Installing a Client Certificate Using a Stand-alone CA



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*This procedure must be performed on the SCS host by the same user as the one that will be identified as the SCS service user (see page 40.)*

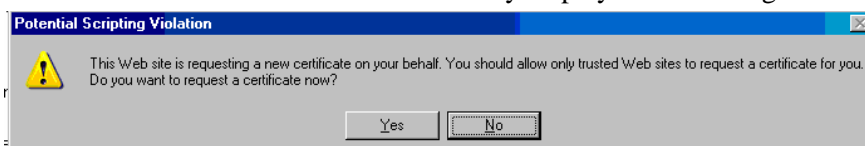
---

1. Run Internet Explorer as the SCS user (Start>Programs>right-click Internet Explorer >Run as....)
2. In the **Run As** dialog click **The Following User** and enter the username and password of the SCS user (the name must be in the format domain\username).
3. Press OK
4. Enter the following address: http://ca\_machine/certsrv (where “ca\_machine” is the FQDN of the platform hosting the CA).
5. Click **Request a certificate**.
6. Click **advanced certificate request**.
7. Click **Create and submit a request to this CA**.
8. Complete the request form. Ensure that the following critical parameters are completed correctly:
  - The Name field **must** be the fully qualified name (FQDN) of the host running the SCS or Management Console. To find this name, from the Windows desktop, right-click My Computer, select Properties, and click the Computer Name tab.
  - The Type of Certificate Needed field **must** be **Other**.
  - In the OID field, enter the client certificate OID and the remote certificate OID. The complete OID value must appear as:  
1. 3. 6. 1. 5. 5. 7. 3. 2, 2. 16. 840. 1. 113741. 1. 2. 1
  - Select 1024, 1536, or 2048 as a key size.
  - Select the **Mark keys as exportable** checkbox.
9. Click Submit. Depending on the selected parameters, one or more confirmation messages are displayed. If the resulting page says “Certificate Pending”, perform step 10. Otherwise, skip to step 11. The behavior depends on how the CA policy module was configured.
10. Issue the certificate.
  - A. Click the Windows **Start** button > **Programs** > **Administrative Tools** > **Certificate Authority**. The Certificate Authority Management Console is displayed.
  - B. Expand the first sub-branch and click **Pending Requests**.
  - C. Right-click on your request and, from the popup menu, select **All Tasks** > **Issue**.

- D. Return to the CA web enrollment home page and select **View the Status of a Pending Certificate Request**. Click on the relevant certificate request.
11. Click **Install this certificate**.

### Creating and Installing a Client Certificate Using an Enterprise CA

1. Create and install a template that supports generating Intel AMT client certificates. (See “Defining a New Template for an Enterprise CA” on page 130).
2. Run Internet Explorer as the SCS user (Start>Programs>right-click Internet Explorer >Run as....)
3. In the **Run As** dialog click **The Following User** and enter the username and password of the SCS user (the name must be in the format domain\username).
4. Press **OK**
5. Enter the following address: http://ca\_machine/certsrv (where “ca\_machine” is the FQDN of the platform hosting the CA).
6. Click **Request a certificate**.
7. Click **advanced certificate request**.
8. Click **Create and submit a request to this CA**.
9. Select the template to be used (the one created in step 1).
10. Set the key size to 1024.
11. Click **Submit**. The CA may display the following warning message. Click **Yes**.



12. The CA will display a “Certificate Issued” page. Click **Install this certificate**. There may be another warning message. Click **Yes**.

### Active Directory (AD) and Changes to the AD Schema

AD provides users with a single network logon and a single point of administration and replication. It provides Kerberos Authentication, DNS and X.500 naming standards, as well as Lightweight Directory Access Protocol (LDAP). It also includes several important protocols and various useful APIs.



---

*This manual assumes that AD is installed. For installation instructions, see Microsoft documentation.*

---

### Adding an OU for AMT Objects

Active Directory allows dividing a domain into substructures called organizational units (OUs). OUs are container objects that can be nested within other OUs. An OU can contain Users, Groups, and other OUs. OUs are part of the Active Directory scheme for managing privileges and accesses. One of the parameters that must be specified for each Intel AMT device before it can be setup in an AD environment is the OU where it will be installed.

The OU created for holding AMT objects does not need special privileges. However, if the SCS user does not have sufficient permissions to add users to Active Directory, the SCS will not be able to add new entries to the OU. The SCS user needs “Create/Delete Intel-

Management-Engine objects” permission in the OU as well as full control over Intel-Management-Engine object.

To add an OU to an Active Directory domain, in an Active Directory management window, right-click on the domain, select **New/Organizational Unit** and supply the desired OU name.

In an installation with Intel AMT-based platforms deployed in multiple domains, add an OU to each domain.

## Updating the Schema for Intel AMT

Installation of the SCS optionally adds a schema definition and script that are used to extend the Active Directory schema for Intel AMT. When a user with Enterprise Admin permissions runs it, the script creates a new class – Intel-Management-Engine – based on the AD computer object, with the following new attributes:

- Intel-Management-Engine-Version (received in the “Hello” message from the Intel AMT device)
- Intel-Management-Engine-Host-Computer (a link to the platform computer object created when the host joins the domain)
- Intel-Management-Engine-Platform-UUID (received in the “Hello” message)
- Intel-Management-Engine-Host-Computer-BL (added to the computer object class as a back link to an AMT object)
- “Intel-Management-Engine-Host-computer-BL” (added to the top computer object class)

When the SCS performs setup for an Intel AMT device, the SCS service:

- creates an AMT Object with the first three attributes listed above
- creates a link between the attribute “Intel-Management-Engine-Host-Computer” in the AMT Object and the AMT Host object
- creates a link between the attribute “Intel-Management-Engine-Host-Computer-BL” found on the AMT Host and the AMT Object.

Active Directory will display the AMT Object as the representation of the Intel AMT device itself and show it as having the type Intel-Management-Engine.

## Installation of the SCS Server Components

The Intel SCS components can be installed on a single computer or on separate computers. Setup facilitates those options. In either case, required user intervention presumes knowledge of:

- SQL Server administration
- Internet Information Services (IIS) 6.0 administration
- Windows Service installation

### *Installing the Intel SCS Server Components*

To install the Intel SCS components:

1. Ensure that the computer meets the system requirements listed in “System Requirements” on page 18.
2. Locate the distribution files as downloaded to the server platform.
3. Locate and double-click the file named `AMTConfServer.exe`. The Welcome screen is displayed. Click **Next**. The License Agreement screen is displayed.
4. Accept the license agreement and click **Next**. The Setup Type screen is displayed.
5. From the Setup Type screen, select Complete.



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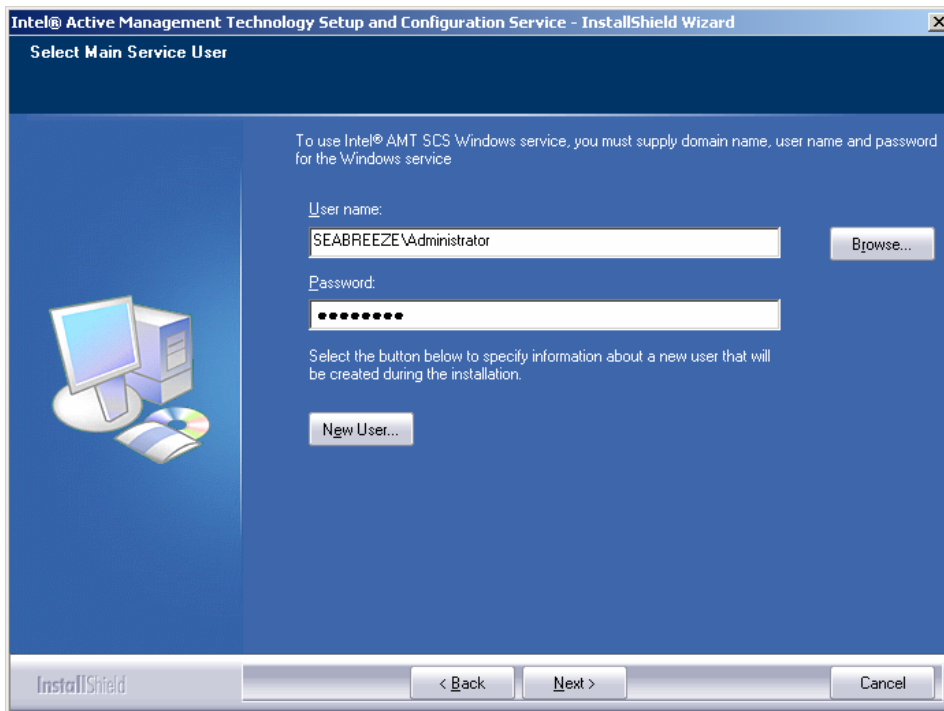
*Intel SCS Setup inspects the computer's software. Messages are displayed if any of the prerequisites are missing. If any prerequisites are missing, click Cancel and add them.*

---

Use the Custom option only if there is a need to use a target directory that is different from the default.

(The default is <root directory>: \Program Files\Intel\AMTConfServer.)  
Although there is an option to select features, install all components.

6. The Select Main Service User screen is displayed.



Enter the user name in the format “NetBIOS Name\Username”. In an Active Directory environment, the NetBIOS name will be the domain name. In the absence of Active Directory, this will be the computer name where the installation is taking place.

This user must have the necessary permissions to run as a service. The installer prompts to add this permission automatically. The user must have all the permissions described in “SCS and Active Directory Tasks and Permissions” on page 12, including permissions to access the CA. In an Active Directory environment, it is recommended to configure the SCS user to have the property “Password never expires.” Otherwise, it will be necessary to change the password, both in AD and in the SCS service properties, according to the organization password update policy (every few months, for example).

Enter the User name and Password and click **Next**.

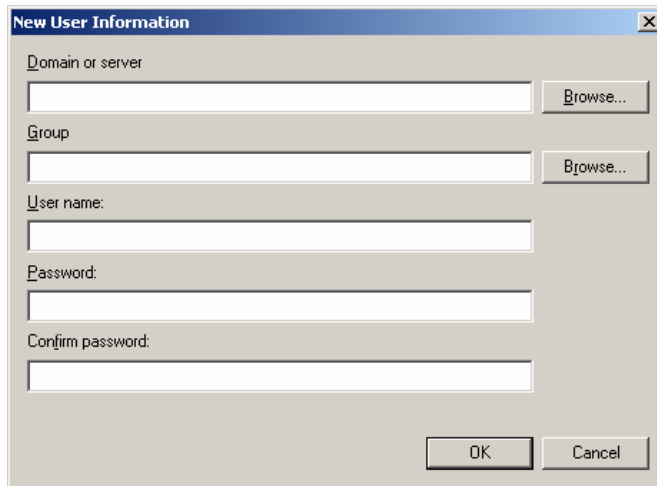


---

*In a TLS environment, the SCS user must have permissions to issue certificates (Issue and Manage Certificates and Request Certificates permission) on a Stand-alone certificate authority (CA). On an Enterprise CA, the user must have Read and Enroll permissions on the template to be used to create certificates.*

---

If a new user will be created later that will be the one associated with the service, select **New User**.

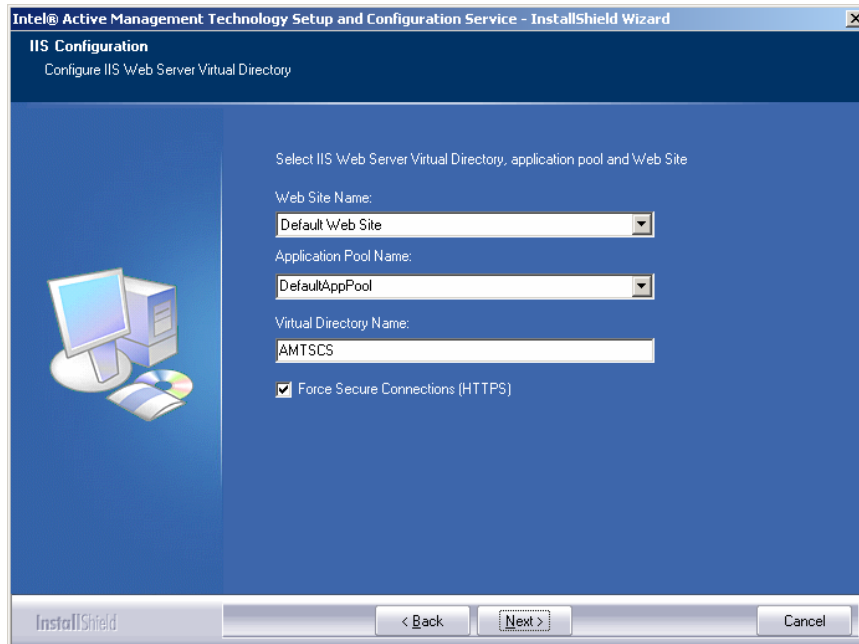


The 'New User Information' dialog box contains the following fields and controls:

- Domain or server: Text input field with a 'Browse...' button to its right.
- Group: Text input field with a 'Browse...' button to its right.
- User name: Text input field.
- Password: Text input field.
- Confirm password: Text input field.
- Buttons: 'OK' and 'Cancel' buttons at the bottom right.

Enter the parameters defining this user and select **OK**, then click **Next**. The installer validates the user account and may prompt that it will add proper permissions to the account.

7. The IIS Configuration screen is displayed.



The 'IIS Configuration' screen is part of the 'Intel® Active Management Technology Setup and Configuration Service - InstallShield Wizard'. It features a blue background and includes the following elements:

- Header: 'IIS Configuration' and 'Configure IIS Web Server Virtual Directory'.
- Instruction: 'Select IIS Web Server Virtual Directory, application pool and Web Site'.
- Web Site Name: A dropdown menu currently showing 'Default Web Site'.
- Application Pool Name: A dropdown menu currently showing 'DefaultAppPool'.
- Virtual Directory Name: A text input field containing 'AMTSCS'.
- Force Secure Connections (HTTPS): A checked checkbox.
- Navigation: '< Back', 'Next >', and 'Cancel' buttons at the bottom.

8. Select a web site from the list of sites defined within IIS.

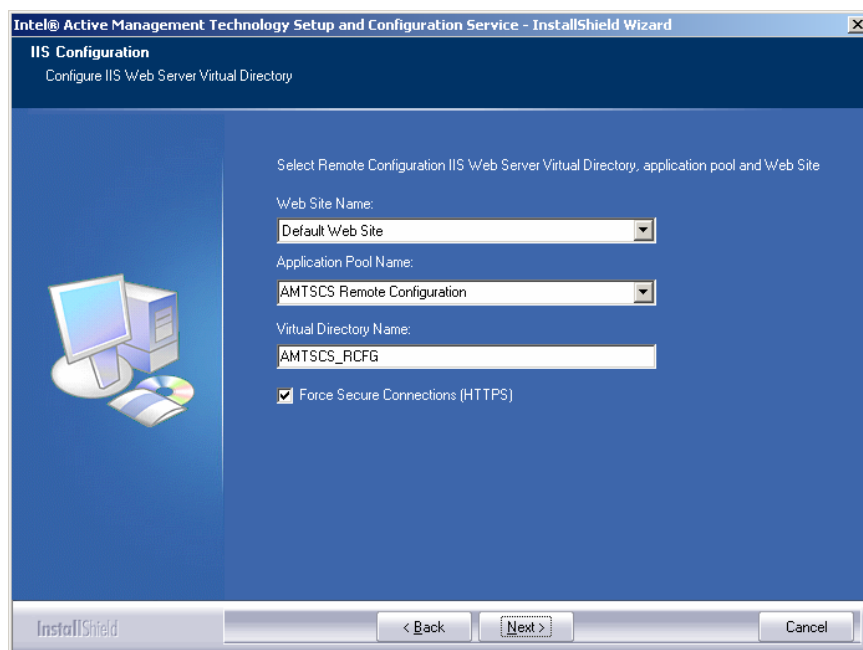
9. Enter the IIS Web Server Virtual Directory name. The default name is AMTSCS.



*The Virtual Directory name must be unique. If a Virtual Directory already exists with this name, the existing Virtual Directory will be preserved. As a result, the SOAP Virtual Directory will not be created.*

10. Check or uncheck the **Force Secure Connections (HTTPS)** option. Selecting this option means that TLS will be used for communications between the SCS console or an ISV-developed console and the API applications in the AMTSCS virtual directory. Unchecking it means that the connection will use TLS. Click **Next**.

11. The Remote Configuration IIS Web Server Configuration page is displayed.

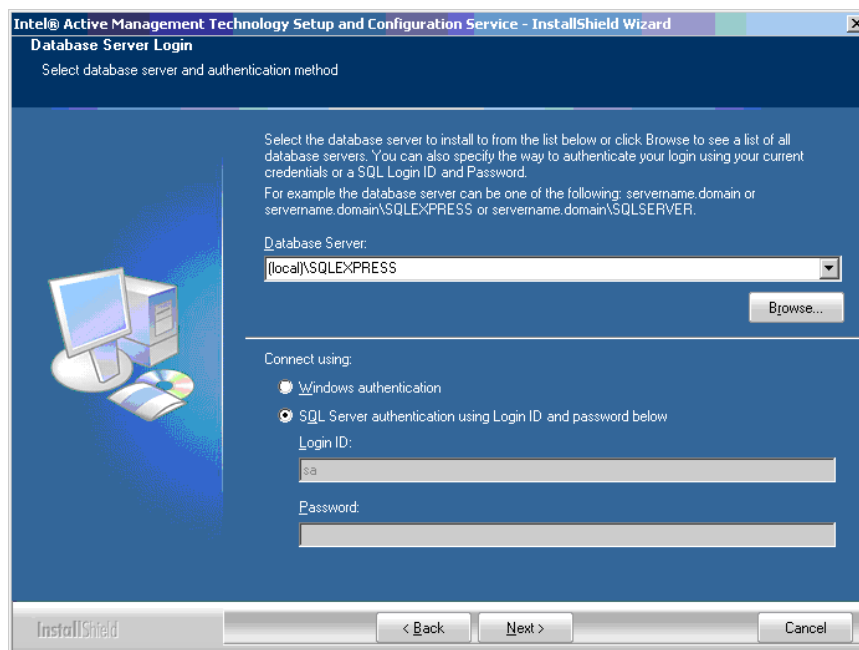


12. Select a web site from the list of sites defined within IIS.

13. Enter the Remote Configuration IIS Web Server Virtual Directory name. The default name is AMTSCS\_RCFG.

14. Check or uncheck the **Force Secure Connections (HTTPS)** option. Selecting this option means that TLS will be used for communications between the RCT and the API applications in the AMTSCS\_RCFG virtual directory. Unchecking it means that the connection will use TLS. Click **Next**.

15. The Database Server Login screen is displayed.



Define the database server—that is, the name of the computer functioning as the database server and the database instance—and the connection type. In the above screenshot, the server is “local” and the instance is SQLEXPRESS. Use the FQDN of



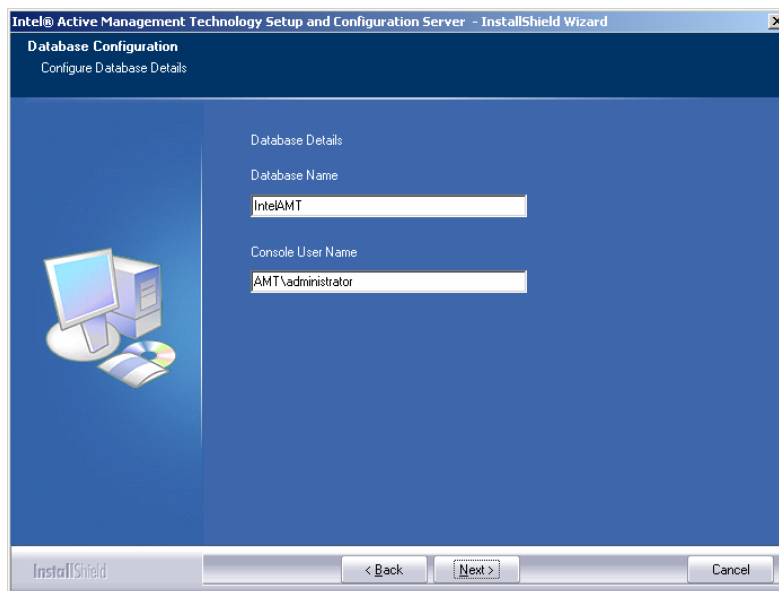
the SQL server platform when the SCS and the SQL server are on different platforms. Select **SQL Server authentication using Login ID and password below** and enter the password defined during the SQL server installation (see page 24). **sa** is the default SQL server Login ID. Click **Next**. The Database Configuration screen is displayed.



---

*The default Server name is the name of the local computer. In an environment with one shared database and more than one Intel SCS, ensure that the Server name is the name of the computer hosting the database.*

---



16. If Database Schema is being installed, enter both the Database Name—that is, the name assigned to the database; the default name is IntelAMT—and the Console User Name.
17. There may be a notice displayed saying that the user does not have necessary privileges. Click **Yes** to assign the user the necessary privileges.

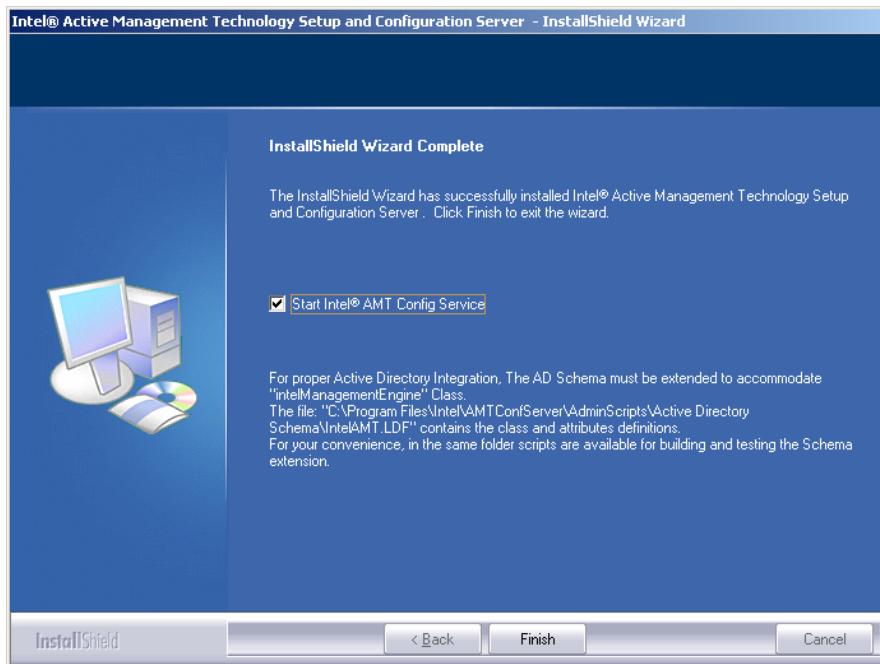


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*If the database was previously installed, the installer displays a notice asking if the database should be replaced. Respond “No” to this request. Install the database only once.*

---

11. From the Ready to Install screen, click **Install**. Installation begins. A progress bar indicates the status of the installation. When the installation is complete, the InstallShield Wizard\* Complete screen is displayed.



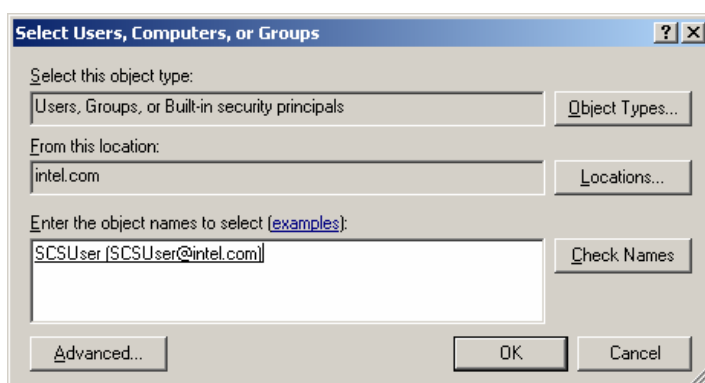
The Installation Complete screen has a reminder to run the scripts required to add the the IntelManagementEngine class to Active Directory. To do this, a user with Enterprise Admin permissions runs BuildSchema.vbs at [installdrive]:\Program Files\Intel\AMTConfServer\AdminScripts\Active Directory Schema. Optionally, select the checkbox to start the SCS immediately.

12. Click **Finish**.

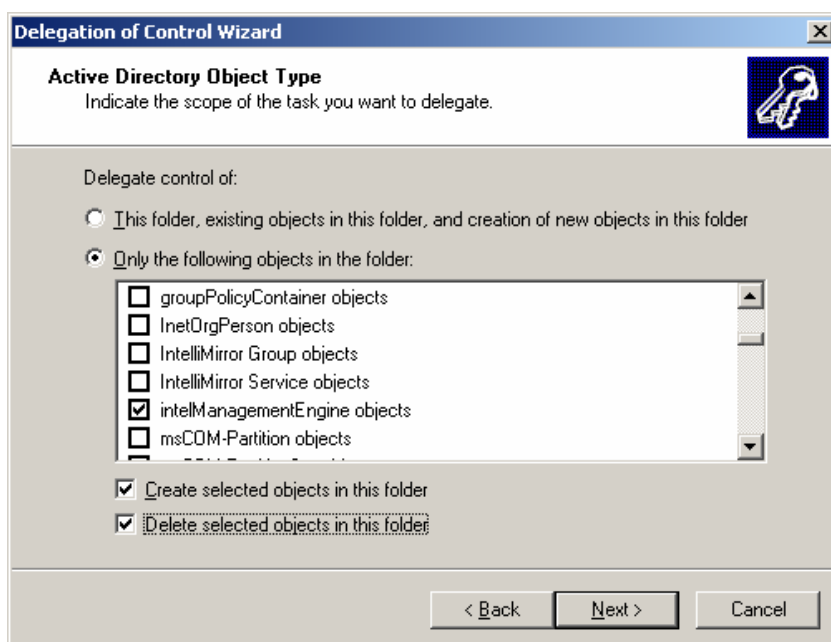
## Give the SCS User Permission to Create/Delete AMT Objects

Once the Active Directory schema has been updated, the SCS user needs permission to add and delete AMT objects in the OU defined for holding the objects. The following procedure explains how to do this.

1. Open a command window and enter mmc.
2. Press **Ctrl+M** followed by **Alt+D**.
3. Select **Active Directory Users and Computers** and click **Add, Close**, and **OK**.
4. In the tree on the left, open the domain containing the OU where AMT objects will be stored. Right-click on the OU folder and select **Delegate Control...**
5. The Delegation of Control Wizard opens. Click **Next**, and **Add**, and then enter the name of the SCS user. Click **OK** and **Next**.



6. On the Tasks to Delegate pane, select **Create a custom task to delegate** and click **Next**.
7. Find intelManagementEngine objects in the displayed list and select it. Also select the Create and Delete options and click **Next**.



8. On the Permissions pane, select **Full Control**. Click **Next** and **Finish**.

## Upgrading the Intel SCS to a New Version

If there is an existing version of the SCS already installed and a new version is to be installed, perform the following steps:

1. Using locally available tools, backup the database.
2. Start installation of the new version of the SCS as described above.
3. If the new version has a newer version of the database schema, a message is displayed reminding the user to perform a database backup. Do so now if step 2 was skipped.
4. Continue with the installation. The installer will update the database so that it conforms to the latest version of the schema.

## Silent Install

The SCS installation image is an InstallShield\* executable. Besides the interactive install described above, the SCS can be installed from a command line using a script file to respond to the installer questions. This capability is called “silent install”. Another application can invoke the silent install with a properly prepared installation script. This can be used by ISVs that wish to embed the SCS into their application.

The usage is:

```
AMTConfServer.exe /s /f1"c:\scsinstall.iss" /f2"c:\scsinstall.log"
```

where `scsinstall.iss` is the install script and `scsinstall.log` is the log file created by the installer.

**Note: As with any script-driven application, the parameters included in the script must be verified before activating the script. The silent install assumes that the supplied values are correct.**

Create an install script from a GUI-based installation sequence by running the installer with the “record” option:

```
AMTConfServer.exe /r /f1"<path>\silentinstall.iss", where  
silentinstall.iss is the created file.
```

The following example of an `scsinstall.iss` script provides the necessary parameters to the installer for a standard install. The highlighted parameters are those that must be customized per installation.

```
[InstallShield Silent]  
Version=v7.00  
File=Response File  
[File Transfer]  
OverwrittenReadOnly=NoToAll  
[ {DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -DlgOrder ]  
Dlg0={DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-OnAppSearch-0  
Count=15  
Dlg1={DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-SdWelcome-0  
Dlg2={DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-SdLicense2Rtf-0  
Dlg3={DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-SetupType2-0  
Dlg4={DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-IntelFlow-0  
Dlg5={DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-AskYesNo-0  
Dlg6={DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-OnMainServiceInitialize-0  
Dlg7={DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-IISDialog-0  
Dlg8={DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-IISRCFGDialog-0  
Dlg8={DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-SQLServerSelectLogin-0  
Dlg9={DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-DBDialog-0  
Dlg10={DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-SdStartCopy2-0  
Dlg11={DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-MainService_Installed-0  
Dlg12={DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-DatabaseSchema_Installed-0  
Dlg13={DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-AskYesNo-1  
Dlg14={DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-SdFinish-0
```

```

[ {DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -OnAppSearch-0]
## If the user is not administrator, the installer displays a warning
## message. In silent install, a warning message will terminate the
## installer, so the Admin_logged_On parameter was added:
## 1: Allow installation even if the user is not an administrator
## 0: Don't allow install without Admin permissions.
Admin_Logged_On=1
## Allow installation if .NET 2.0 is not installed.
NET_2.0_Exists=1
[ {DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -SdWelcome-0]
Result=1
[ {DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -SdLicense2Rtf-0]
Result=1
[ {DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -SetupType2-0]
Result=304
[ {DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -IntelFlow-0]
## This warning message is presented in case the user selects to install SOAP
## API (on IIS) and IIS6 is not installed.
## Allow installation of SOAP API even if IIS6 is not installed.
IIS6_Warning=1
[ {DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -AskYesNo-0]
## Ignored
Result=1
[ {DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -OnMainServiceInitialize-0]
## Domain/User/Password for the main service.
## Note: when running in silent mode the Domain/User/Password is not validated!
Domain_User=DOMAIN\user
Password=password
[ {DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -IISDialog-0]
## The IIS SOAP API virtual directory name and
## web site name. The web site named must exist before installation.
SOAP_Name=AMTSCS
Result=1
SOAP_Web_Site_Name=Default Web Site
SOAP_Secure_Connection=0
SOAP_Application_Pool_Name=DefaultAppPool
[ {DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -IISRCFGDialog-0]
## The IIS SOAP API virtual directory name and
## web site name used by the RCT. The web site named must exist before
## installation.
SOAP_Name=AMTSCS_RCFG
Result=1
SOAP_Web_Site_Name=Default Web Site
SOAP_Secure_Connection=0
SOAP_Application_Pool_Name=AMTSCS Remote Configuration
[ {DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -SQLServerSelectLogin-0]
## User/Password for SQL Server login
## To use Windows authentication simply use blank values, for example:
## szUser=' '.
## Note: The User/Password is not validated in silent mode. If access
## is denied the installation will fail when it tries unsuccessfully
## to access the DB.
szUser=sa
szPass=sa
## Name and Instance of the SQL Server.
szServer=(local)\SQLEXPRESS
szAuthen=1
Result=1
[ {DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -DBDialog-0]

```

```

## Database name.
DB_Name=IntelAMT
## Application user to add when installing the Database
App_User=DOMAIN\user
Result=1
[ {DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -SdStartCopy2-0 ]
Result=1
## If there is an existing database, this parameter determines if the
## installer should update to a newer schema. 1=yes; 0=no
## If the installed DB has a newer schema than the version being installed,
## the installation will continue without updating the DB.
## If the installer attempts to update the DB and fails (for example, there
## are other users still active attached to the DB), then the install will
## fail.
Update_DB=1
[Application]
Name=Intel® Active Management Technology Setup and Configuration Server
Version=3.1.0.5.1
Company=Intel
Lang=0009
[ {DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -MainService_Installed-0 ]
## If the user selected to run the service does not have sufficient
## permissions in local security policy to run
## as a service, the installer will add the necessary privileges if
## Set_Privileges is 1 (0 to ignore).
Set_Privileges=1
[ {DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -DatabaseSchema_Installed-0 ]
## When installing, the Database might be already installed. The
## Use_Exist_DB parameter tells the installer what to do.
## 1: The existing DB will be used; 0: delete the DB and recreate it.
Use_Exist_DB=1
[ {DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -AskYesNo-1 ]
## ignored
Result=1
[ {DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -SdFinish-0 ]
Result=1
# bOpt1 controls whether or not to start the windows service after the
# installation.
# bOpt1=0: do not start the service; bOpt1=1: start the windows service.
bOpt1=0
bOpt2=0
[ {0027D675-4029-47F6-B217-77C6EB1389CB} -DlgOrder ]
Count=0

```

Use the following script to perform a silent uninstall. The highlighted fields must match the corresponding fields in the install script.

```

[InstallShield Silent]
Version=v7.00
File=Response File
[File Transfer]
OverwrittenReadOnly=NoToAll
[ {DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -DlgOrder ]
Dlg0={DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -MessageBox-0
Count=6
Dlg1={DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -DatabaseSchema_UnInstalling-0
Dlg2={DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -SQLLogin-0
Dlg3={DA4F4037-6EB2-4309-86EB-A8902CBC12EC} -AskYesNo-0

```

```

Dlg4={DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-SdFinish-0
Dlg5={DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-SdFinishReboot-0
  [{DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-MessageBox-0]
Result=6
[Application]
Name=Intel® Active Management Technology Setup and Configuration Server
Version=3.1.0.5.1
Company=Intel
Lang=0009
  [{DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-DatabaseSchema_UnInstalling-0]
# Whether or not to remove the DB when uninstalling. 1: Yes; 0: No
Remove_DB=1
  [{DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-SQLLogin-0]
## User/Password for SQL Server login
## To use Windows authentication simply use blank values, for example:
## szUser=' '.
## Note: The User/Password is not validated in silent mode. If access
## is denied the uninstall will fail when it tries unsuccessfully
## to access the DB.
szUser=sa
szPass=sa
Result=1
  [{DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-AskYesNo-0]
# ignored
Result=0
  [{DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-SdFinish-0]
Result=1
bOpt1=0
bOpt2=0
  [{DA4F4037-6EB2-4309-86EB-A8902CBC12EC}-SdFinishReboot-0]
## If the SOAP API cannot be removed, the uninstaller may request a reboot.
## BootOption=0 ignores the request; BootOption=1: uninstaller does reboot
## To avoid the reboot request, be sure no clients request access to SOAP
## API after IIS restart.
Result=1
BootOption=0
  [{951D2E35-5A48-4ED3-8BA4-78205D908B8C}-DlgOrder]
Count=0

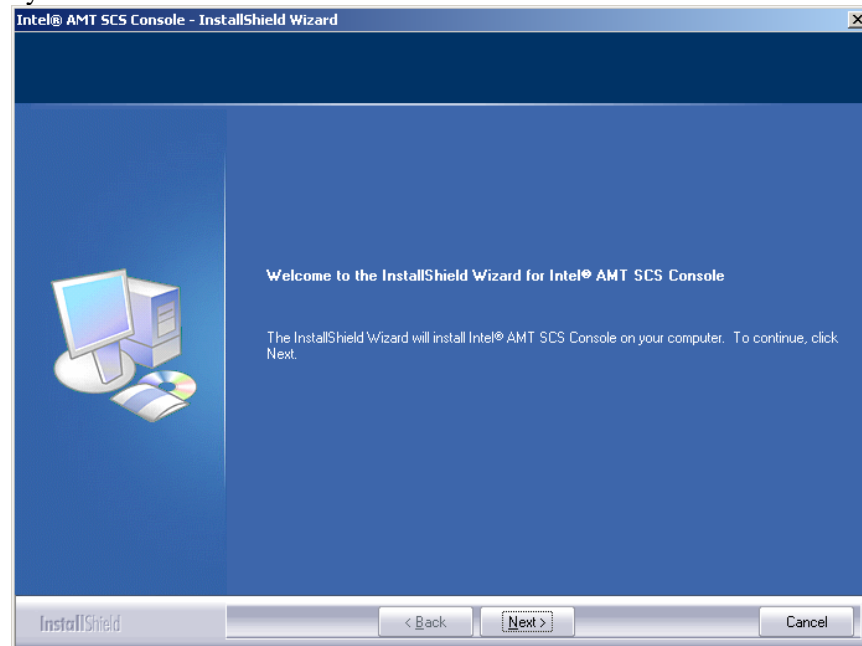
```

## Installing the Intel AMT Management Console

Installing the Intel SCS Management Console requires no user intervention. The default installation folder is C:\Program Files\Intel\AMTConsole.

To install the Intel SCS Management Console: See “Installing the Intel AMT Management Console” on page 50.

1. Ensure that the computer meets the system requirements listed in “System Requirements” on page 18.
2. Locate the SCS distribution files.
3. Locate and double-click the file named AMTConsole.exe. The Welcome screen is displayed.



4. Click **Next**. The License Agreement is displayed.
5. Accept the license agreement and click **Next**. The Choose Destination Location screen is displayed.
6. Define the location where the Intel SCS Management Console will be installed and click **Next**. The Ready to Install screen is displayed.
7. Click **Install**. Installation begins. A progress bar indicates the status of the installation. When the installation is complete, the InstallShield Wizard Complete screen is displayed. Click **Finish**.



## Post Installation Operations

After the components of the Intel SCS are installed, we recommend completing the following procedures.

### ***Intel AMT Configuration and the DNS***

Intel AMT device setup and configuration requires the presence of a Domain Name System (DNS) Server. The DNS must have information for two entities:

The SCS Server must be registered in the DNS.

A configured, operational Intel AMT device must be registered within DNS.

### **Intel SCS**

The platform running the SCS Service (the Main Service) must be registered in the DNS as “ProvisionServer” in every domain in the enterprise. If there is more than one instance of the SCS running, then each instance can register in each domain using a DNS alias.

To register a server in the DNS as “ProvisionServer” when the server itself has a different hostname, add a CNAME (canonical name”) record to the DNS. To do this with a Microsoft DNS server, open the MMC DNS branch, open the Forward Lookup Zones branch, right-click the entry for the server running the SCS, and select New Alias. Then enter “ProvisionServer as the alias name.

### **Intel AMT Devices**

**Ensure that the DNS is configured with the Fully Qualified Domain Names (FQDN) of the Intel AMT-enabled machines that are being configured.**

Intel AMT devices must be configured to have the same FQDN as the host OS. This stems from the fact the Intel AMT device is not a secure DNS client and it relies on the host OS to maintain the DNS record. For this reason, the Intel AMT device snoops the DHCP requests and responses issued by the host OS. The Intel AMT device then uses the IP provided by the DHCP to the host OS as its own.

When the host OS is down, the Intel AMT device requests DNS registration of its configured FQDN from the DHCP (option 81). This works only if the DNS and DHCP are configured to operate in this way. This is a default feature of Microsoft DNS and DHCP servers.

When an Intel SCS contacts a configured Intel AMT device, it uses the FQDN of the Intel AMT device. When using TLS and/or Kerberos, this is essential, as the platform and the Intel AMT device are identified in certificates and Kerberos tickets with the FQDN. This necessitates that the DNS server contain a Host (A) record for every configured Intel AMT device.

This is the responsibility of the Administrator.

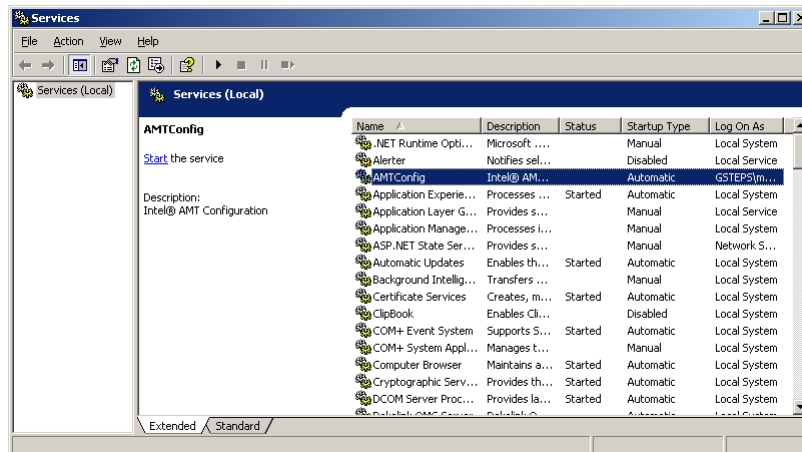
There are several methods to do this:

- Manual entry of the Host (A) record
- A successful boot of the host OS that registers a DNS entry with the same name. This method is good as long as the IP lease and DNS entry are maintained.
- Configure DNS and DHCP to enable AMT use of option 81.

## AMTConfig Service Verification

To verify that the AMTConfig Windows service is running:

1. Click the Windows **Start** button and click **Run**.
2. In the **Open** field, enter **services.msc** and click **OK**. The Services (Local) Window is displayed.
3. In the Status column, check the status of **AMTConfig**. If there is no listing in the column, the service is not running.
4. Select **AMTConfig**. “Start the service” is displayed.



5. Click **Start**. A progress message is displayed. When completed, the word **Started** appears in the Status column.

## Quick Start and System Test

This procedure is a summary of the Intel SCS Management Console section which begins on page 74. However, it can also be completed as a test to ensure that the system is configured and running properly.

1. Log-in to the Intel SCS Console. For details, see “Logging In” on page 77.
2. Add a new profile. For details, see “Configuring Profiles” on page 81.
  - a. From the navigation panel of the Intel SCS Console, expand the **Configuration Service Settings** branch and select **Profiles**.
  - b. Click **Add**. The Profile Configuration dialog box is displayed and the General tab is selected.
  - c. Configure the new profile and save it.
3. Add configuration properties for Intel AMT devices. For details, see “Configuration Parameters per Device” on page 106.
  - a. From the navigation panel of the Intel SCS Console, select **Configuration Parameters**. The New Intel AMT Systems table is displayed.
  - b. Click **Add**. The New Intel AMT Device Properties dialog box is displayed.
  - c. Enter the New Intel AMT device properties and click **OK**.
4. Configure the BIOS administrator password for Intel® AMT 2.0/2.1. For details, see “Configuring Pre-Setup and Configuration Security Keys” on page 99.
  - a. From the navigation panel of the Intel SCS Console, expand the **Configuration Service Settings** branch and select **Security Keys**.
  - b. Select a TLS-PSK entry. (If there are no entries, click **Create Pre-Provision data** to create entries.)
  - c. Click **View**.
  - d. Copy or print the properties of the selected entry.
  - e. The Administrator must enter these values in the appropriate place in the Intel AMT device BIOS screen.
5. If using TLS based Authentication, configure the CA parameters.
  - a. From the navigation panel of the Intel SCS Console, expand the **Configuration Service Settings** branch and select **Profiles**.
  - b. Enable TLS and, if applicable, mutual authentication.
  - c. Select the profile being used and click **Edit**.
  - d. Click the **Network** tab.
  - e. Configure the TLS server certificate details.
  - f. If using Mutual Authentication, select the Mutual Authentication button. Locate one or more trusted certificates and add any available CTRL information.
  - g. Click **Apply**.



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*Without a proper CA configuration, the SCS service will not be able to work with TLS based Authentication.*

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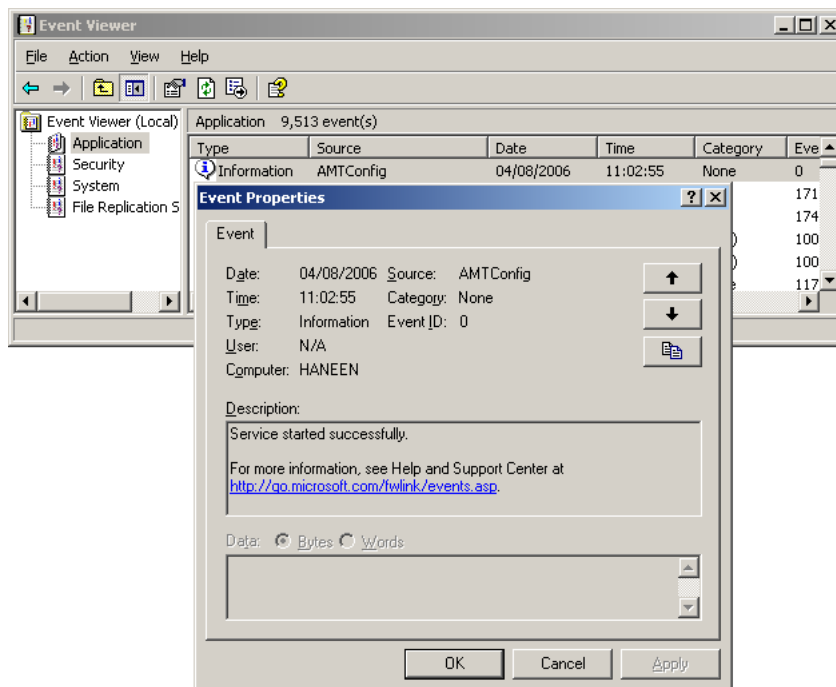


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*Improper Network settings can cause some of the SCS service's features to malfunction. For example, changing only the Network Interface to TLS Server Authentication causes an API failure.*

---

6. Test the Intel SCS Main Service.
  - a. Click the Windows **Start** button > **Programs** > **Administrative Tools** > **Services**.
  - b. Right-click on **AMT Config** and, from the popup menu, select **Start**. A progress bar indicates the advancement of the start-up.
  - c. Click the Windows **Start** button > **Programs** > **Administrative Tools** > **Event Viewer**.
  - d. Click **Application**.
  - e. In the Information entries, double-click the AMTConfig message. A popup message should say “Service Started Successfully.”



- f. Click **OK**. The Event Viewer returns to focus.
- g. From the File menu, click **Exit**.

## Recommended Daily Workflow

After the Intel SCS components are installed and the first Intel AMT devices are configured and operational, we recommend that the following tasks be completed on a regular basis (preferably daily):

- Check for new Intel AMT devices.
- Optionally, authorize provisioning of new Intel AMT systems.
- Review the list of “Existing Intel AMT Systems” for anomalies – devices that have not completed setup and configuration, pending addition of information to the device definition (e.g., a missing UUID or FQDN).
- Review the logs. Note anomalies and fix them. See “Intel AMT SCS Console Logs” on page 117.
- Backup the database.

# INTEL AMT PREPARATION

This section contains:

- “Preparation Without a USB Device” on page 57
- “Using a USB Storage Device for Factory Mode Setup” on page 61
- “Preparing Intel AMT for Future Configuration” on page 61
- “Remote Configuration” on page 62

This section describes the steps required to prepare an Intel AMT device to receive its configuration settings from the Intel SCS. An Intel AMT device is considered in Factory Mode until it is ready to send “Hello” messages to the SCS. Once the appropriate preparation is performed, the device transitions to Setup Mode, sending “Hello” messages periodically until it receives a response from an SCS. When setup and configuration is complete, the Intel AMT device is in Operational Mode. There are four possibilities:

- During power up, if the BIOS implementation supports this capability, the Intel AMT device first checks for the presence of a USB storage device. If the device is present, the setup proceeds as described in “Using a USB Storage Device for Factory Mode Setup” on page 61. The PID/PPS pair is installed and, optionally, the Intel Management Engine BIOS extension password may be changed.
- If there is no USB device or USB enablement is not supported, the technician enters the BIOS extension using the method defined by the BIOS vendor. The BIOS implementation may require that the user enable the BIOS extension from the BIOS. The PID/PPS pair is entered manually as described below, based on values generated by the SCS.
- If the device was prepared for configuration with a PID-PPS pair by an OEM or by previous IT actions, then no further preparation is needed: It is already in Setup Mode. The Intel AMT device will send “Hello” messages once it is connected to the network.
- Intel AMT Releases 2.2, 2.6, and 3.0 have an option for Remote Configuration and do not need any of the above three approaches. See “Remote Configuration” on page 62.

## Preparation Without a USB Device

If there is no USB device or USB enablement is not supported, the platform displays the BIOS startup screen, and then the BIOS Extensions will be processed.

Intel AMT reference platforms display a screen prompting the user to press <Ctrl+P>. Pressing <Ctrl+P> passes control to the Intel Management Engine BIOS extension (MEBx) Main Menu. This step may vary as a function of an OEM-provided BIOS. Follow the manufacturer’s directions for accessing the ME BIOS sub-menu. Steps 1 through 11 or some subset of them may not be required.

Perform the following steps:

1. Enter the MEBx default password. The default password is **admin**.
2. Change the default password to a new value. This step is required.



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*The password must contain at least eight characters, including an upper-case letter, a lower-case letter, numbers, and one of the @ # \$ % ^ & \* symbols at a minimum.*

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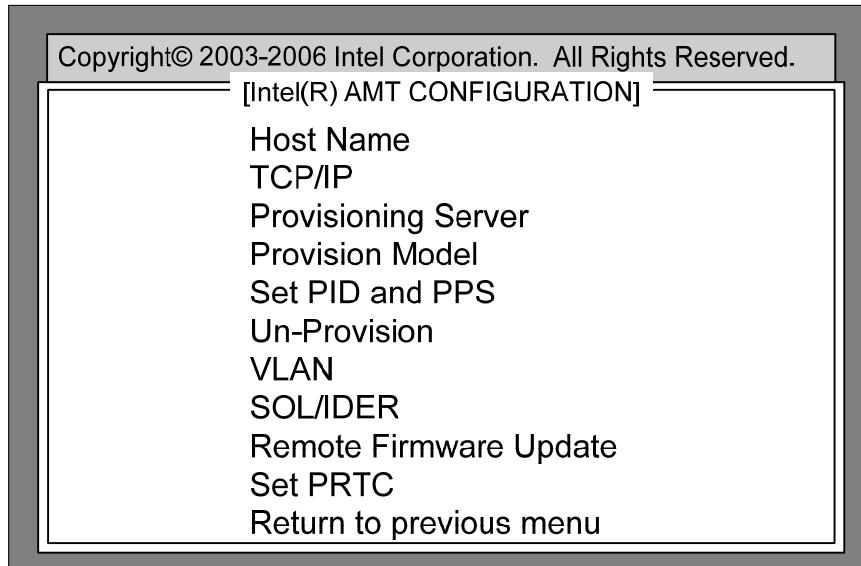
This password is either generated by the SCS or entered manually in the SCS security keys definition. The Intel AMT device uses this password for authentication during Setup and Configuration. Once Setup mode has begun, a management console application can change the Intel AMT device password without modifying the MEBx password.

3. Select **Intel ME Platform Configuration**. A warning message is displayed saying that a reset will occur after configuration is complete.
4. Enter **Y**.
5. Select **Intel ME Features Control**.
6. Select **Manageability Feature Selection**.

7. Select Intel AMT and return to the previous menu.
8. Select the **Intel ME Power Control** menu.
9. (Intel AMT Release 2.0/2.1/2.2) Set the following power control settings:
  - Intel ME State upon Initial Power-On = ON
  - Intel ME ON in Host Sleep States = Always
  - Intel ME Visual LED Indicator = ON
10. (Intel AMT Release 2.5/2.6) Select from one of the following choices (OEMs can select which options will be available in this list):
 

Mobile: On in S0	(The Intel ME and Intel AMT are on only when the host is on—this is the default setting.)
Mobile: On in S0, S3/AC	(The Intel ME and Intel AMT are on when the host is on or when the host is in S3, as long as the platform is connected to AC power.)
Mobile: On in S0, S3/AC, S4-5/AC	(The Intel ME and Intel AMT are on when the host is on or when the host is in S3 to S5, as long as the platform is connected to AC power.)
Mobile: On in S0, ME WoL in S3/AC	(The Intel ME and Intel AMT are on when the host is on. When the host is in S3 and the platform is connected to AC power, the ME will shut down after a defined period of time, but will awaken when it receives a network message – Wake on LAN.)
Mobile: On in S0, WoL in S3/AC S4-5/AC	(The Intel ME and Intel AMT are on when the host is on. When the host is in S3 to S5 and the platform is connected to AC power, the ME will shut down after a defined period of time, but will awaken when it receives a network message –Wake on LAN.)
11. (Intel AMT Release 3.0) Select Desktop: ON in S0, S3, S4-5.
12. Return to the previous menu.
13. Exit all menus. The computer will restart.
14. Press <Ctrl+P> and enter the Main Menu.
15. Select **Intel AMT Configuration** and press **Enter**. The Intel BIOS extension screen is displayed.





16. Configure the parameters as described in the following sections.

#### **Host Name**

This parameter is set by the SCS.

#### **TCP/IP Settings**

Enable the network interface and DHCP. These are the default settings in enterprise mode and are required for interoperability with the SCS. The Intel AMT device will share the IP address received from a DHCP server with the host platform. The SCS **does not support static IP addresses** for the host and the Intel AMT device.

#### **SCS Service IP Address (“Provisioning Server”)**

By default, the SCS Service IP address is set to 0.0.0.0. A value of 0.0.0.0 means that the Intel AMT device will attempt to obtain the actual IP address of the SCA by performing a DNS lookup for a host named "ProvisionServer". If the DNS is unable to resolve the host name, the IP address of the SCS must be supplied manually. The name ProvisionServer can be configured by an OEM to a different value, so verify the delivered value of this parameter.

By default, port 9971 is used to establish a connection to the SCS. This default may be changed by an OEM. If the SCS has been configured to listen on a different port, then enter the actual port the SCS is listening on.

#### **Setup Type (“Provision Model”)**

The default setup type of Intel AMT is Enterprise. The Small Business Setup option is used in environments where infrastructure required for TLS is not available, and configuration can be completed from the BIOS menu. The SCS service does not support Small Business setups.

The Setup Type menu also allows selection of Legacy Mode. The SCS does not support configuration of Intel AMT devices that are in Legacy Mode

#### **Virtual Local Area Network (VLAN) Settings**

Set by the SCS

#### **PID-PPS**

The Provisioning ID (PID) and the Provisioning Pre-Shared Key (PPS) settings are required for establishing secure communication during the Setup and Configuration of Intel AMT Release 2.0/2.1 platforms.

The SCS service generates a file of PID-PPS pairs used either for manual installation or for loading onto a USB storage device. To load a PID/PPS pair manually:

1. At the SCS Console, print the values to be installed manually from the security keys screen, and then mark the selected keys as “used” so they will not be installed on more than one platform.
2. At the platform being prepared for configuration, enter the values as prompted when the “Set PID and PPS” menu item is selected.

The PID-PPS pair may have been preloaded by a platform OEM or loaded using a USB storage device. See “Using a USB Storage Device for Factory Mode Setup” on page 61.

The PID and PPS are 64-bit quantities made up of ASCII codes of some combination of characters – capital alphabet characters (A–Z), and numbers (0–9).

The PID is an eight character entry of the form: XXXX-XXXX and is sent in unencrypted format in the “Hello” message.

The PPS is a thirty-two character quantity of the form:

XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX and is a secret shared between the Intel AMT device and the SCA.

Here is an example pair:

PID: 0000-037M

PPS: NKLD-G5DC-RRNQ-E9YZ-ZIJL-7LFL-VJED-69XJ

The firmware checks for checksum characters embedded in the values. The last character of the PID is expected to be a checksum of the previous seven characters, and the fourth character in each group of four characters in the PPS is expected to be a checksum of the previous three characters. This check is made to reduce the possibility of operator error when entering these values.

### **Other Settings**

The SOL/IDER, Remote Firmware Update and Set PRTC menu options are not required for setup and configuration. The SOL/IDER option enables the Intel AMT device redirection capabilities. The Remote Firmware Update option enables the ability to perform remote updates to the firmware. The Set PRTC allows an Administrator to set the programmable real-time clock to a correct value if the clock lost its value inadvertently in a situation where it could not be reset remotely.

### **Exit Intel AMT Configuration**

Highlight the Return to Previous Menu option and press Enter. Upon exiting the Intel AMT BIOS extension, the Intel AMT device will enter Setup Mode and begin sending “Hello” messages to the SCS service.

### **“Hello” Message Retry Frequency**

The Intel AMT device sends “Hello” messages according to the following algorithm:

- 5 retries on 1 minute intervals
- 5 retries on 10 minute intervals.
- 5 retries on 1 hour intervals.



---

*The retry algorithm will restart after a firmware reset, which requires disconnecting AC power from the platform containing the Intel AMT device.*

---

## ***Using a USB Storage Device for Factory Mode Setup***

The Factory mode setup process can be simplified by using a USB key containing a file of PID/PPS pairs and replacement passwords, when the BIOS supports this method. This method can be used for one-touch configuration if all the defaults listed below are suitable for an enterprise installation. Even if additional parameters need to be changed, the USB key can install the PID and PPS without the problem of operator error. Use this method also for preparing platforms for future Intel AMT configuration.

### **Requirements**

The following items are required to be able to use a USB key for Intel AMT device configuration:

- A dedicated USB key with no data on it.
- The function within the SCS service that generates a file of PID/PPS/password triplets in the proper format.
- Good security procedures for controlling the USB key.

### **Preparation**

All that is required is to execute the SCS function, which will do the following:

1. Create a list of PID/PPS/password triplets. (See “Configuring Pre-Setup and Configuration Security Keys” on page 99).
2. Use the export function to create a file to write to the USB key. The SCS automatically formats the key file format to FAT16 and copies the file to the key.

### **Initializing a Platform**

To install the PID/PPS information on an Intel AMT device an Administrator will:

1. Take the platform out of the box and connect cables, a monitor, and a keyboard.
2. Connect the USB key to a USB port.
3. Turn on the platform.

The BIOS on the platform will detect the presence of the USB key, read the next available entry in the file, authenticate the password, save the PID/PPS values, optionally update with the replacement password, and mark the entry on the USB key as “used”. A message displayed on the monitor informs the technician that the process is complete. The Administrator powers down the platform.

### **Moving to Setup Mode**

The platform may now be ready for moving to Setup mode, if the default parameters are appropriate for the specific enterprise. The critical defaults are:

- DHCP mode with no domain defined
- Setup and Configuration Service with the default host name and port
- No DNS IP defined (The DHCP server must be configured to provide a DNS IP, which will be required to discover the IP of the Setup and Configuration Server)

If these defaults are acceptable, the platform can now be connected to the network and powered on. Otherwise, the Administrator can power on the platform, enter the MEBx sub-menu and configure additional parameters.

### ***Preparing Intel AMT for Future Configuration***

A user may wish to postpone Intel AMT device setup and configuration until a later date. An OEM may supply platforms with a PID-PPS pair already written to the Intel AMT

device Flash memory. In this case, the platform may be already prepared for configuration, as described earlier. The OEM will have to securely deliver a file of the PID-PPS pairs to the customer IT organization for use in the setup and configuration process. The import function on the SCS Console Security Keys screen can import such a file. The platform will start sending “Hello” messages as soon as it is powered on and connected to a network. If no SCS server is present to respond to the messages, the platform will have to be disconnected from AC power and then reconnected to start the “Hello” sequence again, as described on page 60.

It is also possible to prepare the Intel AMT-based platform for configuration without entering Setup Mode. Either use a USB storage device, as described above or follow the Factory Mode Setup steps, but under the TCP/IP menu item, select Y at the “Disable Network Interface?” option. Enter a PID-PPS pair as well. When the time comes to configure and enable the Intel AMT device, re-enter the BIOS sub-menu and change the TCP/IP settings to make the network interface operational by responding Y to “Enable Network Interface” and setting DHCP as the IP source..

## **Remote Configuration**

Remote Configuration is a feature added with Intel AMT Releases 2.2, 2.6, and 3.0. It eliminates the need for IT personnel to manually install a PID/PPS pair to enable setup. The Remote Configuration process depends on several Intel AMT enhancements:

### **Embedded hashed root certificates**

The Intel AMT device contains one or more root certificate hashes from worldwide SSL certificate providers in the firmware image. As part of the “Hello” message, the Intel AMT device sends all of the hashes to the SCS. When the SCS authenticates to the Intel AMT device, it must do so with a certificate compatible with one of the hashed root certificates.

### **Self-signed certificate**

The Intel AMT device produces a self-signed certificate that it uses to authenticate to the SCS. The SCS must be configured to accept such a certificate.

### **One-time password (OTP)**

Security policy may require use of a one-time password to improve security. The Remote Configuration Tool (RCT) running on the local host requests the OTP from the SCS and sends it to the Intel AMT device. The SCS saves the OTP in the database entry associated with the specific Intel AMT device, and uses it to validate the connection to the device.

### **Limited network access**

The network interface opens for a limited period of time to send “Hello” messages and to complete the setup and configuration process. After 24 hours, the interface will close if the setup and configuration time was not extended by a network command from the SCS.

## **Overview of Remote Configuration Flow**

### **Initial Conditions**

Before Remote Configuration begins, the following initial conditions must be met:

1. The Intel AMT device is configured to receive its IP address from a DHCP server. The DHCP server supports option 15 and will return the local domain suffix.
2. The Intel AMT device is pre-programmed with at least one active root certificate hash.
3. For the delayed installation sequence described below (“delayed” meaning that the Intel AMT device was not setup immediately upon being connected to the network—see “Bare Metal Setup and Configuration” on page 66), the Remote Configuration Tool must be executed on the host platform.
4. The SCS is registered with a DNS server accessible to the Intel AMT device with the name “Provisionserver” (or the name defined by the OEM) and is in either the same

- domain as the device or it is in a domain with the same suffix.
5. The SCS has a certificate with the appropriate **OID** or **OU** that traces to a CA which has a root certificate hash stored in the Intel AMT device.

The OID in the Extended Key Usage field must be a Server Authentication Certificate with an Intel setup extension:

1.3.6.1.5.5.7.3.1,2.16.840.1.113741.1.2.3

**or**

the **OU** value in the **Subject** field must be “**Intel(R) Client Setup Certificate**”.

The Subject CN must match the domain suffix of the Intel AMT platform (see “Remote Configuration Certificate – Differences between Releases” on page 66, below).

6. The SCS is configured to allow remote configuration. The checkbox on the Console Service Settings/General screen for **Allow configuration with certificate-based configuration** must be checked. **One-time password required** should be checked if one-time passwords will be used. See page 78.

## Acquiring and Configuring a Certificate that Supports Remote Configuration

Contact one of the vendors whose root certificate hashes are built into the Intel AMT firmware. A list of the hashes should be provided by the platform vendor. Go to the vendor's website and purchase an "SSL certificate" For example, the following link to Verisign's\* site <http://www.verisign.com/ssl/buy-ssl-certificates/index.html> shows how to purchase an appropriate certificate. The site documents in detail the steps required to request, enroll, install and move an SSL certificate. The following settings are required for the certificate to be compatible for Remote Configuration use:

- The OU or the OID must match the values defined [above](#), in step 5 (the OU is the usual value entered when purchasing a certificate commercially).
- The CN must match the Intel AMT platform domain suffix (see "Remote Configuration Certificate – Differences between Releases" on page 66, below).
- The keys should be exportable to support IT key backup policies.
- The request type should be PKCS10.

After completion, export the acquired certificate in p7c format.

## Selecting the Certificate Used by the SCS for Remote Configuration

The SCS only works with one Remote Configuration certificate at a time, matching one of the hashes in the Intel AMT devices in the enterprise. Perform the following two steps to select the desired certificate.

1. Install the certificate created above in the System Certificate Store on the platform where the SCS executes. Follow the following steps:
  - a. Open certificates (local computer) using the Microsoft Management Console (MMC). To add the certificates plug-in to the MMC,
    - i. Select **file/add snap-in**.
    - ii. Select **Add....**
    - iii. Select **Certificates**.
    - iv. Select **computer account**; click **Next**.
    - v. Select **Local computer**; click **Next**.
    - vi. Select **Finish**; **Close**; select **Certificates** and click **OK**.
  - b. In the console tree, click the logical store where the MMC will import the certificate.
  - c. On the **Action** menu, point to **All Tasks** and then click **Import** to start the Certificate Import Wizard.
  - d. Type the path and file name of the certificate to be imported or click **Browse** and navigate to the file.
  - e. Select **Automatically select the certificate store based on the type of certificate**.
2. Invoke the loadcert utility, located at <install\_root>:\Program files\Intel\AMTConfServer\Tools. Double-click on **loadcert.exe**. Select the certificate that was just imported. The utility writes the certificate to the registry after deleting any previously stored certificates. It will report any problems in the certificates that it detects that would prevent using it as a Remote Configuration certificate.



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*If the SSL certificate comes from a CA whose "chain of trust" certificates are not automatically included in the Window 2003 trusted certificates store, it will be necessary to install the root certificate and any intermediate certificates in the local computer store on the processor where the SCS executes. To save the root certificate, follow the brief procedure below.*

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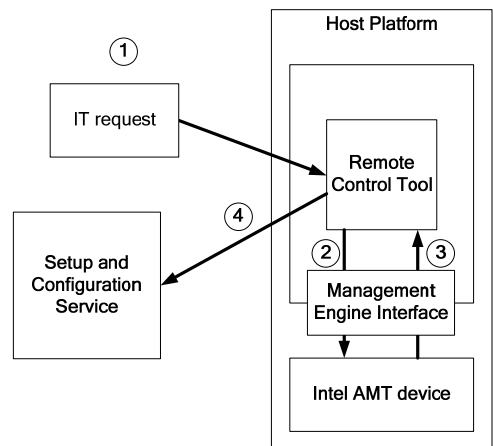
## Installing a Root Certificate and Intermediate Certificates on the Server Running the SCS

1. Retrieve the root certificate and the certificates of any intermediate CAs, according to the instructions of the certificate vendor. It may be possible to download them from the vendor website, or the vendor may e-mail the trusted root. Save the certificate in .cer format.
2. Navigate to each stored certificate and right-click on it. Select **Install certificate**. A certificate manager Import Wizard will appear. Click **Next**.
3. Select **Automatically select the certificate store based on the type of the certificate** and click **OK**.
4. Click **Next** then **Finish**.
5. When prompted and asked if you wish to add the following certificate to the root store, click **Yes**.

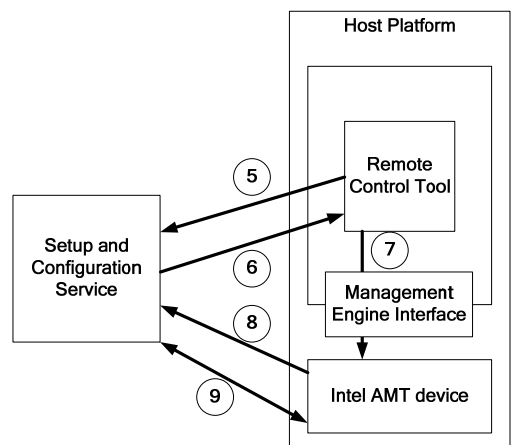
## Steps leading to the start of Setup and Configuration

Once the above preparations are complete, the following steps are performed:

1. IT activates the Remote Control Tool (RCT), via a startup script or an enablement script.
2. The RCT detects Intel AMT and requests the UUID and the FQDN.
3. Intel AMT device returns the values to the RCT.
4. The RCT sends the platform information to the SCS.



5. The RCT requests a one-time password (OTP) from the SCS.
6. The SCS sends an OTP to the RCT.
7. The RCT sends the OTP to the Intel AMT device and commands it to open the network interface. The Intel AMT device generates a self-signed certificate. This process may take up to seven minutes to generate the necessary keys.
8. The Intel AMT device starts sending version 3 “Hello” messages.
9. Setup and configuration begins using the PKI-CH protocol. The SCS requests the Intel AMT device to send an OTP. The device responds with the value it received from the RCT.



## Remote Configuration Setup and Configuration Process

10. After the RCT commands the Intel AMT device to start configuration, the device opens its network interface for 24 hours, and starts sending “Hello” messages. Note:

The interface is open for 24 hours (configurable by the OEM) only the first time that it is enabled. If the time runs out before setup and configuration completes or the Intel AMT device is unprovisioned or partially unprovisioned, any subsequent calls from the RCT to start configuration will open the interface for only six hours.

11. The SCS extracts the hashes from the “Hello” message.
12. The SCS sends a certificate chain that includes a trusted root certificate matching one of the received hashes.
13. The Intel AMT device validates the SCS certificate: It checks that the OID or the OU is correct as described above, and that it is derived from a certificate authority that matches one of the root certificate hashes.
14. The Intel AMT device verifies that the domain suffix matches the DNS suffix in the SCS certificate. (See “Remote Configuration Certificate – Differences between Releases” on page 66, below.)
15. The SCS and the Intel AMT device perform a complete mutual authentication session key exchange:
  - a. The Intel AMT device uses a self-signed certificate, sending its public key.
  - b. The SCS creates a TLS session master key, encrypts it with the Intel AMT device public key, and sends it to the Intel AMT device.
  - c. The device decrypts the master key with its private key. The key is the shared secret used to establish the setup and configuration TLS session.
16. One Time Password verification: The SCS requests the OTP from the Intel AMT device. The device sends the OTP securely. The SCS verifies the OTP for correctness.
17. Setup and configuration continues. At some point before the SCS sends a CommitChanges command to complete the setup and configuration process, it must send a SetMEBx password command to change the password from its default.
18. Since the Intel AMT device network interface is open for a limited period after sending the first “Hello” message, the SCS can command the device to extend this period by up to an additional 24 hours.

## Intel AMT Release 3.0 Additional Features

### Simplified One-Touch

Intel AMT Release 3.0 supports a one-touch configuration mechanism that avoids the possibility of a malicious user masquerading as the SCS. If an IT administrator enters the FQDN of the SCS via the MEBx menu, then in Step 14 above, the Intel AMT device verifies that the FQDN in the SCS client certificate matches the entered value.

### Bare Metal Setup and Configuration

With Intel AMT Release 3.0, a platform containing Intel AMT can be configured by the manufacturer to start sending “Hello” messages as soon as the platform is connected to AC power and to the network. There may be no operating system up and running on the host, thus the name “bare metal”. With no operating system, there is no way to run the Remote Configuration Tool to install a One Time Password. This mode allows entering an optional FQDN for the SCS. Either the manufacturer adds it before delivery or an IT administrator adds it, as described in Simplified One-Touch. The Intel AMT device will acquire an IP address from a DHCP server, and then start sending “Hello” messages. There is no OTP to exchange in this case; otherwise, the setup and configuration flow is the same. The SCS cannot setup Bare Metal platforms when an OTP is required. (See page 79).

### Remote Configuration Certificate – Differences between Releases

Intel AMT validates the SCS certificate by comparing a domain suffix or FQDN against the CN in the certificate. Different Intel AMT releases perform this comparison differently. This can have an impact on the certificate that an organization acquires. Note



that an SCS installation that will set up platforms with a mix of Intel AMT releases will need to acquire a certificate that is appropriate for all the versions that will be configured.

## Intel AMT Release 2.2

Intel AMT retrieves its domain suffix using DHCP Option 15. The CN in the SCS certificate must match the full domain suffix. The result is that a separate certificate is required for each domain.

For example, the CN in the certificate is **corp.east.yourenterprise.com** and DHCP returns a domain suffix of **east.yourenterprise.com**. The CN contains the full suffix so there is a match. A CN of **yourenterprise.com** would not match **east.yourenterprise.com**.

Since an SCS installation can only work with one Remote Configuration at a time, a separate certificate and SCS instance is required for each domain where Intel AMT-based platforms are located.

## Intel AMT Release 3.0

If a Release 3.0 platform depends exclusively on the domain suffix returned by DHCP, it behaves the same as Release 2.2.

The Release 3.0 FQDN option and domain extension option add the following:

- If IT enters the FQDN of the SCS via the MEBx menu or with a formatted USB key or the manufacturer enters the value before delivery, the CN in the certificate must either exactly match all fields of the FQDN or it must be a wildcard entry with a match in all but the first field of the FQDN. For example, if the FQDN is **east.corp.yourenterprise.com**, the CN must also be **east.corp.yourenterprise.com** or **\*.corp.yourenterprise.com**.
- If a DSN suffix is entered, then all fields in the suffix must be included in the CN. For example, if the entered suffix is **corp.yourenterprise.com**, then the CN could be **corp.yourenterprise.com** or **east.corp.yourenterprise.com** or **main.east.corp.yourenterprise.com** (but not **east.yourenterprise.com**).

Using one of the above options requires a “single touch,” which should be balanced against the need for an SCS installation and unique certificate for each domain.

## Intel AMT Release 2.6

Release 2.6 supports the 2.2 functionality, with the following additions:

- Wildcard CN: If the CN in the certificate is preceded by “\*.”, then the domain suffix received from DHCP need only match the CN where they have overlapping fields. For example, if the CN is **\*.a.b.org**, then **yyy.a.b.org**, **a.b.org**, and **b.org** would all match (but **c.b.org** would not).
- If the CN ends with “.com” or “.net”, then the domain suffix received from DHCP needs to match only last two fields in the CN. For example, if the CN is **east.corp.yourenterprise.com**, then **west.mkting.yourenterprise.com** would match.
- Release 2.6 supports certificates that use theSubjectAltName (SAN) “DNS Name” extension. The certificates have multiple DNS names, and each one is compared consecutively with the domain suffix received from DHCP. When one of the names matches, Intel AMT accepts the certificate. A certificate with multiple DNS names would be useful when the root domain is not .com or .net.

With one of these methods is used, a single SCS can support Intel AMT devices with Release 2.6 in multiple domains with a single remote configuration certificate.

## Remote Configuration Tool

The Remote Configuration process includes the Remote Configuration Tool (RCT) that runs on the host. RCT.exe is included in the SCS distribution. It is recommended to copy the RCT to the Intel AMT system and run it from the Intel AMT system with a local user. The RCT tool does the following:

- It sends platform identification information directly to the SCS API, eliminating the need for a separate script to perform this function. The RCT can be used for this purpose for all Intel AMT releases from 2.0 onwards. The platform information includes the UUID and FQDN and, optionally, the SCS Profile and Active Directory Operational Unit to be used when configuring the platform.
- It checks that the platform is configured for Intel AMT manageability. If it is not, the RCT optionally transitions the platform to Intel AMT manageability. The RCT must be re-run after a restart of the platform to complete the following steps if the transition was required.
- If the platform is configured for Remote Configuration mode, the RCT requests an OTP from the SCS. The tool sends the OTP to the Intel AMT device and commands the device to start configuration and open the network interface.
- If the platform has already started remote configuration, but it has not completed the process, the tool will request an OTP and send it to the platform and command it once again to open the network interface.
- If the platform does not support remote configuration or is has already started setup and configuration using a PID/PPS pair, or it has already completed setup and configuration, the tool exits with a status code indicating the platform state.
- If the Intel AMT system is in “In Provisioning” mode and no longer sends “Hello” messages, the RCT can be used to send a “Hello” packet to the SCS to allow it to complete the provisioning process. The “Hello” packet is sent to the SCS server port specified by the */l* parameter; if the */l* parameter is not used, the packet is sent to port **9971**. Since the “Hello” packet needs to include the authentication hint (PID for a PSK configuration, or certificate hashes of the trusted root certificates for remote configuration), the RCT can retrieve this information from the Intel AMT system (on those versions of Intel AMT that allow retrieving the information). If the Intel AMT system uses PSK but does not allow retrieving the PID, the user must include it in the RCT command.

The actions of the RCT depend on the type of security employed on the Intel AMT system and on whether the security credentials are present:

- **Remote Configuration:** If the system uses remote configuration, the RCT extracts the certificate hashes from Intel AMT and transmits them and the “Hello” packet to the SCS.
- **PSK, with PID present on Intel AMT Releases 2.0, 2.1, 2.5:** The RCT cannot retrieve the PID from these platforms. The user must include the PID in the RCT command line.
- **PSK, with PID present on other Intel AMT releases:** If the PID is present on the Intel AMT system, the RCT extracts it and sends it with the “Hello” packet to the PID.
- **PSK, but PID not present on system:** If the system is supposed to use PSK but no PID is present on the Intel AMT system, the “Hello” packet cannot be sent to the SCS.
- If the Intel AMT system’s host FQDN has been changed, the RCT can be used (with the */f* command) to send the new FQDN to the SCS service. (For example, the FQDN might have been changed by giving the system to another user or moving it to another domain). The SCS service then changes the machine’s FQDN in the SCS database and reprovisions the machine if possible, updating the AMT

FQDN with the new host FQDN. The SCS ignores the FQDN mismatch between the new FQDN and the existing Intel AMT certificate's CN. If the system's UUID has been changed (for example, as the result of replacing part of the hardware), the SCS returns an error code which the calling program is responsible for handling. If the platform is in "In Provisioning" state, the RCT does not change its FQDN. If the **/f** command is used with an Intel AMT system that has not been provisioned, the **/f** command is ignored and provisioning proceeds. **Note:** The user running the RCT requires SCS Operator permissions in order to enable it to change the FQDN.

The RCT has the following command interface:

rect	/s <full URL of SCS, including port, if this is a nonstandard port>	This URL is the one that was defined for remote configuration use when the SCS was installed. (for example /AMTSCS_RCFG) Use http or https depending on the installation option selected (see page 42).
	[p profile-id]	This optional field is the numerical profile ID shown on SCS Console profile page.
	[o <organizational unit>]	This is the optional Active Directory OU where the Intel AMT device AMT object will be placed, in LDAP format. This is a string with no embedded blank characters.
	[t on off]	If the RCT detects that the platform manageability mode is not Intel AMT Manageability, "on" indicates that the RCT will transition the platform to Intel AMT Manageability mode. "off" indicates that the tool should not perform the transition. If this optional parameter is not provided, the default value is "off".
	[e]	(Optional) By default, the RCT does not validate certificate expiration dates against CRLs or attempt to contact issuing certification authorities. Entering <b>/e</b> requires RCT to validate expiration dates. This is significant if the certificate provided by IIS is from an external CA: The platform running the RCT will either need an updated CRL installed or it will need access to the external CA.
	[h]	This optional parameter causes the RCT to send a "Hello" packet to the SCS.
	[l]	If the <b>/h</b> parameter is used, this optional parameter specifies the port on the SCS server to which the RCT should send the "Hello" packet. If this parameter is not used, the packet is sent to port <b>9971</b> .
	[d <PID>]	If the <b>/h</b> parameter is used, and the Intel AMT system uses PSK but does not allow retrieval of its PID, this command must be used to transmit the PID with the "Hello" packet to the SCS.
	[f]	This optional parameter is used to inform the SCS that the Intel AMT system's FQDN has changed. The RCT sends the new FQDN to the SCS service, which then changes the machine's FQDN in the SCS database and reprovisions the machine if possible, updating the AMT FQDN with the new host FQDN.

## Examples of Use:,

```
rct /s https://ProvisionServer.youenterprise.com/amtscs_rcfg /p 3  
/o OU=AMT_Users,DC=East,DC=youenterprise,DC=com /t on
```

This example shows how to use the RCT to inform the SCS that the Intel AMT system's FQDN has changed:

```
rct /s https://ProvisionServer.youenterprise.com/amtscs_rcfg /p 3  
/o OU=AMT_Users,DC=East,DC=youenterprise,DC=com /t on /f
```

This example shows how to use the RCT to send a "hello" packet with a PID, from an Intel AMT system that uses PSK but does not allow retrieval of its PID:

```
rct /s https://ProvisionServer.youenterprise.com/amtscs_rcfg /p 3  
/o OU=AMT_Users,DC=East,DC=youenterprise,DC=com /t on /h /d 0000037M
```



---

*Transitioning to Intel AMT Manageability mode does not take affect until the platform reboots. Therefore, the IT script that activates the RCT should schedule it to re-run at the next startup to complete initiation of setup and configuration.*

---

## Distributing and Running the Remote Configuration Tool

To distribute and run the RCT:

1. Copy the RCT executable to the Intel AMT platform.
2. Run the RCT using an account on the Intel AMT platform that has local administrator permissions.

Note: You can use different methods to automatically distribute and execute the RCT on multiple platforms.

## RCT Messages

The RCT returns a message code that describes the state that the tool detected. The table below itemizes the codes and their meaning.

**Table 5: RCT Return Codes**

Return Value	Meaning
0	All operations succeeded; interface opened.
1	Setup and configuration already completed.
2	Platform is already in setup and configuration mode. This may be due to "bare metal" setup or because the RCT was already run. This error can be ignored if the RCT was executed to send the FQDN to the SCS without opening the Intel AMT network interface
3	Platform does not support Intel AMT, or the MEI driver is either not installed or is not responding.
4	Unable to connect to Intel AMT device (drivers may not be installed on the host).
5	SCS Internal error.

<b>Return Value</b>	<b>Meaning</b>
6	Unable to authenticate to the SCS - IIS does not recognize the user credentials. This may be due to an incorrect password or the user does not have sufficient permissions.
7	Unable to connect to the SCS. This may be due to a number of causes, such as TCP error, HTTP error, or server not found. This may result from: <ul style="list-style-type: none"> <li>• An incorrect FQDN for the SCS in the command line.</li> <li>• A failed HTTPS connection due to a missing trusted root certificate.</li> <li>• IIS is stopped on the SCS platform.</li> </ul>
8	Error code received from SCS. See the SCS logs for the specific error.
9	Requires one-touch: this platform either does not support remote configuration and requires a PID/PPS pair before setup and configuration can start, or the MEBx password has not been changed from its default value.
10	Invalid command line input parameters. For example, a malformed OU or a non-numeric entry for profile number.
11	Manageability mode is not Intel AMT and transitioning to Intel AMT was not enabled. Try using the “/t on” parameter.
12	Manageability mode changed to Intel AMT. The platform must be restarted and the RCT re-executed before setup and configuration can start.
13	Transition to Intel AMT Manageability mode did not succeed.
14	RCT internal error
15	RCT did not succeed in retrieving the platform’s PID. The platform’s version of Intel AMT does not support PID retrieval, and the PID was not included in the RCT command line via the /d parameter.
16	After the RCT was run with the /f command, the SCS did not need to change the Intel AMT system’s FQDN because the system already had the new FQDN.
17	The RCT did not succeed in sending the “Hello” packet to the SCS service.
18	The RCT did not change the FQDN because the platform was in “In Provisioning” state.

## **RCT Logging**

The RCT logs its actions in two ways:

- Windows event log: The RCT logs each action it takes as well as any errors that occur.
- RCT log: The RCT creates a file called rctlog.txt with more detailed information about the last execution of the tool. The tool deletes the previous log before creating a new one for the current execution. The tool creates the log in the same directory as the executable.

## **User Permissions for the Remote Configuration Tool**

The RCT user requires special permissions so the tool can perform its functions.

- The RCT must be run from the Local System account to retrieve platform information and to communicate with Intel AMT via the Management Interface driver.

- The platform must have a Client Configuration role to enable the RCT to perform its regular tasks. If the RCT will be used for changing the Intel AMT platform's FQDN in the SCS repository, it will also need the Operator role. See "Adding a User" on page 103. A straightforward way to do this is to define a Group for all platforms with Intel AMT that need setup and configuration, grant the group the Client Configuration role, and add platforms to this group when they are added to the domain or when it is time to configure the Intel AMT capability. Note that the default Domain Computers Group cannot be granted the Client Configuration role.

## **RCT Source**

The SCS delivery includes the RCT source files and supporting libraries. The RCT source demonstrates how to work with the host interface to Intel AMT and with the SCS SOAP API. ISVs can use the RCT source as a starting point for creation of tools more specific to their applications. To compile the RCT project, see the readme file included with the distribution.

# INTEL SCS CONSOLE

This section includes

- “SCS Console Overview” on page 74
- “Logging In” on page 77
- “Defining General Parameters” on page 78
- “Configuring Profiles” on page 81
- “Configuring Pre-Setup and Configuration Security Keys” on page 99
- “Configuring Users” on page 103
- “Configuration Parameters per Device” on page 106
- “Configuring Existing Intel AMT Devices” on page 109
- “Maintenance Policies” on page 115
- “Intel AMT SCS Console Logs” on page 117

## SCS Console Overview

The SOAP API used to query and manage the SCS service is available for ISVs to create their own interface to the SCS. The Intel SCS also includes an implementation of such an interface, a software component with a graphic user interface. This component, called the SCS Console, supports stand-alone operation of Intel SCS. The SCS distribution includes documentation of the API, the WSDLs that define the interface functions, sample applications, and the full source of the SCS console. ISVs can add value to the console and incorporate it into their Management Console products.

The SCS Console works by communicating with the SOAP API that, in turn, updates and accesses the SCS database. The API does not interact with the SCS service directly. There are pairs of get/set SOAP calls to update and retrieve database parameters. For example, to change the Power Policy parameter for a selected Profile, the SCS Console first fetches the data from the database using the SOAP API call `getProfilePowerPolicy`. After the Administrator sets the new policy via the console GUI, the console performs the SOAP API call `setProfilePowerPolicy` to save the changes in the database.

### ***Using the SCS Console for the First time***

To use the SCS Console and the SCS for the first time, perform the following steps, as described in sections of this chapter.

1. Configure the Main (SCS) Service settings. See page 78.
2. Add Users who have the appropriate privileges to use and to administer the SCS. See page 103.
3. Create one or more Profiles with settings for groups of Intel AMT devices. Profile parameters include the administrative username and password, use of TLS and mutual authentication, the certificates and certificate servers to be used, Digest and Kerberos ACL entries. See page 81.
4. Create entries in the New Intel AMT Systems list for all platforms to be setup and configured. See page 106.
5. Create keys (PID/PPS/current password/new password sets) to prepare Intel AMT devices for configuration.

There is now adequate information in the SCS database to respond to “Hello” messages automatically.

There are two panes on the SCS Console: the Navigation Pane and the Configuration Pane.



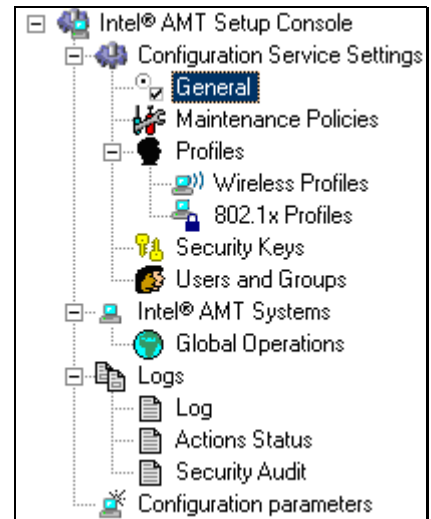
## Console Navigation Pane

The Navigation pane enables easy access to each of the major subdivisions of the Intel SCS.

- To view the **Configuration Service Settings**, the **Profiles**, or the **Logs**, expand the branch and select a sub-branch.
- To define the settings to be used to configure Intel AMT devices, select **Configuration parameters**.

To review existing Intel AMT devices (devices that have sent at least one “Hello”

message that the SCS received), select **Intel AMT Systems**.



## Console Configuration Pane

The SCS Console Configuration pane includes standard user interface elements that enable configuration of the Intel SCS. Selecting a sub-branch in the navigation pane opens a configuration pane. For example, selecting Configuration Settings /General opens the General Configuration Pane.

The screenshot shows the 'General' configuration pane for the Intel SCS. The pane is titled 'General' and includes the Intel logo in the top right corner. Below the title, it says 'Configure the Intel® AMT Setup and Configuration Service General parameters.' The configuration is divided into several sections:

- General:** Includes a 'TCP Listen Port' dropdown set to '9971'. There are four checkboxes: 'Integrate with Active Directory' (checked), 'AMT requires authorization before provisioning' (unchecked), 'Allow Remote Configuration' (checked), and 'One time password required' (unchecked). Below these are two dropdowns: 'First common name (CN) in certificate subject name' set to 'Fully qualified domain name' and 'Log Level' set to 'Verbose'. A 'Service Version' field shows 'N/A'.
- DB Settings:** Contains two empty text input fields for 'DB Server Name' and 'DB Name'.
- Get New Intel® AMT Properties:** Features two radio buttons: 'From DB' (selected) and 'Get AMT Configuration from script'. Below is a 'Script Location' text input field.
- Server settings:** A vertical list of dropdown menus: 'Queue Polling Period' (1,000 Milliseconds), 'Max Queue Size' (1,000 Requests), 'No. of Worker Threads' (10), 'No. of Slow Worker Threads' (10), 'Delayer Polling Time' (1 Minutes), 'Keep Log Time' (60 Days), and 'Keep Security Audit Time' (2 Months).

At the bottom of the pane are two buttons: 'Apply' and 'Refresh'.

## Commands and Navigation using the Console

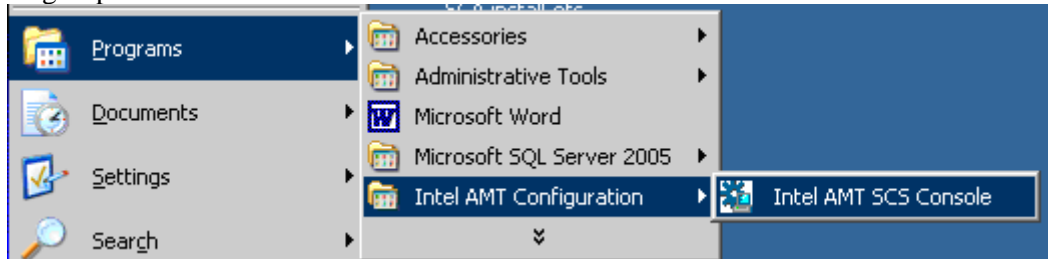
The console controls are activated using mouse clicks. It is also possible to use many of the controls from the keyboard. When the display focus is in the same region as a control that has an underlined letter in its legend, typing the underlined letter will activate the control.

Use the Tab key to move from one control to the next and one display region to the next. When a control is highlighted, press **Enter** to activate the control.

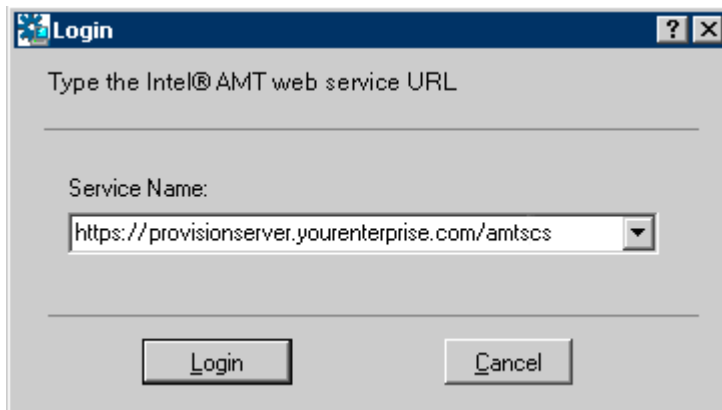
## Logging In

To log-in to the Intel SCS Console:

1. Click the Windows **Start** button to select the Intel AMT **Configuration** program group.



2. Select **Intel AMT SCS Console**. The Console displays the log-in screen.



3. Enter the SOAP web service URL path **including** the virtual directory. The entry format is:

`https://FQDN/<Virtual Directory>`

For example: `https://provisionserver.youenterprise.com/AMTSCS`

Use http or https depending on the installation option selected (see page 41). In this example, `provisionserver.youenterprise.com` is the FQDN of the IIS host of the web service and `AMTSCS` is the virtual directory of soap web service in the IIS host. If the web server expects a port number other than port 80, include the port number after the FQDN. For example,

`https://provisionserver.youenterprise.com:123/AMTSCS`



---

*A file named “amtconsole.log” is generated in the console install directory. It contains a log of transactions of the client application.*

---

The Intel SCS Console opens.



---

*If the application does not open, there may be a security problem. See “Secure the Connection to IIS Using SSL” on page 34.*

---

# Configuring Main Service Settings

Use the Intel SCS Console to configure, control, and manage the Intel SCS Main Service.

## Defining General Parameters

General settings define the configuration of the Intel AMT Main Service. The Integrate with Active Directory option can be changed dynamically. All of the other parameters on this pane will not take effect until the SCS service is stopped and restarted.

To configure General settings:

1. Open the AMT Setup and Configuration Console.
2. Expand the **Configuration Service Settings** branch.
3. Select **General**. The General screen is displayed.

**General**  
Configure the Intel® AMT Setup and Configuration Service General parameters.

**General**

TCP Listen Port: 9971

Integrate with Active Directory  
 AMT requires authorization before provisioning  
 Allow Remote Configuration  
 One time password required

First common name (CN) in certificate subject name: Fully qualified domain name

Log Level: Verbose

Service Version: N/A

**Server settings**

Queue Polling Period: 1,000 Milliseconds

Max Queue Size: 1,000 Requests

No. of Worker Threads: 10

No. of Slow Worker Threads: 10

Delayer Polling Time: 1 Minutes

Keep Log Time: 60 Days

Keep Security Audit Time: 2 Months

**DB Settings**

DB Server Name:

DB Name:

**Get New Intel® AMT Properties**

From DB  
 Get AMT Configuration from script

Script Location:

Apply Refresh

4. Define the General parameters:

### TCP Listen Port

Each instance of Intel SCS listens for “Hello” messages from Intel AMT devices on a defined TCP port. Enter the TCP port used for listening. The default port is 9971.

### Integrate with Active Directory

Selecting this checkbox will cause the SCS server to add AMT objects to Active Directory. This enables the use of Kerberos authentication and the AD users list. This option must be selected to configure an Intel AMT device for wired 802.1x, or for wireless when the wireless profile uses 802.1x for authentication.

### AMT requires authorization before provisioning

When the SCS receives a “Hello” message from an Intel AMT device, setup and configuration will proceed automatically, unless this checkbox is selected. Selecting

this checkbox requires the Console operator to authorize setup and configuration via the Operations function on the Intel AMT Systems pane. See “Ad Hoc Operations on an Individual Intel AMT Device” on page 110.

### **Allow Remote Configuration**

Intel AMT Releases 2.2, 2.6 and 3.0 support Remote Configuration. As part of this feature, the Intel AMT device sends a self-signed certificate for the TLS Mutual Authentication process. This certificate is used for setup and configuration only. The device creates the self-signed certificate just before sending the first “Hello” message. Selecting this checkbox enables the SCS to accept self-signed certificates from Intel AMT devices.

### **One time password required**

Selecting this checkbox adds an additional security feature. An enterprise policy may require a one-time password (OTP) exchange between the SCS and the Intel AMT device requesting setup (See page 65). If an operator entered the OTP manually on the platform containing the Intel AMT device, then an SCS operator must enter it via the Operations function on the Intel AMT Systems pane. See “Ad Hoc Operations on an Individual Intel AMT Device” on page 110.



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*So-called “Bare-Metal” platforms are certain platforms that contain Intel AMT Release 3.0 or higher that are configured by the manufacturer to start sending Remote Configuration “Hello” messages as soon as they are connected to the network. Bare Metal platforms do not support one-time passwords. Therefore, selecting the **One time Password Required** option prevents configuring bare-metal platforms.*

---

### **First common name (CN) in certificate subject name**

Client certificates used to validate Intel AMT with RADIUS servers or other external servers must be in a format compatible with those servers. In particular, the Common Name must be in the form that the server expects. When the SCS requests a certificate for an Intel AMT device, the SCS-generated certificate request will use the selection made here for the Common Name in the request.

The selection box provides three choices:

- Fully qualified domain name –FQDN of the Intel AMT device
- Host name – Host name of the platform
- SAM account name – Active Directory account name for the AMT object

The Funk RADIUS server expects a host name. Cisco ACS and Microsoft IAS require a SAM account name. All others tested with the SCS accept an FQDN.

### **Log Level**

Logs can be recorded at several levels. The more detail recorded, the more system resources and bandwidth must be allocated.

5. Select a **Get New Intel AMT Properties** option. This option determines how the SCS acquires the necessary information defining the Intel AMT device properties.
  - **From DB**  
When this option is selected, the SCS searches for properties in the Configuration parameters table stored in the SCS database.
  - **Get AMT Configuration From Script**  
When this option is selected, the SCS first searches the Configuration parameters table for a matching entry, based on the UUID in the “Hello”

message. If there is no matching entry, the SCS determines the properties by invoking a script written by the controlling enterprise and which either refers to an independent database or file or requests the identifying information from the host platform. After the script returns the required information, the SCS stores the information in the Configuration data table. See “Using a Script to Import Intel AMT Configuration Properties” on page 127.

- **Script Location**

Enter the path to the location of the script **on the platform where the SCS executes**. If there is more than one instance of the service running in the domain, the script must be **in the same location on all platforms** running the service. (e.g., C:\program files\intel\AMTConfserver\scripts\)



---

*Warning: If the script is not in the location defined here, the SCS will not complete setup for any Intel AMT devices.*

---

6. Enter the Service Maintenance parameters. These are the parameters used to tune the performance of the SCS, as described in “Intel AMT SCS Functional Flow” on page 5.

**Queue Polling Period**

This parameter determines how frequently the Intel SCS checks the queue in the database for new tasks.

**Max Queue Size**

This parameter sets the maximum permitted length of the database queue. If the queue is full when the server or the API tries to add an additional entry, the entry will be lost.

The following three parameters define quantities for several multithreading transactions that are processed by the Intel SCS.

**No. of Worker Threads**

This parameter limits the number of Worker Threads permitted simultaneously.

**No. of Slow Worker Threads**

This parameter limits the number of Slow Worker Threads permitted simultaneously.

**Delayer Polling Time**

When a process fails, it is sent to the Delayer. A process may fail because information is missing. For example, an Intel AMT device sends a “Hello” message before the device has an entry in the New Intel AMT devices list, so there is no profile associated with the device and configuration cannot complete. The Delayer is a thread that manages rerunning delayed processes. This parameter determines how frequently the Delayer attempts to rerun a process.

**Keep Log Time**

This parameter determines how long log entries are saved.

**Keep Security Audit Time**

This parameter determines how long security status entries are saved.

7. Click **Apply**.

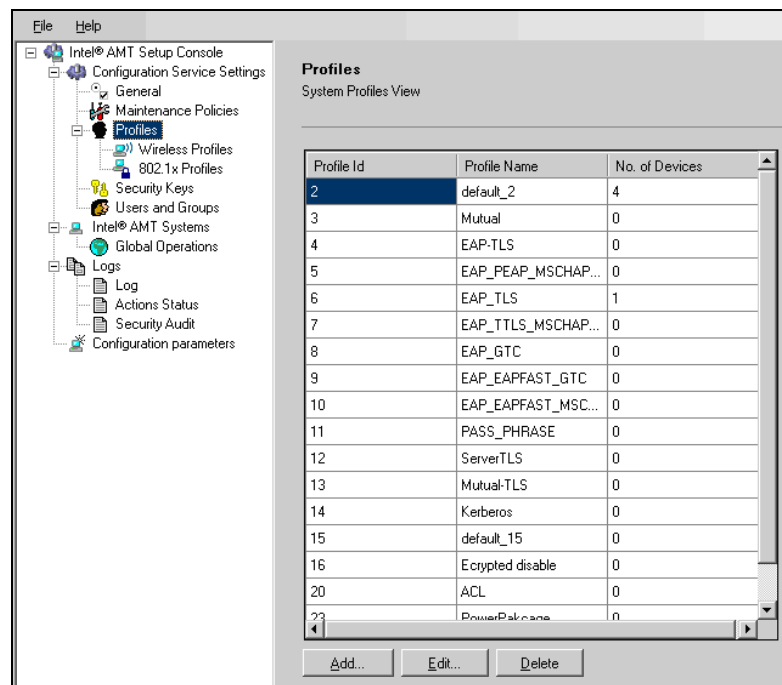
## Configuring Profiles

Profiles contain the Intel AMT device configuration parameters. Profiles determine which features are enabled in the device, what authentication mechanism will be used, and which users have access to device features. One or many profiles can be defined. For example, use a different profile for different sites. Each profile can be assigned to one or more Intel AMT devices. Entries in New Intel® AMT Systems associate a profile name with a specific Intel AMT device.

## Viewing Existing Profiles

To view existing Profiles:

1. Open the Intel SCS Console.
2. Expand the Configuration Service Settings branch.
3. Select **Profiles**. The Profiles screen is displayed. This screen lists all defined Profiles and the number of devices assigned to each profile.



## Adding a Profile

1. Open the Intel SCS Console.
2. Expand the **Configuration Service Settings** branch.
3. Select **Profiles**. The Profiles screen is displayed.
4. Click **Add**. The Profile Configuration dialog box is displayed and the General tab is selected.



---

*Each Profile tab is self contained. Changes to a tab require confirmation before moving to another tab. Perform Confirmation by clicking **Apply**.*

---

## The Profile Configuration General Tab

The screenshot shows the 'Add/Edit Profiles' dialog box with the 'General' tab selected. The 'General' section contains a 'Profile Name' field with the text 'default\_2' and a 'Profile Description' text area containing 'Default profile'. Below the text area is an 'Advanced' button. The 'Administrator Credentials' section contains a 'User Name' field with 'admin', a 'Password' section with radio buttons for 'Random Creation' and 'Manual' (selected), and two password input fields labeled 'Enter Password:' and 'Re-Enter Password:'. At the bottom of the dialog are 'Apply', 'OK', and 'Cancel' buttons.

On this tab, enter general information that pertains to this profile.

5. In the General box, enter:

**Profile Name**

Enter a short, descriptive name. This name appears in the Intel AMT devices table.

**Profile Description**

Enter a more complete description of the profile. The description appears in the Profile Details screen.

6. In the Administrator Credentials box, enter:

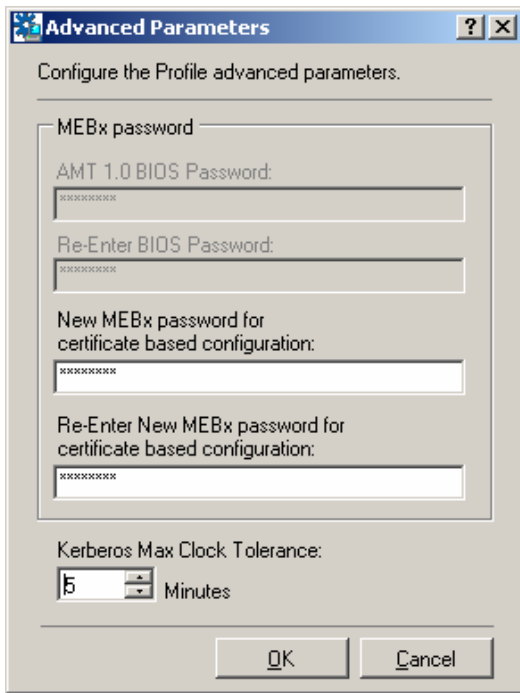
**Password**

Select either Random Creation or Manual. If Manual is selected, enter the password and confirm the entry.

The above username and password will be the administrative username and password in the Admin ACL entry for all Intel AMT devices configured with this profile. A third-party Management Console application may have a pre-defined username and password for Intel AMT device administration. Those values should be used here. Selecting Random Creation means that only the SCS can use the admin ACL entry for managing the Intel AMT device.

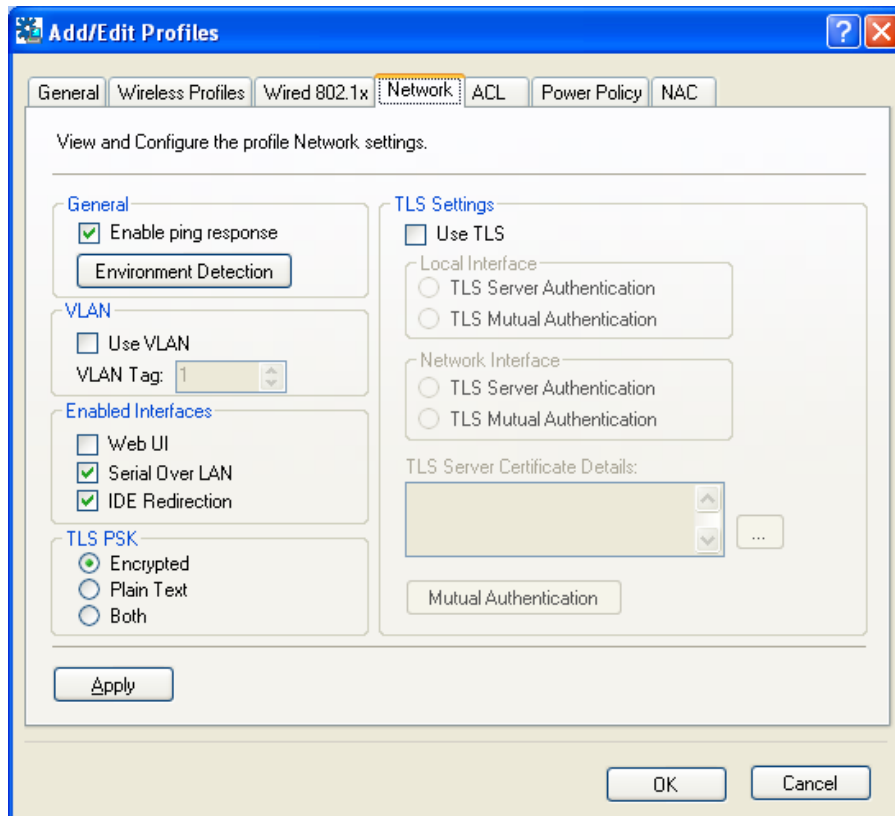
7. To edit the MEBx password and Kerberos clock tolerance, click **Advanced**.





8. New MEBx password for certificate based configuration: Enter and confirm the password used during Remote Configuration. The Remote Configuration process requires that the MEBx password be changed before the setup and configuration can complete.
9. Enter Kerberos Max Clock Tolerance—This is the allowable difference between the clock of an Intel AMT device and the timestamp of a received message. This is part of the mechanism used to eliminate “replay” attacks.
10. Click **OK**.
11. Click **Apply**.

## The Profile Configuration Network Tab



On this tab, define the network settings for this profile.

12. In the **General** box, select or clear the **Enable ping response** checkbox. When enabled, the Intel AMT device will respond to a ping.
13. Click the **Environment Detection** button to setup this capability (Releases 2.5, 2.6, and 3.0).
  - a. Click **Add...** to enter up to five domain suffixes that define permitted domains within the enterprise network. The Intel AMT device uses this list to determine whether the platform is operating inside or outside the enterprise network. Management consoles can define the behavior of the device when it is outside the enterprise, including setting a policy that will block network traffic. Click **Delete...** to delete a selected suffix from the list.



14. In the **VLAN** box, select or clear the Use VLAN checkbox. If a VLAN is used, set the **VLAN Tag Integer**, used to distinguish between different VLANs.



---

*Be careful when configuring the VLAN value. If the value is incorrect, the Intel AMT devices will not be accessible.*

---

15. The Intel AMT device includes three special interfaces, or features, that can be enabled or disabled at configuration time. In the **Enabled Interfaces** box, select the checkboxes to activate one or more interface.

#### **Web UI**

Administrators can use this browser-based interface for management and maintenance of Intel AMT devices.

#### **Serial Over LAN**

This feature is used to manage an Intel AMT-enabled platform remotely by encapsulating keystrokes and character display data in a TCP/IP stream.

#### **IDE Redirection**

Use this feature to remotely enable, disable, format or configure individual floppy or IDE CD drives and to reload operating systems and software from remote locations. These actions are independent of and transparent to the host.

16. In the TLS-PSK box, select an option. The **Encrypted** option limits setup and configuration to platforms that support encryption. The **Plain Text** option limits setup to platforms that do not support encryption. **Both** allows a mix of platforms. Do not select either the **Plain Text** or **Both** options if all platforms containing Intel AMT devices in the enterprise are supposed to support encryption. Use an unencrypted PSK only in cases where Intel® AMT does not support encryption due to import restrictions.
17. In the TLS Settings box, select or clear the **Use TLS** checkbox. When TLS is enabled, the Intel AMT device will require a server certificate used to authenticate itself with other applications. If mutual TLS authentication is enabled, then any applications that interact with the device will need to supply client certificates that the device will use to authenticate the applications. When Use TLS is selected, configure the interfaces to indicate which will use TLS or mutual TLS or neither.



---

*Only three server and client certificates can be associated with a single profile. These include the Server certificate required for TLS and any client certificates required for 802.1x profiles or for NAC posture signing. In a normal installation, a single client certificate would be purchased for all applications in the facility. If a profile requires more than three certificates, setup of an Intel AMT device based on this profile will fail.*


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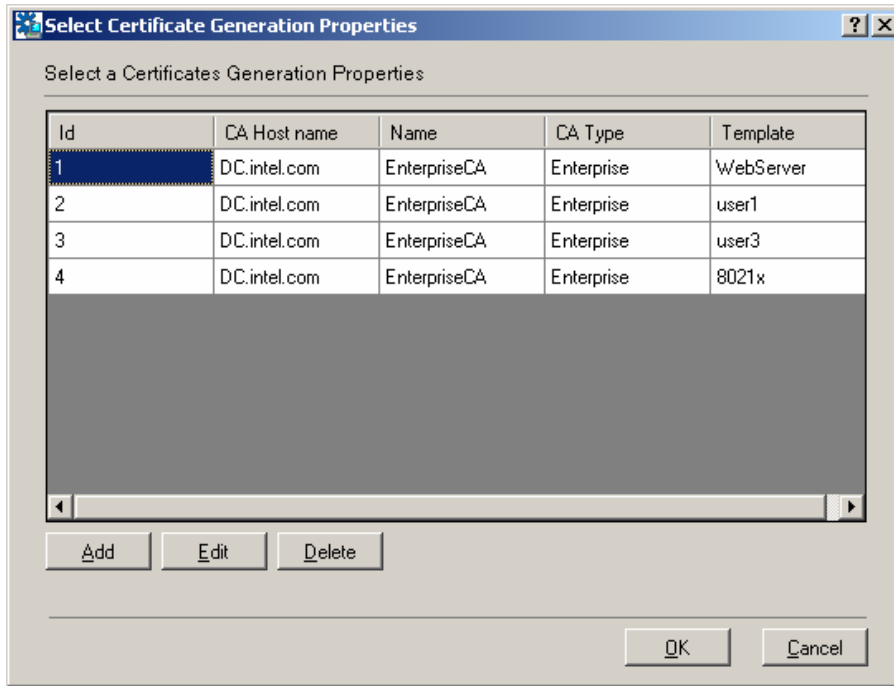
#### **Local Interface**

When enabled, host communications with the Intel AMT device will require TLS or TLS with mutual authentication.

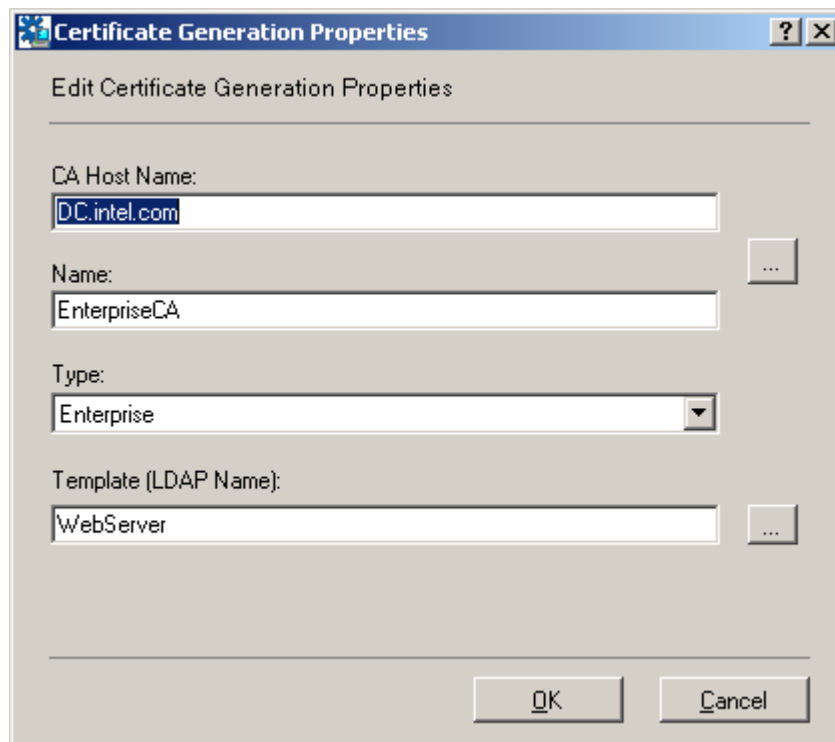
## Network Interface

When enabled, network communications with the Intel AMT device will use TLS or TLS with mutual authentication.

18. TLS Server Certificate: Identify the certificate authority (CA) associated with this profile that will be used to generate server certificates for the Intel AMT devices associated with the profile. Selecting the  control opens a window for entering the CA information.



To add a new CA to the list or edit an existing entry, click **Add** or **Edit**. Either option will open a window for entering or modifying CA properties.



### CA Host Name

Enter the FQDN of the computer that handles, stores and issues digital certificates. It is the platform hosting the Microsoft CA used to generate individual certificates for Intel AMT devices.

### Name

Enter the name of the CA. The name is listed in the CA Administration Manager. Click the Windows **Start** button >**Programs** > **Administrative Tools** > **Certificate Authority**. The name is listed in the first sub-branch in the left pane.

### Type

Windows Server 2003 Certificate Services supports two types of CAs, Enterprise and Stand-alone. Enterprise CAs are integrated with Active Directory and use information stored in Active Directory. Stand-alone CAs do not require Active Directory but require that all information about the requested certificate type be included in the certificate request.



---

*Templates cannot be edited when using a Stand-alone CA. The default template is WebServer.*

---

### Certificate Template

When working with an Enterprise CA, enter the name of the Certificate Template to be used. The name must be the LDAP name stored in Active Directory. When the template is displayed using the CA management tools, it is the Template Name and **not** the Template Display Name. A template allows customization of the content of the certificates issued by the Certificate Services. The template defaults to WebServer. If a custom template is defined, the template must support the Server Authentication application policy. The SCS user must have Read and Enroll permissions on an Enterprise CA WebServer template or custom template. See “Defining a New Template for an Enterprise CA” on page 130.

19. Click **OK/OK**.

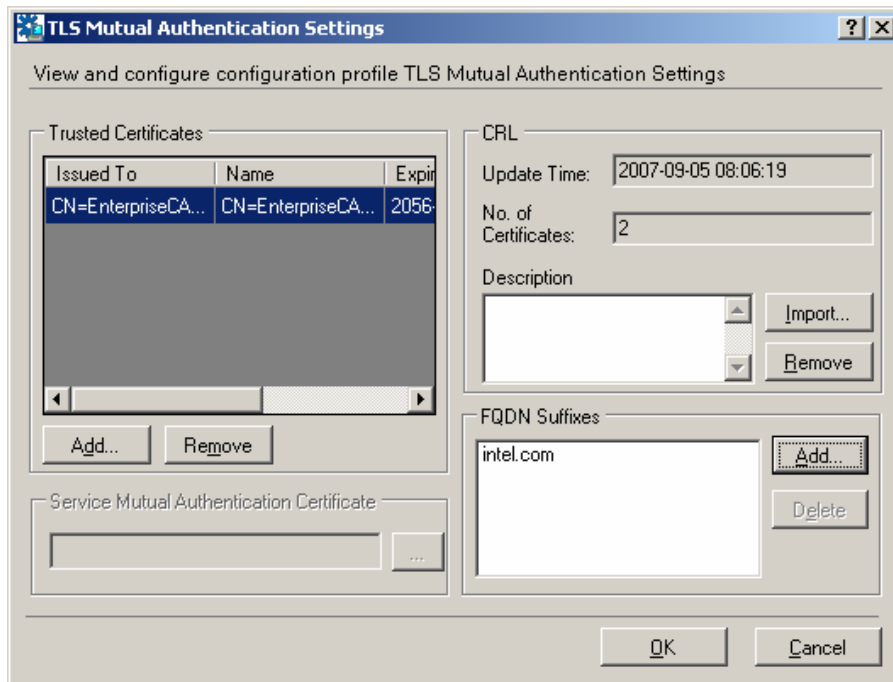


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*Applications using the Intel AMT redirection library with TLS require additional steps for authentication with Intel AMT devices to be performed successfully. See “Configuring PEM Files for Redirection Applications” on page 137.*

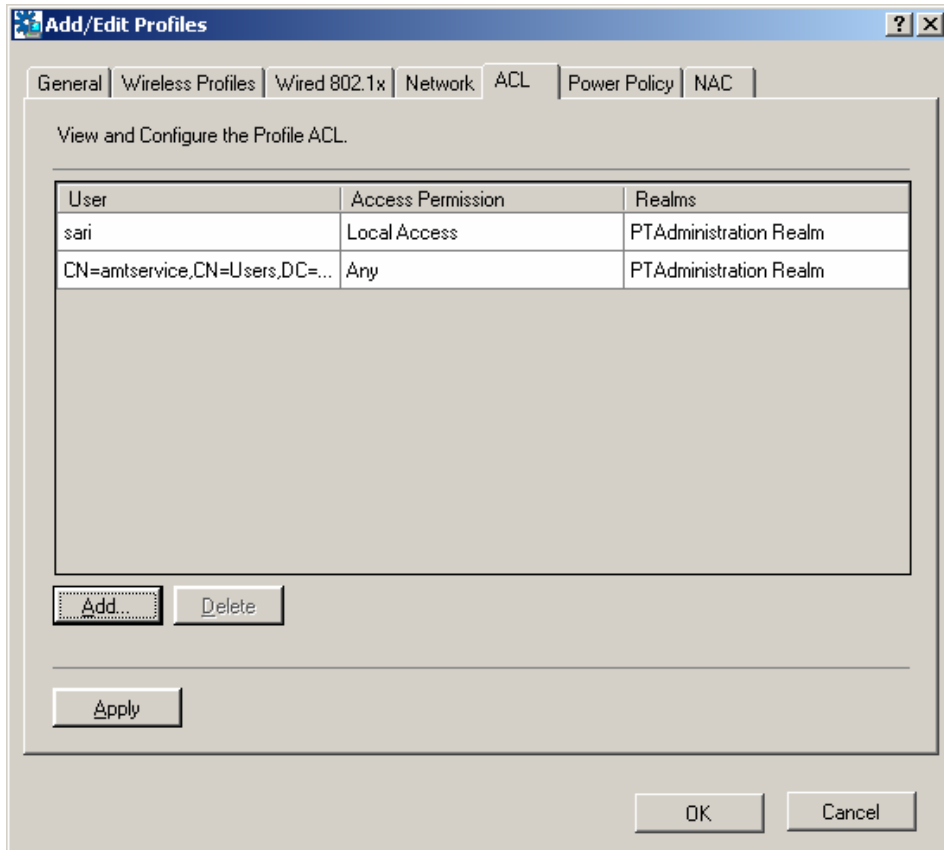
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20. **Mutual Authentication:** Selecting this option opens a template for entering TLS Mutual Authentication settings.

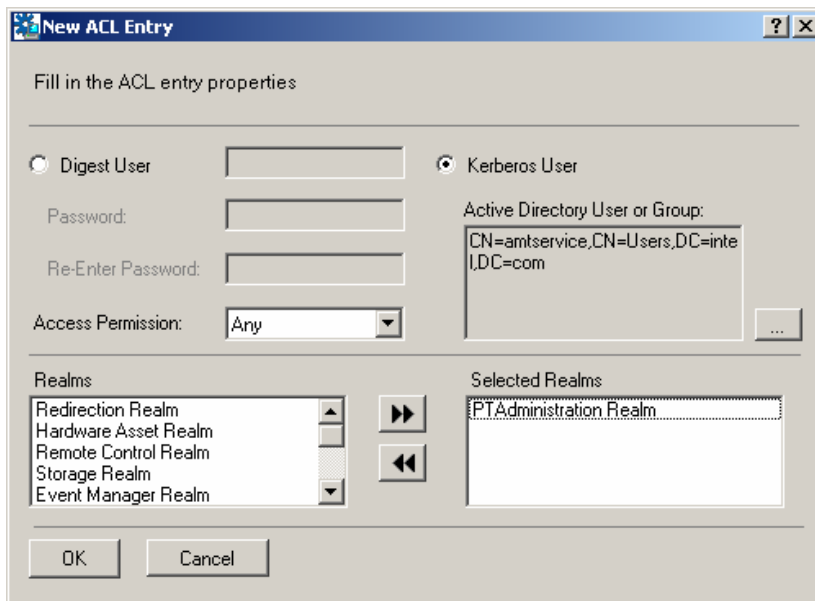


21. In the Trusted Certificates box, click **Import** to add a list of Trusted Root Certificates. These are the issuers of the client certificates that the Intel AMT device will recognize as authentic. These certificates are stored in the database, and then sent to the Intel AMT device during setup and configuration. Intel AMT can accept up to four trusted root certificates, so no more than four should be added to a profile. See “Exporting and Installing the CA Root Certificate” on page 32. Select **Add** to display the Trusted Root Certificates template.
  - a. Select **Import**, navigate to where the root certificate is stored and select the certificate.
  - b. Alternatively, in an Active Directory environment, select **Get from CA**, pick a CA from a displayed list of known CAs and select **OK**.
  - c. If there is a root certificate displayed that should not be sent to the Intel AMT devices using the profile, select the certificate, and then select **Remove**.
  - d. Select **OK**.
22. Service Mutual Authentication Certificate This feature is not implemented; the SCS uses the first Intel AMT remote client certificate in the SCS user’s personal certificate store (A certificate with the dedicated OID).
23. Import a Certificate Revocation List (CRL). The CRL is a list of entries which indicate which certificates have been revoked. The CRL contains certificate authority URLs and the serial numbers of revoked certificates. See “CRL XML Format” on page 137 for the xml file format.  
Enter information about the list into the Description field.
24. Define the Fully Qualified Domain Name suffixes that will be used by mutual authentication. The Intel AMT device will validate that any client certificates used by the SCS or Management Consoles have one of the listed suffixes in the certificate subject.
25. Click **OK**. Click **Apply**.


## The Profile Configuration ACL Tab

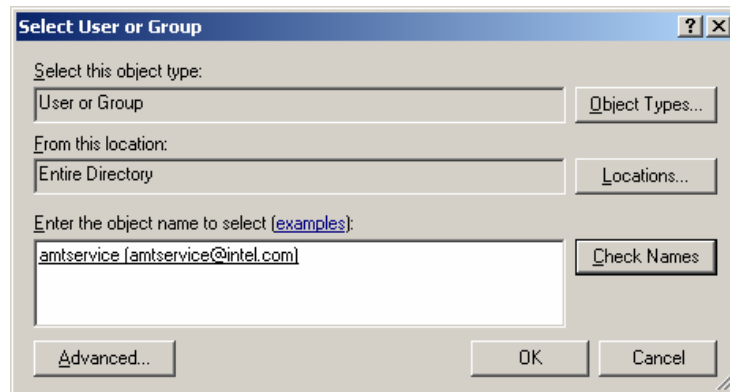


26. Use the ACL (Access Control List) tab to review users already associated with this profile and to add new users and define their access privileges. User identification and realm selection must be coordinated with the requirements and instructions of third-party Management Consoles.
27. Click **Add**. The New ACL Entry dialog box is displayed.



28. Select one of the following:

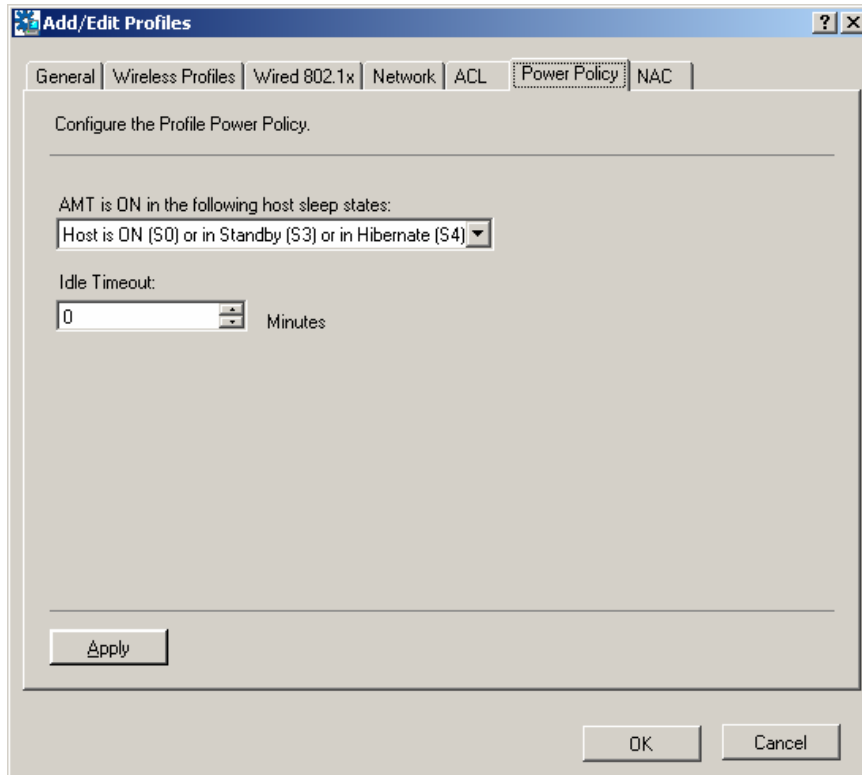
- **Digest User**  
Digest authentication is a password-based authentication. If selected, enter the user name. Then, enter the new password and confirm the entry.
- **Kerberos User**  
Select this option only if the profile has Active Directory enabled. To complete the entry:
  - iv. Click the  control. The Select User dialog box is displayed.



- v. Enter all or part of a user name. The user must be an individual for Digest ACL entries but can be a Group for a Kerberos ACL entry.
  - vi. Click **Check Names**. The Intel SCS searches the AD and completes or confirms the user name.
  - vii. Click **OK**.
29. Select an **Access Permission**. This parameter defines user access, that is, locations from where the user is allowed to perform an action. A user might be limited to local actions or might also be able to perform actions from the network.
    - **Local Access**  
The user is limited to access to the Intel AMT device via the local host.
    - **Network Access**  
The user can execute an action via the network.
    - **Any**  
The user can execute an action both locally or from the network (This option is not recommended).
  30. Select the realms—that is, specific functional capabilities such as Redirection or PT Administration—available to this ACL entry.
  31. Optionally, add additional ACL entries.
  32. Click **OK**.
  33. Click **Apply**.



## The Profile Configuration Power Policy Tab



Use the Power Policy settings to determine the highest power state (as defined by the ACPI specification) when the Intel AMT devices assigned this profile will be active or will activate from a sleep state. S0 is the normal working state of a computer platform. S1 to S5 are successively deeper sleep states. A platform in S5 is shut down but still connected to AC power.

### **AMT is ON in the following host sleep states**

This parameter defines the highest power state at which Intel AMT will operate while the device is connected to AC power. Note that this includes operation in higher power states. For example, if the platform is in S3 and this parameter is set to **Host is ON (S0)**, the Intel AMT device will not operate until the platform returns to S0.

### **Idle Timeout**

Once the Intel AMT device wakes up and the host system is not turned on, this parameter determines the minimum time (in minutes) that the Intel AMT device will remain operable when there is no activity. The device will return to a sleep state after the idle timeout period. The timeout timer is restarted whenever the device is serving requests. If the value of the parameter is zero, the device will remain on when there is no activity.

For example, the **AMT is ON** parameter is set to **Host is ON (S0) or in Standby (S3)**. When the platform transitions to S3, the Intel AMT device will remain awake until there is no activity for the number of minutes set in the **Idle Timeout**. At that point the device reduces power. Any network access to the Intel AMT device will cause it to wake up and restart the timeout timer. This parameter should be set to three minutes at a minimum.

Click **Apply**.



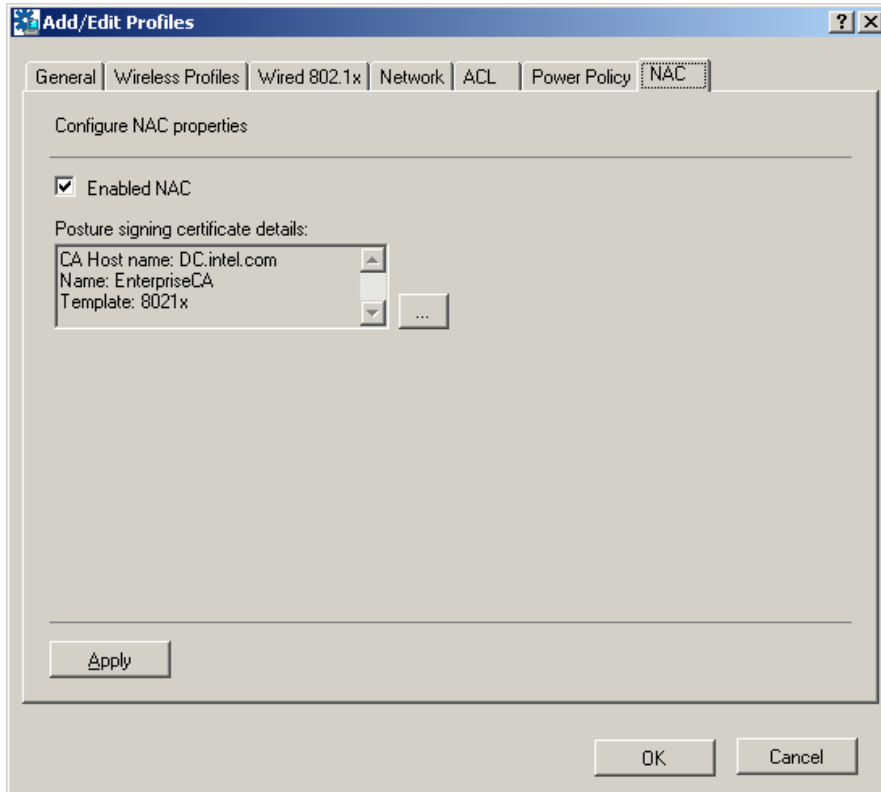
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*Some platforms that support Intel AMT Release 3.0 have a “power loss” option, where Intel AMT stays off until the platform is rebooted after a power failure. The SCS does not support configuring this option.*

---

## The NAC Tab

The NAC Tab is used to identify the certificate used to sign NAC posture messages.



Selecting Enabled NAC means that the NAC Posture generation capability will be enabled in Intel AMT devices configured using this profile.

See “Retrieving a Certificate for Use by a Posture Validation Server” on page 136 for a description of how to export the certificate designated here so its public key is available for validating the signature created using the private key.

Enter a definition for the certificate source (CA identification information) that the SCS will use to create a certificate for signing NAC postures.



---

*If the certificate source (Certificate Authority name) and template type are the same for the TLS Server Authentication certificate, the NAC posture signature certificate, and the 802.1x server authentication certificate, the SCS will request one certificate and configure the Intel AMT device to use it for all of these purposes.*

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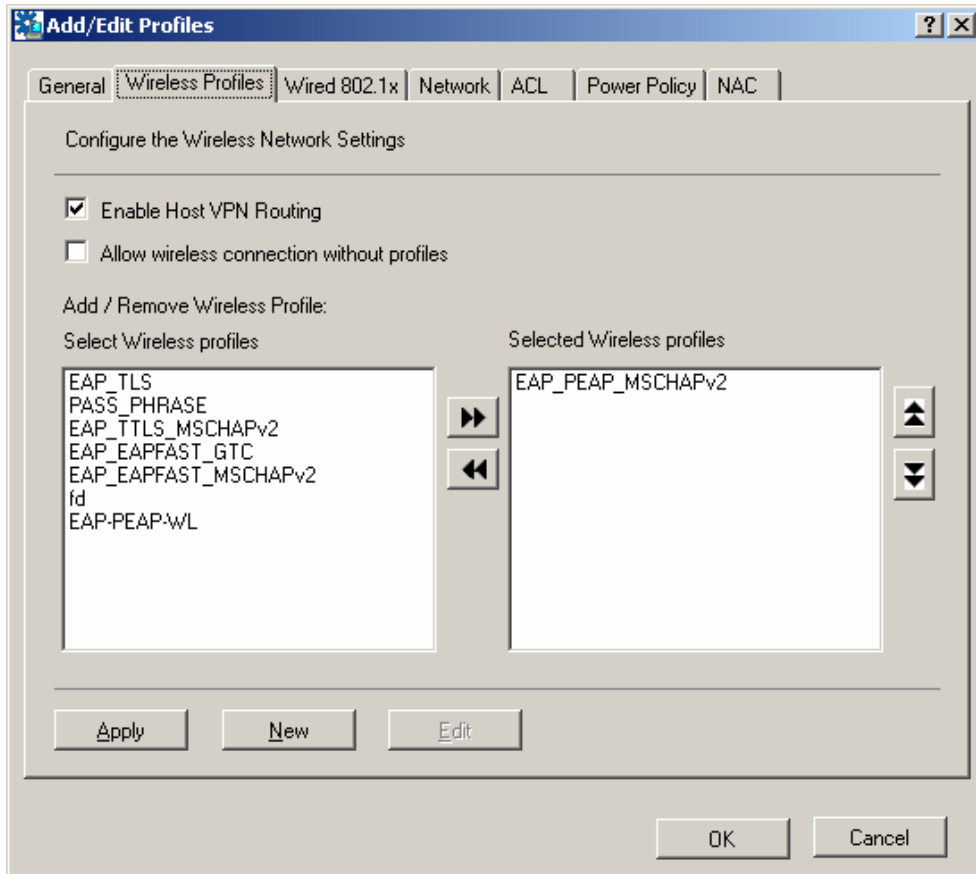
*Only three server and client certificates can be associated with a single profile. These include the Server certificate required for TLS and any client certificates required for 802.1x profiles or for NAC posture signing. In a normal installation, a single client certificate would be purchased for all applications in the facility. If a profile requires more than three certificates, setup of an Intel AMT device based on this profile will fail.*

---

## The Wireless Profiles Tab

Use the Wireless Profiles Tab to select wireless profiles to use to configure mobile platforms. (This tab applies only to Intel AMT Release 2.5.) See “Defining Wireless Profiles” on page 96 for information on creating wireless profiles. When the Intel AMT device on a mobile platform is active in S3, S4, or S5 power states, it will attempt to authenticate according to the selected wireless profiles in order of priority. The SCS allows up to fifteen wireless profiles to be added to a profile.

Note that **Integrate with Active Directory** must be selected on the General Configuration page to be able to configure an Intel AMT device with a wireless profile if that profile uses 802.1x for authentication.



Select the **Enable Host VPN Routing** checkbox to configure Intel AMT devices to accept management traffic over a Virtual Private Network connection when Intel AMT detects that the platform is operating outside the enterprise network.

Select the **Allow wireless connection without profiles** checkbox if Intel AMT devices will depend exclusively on host platform wireless profiles for out-of-band manageability over wireless networks. (This feature applies only to platforms running Intel AMT Release 2.6.) This feature operates under the following conditions:

- Environment detection is enabled (See page 84).
- The platform is operating within the enterprise.
- The host wireless system is WPA/RSN secure (WEP is not considered secure).



If the host wireless connection fails, then the Intel AMT device will also lose wireless connectivity.





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*An Intel AMT device managed over a wireless LAN that does not have a wireless profile installed cannot perform SOL/IDER functions.*

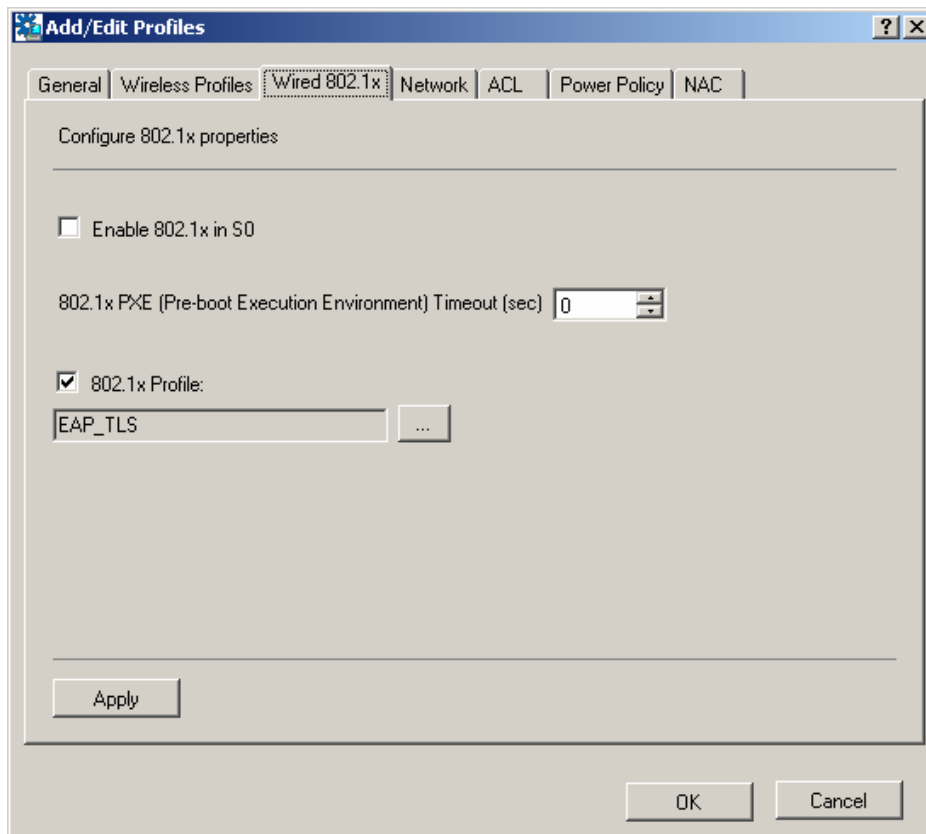
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Select from the available wireless profiles and move the desired ones to **Selected Wireless Profiles** using the  control. Use the  control to remove a selected profile from the list.

Use the  and  controls to adjust the relative priorities of the profiles. The profile at the top of the list will have the highest priority.

## The Wired 802.1x Tab


Use the Wired 802.1x tab to select an optional 802.1x profile, used by the Intel AMT device to authenticate on a wired LAN when the device is active in S3, S4 or S5 power states. (This tab applies only to Intel AMT Releases 2.5, 2.6, and 3.0.) See “Defining 802.1x Profiles” on page 98. Note that Integrate with Active Directory must be selected on the General Configuration page to be able to configure an Intel AMT device with a wired 802.1x profile.

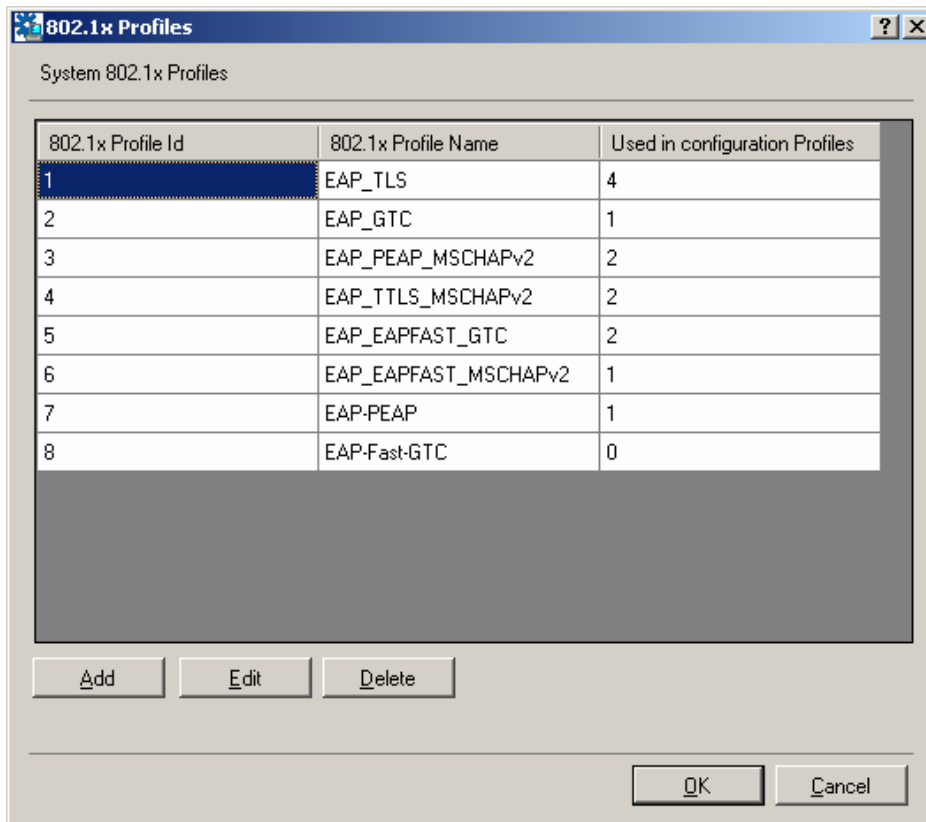


Select the **Enable 802.1x in S0** checkbox to allow Intel AMT to authenticate using the 802.1x profile even when the host is active. This mode of operation allows manageability traffic even if the host is unable to complete authentication to the network.

Set the PXE boot timeout (up to 86,400 seconds). This parameter defines the period allowed for completion of an 802.1x authentication. This parameter can be set only when an 802.1x profile has been selected. If the 802.1x profile is deleted, this value will be forced to zero.

Select the 802.1x Profile checkbox to allow selection of a profile to include in the field below.

Select the  control to display a list of defined profiles and select one of them.



Select **Add** to define a new profile. Select **OK/OK** to complete the profile selection.

## Defining Wireless Profiles

A wireless profile defines which protocol will be used between an Intel AMT device and a wireless access point. If the Intel AMT device is to receive manageability messages over a wireless connection, there must be a wireless profile installed on the device that corresponds with the wireless profile active on the host. The profiles conform to IEEE 802.11i. Select **Wireless Profiles** in the left-hand pane of the Console display and select **Add...** to create a new profile, **Edit...** to modify an existing profile or **Delete** to delete an existing profile.

### Profile Name

Enter a name for this profile.

### SSID

Enter an optional Service Set ID: a 1 to 32 character string naming a specific wireless LAN.

### Security Settings

Select a Key Management scheme (WPA or RSN) and an Encryption Algorithm (TKIP or COMP). These choices must correspond to the settings used in the specific wireless LAN environment.

### Authentication

Either provide a passphrase or select an 802.1x profile.





---

*Intel AMT Release 2.5 requires a strong passphrase: It must be at least eight characters and contain an upper-case letter, a lower-case letter, numbers, and one of the @ # \$ % ^ & \* symbols at a minimum. The SCS does not validate for a strong passphrase.*

*Intel AMT Release 2.6 requires only that the passphrase be at least eight printable ASCII characters.*

---

To assign an 802.1x profile to the wireless profile, select the  control to display a list of defined 802.1x profiles, and then select one of them. Select **Add** to define a new profile. Select **OK/OK** to complete the profile definition. Intel AMT must be integrated with Active Directory to use 802.1x profiles.

## Defining 802.1x Profiles

IEEE802.1x defines an extendable set of layer 2 protocols used to authenticate LAN communications. The profiles defined here can apply to any Intel AMT Profile, and apply to either wired or wireless connections. This capability only applies to Intel AMT releases 2.5 and 3.0. Select **802.1x Profiles** in the left-hand pane of the Console display and select **Add...** to create a new profile, **Edit...** to modify an existing profile, or **Delete** to delete an existing profile.

### Profile Name

Enter a name for the new 802.1x profile.

### Protocol

Select from one of the available options. The client and server authentication methods enabled on the 802.1x Profile tab vary according to the protocol selected:

**Table 6: 802.1x Protocol Options**

Protocol	Client Authentication Options	Server Authentication Options
EAP-TLS	Client Certificate required	Trusted root for Radius server certificate required
EAP-TTLS (MS-CHAP v2)	Client Certificate required, Roaming Identity optional	Trusted root for Radius server certificate required
EAP-PEAP (MS-CHAP v2)	Not required	Trusted root for Radius server certificate required
EAP (GTC)	Not required	Not required
EAP-FAST (MS-CHAP v2)	Client Certificate required, Roaming Identity optional	Trusted root for Radius server certificate required
EAP-FAST (TLS)	Client Certificate required	Trusted root for Radius server certificate required



Protocol	Client Authentication Options	Server Authentication Options
EAP-FAST (GTC)	Client Certificate required, Roaming Identity optional	Trusted root for Radius server certificate required

### Client Authentication

The client authentication options require defining a source for a client certificate for authenticating an Intel AMT device to a Radius server.

### Client Certificate

Select the  control to enter a path to a certificate authority and select a template defined for creating the appropriate client certificate. See “Defining a New Template for an Enterprise CA” on page 130 for information about creating a template for 802.1x client certificates. **Defining a template requires an Enterprise CA, which requires presence of Active Directory.**




---

*Only three server and client certificates can be associated with a single profile. These include the Server certificate required for TLS and any client certificates required for 802.1x profiles or for NAC posture signing. In a normal installation, a single client certificate would be purchased for all applications in the facility. If a profile requires more than three certificates, setup of an Intel AMT device based on this profile will fail.*

---

### Roaming Identity

Selecting this checkbox enables roaming. The user will have an identity of “Anonymous”.

### Radius Server Authentication

Provide a link to the certificate authority that was the source of the server certificate installed on the Radius server. The SCS will install a root certificate from that CA in Intel AMT devices configured with this profile.

### Trusted Root CA for Radius server certificate

Use the  control to add a root certificate from the CA.

### Radius Server Certificate Subject Name

Enter the subject name in the certificate installed in the Radius server. The Full/Suffix selection below this field indicates whether this is the FQDN of the Radius server or the domain name suffix of the Radius server.

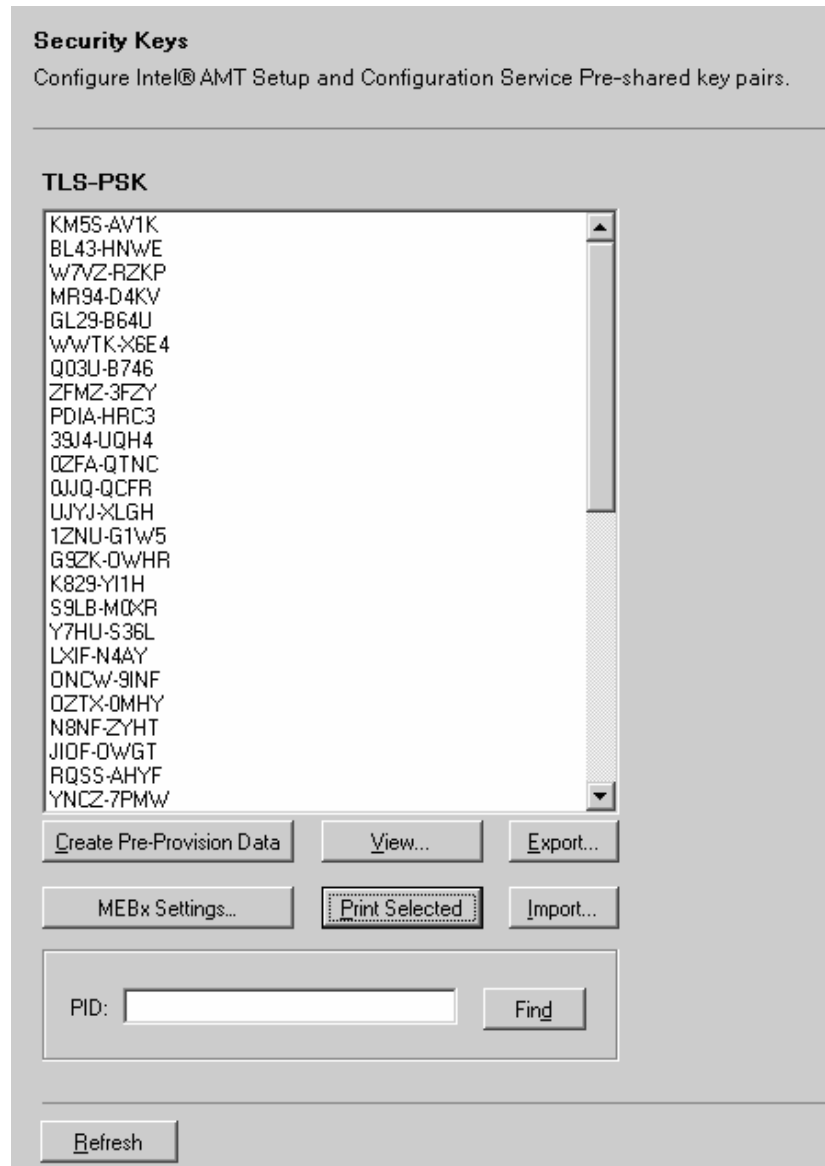
## Configuring Pre-Setup and Configuration Security Keys

Setup and configuration of Intel AMT Release 2.0/2.1/2.5 devices is done using the TLS-PSK (Pre-Shared Key) protocol. The protocol requires a security key installed both in the Intel AMT device and in the SCS database. This pane is used to generate the pre-shared keys and associated parameters. Each key has four elements: the key itself (PPS), an identifier sent in the clear by the Intel AMT device in the “Hello” message (called a PID), an initial MEBx password, and a replacement MEBx password. See “PID-PPS” on page 59 for additional information. Sets of these parameters can be exported to a USB key and installed in new Intel AMT devices. Alternately, an OEM may ship platforms with PID/PPS pairs and a default password already installed. In this case, the file from the OEM must be imported into the SCS database. The third option, entering the PID and PPS

manually, is also described at the above reference.

To configure the Security Keys:

1. Open the Intel SCS Console.
2. Expand the **Configuration Service Settings** branch.
3. Select **Security Keys**. The Security Keys screen is displayed.
4. Click **Create Pre-Provision data**. Intel SCS creates a list of Security Keys. See the MEBx Settings pane to configure the number of keys generated. Each record consists of an 8 byte PID, a 32 byte PPS and the administrator's password.



5. Select **Export** to write the current list of keys to a file on a USB Key in the format expected by the platform BIOS.
6. Select **Import** to incorporate a file of keys from an OEM into the SCS database.
7. Optionally, to view the details of a particular Security Key, select the Security Key and click **View**.

This screen is used to print and reserve a single set of security parameters that will be used to configure an Intel AMT device manually:  
 First print the parameters using the Print option, then select Mark as Used so that the key will not be used with more than one Intel AMT device.



The following information is displayed:

**PID (Provisioning ID)**

The PID is the 8 character identification string sent in the clear in the “Hello” message.

**PPS (Provisioning Pre-Shared Key)**

The PPS is a 32 character key string that is the secret shared between the Intel AMT device and the SCS service.

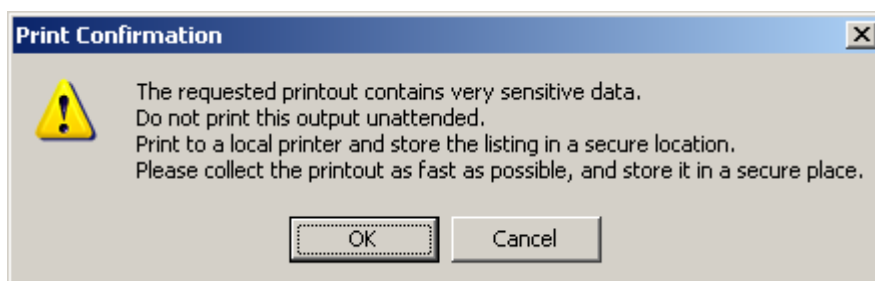
**Factory Default MEBx Password**

The factory default MEBx password is the password assigned when the Intel AMT device is preconfigured, whether by an OEM or from a previous installation. The default value is “admin”.

**New MEBx Password**

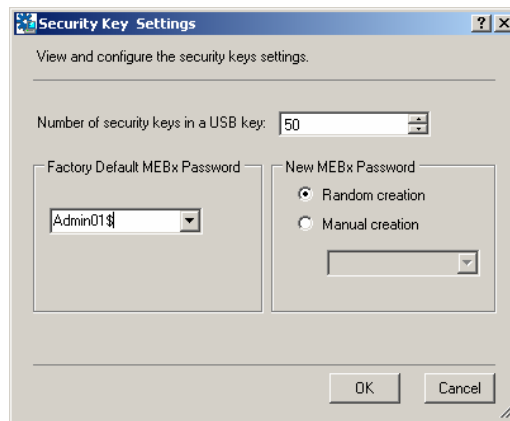
The New MEBx password is assigned to the Intel AMT device during setup and configuration.

**Print** prints the parameters of the single displayed key. Before the print request executes, the SCS displays the following message:



**Mark as Used** removes the selected key from the visible list. It will remain in the database but will not be exported to a USB Key. Select this if the keys were printed.

8. To set the passwords, and the maximum number of security keys that can be stored on a single USB key, click **MEBx Settings**.



- a. Enter a number in the Number of security keys field.



---

*This number determines the number of keys created by clicking Create Pre-Provision data and how many keys are exported when Export is clicked.*

---

- b. Select the factory-assigned OEM password. If it is not in the dropdown list, add it to the list by performing the following steps:
- Click within the **Current Password** field. The content is selected.
  - Begin typing. The old content disappears but is not deleted.
  - Enter the new Current Password.
  - Click **OK**. The new OEM MEBx password is added to the list.
- c. In the New MEBx Password box, select either Random or Manual. If Manual is selected, enter the new password. This will be the MEBx password after setup and configuration completes.
- d. Click **OK**.



---

*Passwords are stored in the Intel AMT table saved in the database.*

---

## Configuring Users and Groups

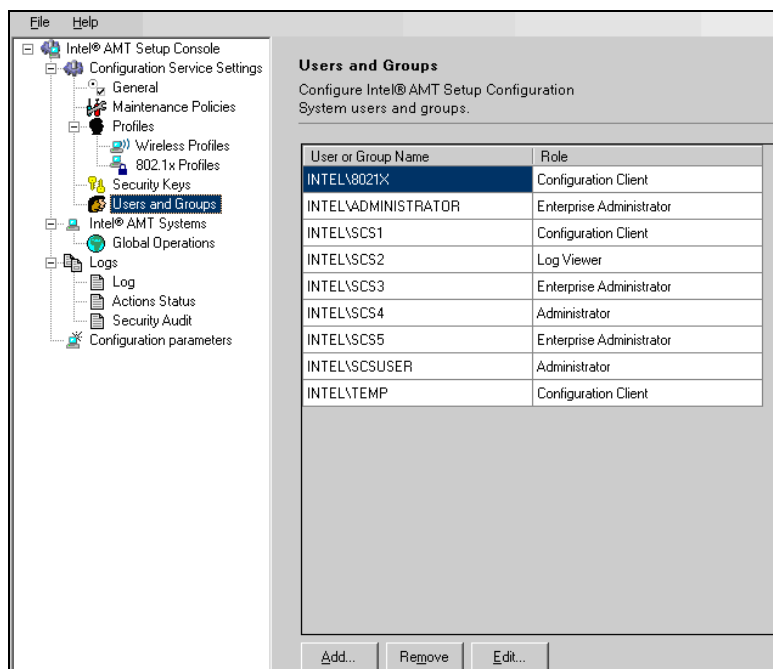
The Users and Groups list defines identities with access to the Intel SCS Console. Each user is assigned a role which defines the permissions allotted to the user. See below for the permissions associated with each role. The console supports assigning a role to a defined group of users. This is a more manageable approach. Create an SCS Admins Group, for example, and assign it the Administrator role. Then IT can add users to the group or delete users from it without having to do this from the SCS console.

To improve performance, the SCS maintains a cache of users that access the service. This reduces the number of times that the service needs to access directory services to validate a user. If a user is moved from one group to another, the SCS will continue to use the cache entry to validate the user, and validation may fail as a result. To avoid this failure, flush the cache by restarting IIS.

## Viewing Existing Users

To view a list of existing users:

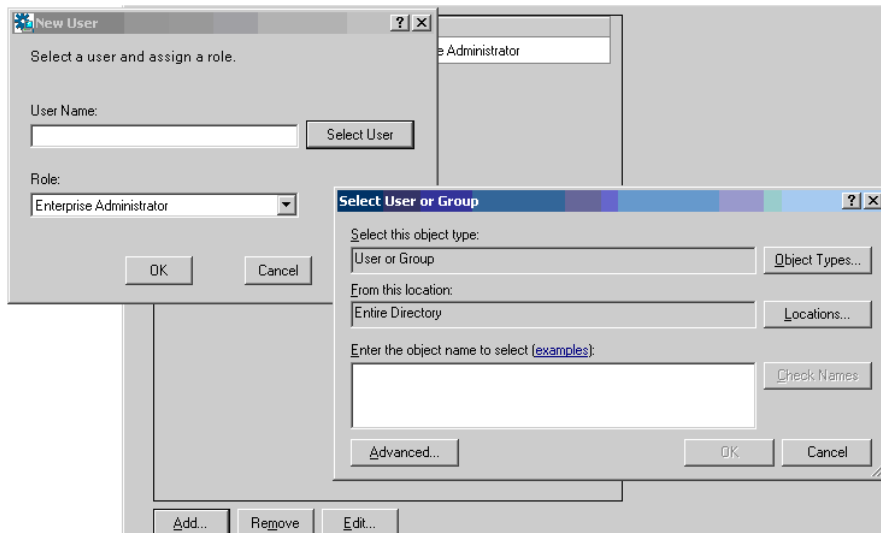
1. Open the Intel SCS Console.
2. Expand the **Configuration Service Settings** branch.
3. Select **Users**. The Users table is displayed.



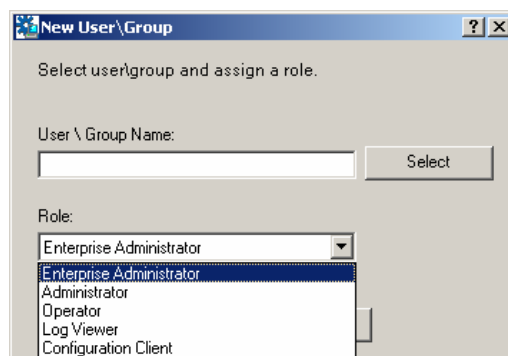
## Adding a User

To add a new user:

1. Open the Intel SCS Console.
2. Expand the **Configuration Service Settings** branch.
3. Select **Users**. The Users table is displayed.
4. Click **Add**. The New User dialog box is displayed.
5. Click **Select User**. The Select dialog box is displayed.



6. Enter all or part of a user name.
7. Click **Check Name**. The Intel SCS searches the AD and completes or confirms the user name.
8. Click **OK**.
9. From the Role dropdown menu, select a role:



### **Enterprise Administrator**

The Enterprise Administrator has access to all Intel SCS Console configuration and management screens, fields, and parameters.

### **Administrator**

The Administrator role has the same permissions as the Enterprise Administrator but does not have permission to create or edit Profiles, or access to the Users, General Configuration or Maintenance functions.

### **Operator**

The Operator role has access to the following:

- Access Security Keys on the Configuration Service Settings branch.
- View the Status table on the Intel AMT Systems branch.
- View the standard log and the security audit log.
- Access the complete configuration parameters branch.

### **Log Viewer**

This role allows a user to view the standard log and the security audit log.

### **Configuration Client**

Users with this role can add platform parameters and request a one-time password (OTP).

The Configuration Client role is required by all platforms executing a client script that communicates directly with the SCS API. This includes the Remote Configuration Tool (RCT). Add IT-defined groups that contain all computers in each domain that the SCS supports. The SCS does not grant the Configuration Client role to the default Domain Computers Group.

10. Click **OK**.



---

*Never remove the user that is used by the SCS service when it is started. Removing this user causes the service to fail.*

---

## Configuration Parameters per Device

The SCS maintains two lists of Intel AMT devices:

A list of device information entered into the database by the administrator, provided by a script, or entered by external calls to the API. Each entry relates a specific Intel AMT device (defined by its UUID and FQDN) to a Profile and an Active Directory storage location. The SCS Console displays and manages this list with the **Configuration Parameters** branch of the tree.

- A list of Intel AMT devices that have sent “Hello” messages to the SCS. These devices may have been configured or not. The administrator can update the configuration of one or all of the already configured devices, among other operations. The console performs these functions and manages the list from the **Intel AMT Systems** branch of the tree.

This section describes the “Configuration Parameters” features. The opening screen shows a list of Intel AMT devices that are known to the SCS service. A device requires an entry in this database table for the SCS service to complete setup and configuration. If there is no entry, configuration will not complete due to the lack of critical setup information.

The SCS may be configured to acquire the necessary Intel AMT device information using a script that executes when the SCS receives a “Hello” message. In this case, the script will create an entry in the table for the device.

## Viewing Defined Intel AMT Devices

To view a list of Intel AMT Devices already defined in the SCS database:

1. Open the Intel SCS Console.
2. Select **Configuration Parameters**. The screen displays a list of Intel AMT devices, ordered by UUID. The display can be ordered by any of the columns by clicking on the column header, or it can be paged through using the controls below the table.

UUID	FQDN	AD Organizational Unit	Profile Name
25242322-2726-2928-2A28-2C2D...	bw1.intel.com	OU=amts,dc=intel,dc=com	EAP_TLS
88888888-8810-8888-8888-10888...	matanzas.intel.com	OU=AMT's,DC=intel,DC=com	default_2
88888888-8887-8888-8888-87888...	sr2.intel.com	ou=amts,dc=intel,dc=com	default_2
03020100-0504-0706-0809-0A0B0...	bw4.intel.com	OU=AMT's,DC=intel,DC=com	default_2
E1E0DFDE-E3E2-E5E4-E6E7-E8...	bearlake.intel.com	ou=amts,dc=intel,dc=com	default_2

The UUID is a unique value for a specific Intel AMT device and its platform. The FQDN (Fully Qualified Domain Name) is the combination of host name and domain



that is unique for the platform containing the device. The Active Directory Organizational Unit determines where the AMT object for this device should be placed in the directory system. The profile name is the profile to be used to configure this device.

3. To filter the view, select a filter options from the bottom of the screen and click **Apply Filter**.

## Defining a New Intel AMT Device Record



---

*When the AddServicNewAmtProperties.exe program is included in a platform initial configuration script, it can be used to create an entry in the SCS database without additional operator intervention. Use the console to add devices one by one.*

---

To add a new Intel AMT device to the table manually:

1. Open the Intel SCS Console.
2. Select **Configuration parameters**. The New Intel AMT Systems table is displayed.
3. Click **Add**. The Edit New Intel AMT Properties dialog box is displayed.

4. Enter the parameters.

### UUID

This is the 128-bit value represented as a hexadecimal string that uniquely identifies an Intel AMT device. Enter the UUID in the format shown, with hyphens separating the sub-strings.

### FQDN (Fully Qualified Domain Name)

Enter the combined host name and the domain where the platform will be installed.

### Active Directory Organizational Unit

The AD element where the AMT object will be located after setup and configuration is completed. A value must be entered for this parameter even if Active Directory use is not enabled. If use of Active Directory is possible in the future, select values for this field that will be usable with the AD deployment.

### Profile

Enter the profile to be used for this device.

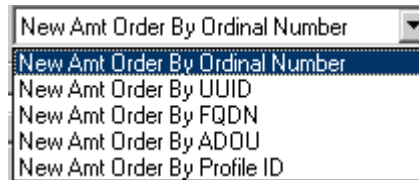
5. Click **OK**.

## Filtering the Display

The display of potential Intel AMT devices can be filtered. When filtered, only devices that match the specific filtering criteria are displayed.

To filter the display:

1. Select one or more of the checkboxes.
2. As applicable, either select an entry from the dropdown list or complete the entry in the available field. The dropdown list includes the following options:



3. Click **Apply Filter**.

To sort by a specific parameter, click on the appropriate column title. Click again to alternate between an ascending and a descending sort.

## Configuring Existing Intel AMT Devices

Use the Intel AMT Devices screen to view the status of all Intel AMT devices that have sent a “Hello” message at least once to the SCS, review details about a single Intel AMT device, and configure an individual Intel AMT device.

### Viewing Intel AMT Devices and Reviewing the Details of a Device

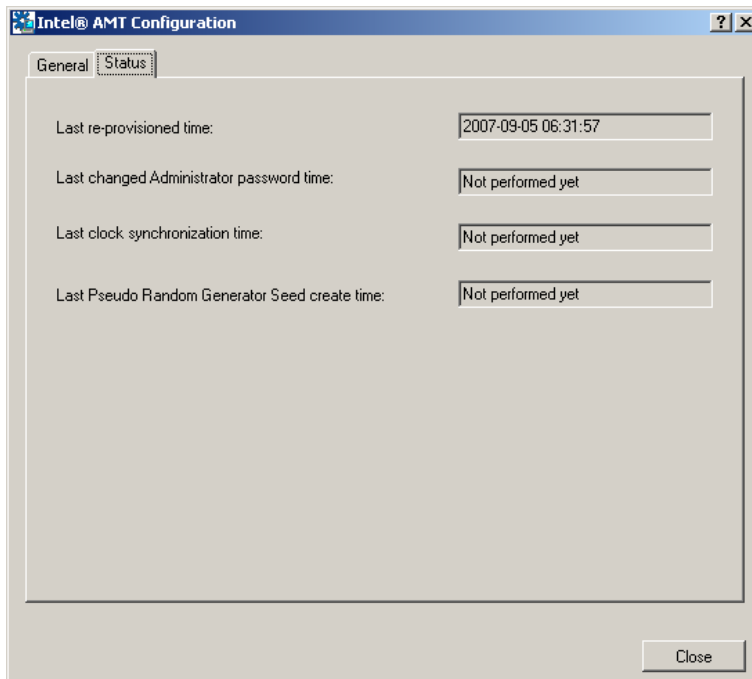
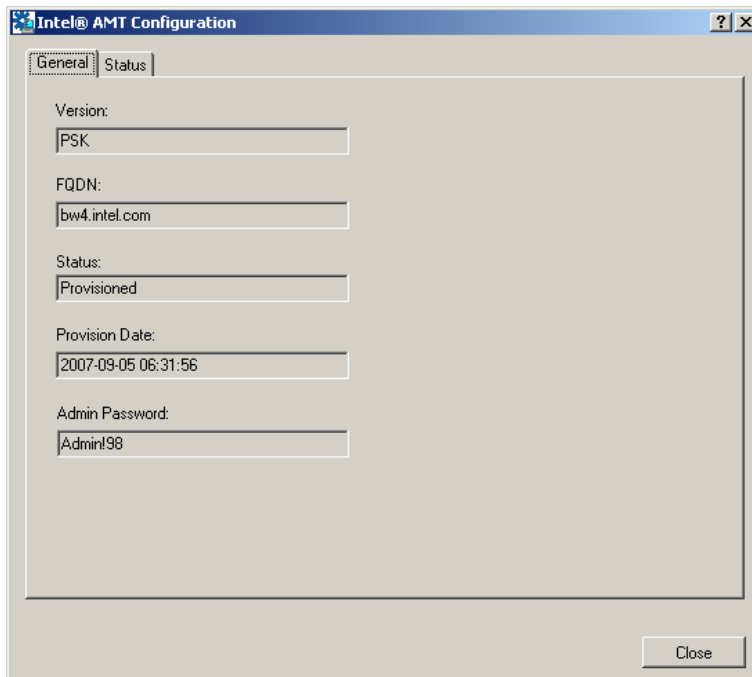
To view a list of existing Intel AMT devices:

1. Open the Intel SCS Console.
2. Select **Intel AMT Systems**. The Intel AMT Systems table is displayed.

The screenshot displays the 'Intel® AMT Systems' interface. At the top, it says 'List of Intel® AMT devices' and features the Intel logo. Below this is a table with the following columns: UUID, FQDN, Status, Provision Date, Comm. Type, Profile ID, Profile Name, Authorized, and Full Version. The table contains five rows of data, with the last row highlighted in blue. Below the table is a control bar with buttons for 'Details...', 'Operations', 'Export...', 'Refresh', 'Log', 'Apply Filter', and 'Set Props...'. At the bottom is an 'Intel® AMT Filter' section with several checkboxes and dropdown menus for filtering by version, profile ID, status, UUID, and provisioning date.

UUID	FQDN	Status	Provision Date	Comm. Type	Profile ID	Profile Name	Authorized	Full Version
E1E0DFDE-E3E2-E5E4-E6E7-E8E9EAEB...	bearlake.inte...	UnProvisi...		PKI	2	default_2	False	
88888888-8887-8888-8888-878888888888	sr2.intel.com	Provision...	2007-09-05 06:01:56	PSK	2	default_2	False	2.6.0
88888888-8810-8888-8888-108888888888	matanzas.int...	UnProvisi...	2007-09-04 13:12:54	PSK	2	default_2	False	2.5.7
25242322-2726-2928-2A2B-2C2D2E2F30...	bw1.intel.com	Provision...	2007-09-05 06:26:58	PSK	6	EAP_TLS	False	2.3.0
03020100-0504-0706-0809-0A0B0C0D0E...	bw4.intel.com	Provision...	2007-09-05 05:56:55	PSK	2	default_2	True	2.1.0

3. Select an Intel AMT device and click **Log** for a display of system log entries for the selected device.
4. To review specific details about the configuration of a device, select a device and click **Details**. The Details screen has two tabs (see below). The General pane shows basic information for the Intel AMT device, while the Status pane shows the last time that certain functions were performed.
5. Click **Export** to create and save an XML file containing the information in the device table.



## ***Ad Hoc Operations on an Individual Intel AMT Device***

To configure a single, Intel AMT device that has sent at least one “Hello” message:

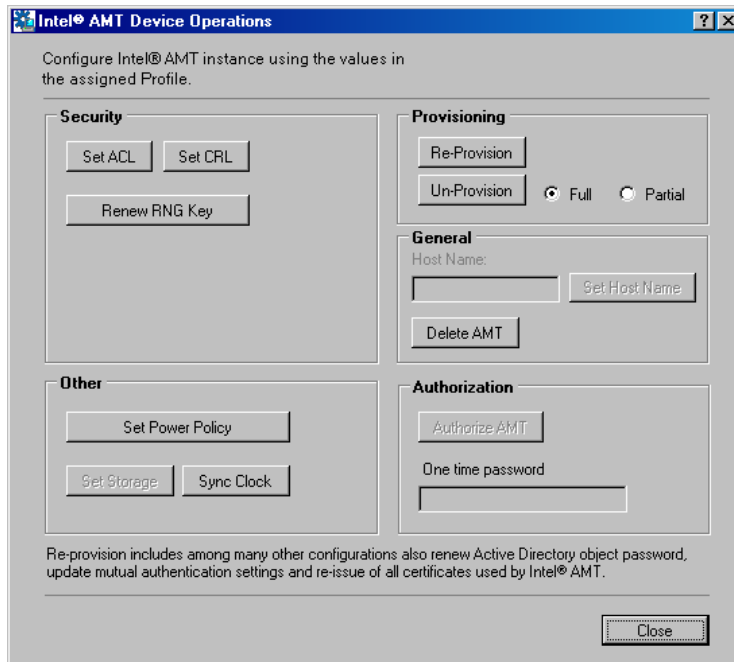


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*The profile last used to configure an Intel AMT device will be used for the operations in this section, except for reprovision.*

---

1. Update the profile used when the device was configured with any new parameters that will be needed for the desired ad hoc operations.
2. Open the Intel SCS Console.
3. Select Intel AMT **Systems**. The Intel AMT Systems table is displayed.
4. Select a device and click **Operations**. The Operations screen is displayed.



5. To perform an operation, click a button.

### Security

#### Set ACL

This operation updates the list of Intel AMT users—according to the ACL entries in the profile—and their access privileges. See also “The Profile Configuration ACL Tab” on page 89.

#### Set CRL

This operation updates the list of revoked certificates.

#### Renew RNG Key

This operation replaces the random number generator seed.

### Provisioning

#### Re-Provision

This operation first removes all settings from the Intel AMT device and then applies all the current settings in the profile associated with the device in the configuration parameters table. It also updates the AMT object in Active Directory based on the profile settings.



---

*When there is an enabled active wireless profile on the Intel AMT device, that profile cannot be disabled by an external command, since this might break the only manageability connection with the device. Also, if the wireless profile depends on a certificate, that certificate cannot be deleted. During reprovisioning, if there is a wireless profile with the same name as the active profile in the configuration profile associated with the device, the SCS will define a profile with the same name with an appended underscore and send it to the device. For example, if the active profile is named WP1, the SCS will install a profile named WP1\_.*

*Continuing the above example, after reprovisioning completes, and the wireless link is eventually dropped, the next wireless connection attempt may fail. This occurs because the Intel AMT device will try to establish a link using WP1 and the RADIUS server may try to authenticate using Active Directory. The credentials in the old profile WP1 will not match the new Active Directory credentials created during reprovisioning. After WP1 fails, the device tries to connect using the next wireless profile (WP\_) and will succeed as this profile has up-to-date credentials.*

---

## Un-Provision

This operation disables the Intel AMT device and leaves it without any Setup and Configuration parameters. There are two modes:

- Full unprovisioning:  
Deletes all data from the Intel AMT device. The Intel AMT device is not functional. If it is configured for “bare metal” remote configuration, the device will open the network interface and start sending “Hello” messages.
- Partial unprovisioning:  
Deletes all data on the Intel AMT device except for the PID, PPS, admin ACL settings, host name, domain name, and provisioning server IP and port number. The device will immediately start sending “Hello” messages. The SCS will setup and configure the device according to the profile associated with it.

## General

### Host name

Changes the host name of the selected device in the SCS database.

### Delete AMT

This operation deletes the selected Intel AMT device from the database. A warning message is displayed which requires confirmation of intent to delete.

## Other

### Set Power Policy

This operation updates the power policy according to the parameters defined in the profile. See also “The Profile Configuration Power Policy Tab” on page 91.

### Sync Clock

This operation synchronizes the clocks between the Intel AMT device and the SCS service.

## Authorization

When **AMT requires authorization before provisioning** is selected on the General page, an operator must select **AuthorizeAMT** on the Device Operations page for a selected Intel AMT device before setup and configuration can continue.

## One time password

When **One time password required** is selected on the General page, the OTP used when starting the Remote Configuration process should be entered here to allow setup and configuration to proceed.

## Filtering the Display

The display of existing Intel AMT devices can be filtered. When filtered, only Intel AMT devices that match the specific filtering criteria are displayed.

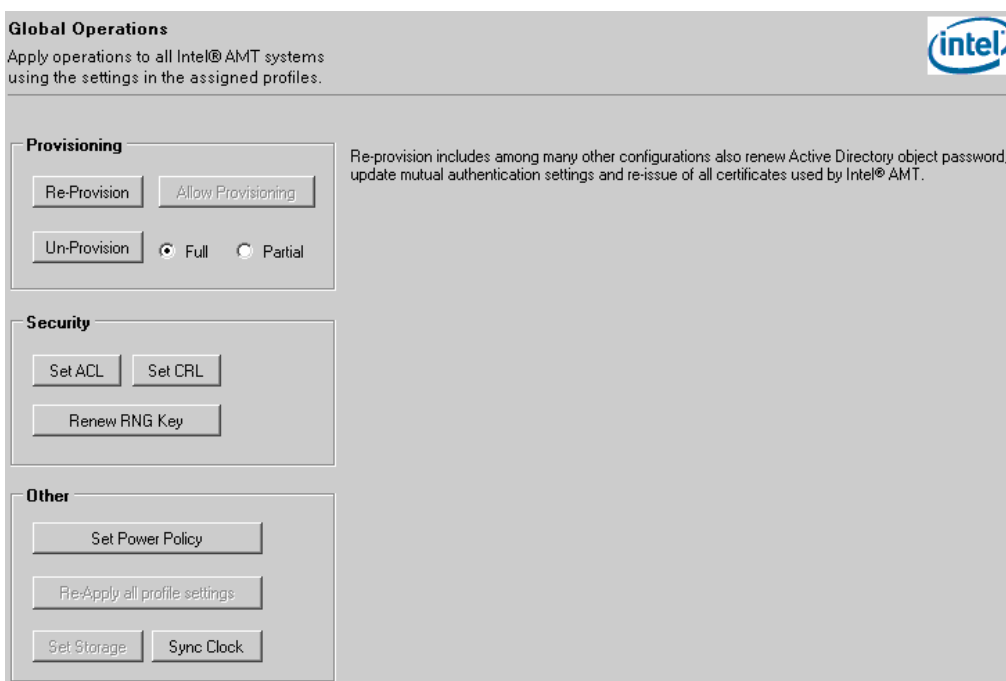
To filter the display:

1. Select one or more of the checkboxes.
2. As applicable, either select an entry from the dropdown list or complete the entry in the available field.
3. Click **Apply Filter**.

## Global Operations

To apply new settings to all existing Intel AMT devices:

1. Open the Intel SCS Console.
2. Expand the Intel AMT **Systems** branch.
3. Select **Global Operations**. The Global Operations page is displayed.



4. To perform an operation, click a button.

### Re-Provision

This operation applies all the current settings in the profile associated with each Intel AMT device. See page 111 for a note on re-provisioning wireless profiles.

### Un-Provision

This operation disables each Intel AMT device and leaves it without any Setup and Configuration parameters. There are two modes:

- Full unprovisioning:  
Deletes all data from each Intel AMT device. The Intel AMT devices are not functional.

- **Partial unprovisioning:**  
Deletes all data on every Intel AMT device except for the PID, PPS, admin ACL settings, host name, domain name, and provisioning server IP and port number. The devices will immediately start sending “Hello” messages. The SCS will setup and configure the devices according to the profiles associated with them.

### **Set ACL**

This operation updates the list of Intel AMT users—according to the ACL entries in the profile associated with each device—and their access privileges. See also “The Profile Configuration ACL Tab” on page 89.

### **Set CRL**

This operation updates the list of revoked certificates.

### **Renew RNG Key**

This operation resets the random number generator key for each device.

### **Set Power Policy**

This operation updates the power policy for all devices according to the parameters defined in the profiles. See also “The Profile Configuration Power Policy Tab” on page 91.

### **Sync Clock**

This operation synchronizes the clocks of the Intel AMT devices with the SCS service.



## Maintenance Policies

The Maintenance Policies pane defines actions that the SCS will perform periodically on all configured Intel AMT devices. The items enabled with a checkbox can be used to implement a specific site security policy.



---

*If TLS is not enabled, maintenance messages to the Intel AMT devices are sent in the clear, without encryption. It is recommended that in non-TLS environments, passwords for the AMT objects in Active Directory should be configured as “Password Never Expires”. The maintenance function should be used only to synchronize the Intel AMT clock.*

---

### Maintenance Policies

Configure the Intel® AMT Setup and Configuration Service Maintenance Policies.

---

**Re-provision Intel® AMT**  
Re-provision includes among many other configurations also renew Active Directory object password, update mutual authentication settings and re-issue of all certificates used by Intel® AMT.  
Every:  Months

**Change Intel® AMT Administrator password**  
Every:  Months

**Renew Pseudo Random Generator Seed**  
Every:  Months

**Synchronize Intel® AMT Clock**  
Every:  Minutes

---

### Re-provision Intel® AMT

If this item is checked, all parameters in each device will be updated according to the latest values in the associated profile. New certificates and passwords will be issued. See page 111 for a note on re-provisioning wireless profiles.

**Change Intel® AMT Administrator Password**

The administrative user has access to all functions of the Intel AMT device. Only the SCS has access to this ACL entry. When this option is selected, the administrative password is changed periodically to either a randomly-generated password or to a fixed password. The option used is defined on the [Profiles Configuration General Tab](#) for the profile associated with each Intel AMT device. Normally, this maintenance function is used only with the random password option.

**Renew Pseudo Random Generator Seed**

When this option is selected, the SCS generates and sends a new random number generator seed to each Intel AMT device.

**Synchronize Intel® AMT Clock**

This option synchronizes the clock in each Intel AMT device to the clock on the SCS platform. This operation is critical when using Kerberos authentication. It ensures that the clocks do not differ by more than the Kerberos Max Clock Tolerance defined in the Profiles.

# Intel AMT SCS Console Logs

The Intel AMT Console logs activity into the database. There are three log categories:

## Log

This log displays system-wide actions. This includes actions that succeeded and actions that failed. In particular, this log highlights failed actions. The log messages can be filtered by date, by message type, and by severity. The Log Level setting on the General Settings screen determines the number and level of messages displayed in the log. See “Windows Service Messages” on page 142 for a description of these messages and the action to take to correct a detected error.

## Actions Status

This log displays asynchronous actions—such as global operations or operations per Intel AMT device—that are entered into the queue. Their status in the queue is also displayed. The Name field shows the attempted action, the Status field shows success or failure or whether an action is queued, delayed or in progress.

The SCS checks its queues every five minutes to see if it is time to perform a scheduled maintenance task. The SCS records this in the Actions Status log as a maintenance task, even if no other activity was performed. Each of the maintenance events are noted as a CleanLog and ClearRequestStatus event. Note that an actual CleanLog event occurs only once every 24 hours.

## Security Audit

This log displays potential breaches in security, such as unauthorized attempts to log-in and unauthorized attempts to perform the re-provision function on all Intel AMT devices. The security log also registers valid events that have security impact, such as user log-ins. The SCS logs the following events in the security log:

**Table 7: SCS Security Log Events**

Message Type	Event
Error	Cannot contact CA server - Process delayed.
Error	Certificate cannot be issued - Process interrupted.
Error	Cannot request CA - Process interrupted.
Error	Working without CA - Process interrupted.
Error	Invalid network TLS authentication value
Error	Fail to delete Certificate
Error	User is not authorized
Error	Failed to remove profile.
Error	Unexpected exception when requesting certificate: - Process interrupted.
Error	Cannot contact unprovisioned Intel AMT device without PID/PPS.
Error	Cannot obtain connection to Intel AMT device on nn.
Information	Certificate request already under submission - Process delayed.
Information	Set Certificate Template
Information	User logged in.

Message Type	Event
Information	Modify user account nn.
Information	Set EACL.
Information	Set FACL.
Information	Set general parameters for profile.
Information	Adding TLS server certificate.

The following is an example of the System log display:

**Log**  
View the Logs.

Date	Description	Severity	Originator	UUID
2007-03-26 08:29:38	Server stopped.	Information		
2007-03-26 08:29:38	Server stopped.	Information	SEABREEZE\Admi...	
2007-03-26 08:29:38	HELLO Listener has been stopped.	Information	SEABREEZE\Admi...	
2007-03-26 08:29:38	Stop delayer manager.	Information	SEABREEZE\Admi...	
2007-03-26 08:29:38	Finishing HELLO listener in port 9971.	Information	SEABREEZE\Admi...	
2007-03-14 11:53:58	Listening on port 9971 for incoming connections.	Information	SEABREEZE\Admi...	
2007-03-14 11:53:58	Start delayer manager.	Information	SEABREEZE\Admi...	
2007-03-14 11:53:58	Server started with user SEABREEZE\Administra...	Information	SEABREEZE\Admi...	
2007-03-14 11:53:58	Start HELLO listener as user SEABREEZE\Admi...	Information	SEABREEZE\Admi...	
2007-03-14 11:53:58	Checking user....	Information	SEABREEZE\Admi...	
2007-03-14 11:48:00	Server stopped.	Information		
2007-03-14 11:48:00	Server stopped.	Information	SEABREEZE\Admi...	
2007-03-14 11:48:00	HELLO Listener has been stopped.	Information	SEABREEZE\Admi...	
2007-03-14 11:48:00	Stop delayer manager.	Information	SEABREEZE\Admi...	
2007-03-14 11:48:00	Finishing HELLO listener in port 9971.	Information	SEABREEZE\Admi...	

Print Export... Refresh Apply Filter (Page 1 of 2)

**Log Filter**

By Description:

By Severity:

Order By:

By UUID:

**Date and Time**

From:


To:

By Request ID:

By Source:

The following is an example of the Actions Status log display:

**Actions Status**  
View the status of asynchronous actions initiated by the console or by other SOAP API requests.



ID	Name	Execute Time	Status	Applied By	UUID
32	Maintenance	2006-09-27 07:41...	Succeeded	AMT\Administrator	
29	Maintenance	2006-09-27 07:36...	Succeeded	AMT\Administrator	
26	Maintenance	2006-09-27 07:31...	Succeeded	AMT\Administrator	
23	Maintenance	2006-09-27 07:26...	Succeeded	AMT\Administrator	
20	Maintenance	2006-09-27 07:21...	Succeeded	AMT\Administrator	
17	Maintenance	2006-09-27 07:16...	Succeeded	AMT\Administrator	
14	Maintenance	2006-09-27 07:11...	Succeeded	AMT\Administrator	
11	Maintenance	2006-09-27 07:05...	Succeeded	AMT\Administrator	
8	Maintenance	2006-09-27 07:00...	Succeeded	AMT\Administrator	
5	Maintenance	2006-09-27 06:55...	Succeeded	AMT\Administrator	
1	Maintenance	2006-09-27 06:50...	Succeeded	AMT\Administrator	

Refresh Apply Filter (Page 1 of 1)

**Global Operations Statistics**  
Updated: 2 List Pending: 0 List Failed: 0 List


**Actions Filter**

By Action ID:   
 By Name: No Operation  
 By Status: In Progress  
 By User:   
 Order By: Request Order By Actio

**Date and Time**  
 From: 2006-09-27 09:42:14  
 To: 2006-09-27 09:42:14

The following is an example of a Security Audit log display:

**Security Audit**  
View Security Audit Logs.



Date	Description	Severity	Originator	UUID	AK
2007-04-01 07:12:57	User logged in.	Information	ELAUUser1		
2007-03-27 12:01:08	Adding TLS server certificate.	Information	ELAUUser1		
2007-03-27 12:01:07	Adding TLS server certificate.	Information	ELAUUser1		
2007-03-27 12:00:14	Set general parameters for profile.	Information	ELAUUser1		
2007-03-27 12:00:10	Set general parameters for profile.	Information	ELAUUser1		
2007-03-27 09:11:18	Adding TLS server certificate.	Information	ELAUUser1		
2007-03-27 09:11:16	Adding TLS server certificate.	Information	ELAUUser1		
2007-03-27 09:11:12	Set general parameters for profile.	Information	ELAUUser1		

Print Export... Refresh Apply Filter (Page 1 of 1)

**Security Log Filter**

By Description:   
 By Severity: Fatal  
 By Creator:   
 Order By: Ordinal Number

**Date and Time (UTC)**  
 From: 2007-04-01 11:17:37  
 To: 2007-04-01 11:17:37

## Filtering a Log Display

The Log Displays can be filtered. After a filter is applied, only log entries that match the specific filtering criteria are displayed.

To filter the display:

1. Select one or more of the checkboxes.
2. As applicable, either select an entry from the dropdown list or complete the entry in the available field.
3. Click **Apply Filter**.

The filtering capability is especially useful with the Action Status log. The administrator can view recently configured Intel AMT devices, or which ones are queued to be configured or which ones failed configuration and require manual action.

## Chapter 5

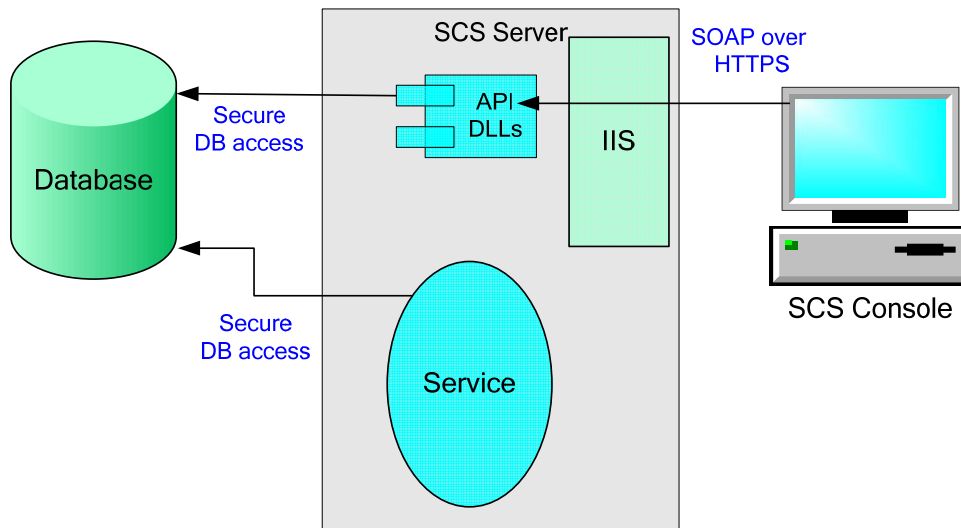
# SOAP API

This section includes

- “Overview of the SOAP API” on page 122
- “SOAP Faults” on page 123

## Overview of the SOAP API

The SCS service receives a stimulus from Intel AMT devices sending “Hello” messages requesting that they be configured. The SCS service polls and updates the database and Active Directory. An external application such as the SCS Console configures the service indirectly by sending SOAP requests via the SOAP API to modify or query the database. The SOAP API does not interact with the SCS service directly.



An ISV-developed Management Console can also use the SOAP API for platform discovery: It can query the SCS database for a list of configured Intel AMT devices or a list of those devices configured recently.

The API is implemented with three .dll files that are installed on the same platform as the SCS service. An application addresses the API with SOAP requests addressed to the IIS web server virtual directory, in this case AMTSCS, requests are directed to the appropriate API dll.

The API functions are segmented into four groups, and each group has a WSDL that defines the parameters of each function within the group.

The groups are:

- **Authentication Interface:** Used to log in, define users, and set database parameters
- **Profile Interface:** Manages Profile objects in the database
- **AMT Interface:** Manages AMT System objects in the database
- **Service Interface:** manages all other SCS service functions

The SCS distribution includes the four WSDLs, the SOAP API description document *Configuration Service SOAP API.doc* and the Console source code, contained in AMTConsoleSln.zip.



## SOAP Faults

Each API may throw a standard SOAP Fault Response. The structure of the SOAP Fault response depends on the client request SOAP version.

### SOAP Fault version 1.1

```
<SOAP-ENV:Fault>
  <faultcode>301</faultcode>
  <faultstring xsi:type="xsd:string">User is not authorized</faultstring>
  <detail>Profile get error 301: Action not allowed for the user</detail>
</SOAP-ENV:Fault>
```

### SOAP Fault version 1.2

```
<SOAP-ENV:Fault>
  <SOAP-ENV:Code>
    <SOAP-ENV:Value>SOAP-ENV:Sender</SOAP-ENV:Value>
    <SOAP-ENV:Subcode>
      <SOAP-ENV:Value>301</SOAP-ENV:Value>
    </SOAP-ENV:Subcode>
  </SOAP-ENV:Code>
  <SOAP-ENV:Reason>
    <SOAP-ENV:Text>User is not authorized</SOAP-ENV:Text>
  </SOAP-ENV:Reason>
  <SOAP-ENV:Detail>Profile get error 301: Action not allowed for the user</SOAP-
ENV:Detail>
</SOAP-ENV:Fault>
```

# SCS SUPPORT CONTENT

This section includes:

- “SCS Tools” on page 125
- “Using a Script to Import Intel AMT Configuration Properties” on page 127
- “Defining a New Template for an Enterprise CA” on page 130
- “Internationalization of SCS Messages” on page 135
- “Retrieving a Certificate for Use by a Posture Validation Server” on page 136
- “Configuring PEM Files for Redirection Applications” on page 137
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- “Troubleshooting” on page 140
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- “Glossary” on page 160

## SCS Tools

This section describes the command line and administrative tools installed with the SCS.

### Command Line Tools

#### Add new Intel AMT Properties

The Administrator can use this command line tool to add a new record to the NewAMTs table in the SCS database. The tool runs on the platform host and retrieves the UUID and the platform FQDN. It takes as input the URL of the IIS virtual directory so it can send a request to the SOAP API to add the entry to the database. It also takes as input the Profile name and the AD OU where the entry should be stored.

The trusted root certificate for the IIS instance on the SCS service platform must be installed on the host to enable the tool to send the entry to the database.

1. Navigate to the directory named:  
[InstallDrive]:\Program Files\Intel\AMTConfServer\Tools
2. From the command line, run: **AddServiceNewAMTProperties.exe** The function displays a usage message.

#### Database Dump

The Administrator uses this tool to dump the contents of the setup and configuration database. The tool uses ADO.NET and Window authentication to access the database.

1. Navigate to the directory named:  
[InstallDrive]:\Program Files\Intel\AMTConfServer\Tools
2. From the command line, run: **DumpDB.exe** A usage message will be printed. The parameters are: DB Server name/Server Instance, and DB name. Optionally provide a DB User and password for SQL Server authentication.

The program dumps the DB contents to a file in the same directory as the command.

### Administrative Tools

Administrative Tools are vbs scripts that extend and test the Active Directory schema.

They are located in folders under

[InstallDrive]:\Program Files\Intel\AMTConfServer\AdminScripts



---

*We recommend running the scripts from the command line prompt using cscript, for example: "cscript myscript.vbs". This ensures that, instead of opening separate messages, all messages are printed on the command line.*

---

### Active Directory Schema

This folder contains three scripts.

#### BuildSchema.VBS

Extends the Active Directory Schema to support the Intel-Management-Engine class. This script is run only once per domain.

The file Intel.AMT.LDF must be in the same folder.

Parameters: None.

**CheckSchemaExists.VBS**

Checks that the Schema is properly extended.

Parameters: None.

**ExportSchema.VBS**

Exports the portion of the Intel-Management-Engine Schema to Intel AMTExport. LDF.

Parameters: None.

# Using a Script to Import Intel AMT Configuration Properties

When the SCS is configured to use a script to obtain information about an Intel AMT device that sent a setup request, the following occurs:

- The Intel AMT device sends a “Hello” message.
- When the SCS receives the “Hello” message, it first searches the New Intel AMT table for a matching UUID entry.
- If there is no matching entry, the SCS sets environment variables based on values in the message.
- The SCS activates the script.
- The script locates the necessary parameters and creates a file consisting of an XML fragment.
- When the script completes, the SCS reads the file and adds an entry to the New Intel AMT table using the values returned by the script in the file.
- The SCS performs setup and configuration using the information in the file.

## Environment Variables

The SCS sets the following environment variables to pass values to a script:

- **CS\_AMT\_UUID:** The UUID from the Hello message
- **CS\_AMT\_STATUS:** status of the device to be setup— “U” (Unprovisioned), “I” (In provisioning), or “P” (Already provisioned)
- **CS\_AMT\_ADDRESS:** The value depends on the value of the previous parameter.
  - If **CS\_AMT\_STATUS** = “U” or “I”, **CS\_AMT\_ADDRESS** = the source IP address from the Hello message.
  - If **CS\_AMT\_STATUS** = “P”, **CS\_AMT\_ADDRESS** = the FQDN of the Intel AMT device to be set up.
- **CS\_OUT\_FILE\_NAME:** A file name generated by the SCS. The script returns the Intel AMT properties in a file with this name in the same directory as the script in the format described below.

## Output File Format

The output file generated by a script must be an XML fragment interpretable by the SCS. The fragment has the tag **amtConfiguration** and contains the following attributes:

- **fqdn:** The FQDN of the platform containing the Intel AMT device
- **addn:** The Active Directory OU to be used for this device or “NA” when the SCS is not integrated with Active Directory.
- **profile** or **profile\_id:** Either the SCS Profile name or the index of the profile to be used when setting up this device (only one of these can be used).

The file will have the structure shown in the following examples:

```
<amtConfiguration fqdn="jonesr.west.yourenterprise.com"
addn="OU=AMTDevs,DC=west,DC=yourenterprise,DC=com"
profile="Standard_user" />
```

or

```
<amtConfiguration fqdn="jonesr.west.yourenterprise.com"
addn="OU=AMTDevs,DC=west,DC=yourenterprise,DC=com"
profile_id="2" />
```

## Script Functionality

Script functionality is the responsibility of the ISV or the IT organization. The script may retrieve the information from an external source or from the platform containing the Intel AMT device, or some combination of the two methods. For example, the script may request the FQDN from the platform using the IP address, then determine the Active Directory OU and SCS Profile based on the FQDN.

## Sample Scripts

The SCS distribution includes several sample scripts. They each have advantages and disadvantages. The scripts take two approaches to acquiring the necessary device data. The first approach is a Server Script that requests the data remotely from the platform sending the “Hello” message. The second approach is a pair of scripts: a Client Script that runs on the host processor of a platform containing Intel AMT and requests the platform information and writes it to a database, and a Server Script that reads the database entry and returns it to the SCS. In either case, the controlling enterprise has to modify these scripts for local use.

## Server Script

The Server Script approach requires a copy of the script only on the platform running the SCS. It has the disadvantage of requiring the SCS user to have administrator permissions on every client (see box below).

The SCS distribution includes a script called GetConfigProperties.vbs. The script sends a WMI query to the host platform that sent the “Hello” message, and therefore requires that the host is operational and running a version of Microsoft Windows that processes WMI queries.



---

*The SCS user requires appropriate permissions to invoke WMI remotely. To use this script, the SCS user must be an administrator on the local host (a member of the local Administrators group).*

---

The sample script has a 30 second timeout in case WMI freezes on the host; however, the script may require 10 to 20 seconds to execute normally, due to WMI timing on the host.

The script:

1. Validates the environment variables.
2. Using the WMI protocol, requests the Win32\_ComputerSystemProduct object to recover the platform UUID from the host platform.
3. Using the WMI protocol, requests the Win32\_ComputerSystem object to recover the platform name and domain from the host platform.
4. Creates the FQDN by concatenating the name and domain.
5. Validates that the returned UUID is the same as the UUID environment variable.
6. Creates an amtConfiguration XML fragment using the FQDN and a hard-coded OU and profile name.
7. Writes the fragment to an output file.

The script is run by executing runscript.bat, which invokes cScript.exe, the command-line version of the Windows script host. The script writes output files to the same directory as the one containing the script and runscript.bat. The distribution also includes testme.bat, a batch file that sets the environment variables and then invokes the script.

On the General Properties pane of the SCS Console, select **Get New Intel AMT Properties/Get Intel AMT Configuration from Script** and enter the path name to the batch file on each platform running the SCS, for example:

```
C:\program files\intel\AMTConfserver\scripts\runscript.bat
```

See Step 5 on page 79.

## Client Script

The sample client script has the advantage of requiring only local system privileges. It has the disadvantage of requiring an auxiliary database and deployment to all client platforms. This approach has three elements:

- A database accessible to all machines in the Active Directory group account. Each row in this database contains information about a platform that has Intel AMT on it. The unique key is the UUID. The client platforms only have Add Row privileges to this database. The sample includes an SQL file, CreateAuxDB.SQL, that creates the database in SQL Server.
- A client script named AddConfigPropertiesToAuxDB.vbs that runs at least once on each client platform. The client script reads the UUID and the FQDN and writes them to the database.
- A server script named GetConfigPropertiesFromAuxDB.vbs that searches the database for an entry that matches the UUID in a “Hello” message and returns the UUID, FQDN, Profile name, and Active Directory OU to the SCS. The sample script returns a profile and OU based on the FQDN. The SCS would call this script on receipt of a “Hello” message when there is no entry in the SCS database for the UUID in the “Hello” message.

The client script:

1. Sets up script parameters.
2. Using the WMI protocol, requests the Win32\_ComputerSystemProduct object to recover the platform UUID and FQDN.
3. Writes a record to the database.

The server script:

1. Queries the database using the UUID.
2. Erases the row in the database so future updates by the client script will be successful, for example, after changing the FQDN of the platform.
3. Builds an XML fragment with the returned parameters.
4. Returns the XML fragment to the SCS.

Add the path to the batch file that executes the script to the **General Properties** page of the SCS Console. As with the server script, GetConfigPropertiesFromAuxDB.vbs can be executed with runscript.bat and tested with testme.bat.

## Remote Configuration Tool

The Remote Configuration Tool (described above on page 66) eliminates the need for a script by sending platform description information directly to the SCS via calls to the SOAP API. The tool executes on the Intel AMT Host platform.

## Defining a New Template for an Enterprise CA

When requesting a certificate from a Stand-alone CA, it is possible to change many of the fields in the certificate request manually. This is not true for an Enterprise CA certificate request. The parameters in a template are largely predefined. This is particularly the case for certificates that the SCS requests automatically for an individual Intel AMT device.

The following procedures show how to define a certificate template, how to give the SCS user the necessary rights to create certificates from that template, and add the template to the list of templates known to the Enterprise CA.



---

*Organizational security policies may determine certain template properties, such as certificate expiration. Adjust the values in the following examples to the local policy.*

---

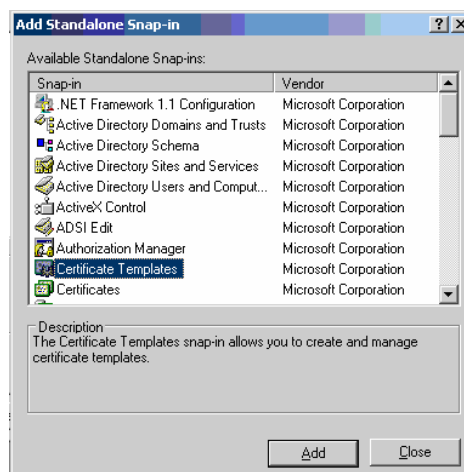
The following conditions require creation of an Enterprise CA template:

- Creating a Mutual Authentication client certificate for use by the SCS or a Management Console. Rather than filling in fields manually in the user template, as with a Stand-alone CA, first define a template with the necessary parameters and then request a certificate using the template. The procedure below shows specific steps required for the Intel AMT client certificate template.
- Creating a client certificate to install in an Intel AMT device so it can authenticate to a Radius server, as a requirement of IEEE802.1x. The SCS creates this certificate automatically for each device that requires one.

Using an Enterprise CA to generate server certificates for Intel AMT devices does not require a customized template, but it does require that the SCS user have **Read** and **Enroll** permissions for the default WebServer template.

Use the following procedure to create a template based on an existing default template.

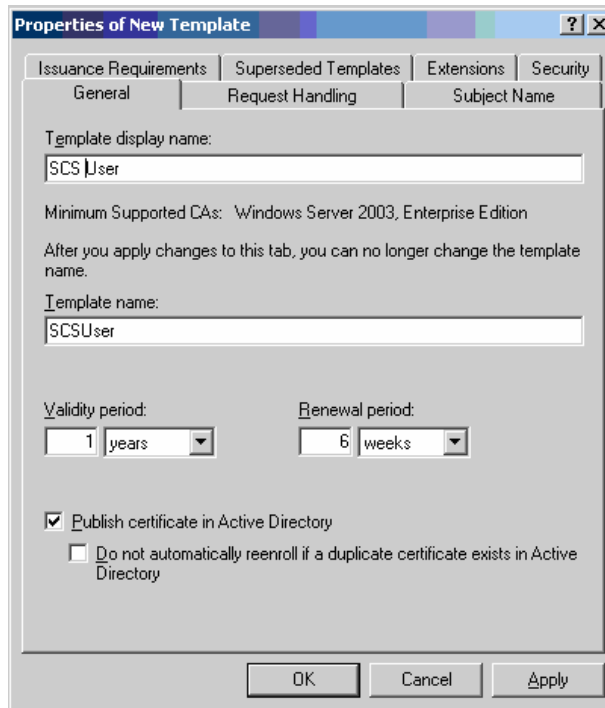
1. Log onto the platform running the Enterprise CA. The user must have Administrator permissions on this platform.
2. Click **Start/Run**, type MMC and click **OK**.
3. A Microsoft Management Console window will open. Select **File/ Add/Remove Snap-in**. Click **Add...** .



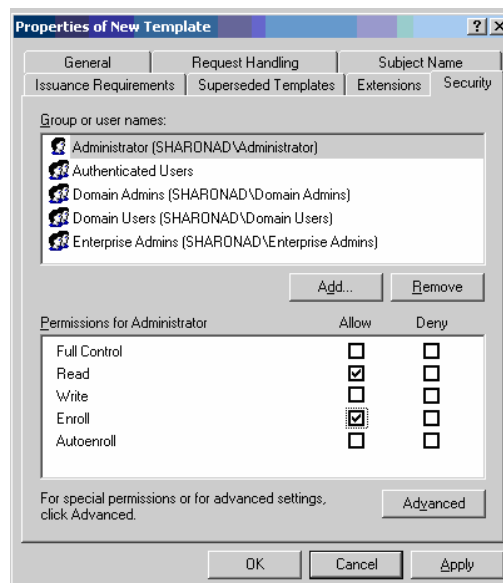
4. From the displayed list, select **Certificate Template**, click **Add**, then **Close**, then click **OK** in the previous window.
5. Select **Certificate Template** on the console display. Select **User** from the list of displayed templates. Right-click and choose **Duplicate Template**.



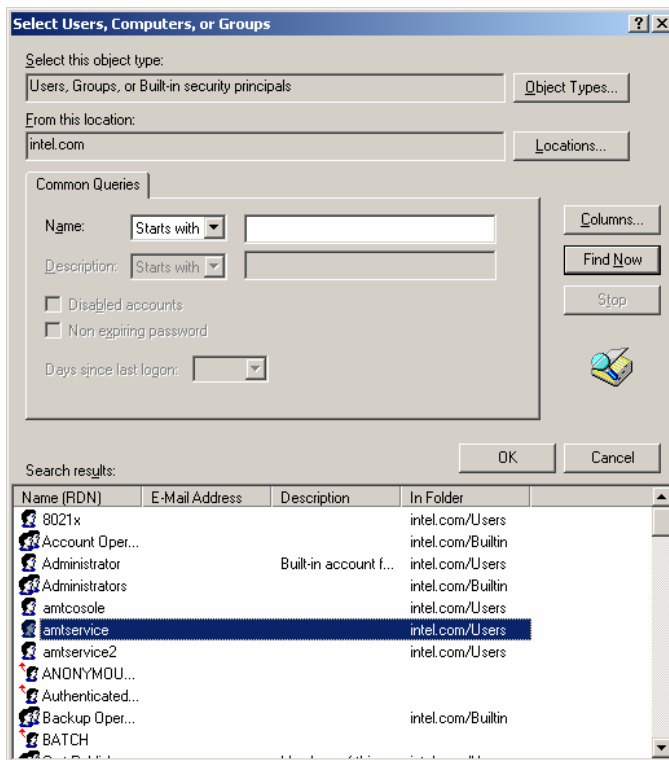
The new display is a tabbed form called **Properties of New Template**.



6. Set the Template display name to “SCS User” or some other meaningful name. For example, name a template used to generate 802.1x client certificates “802.1x”. Redefine the validity and renewal periods as required by local policy. Click **Apply**.
7. Select the Request Handling tab and click the **CSPs...** button.
8. Select the **Microsoft Strong Cryptographic Provider** checkbox. Click **OK** and **Apply**.
9. Select the Subject Name tab and select the **Supply in the Request** radio button. Click **Apply**.
10. Select the Security tab. Select Administrator (or the SCS user or the group the SCS user is in) and assign **Read** and **Enroll** permissions. The SCS user must be added to this list if the SCS requests certificates using this template. Click **Apply**.

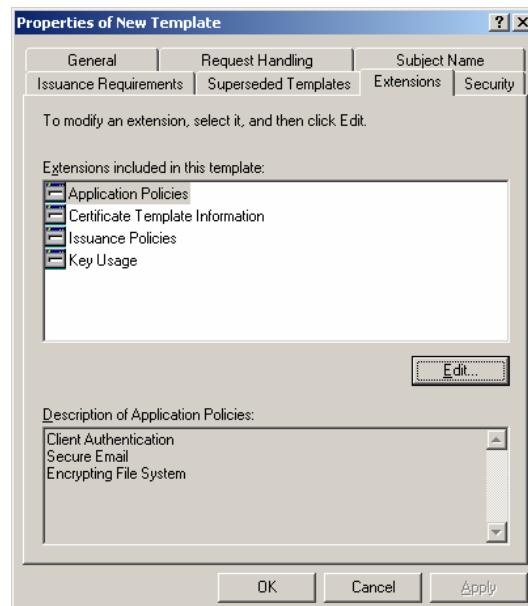


11. Select Add... to add a user that is not already in the template list. Then set the permissions for the added user.

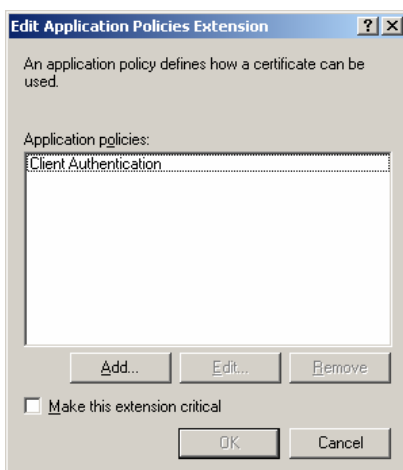


An 802.1x certificate does not need changes to the Extensions. Skip to step 16.  
To build a template for a Mutual Authentication client certificate, perform the following four steps:

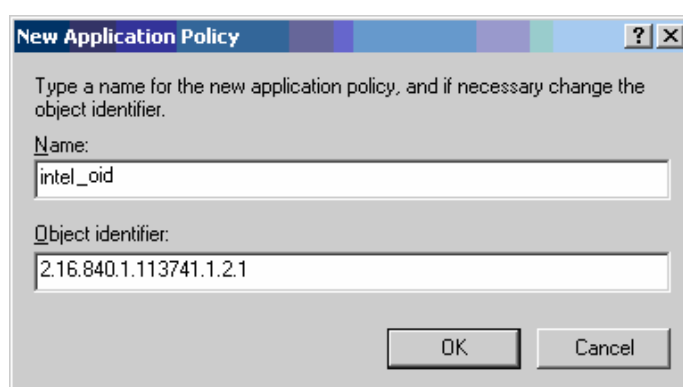
12. Select the Extensions tab.



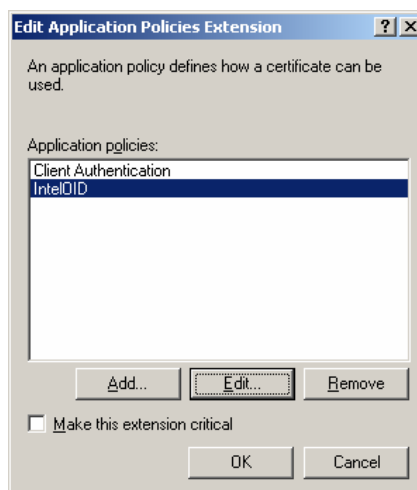
13. Select **Application Policies** and **Edit...**



14. Select Add.../New...



15. Enter the following name: **intel\_oid** (or something similar). Enter the second half of the OID (the first half is generated automatically as this is a client certificate):  
 2.16.840.1.113741.1.2.1  
 Select **OK/OK**.



16. Select **OK** to save the completed template.  
 Now that the template has been created, add it to the list of templates known to the CA.  
 17. Open the Certificate Authority by selecting **Start/Programs/Administrative Tools/Certificate Authority**.  
 18. Select **Certificate Templates** in the navigation tree and right-click. Select

**New/Certificate Template to Issue.**

19. The newly created template will appear in the **Enable Certificate Templates** window. Select the template and click **OK**. The new template will now appear in the list of templates.

## Internationalization of SCS Messages

The SCS was designed to support internationalization of the user interface. The service and the associated API display all status, warning, and error messages based on a single file. The application executables retrieve a message based on a message number and the current language on the platform where the application executes. If the message file supports the current language, then the file will return the message in the proper language. If the file does not support the current language, it will return the message in English. See the document *Internationalization of SCS Messages.doc* for the steps required to add an additional language to the message file.

## Retrieving a Certificate for Use by a Posture Validation Server

The Cisco NAC scheme uses a Posture Validation Server (PVS) to check each posture type for validity. A PVS can check the fields in the posture and the signature in the posture. The signature is a hash of fields in the posture encrypted using the private key of a PKI public-private key pair. The PVS validates the signature by calculating a hash over the same fields, decrypting the signature using the public key, and comparing the results.

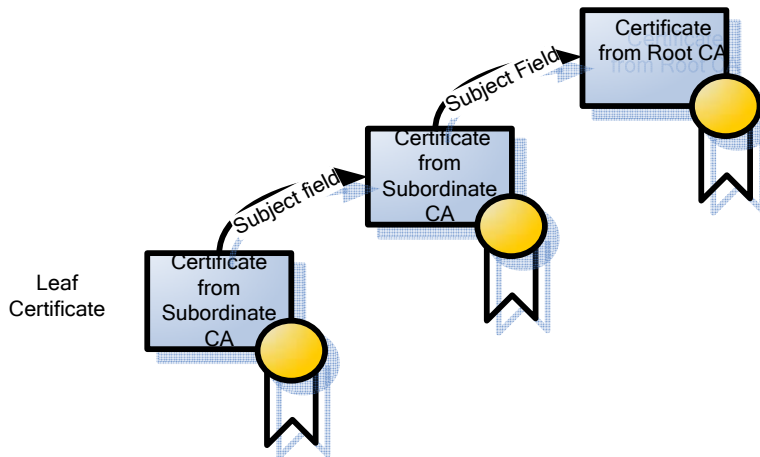
The key pair used by Intel AMT is in the certificate specified on the NAC tab of the profile used to set up the Intel AMT device. The PVS needs this certificate to perform signature validation. The SCS API includes a function to recover the certificate for a selected Intel AMT device.

The Intel AMT SDK includes a sample PVS that expects the certificates to be in DER format, with a name set to the serial number of the certificate. The following procedure retrieves a certificate from the SCS database, converts the certificate to DER format, and renames it with the certificate serial number. This is a manual procedure. IT organizations or ISVs supporting this functionality should provide scripts to accomplish the same thing on an enterprise scale.

1. Extract the certificate by executing the SCS API SOAP function GetAMTCertificate. The function accepts either the FQDN or the UUID to identify a unique Intel AMT device. See the SCS API document for details of the function.
2. Save the returned certificate as a .cer file. This file is in Base-64 format.
3. Double-click on the certificate file. Select the Details tab and **Copy to File...**
4. In the Certificate Export Wizard, Select DER encoded binary as the file format.
5. Name the file temporarily and complete the wizard. The resulting file is still a .cer file, but its contents will be in the DER format.
6. Double-click again on the certificate, select the Details tab, select the serial number and copy it.
7. Rename the newly exported certificate by pasting the serial number over the temporary name.
8. Remove the blanks in the name so that it is a continuous hexadecimal number.
9. Move the renamed certificate to the CERT folder in the directory containing the PVS sample executable.

## Configuring PEM Files for Redirection Applications

A certificate generated by a subordinate CA is linked to a sequence of certificates that eventually link to a certificate from the root certificate authority.



The Issuer Field of a certificate equals the Subject Field of the certificate of the issuing CA. In this way, each certificate points to the next certificate in the chain, until the path reaches a certificate created by the root CA.

When the Intel AMT Setup and Configuration Server enrolls a certificate (installs it in an Intel AMT device) it only sends the leaf certificate and does not include any subordinate certificates. When a client initiates a TLS session with an Intel AMT device, the device only sends the leaf certificate to the client application (an ISV Management console application). The client needs to know the full chain and must acquire the intermediate subordinate CA certificates. In a correctly configured Microsoft environment, the client dynamically retrieves the intermediate CA certificates based on the information in the issued leaf certificate. This can succeed if the IT administrator has set up the environment correctly by ensuring that the application has the necessary privileges to obtain the subordinate certificate information.

If a TLS stack other than the Microsoft stack is used (for example, if the application uses the Intel AMT redirection library that depends on OpenSSL), then the certificate chain must be provided explicitly.

The user must create a .PEM file that contains all of the certificates in the chain to the certificate from the root CA, not including the leaf certificate itself.

The way to do this is to convert each certificate in the chain to a .PEM file, then concatenate the PEM files.

When the subordinate CA was installed, certificates for all the CAs in the chain were also installed in the Trusted Certificate Store on the server where the subordinate CA was installed. Go to the web interface for the CA, (for example, open a web browser and navigate to <http://<CA hostname>/certsrv>) and download the certificates for each subordinate CA. Downloading in Base 64 format results in a .cer file that is in PEM format.

The file starts with the string  
-----BEGIN CERTIFICATE----- and ends with the string  
-----END CERTIFICATE-----.

Concatenate the files by combining the files using copy and paste in a text editor including the opening and ending strings. Rename the file as a PEM file.

The resultant file is used as an input to the redirection library function `IMR_SetCertificateInfo` (see the *Redirection Library Design Guide*).



# CRL XML Format

The Intel AMT SCS Console can import a Certificate Revocation List (CRL) into a Profile. The following file is an example of the XML format.

```
<?xml version="1.0" encoding="UTF-8"?>
<!--
This file maps the untrusted certificates serial number to the URI of the issuer.
The URI value represents the a valid CRL distribution point of a Certificate Authority.
-->
<crl>
  <uri name="http://crl.myenterprise.com/pki/mscorp/crl/mswww(2).crl">
    <cert serialnumber="15 27 82 20 00 00 00 00 01"/>
    <cert serialnumber="15-27-82-20-00-00-00-00-02"/>
    <cert serialnumber="15278220000000000003"/>
  </uri>
  <uri name="http://corpki/crl/mswww(2).crl">
    <cert serialnumber="15 27 82 20 00 00 00 00 04"/>
    <cert serialnumber="15 27 82 20 00 00 00 00 05"/>
  </uri>
</crl>
```

The *serialnumber* attribute must contain the following format:

1. Use exactly two hexadecimal characters for each byte (a byte with a single character will be ignored).
2. The serial number can be represented as a single hexadecimal number. If the bytes are separated from each other, use any **non-hexadecimal** character separator between each pair.

The file format is defined with following XSL style sheet:

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified">
  <xs:element name="cert">
    <xs:complexType>
      <xs:attribute name="serialnumber" type="xs:base64Binary" use="required"/>
    </xs:complexType>
  </xs:element>
  <xs:element name="crl">
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="uri" maxOccurs="unbounded"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="uri">
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="cert" maxOccurs="unbounded"/>
      </xs:sequence>
      <xs:attribute name="name" type="xs:string" use="required"/>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

# Troubleshooting

This section includes miscellaneous tables for troubleshooting and maintenance.

**Table 8: Troubleshooting**

Symptom	Solution
Received “Cannot contact CA” error in SCS Service log during provisioning and re-provisioning process.	On the SCS Console, select Profile > Certificate tab. Verify that the “CA Server Name” field has no leading spaces. Do this for each profile in the system.
I’m having an authentication problem when running the AMTConfig (Windows Service).	The installer inserts the password for the windows service correctly, but there is a local security policy that needs to be added. Once the security policy is added, the service can run. To overcome this problem, the user needs to open the service in the Service Manager and re-enter the password. Windows then automatically opens the security policy.
I’m trying to uninstall the “SOAP API” and I’m getting an error: “Failed to extract SOAP directory from the registry” or “Failed to extract SOAP virtual directory name from the registry”	The installer failed to locate the SOAP Directory/Virtual Directory in the registry. This failure will prevent the installer from disabling web extensions added earlier during installation and from deleting the Virtual Directory.
I’m trying to uninstall the “Database schema” and I’m getting an error: “Build Database script failed! Error code:X”	The installer successfully ran the build Database Schema script, but the script returned error code X.
I’m getting an error: “RegDBCcreateKeyEx failed.” Or “RegDBSetKeyValueEx failed.”	The installer failed to create or set registry values. Make sure you are logged-in as an Administrator user.
I can't install/remove the Database. “xxxxx”	This problem might occur during installation or removing of the Database Schema, The “Microsoft SQL Server Management Studio Express” does not present the Database in the list of Databases but the Database files exist. To resolve this problem delete the Database files (LDF and MDF extension) manually from: “Program Files\Microsoft SQL Server\MSSQL.1\MSSQL\Data” Restart and reinstall.
I've checked “Start AMT Config Service” at the end of the installation, but got an error that the service can't be started.	Open the Windows Management Console and select the Services tab. Locate the “AMTConfig” service. Open it. Go to “Log on” and re-type the password. Then, restart the service.

<b>Symptom</b>	<b>Solution</b>
<p>IIS application pool has a protection from rapid failures in a given time (default 5 failures in 5 minutes). If that condition occurs the application pool shuts down.</p>	<ol style="list-style-type: none"> <li>1. Restart the default application pool.</li> <li>2. If that does not help, restart the IIS.</li> </ol>
<p>The server seems to be stuck: The symptoms are 100% CPU usage for more than 10 minutes and the service does not respond to setup requests from Intel AMT devices.</p>	<ol style="list-style-type: none"> <li>1. On the Console Configuration Service Settings / General pane, decrease the number of threads.</li> <li>2. Restart the service.</li> </ol>
<p>I am having trouble connecting to the Intel AMT device either during or after setup and configuration.</p>	<p>If using PSK, make sure that the PID/PPS that has been entered to the Intel AMT device are available in the SCS database and the passwords match.</p> <p>If using remote configuration, make sure that the root certificate is loaded to the SCS using the loadcert tool.</p> <p>If using TLS mode, make sure that certificates are defined and set properly in the SCS profile.</p> <p>Make sure that there is no double DNS registration (the FQDN of the Intel AMT device and the host must be the same).</p>
<p>There is no row in the AMT table in the database with the UUID I am trying to configure.</p>	<p>Make sure that a record exists for the machine in the configuration parameters table.</p>
<p>I am unable to create an AD AMT object</p>	<p>Make sure that the SCS service user has sufficient permission add the AMT object to AD. This means it is a member of the domain admin group or you gave it permissions to add AMT objects to a specific OU in AD.</p>
<p>When I try to logon from remote SCS console I get the message “underlying connect failed”.</p>	<p>The SCS console communicates with the service API using TLS (https). Therefore, a server certificate must be imported to IIS. The error may be caused by not having the root certificate installed on the platform running the console. Also, make sure that server certificate is exported to IIS correctly.</p>
<p>I can't login to WebUI after the Intel AMT platform is configured when the 'Integrate with AD' mode is selected in the SCS.</p>	<p>To connect using webUI with the IE browser, the user needs to run Microsoft patches KB899900 and KB908209, which fix the authentication issue.</p>

## Windows Service Messages

The SCS service and the API issue error messages and information messages that are displayed on the console log. The messages actually displayed will be based on the filter selection on the Log page. The following table lists the possible messages, their cause, and a suggested action to remedy the situation, in the case of an error. The message text may contain values that help identify a device or event tied to the error. These values are indicated by % notation, possible followed by a numeric formatting notation (e.g. “!d!”).

**Table 9: Windows Service Messages**

Msg ID	Message Text	Message Type	Cause	Action
101	Queue is Full.	Error	The queue is full, cannot push more messages at this time	Increase the queue size.
102	Intel AMT device is already provisioned.	Error	Hello message arrived from a provisioned Intel AMT device. SCS rejects hello for provisioned Intel AMT devices.	Delete the Intel AMT device manually from the Database using console
103	Request is already in the queue.	Error	The request is already in the queue The queue does not allow duplications.	Wait until the first identical request is processed
105	Invalid request type.	Error	Invalid request type; request type could be either N(Normal) or S(Slow). Database was corrupted, request cannot be rescued.	Contact SCS support.
107	Invalid Intel AMT version.	Error	SCS not familiar with this Intel AMT version. New Intel AMT features will not be configured.	Upgrade to newer version of SCS.
110	Missing version argument.	Error	Database info about Intel AMT version is missing from entry.	Delete Intel AMT device from DB
111	Missing PID argument.	Error	Database info about Intel AMT device PID is missing.	Make sure the PID list in the Database is up to date. Import OEM supplied pre-provision data.
112	Missing IP argument.	Error	Database info about Intel AMT device IP is corrupt.	N/A
117	Intel AMT device is not provisioned.	Error	Try to unprovision Intel AMT device that already marked in database as unprovision.	N/A
119	Cannot connect to Intel AMT device.	Error	Network problem or Intel AMT device refuses to answer to SCS.	Make sure the Intel AMT device is connected to the network, registered in the DNS and no firewall blocks the unique Intel AMT ports 16992 and 16993.
123	Cannot contact CA server: %1 - Process delayed.	Error	Cannot connect to CA server to request a certificate	Make sure there is routing to the CA server and that it is operational

Msg ID	Message Text	Message Type	Cause	Action
126	Certificate cannot be issued - %1 - Process interrupted.	Error	Cannot retrieve certificate from the CA server	Check the CA server log for more information
130	Create AD AMT object: Cannot locate AD AMT Schema: %1 - Process delayed.	Error	Cannot bind to AD schema	Make sure the schema is extended to contain the Intel management object
131	Cannot create AD AMT Object: %1 - Process delayed.	Error	Failed to create AD AMT object	Make sure the schema is extended to contain the Intel management object
132	Cannot open AD AMT Object: Failed on %1 with call to %2 input = %3, return value = %4!d!. - Process delayed.	Error	Cannot open AD AMT object	Make sure the AD OU is correct
133	Failed to update AD Object %1 (%2!d!).	Error	Cannot update AD AMT object	Make sure the object exists; if not, try to re-provision the Intel AMT device to recreate it.
138	Invalid PID.	Error	Bad PID format	N/A
139	Active Directory integration is disabled on server.	Error	Tried to perform operation that requires AD integration, such as configuring 802.1X, and AD integration is disabled	Enable AD integration
143	Missing mandatory parameter: %1.	Error	Missing the specified mandatory parameter in a SOAP call.	Provide the specified mandatory parameter.
144	Parameter %1 is out of range. Allowed range is (%2).	Error	Specified SOAP parameter is out of range.	Provide valid parameter.
145	Invalid length for parameter %1. Allowed length is (min=%2!d!, max=%3!d!).	Error	Specified SOAP parameter has an invalid length.	Provide valid parameter.
146	Invalid length for parameter %1. Allowed length is (max=%2!d!).	Error	Specified SOAP parameter has an invalid length.	Provide valid parameter.
147	Invalid length for parameter %1. Allowed length is (min=%2!d!).	Error	Specified SOAP parameter has an invalid length.	Provide valid parameter.
148	Parameter %1 must be one of these values (%2).	Error	Specified SOAP parameter is out of range of available values.	Provide valid parameter.
170	Failed on ADsGetObject with %1 (%2!d!).	Error	Failed to get AD AMT object	Make sure the schema is extended to contain the Intel management object
171	Failed on CreatedSObject with %1 (%2!d!).	Error	Failed to create AD AMT object	Make sure the schema is extended to contain the Intel management object
172	Failed to create SPN's on %1.	Error	Failed to create AD SPN's	N/A

Msg ID	Message Text	Message Type	Cause	Action
177	OS error code: 0x%1!X!.	Error	General error for failed retrieving of certificate	N/A
178	Invalid maintenance wakeup time value: %1!d!.	Error	Invalid maintenance wakeup time value	Provide valid value for maintenance settings.
179	Invalid delayer polling value: %1!d!.	Error	Invalid delayer polling value	Provide valid value
180	Invalid number of normal workers: %1!d!.	Error	Invalid number of normal workers	Provide valid value
181	Invalid queue polling value: %1!d!.	Error	Invalid queue polling value	Provide valid value
182	Invalid number of slow workers: %1!d!.	Error	Invalid number of slow workers	Provide valid value
183	Invalid delayer polling value: 1!%d!.	Error	Invalid delayer polling value	Provide valid value
185	Cannot connect Intel AMT device to %1.	Error	Network problem or Intel AMT device does not answer to SCS.	ping Intel AMT device to check network alive.
186	Missing PID/PPS Map for Intel AMT device UUID %1, PID %2.	Error	Database is not contain PID-PPS record for this Intel AMT device	Make sure Intel AMT device has PID-PPS and the record is entered the database.
201	No log code.	Error	General placeholder for errors with no specific error code	N/A
301	User is not authorized %1.	Error	User is not authorized	Use authorized user
302	Role not found.	Error	Role not found	Add the role
303	User is duplicated.	Error	User already exists	N/A
305	User is not found.	Error	User is not found	N/A
306	Role already exists.	Error	Role already exists	N/A
313	Cannot remove Intel AMT device. It has some operations in queue.	Error	Cannot remove Intel AMT device. It has some operations in queue.	Wait until the operations in the queue are done, then try to delete the Intel AMT device again
314	A dependent operation not found in the requests table.	Error	A dependency cannot be found in the requests table.	N/A
315	A dependent operation terminated abnormally.	Error	A dependency terminated abnormally.	N/A
316	Request cannot be continued in a different server instance.	Error	Request cannot be continued in a different server instance.	N/A
401	Intel AMT device is missing.	Error	Cannot found Intel AMT device in the Database	N/A
402	Profile is missing.	Error	Profile is missing.	Provide another profile.

Msg ID	Message Text	Message Type	Cause	Action
406	Cannot execute properties script.	Error	Cannot execute properties script	Make sure the script exists in the path defined
407	Properties script failed.	Error	Failed to execute the properties script	Check the script can be executed properly, use test script
408	Cannot get properties script exit code.	Error	Cannot get properties script exit code	Check the script can be executed properly, use test script
410	Cannot read properties script output.	Error	Cannot read properties script output	Check the script can be executed properly, use test script
411	UUID properties mapping is missing.	Error	UUID properties mapping is missing	Enter the UUID mapping in the configuration parameters
412	Missing FQDN attribute.	Error	Missing FQDN attribute	Make sure the properties script returns the FQDN
413	Missing ADDN attribute.	Error	Missing AD OU attribute	Make sure the properties script returns the AD OU
414	Missing profile attribute.	Error	Missing profile attribute	Make sure the properties script returns the profile
415	Invalid FQDN.	Error	Invalid FQDN	Provide valid FQDN
416	Certificate is missing.	Error	Certificate is missing.	Provide another certificate.
418	Power policy unsupported.	Error	Power policy unsupported	Provide supported power policy
419	Invalid access permission.	Error	Invalid access permission	Provide valid access permission
420	UUID mapping already exists.	Error	UUID mapping already exists	No need to add UUID map for that AMT
422	CRL is missing.	Error	CRL is missing	N/A
427	ACL not found.	Error	ACL not found	N/A
432	TLS is not found.	Error	TLS is not found	N/A
433	Realm not found.	Error	Realm not found	N/A
435	Configuration not found.	Error	Configuration not found	N/A
436	Log not found.	Error	Log not found	N/A
437	TLS PSK pair not found.	Error	TLS PSK pair not found	N/A
438	Storage ACL not found.	Error	Storage ACL not found	N/A
439	Storage FPAACL not found.	Error	Storage FPAACL not found	N/A
441	Cannot delete default profile.	Error	Cannot delete default profile.	N/A
442	Duplicate PID.	Error	Duplicate PID.	Provide another PID.
443	The Certificate already exists.	Error	The Certificate already exists.	Provide different certificate.
444	The MEBx password is missing.	Error	The MEBx password is missing.	Provide MEBx password.

Msg ID	Message Text	Message Type	Cause	Action
445	Cannot create kerberos credentials for domain %1, ADDN %2, host %3.	Error	Cannot create kerberos credentials	N/A
447	Missing PID/PPS entry for Intel AMT device.	Error	Missing PID/PPS entry for Intel AMT device	Make sure PID/PPS entry exists in the DB for Intel AMT device
448	Cannot set power options.	Error	Cannot set power options	N/A
449	Invalid UUID.	Error	Invalid UUID.	Provide valid UUID.
450	Maintenance not found.	Error	Maintenance not found	N/A
452	Improper version used.	Error	Improper version	Check components version, either the service or Database have older version, upgrade the appropriate component
454	Missing wireless profile.	Error	Missing wireless profile.	Provide different wireless profile.
455	Missing wireless profile mapping.	Error	Missing wireless profile mapping	N/A
456	Missing 802.1x profile.	Error	Missing 802.1x profile.	Provide different 802.1x profile.
457	Missing version specific information table.	Error	Version specific information is missing for Intel AMT device	Make sure the Database contains the version specific information for the Intel AMT version you are trying to use
458	Cannot execute properties script, file not found: %1.	Error	Cannot execute properties script, file not found	Make sure the file can be found
459	Cannot execute properties script, execution failed: %1!d!.	Error	Execution of properties script failed	Check the return code
501	Request ID not found.	Error	The given request id does not exist	N/A
601	SOAP cannot be created.	Error	SOAP cannot be created	N/A
701	Crypto failure (%1!d!).	Error	Crypto failure	N/A
702	Certificate failure.	Error	Out of memory when trying to allocate keyBlob, Insufficient memory	Try to restart the server machine
752	Exception when trying to push request - 0x%1!X! : %2.	Error	Exception when trying to push request	N/A
753	Unexpected exception when trying to push request.	Error	Unexpected exception when trying to push request	N/A
754	Exception when trying to delay request - 0x%1!X! : %2.	Error	Exception when trying to delay request	N/A
755	Unexpected exception when trying to delay request.	Error	Unexpected exception when trying to delay request	N/A



Msg ID	Message Text	Message Type	Cause	Action
756	Exception when trying to update IP - 0x%1!X! : %2.	Error	Exception when trying to update IP	N/A
757	Unexpected exception when trying to update IP.	Error	Unexpected exception when trying to update IP	N/A
758	Exception when processing pollProcess - 0x%1!X! : %2.	Error	Exception when processing pollProcess	N/A
759	Unexpected exception when processing pollProcess.	Error	Unexpected exception when processing pollProcess	N/A
760	Error: could not receive all data from soliciting device.	Error	could not receive all data from soliciting device	N/A
761	Invalid Intel AMT version %1.	Error	Invalid Intel AMT version	N/A
763	The server cannot process devices with Intel AMT version %1!d!.	Error	Unknown Intel AMT version in Hello message	N/A
767	Error: could not find Winsock DLL.	Error	could not find Winsock DLL	N/A
768	Error: could not find Winsock DLL version 2.2.	Error	could not find Winsock DLL version 2.2	N/A
769	Error: socket listen error (%1!d!).	Error	socket listen error	Make sure the port is not occupied by another software
771	Warning: Connection has type %1!d! (!= AF_INET).	Warning	Connection has unknown type	N/A
773	Unexpected exception when processing SCS Manager.	Error	Unexpected exception when processing SCS Manager	N/A
774	Exception in add storage EACL worker: (0x%1!X!) %2.	Error	Exception in add storage EACL worker	N/A
775	Exception when processing Maintenance worker - 0x%1!X! : %2	Error	Exception when processing Maintenance worker	See the specific error code
776	Exception in set mutual authentication: (0x%1!X!) %2	Error	Exception in set mutual authentication	See the specific error code
778	This profile is not defined to work with TLS.	Error	This profile is not defined to work with TLS	N/A
783	Exception while reprovisioning Intel AMT device: (0x%1!X!) UUID: %2.	Error	Exception while reprovisioning Intel AMT device	See the specific error code
784	Exception in add storage FPACL worker: (0x%1!X!) %2.	Error	Exception in add storage FPACL worker	See the specific error code

Msg ID	Message Text	Message Type	Cause	Action
785	Exception in clean Intel AMT operations worker: (0x%1!X!) %2.	Error	Exception in clean Intel AMT operations worker	See the specific error code
786	Exception in clean log worker: (0x%1!X!) %2.	Error	Exception in clean log worker	See the specific error code
787	Exception in clean request status worker: (0x%1!X!) %2.	Error	Exception in clean request status worker	See the specific error code
789	Exception in clock sync worker: (0x%1!X!) %2.	Error	Exception in clock sync worker	See the specific error code
794	Create AD AMT object: Unexpected exception when creating AD AMT Object: (%1!d!) %2 - Process interrupted.	Error	Unexpected exception when creating AD AMT Object	See the specific error code
798	Exception when trying to pop a request from the delayed requests list - 0x%1!X! : %2.	Error	Exception when trying to pop a request from the delayed requests list	See the specific error code
800	Unexpected error while handling generic exception.	Error	Unexpected error while handling generic exception	N/A
851	Exception in power policies: (0x%1!X!) %2.	Error	Exception in power policies	See the specific error code
861	Cannot set ACL: %1.	Warning	Cannot set ACL	See the specific error code
867	Processing of provisioning worker aborted: Exit code:(0x%1!X!), %2.	Error	Processing of provisioning worker aborted	See the specific error code
868	Intel AMT device requires a different cipher (%1!d!).	Error	Intel AMT device requires a different cipher	See the specific error code
869	Exception while provisioning Intel AMT device: (0x%1!X!) UUID: %2.	Error	Exception while provisioning Intel AMT device	See the specific error code
870	Cannot handle provisioning exception: (0x%1!X!) %2.	Error	Cannot handle provisioning exception	See the specific error code
871	Finishing re-issue digital certificate for Intel AMT device UUID: %1.	Info	Finishing re-issue digital certificate for Intel AMT device with specified UUID.	See the specific error code
872	Set certificates and key in Intel AMT device UUID: %1.	Info	Set certificates and key in Intel AMT device with specified UUID.	See the specific error code
874	Processing of re-issue digital certificate final worker aborted: %1.	Error	Processing of re-issue digital certificate final worker aborted	See the specific error code

Msg ID	Message Text	Message Type	Cause	Action
875	Exception when processing Maintenance worker - 0x%1!X! : %2.	Error	Exception when processing Maintenance worker	See the specific error code
878	Unexpected error when requesting certificate.	Error	Unexpected error when requesting certificate	N/A
879	Exception in set ACL worker: (0x%1!X!) %2.	Error	Exception in set ACL worker	See the specific error code
882	Exception in set admin password worker: (0x%1!X!) %2.	Error	Exception in set admin password worker	See the specific error code
883	Exception in set CRL worker: (0x%1!X!) %2.	Error	Exception in set CRL worker	See the specific error code
884	Cannot delay task: (0x%1!X!) %2.	Error	Cannot delay task	See the specific error code
886	Exception in unprovision worker: (0x%1!X!) %2.	Error	Exception in unprovision worker	See the specific error code
889	Exception in update Kerberos Password: (0x%1!X!) %2.	Error	Exception in update Kerberos Password	See the specific error code
891	Exception in set rng key worker: (0x%1!X!) %2.	Error	Exception in set rng key worker	See the specific error code
892	Unexpected exception while processing Command ID: %1!d!.	Error	Unexpected exception while processing Command ID	See the specific command ID for more information
893	User %1 does not have the privileges required to execute the SCS Server. Startup aborted.	Error	User does not have the privileges required to execute the SCS Server. Startup aborted.	Start the service with sufficient privileges
894	Cannot register the SCS Server %1 in the database. Startup aborted.	Error	Cannot register the SCS Server in the database. Startup aborted.	Check the development log for more information
895	The connection with the server database has been lost.	Error	The connection with the server database has been lost.	Try to renew the connection.
896	Cannot initialize program. Startup aborted.	Error	Cannot initialize the service. Startup aborted.	Check the development log for more information
898	Exception when processing Poller checker - 0x%1!X! : %2.	Error	Exception when processing Poller checker	See the specific error code
899	SCSThread ColnitializeEx failed: %1!d!.	Error	Failed to initialize COM	N/A
900	SCSThread CreateEvent failed.	Error	Failed to initialize window event	N/A
901	Unexpected exception.	Error	Unexpected exception	N/A

Msg ID	Message Text	Message Type	Cause	Action
904	Invalid parameter.	Error	Invalid parameter	Provide valid parameter
907	Request execution failed.	Error	Stored procedure execution failed	N/A
908	Method not supported.	Error	Method not supported.	N/A
909	Invalid profile id.	Error	The supplied profile id is invalid.	Provide valid id.
910	User cannot configure its own account.	Error	User cannot configure its own account.	N/A
911	Too many trusted root certificates in one profile.	Error	Too many trusted root certificates in one profile.	Remove one or more certificates from profile.
912	Request error.	Error	Request error.	Proceed accordingly to the request.
913	Object not found.	Error	Stored procedure did not return expected values	N/A
914	The FQDN is already mapped.	Error	The FQDN is already mapped.	Provide different FQDN.
915	INTERNAL ERROR. Duplicated requests found in the delayer.	Error	INTERNAL ERROR. Duplicated request in the delayer.	N/A
950	The %1 has a non-strong %2 password. It must meet strong password requirements.	Error	The nn has a non-strong nn password.	Provide strong password.
951	The PID '%1' %2 checksum failed.	Error	The PID checksum failed	N/A
952	%1 list length should be between %2!! and %3!!.	Error	The supplied list length is out of range.	Provide list length as indicated.
953	The %1 '%2' %3 has invalid format. The expected format is '%4'.	Error	The parameter has invalid format.	Provide format as indicated.
957	The enumeration %1 is out of range.	Error	The enumeration is out of range.	N/A
958	The required parameter '%1' is missing.	Error	The required parameter is missing.	Provide the required parameter.
959	The parameter '%1' should be between %2!! and %3!!.	Error	The parameter is not in specified range.	The parameter should be in specified range.
960	The '%1' url format is invalid. The expected format is: http://x/x.crl.	Error	The url format is invalid. The expected format is: http://x/x.crl.	Provide valid URL
963	FQDN '%1'.	Error	Validate that the FQDN does not exist, if it DOES NOT: an exception will be thrown	N/A
964	One or more required parameters are missing.	Error	One or more required parameters are missing.	Provide requested parameters.
965	Intel AMT device name - %1, UUID - %2 is not authorized for provisioning.	Info	Intel AMT device is not authorized for provisioning	Authorize the Intel AMT device
983	Failed to set wireless profile - %1.	Error	Failed to set wireless profile	See the specific error code

Msg ID	Message Text	Message Type	Cause	Action
984	%1 with the same name already exists - %2.	Error	The parameter with the same name already exists.	Provide alternative name.
985	Invalid certificate handle was specified.	Error	Invalid certificate handle was specified	N/A
986	Wireless profile not allowed to use 802.1x when Active Directory integration is disabled.	Error	Wireless profile not allowed to use 802.1x when Active Directory integration is disabled.	Enable Active Directory.
987	Update 802.1x profile with Kerberos password failed, (0x%1!X!), %2.	Error	Update 802.1x profile with Kerberos password failed	See the specific error code
989	Wireless profile name is too long - %1, maximum length is - %2!d!.	Error	Specified Wireless profile name is too long.	Provide name's valid length.
990	Wireless profile %1 priority %2!d! already in use for other profile.	Warning	Wireless profile with specified priority already in use for other profile.	Provide different priority.
991	Wireless profile priority %1!d! has exceeded the maximum allowed, maximum priority is - %2!d!.	Warning	Wireless profile priority has exceeded the maximum allowed.	Specify priority up to maximum allowed.
992	Invalid pass phrase was specified, pass phrase must be between 8 and 63 printable ASCII characters.	Error	Invalid pass phrase was specified, pass phrase must be between 8 and 63 printable ASCII characters.	Invalid pass phrase was specified, pass phrase must be between 8 and 63 printable ASCII characters.
996	Remove wireless profile %1 failed with error %2!d!.	Warning	Remove wireless profile failed with the specified error.	Proceed accordingly to the error.
997	%1 must not contain (^<>:;* ?) characters.	Error	The specified field contains (^<>:;* ?) characters.	Remove these characters (^<>:;* ?) from the field.
998	The selected profile is in use and cannot be deleted.	Error	The selected profile is in use and cannot be deleted.	Remove the profile from "Profiles", "Wireless profiles" etc. to allow its deletion.
999	Attempt to enumerate wireless profiles for an Intel AMT device failed. Details: %1.	Error	Attempt to enumerate wireless profiles for an Intel AMT device failed	See details specific error
1001	Set wireless profile %1 failed. Details: %2.	Error	Set wireless profile failed	See details specific error
1002	Invalid credentials were specified for an Intel AMT device.	Error	Invalid credentials were specified for an Intel AMT device	Supply valid credentials
1003	%1 must not be empty.	Error	The parameter is empty.	Provide the parameter.
1005	The path must start with drive letter preceded with '\\.	Error	The path was supplied incorrectly.	The path must start with drive letter preceded with '\\.

Msg ID	Message Text	Message Type	Cause	Action
1006	The selected certificate is in use and cannot be deleted.	Error	The selected certificate is in use and cannot be deleted.	Remove the certificate from "Profiles", "Wireless profiles" etc. to allow its deletion.
1008	Set 802.1x wired profile %1 failed with %2.	Error	Set 802.1x wired profile failed	See specific error code
1012	Remove existing 802.1x wired profile failed (%1!d!).	Error	Remove existing 802.1x wired profile failed	See specific error code
1013	This function is deprecated. See product documentation for newer function.	Warning	This function is deprecated. See product documentation for newer function.	N/A
1014	Invalid LAN interface handle.	Error	Invalid LAN interface handle	N/A
1015	Could not construct 802.1x profile.	Error	Could not construct 802.1x profile	N/A
1016	Same record already exists.	Error	The record you have selected already exists in the list.	Select another record.
1017	Please provide at least one Trusted Certificate for Mutual Authentication.	Error	No Trusted Certificate provided for Mutual Authentication.	Provide at least one Trusted Certificate for Mutual Authentication.
1018	Invalid 802.1x protocol type. EAP-GTC is not supported for wireless usage.	Error	Invalid 802.1x protocol type. EAP-GTC is not supported for wireless usage.	Provide 802.1x profile that does not use EAP-GTC protocol.
1019	One or more of the priorities of the specified profiles are incorrect or duplicated. Priority values should be sequential.	Error	One or more of the priorities of the specified profiles are incorrect or duplicated. Priority values should be sequential.	Priority values should be sequential.
1020	Cannot modify the AMT password.	Error	Error when tried to change Intel AMT device admin password.	Check connection and password validity format.
1021	Cannot modify the AMT password - using old password.	Info	Cannot modify the Intel AMT device password - using old password	N/A
1022	Cannot use AMT old password - unknown current password.	Error	Error when tried to use Intel AMT old admin password.	Check connection.
1200	Hash list does not contain Root Certificate hash. PKI Provisioning failed.	Error	None of the hashes sent by the Intel AMT device in Remote Configuration process matches the root certificate held by SCS.	Verify the Intel AMT device contains the correct hash
1201	Invalid Intel AMT OTP.	Error	The OTP ( one time password ) installed in the Intel AMT device does not match the expected OTP as exist in database	use ( console ? \ soap ? ) to modify the OTP in database.

Msg ID	Message Text	Message Type	Cause	Action
1202	Remote Configuration provisioning is not supported by SCS.	Error	Intel AMT device sends PKI-based hello message but provisioning based on this type of hello is not allowed	use ( console ? \ soap ? ) to support pki based provision .
1203	OTP is required but not Assigned.	Error	No OTP record was found in the database for Intel AMT device	Enter the OTP in the Database for the Intel AMT device
1204	Missing registry key for PKI provisioning, make sure at least one certificate is selected for PKI provisioning.	Error	Missing registry key for PKI provisioning	Make sure at least one certificate is selected for PKI provisioning
1300	Failed to extend provisioning period - %1.	Error	Failed to extend provisioning period	If Intel AMT device is already provisioned, there will no other attempt to extend the period. If device is not provisioned - check connectivity to the device.
1500	Cannot contact provisioned Intel AMT device at FQDN - %1.	Error	Cannot contact provisioned Intel AMT device	Check connectivity to Intel AMT device
1501	Cannot extract provisioned Intel AMT device state.	Error	Cannot extract provisioned Intel AMT device state	N/A
1502	Intel AMT device reports un-provisioned state although it was successfully provisioned.	Warning	Intel AMT device reports un-provisioned state although it was successfully provisioned	N/A
1612	Cannot add certificate (%1!d!) to certificate store map, number of certificates (%2!d!) exceeded the maximum (%3!d!).	Info	Cannot add certificate to certificate store map, number of certificates exceeded the maximum.	Remove one or more certificates from the certificate store map.
1613	Cannot connect to unknown Intel AMT version.	Error	Cannot connect to unknown Intel AMT version	N/A
1614	Cannot connect to provisioned PKI-based Intel AMT device.	Error	Cannot connect to PKI-based Intel AMT device	N/A
1615	Invalid 802.1x profile type.	Error	Invalid 802.1x profile type	Provide valid type or check profile integrity
1616	Trusted root certificate handle is missing.	Error	Trusted root certificate handle is missing	N/A
1617	Client certificate handle is missing.	Error	Client certificate handle is missing	N/A
1618	Failed to convert existing certificate base object type.	Error	Failed to convert existing certificate base object type	N/A

Msg ID	Message Text	Message Type	Cause	Action
1619	Unable to update certificate.	Error	Unable to update certificate in Intel AMT device	N/A
1621	Failed to convert certificate object type.	Error	Failed to convert certificate object type	N/A
1622	Unexpected Intel AMT device status.	Error	Unexpected Intel AMT device status	N/A
1623	Failed to run script: %1.	Error	Failed to get script failure attribute	Provide the attribute in the script
1624	Missing UUID of Intel AMT device in create AD AMT object.	Error	Missing UUID of Intel AMT device in create AD AMT object	N/A
1625	Missing UUID.	Error	Missing UUID.	Supply UUID.
1626	Memory allocation error.	Error	Memory allocation error	N/A
1627	The required Intel AMT device is in 'unprovisioning' state.	Error	The required Intel AMT device is in 'unprovisioning' state	N/A
1628	Failed to retrieve TLS client certificate.	Error	Failed to retrieve TLS client certificate	N/A
1629	Missing expiry date for certificates.	Error	The supplied certificate has no expiration date.	Provide valid certificate with defined expiration date.
1630	Cannot connect to Intel AMT device with the previous password. The Intel AMT device is inaccessible.	Error	Cannot connect to Intel AMT device with the previous password. The Intel AMT device is inaccessible	Use MEBx to reprovision the Intel AMT device(unprovision and send Hello message again)
1640	Failed to retrieve NAC certificate.	Error	Failed to retrieve NAC certificate	N/A
1641	The Intel AMT device with UUID %1 is not registered as provisioned.	Error	The Intel AMT device is not registered as provisioned	N/A
1642	Unknown Certificate status.	Error	Unknown Certificate status	N/A
1643	Failed to extract domain from AD OU: (%1) on update Kerberos Password.	Error	Failed to extract domain from AD OU on update Kerberos Password	N/A
1644	Invalid PID %1.	Error	Invalid PID	Provide valid PID
1645	Invalid PPS %1.	Error	Invalid PPS	Provide valid PPS
1700	Failed in database command creation %1.	Error	Failed in database command creation	N/A
1701	Cannot add parameter for column %1.	Error	Cannot add parameter for column	N/A
1702	Cannot get column at index %1!d!.	Error	Cannot get column	N/A
1703	Time has invalid format, expected format is: yyyy-MM-dd hh:mm:ss.	Error	Time has invalid format.	Provide date in following format :yyyy-MM-dd hh:mm:ss.
1705	Cannot contact unprovisioned Intel AMT device without PID/PPS.	Error	Cannot contact unprovisioned Intel AMT device without PID/PPS	Make sure there are valid PID/PPS



Msg ID	Message Text	Message Type	Cause	Action
1706	Cannot obtain connection to Intel AMT device on %1.	Error	Cannot obtain connection to Intel AMT device	N/A
1707	Invalid access permission type.	Error	Invalid access permission type	N/A
1708	SOAP Failure (%1!d!): %2	Error	SOAP Failure.	Proceed accordingly to the error.
1715	Intel AMT device is provisioned, unable to extend configuration time.	Error	Intel AMT device is provisioned, unable to extend configuration time	N/A
1716	This Hello message version does not support extending configuration time.	Info	This Hello message version does not support extending configuration time	N/A
1753	The specified Active Directory Organizational Unit %1 not found.	Error	The specified Active Directory Organizational Unit not found.	Provide existing Active Directory Organizational Unit;
1754	No Intel AMT device exists in the database with UUID: %1.	Error	No Intel AMT device exists in the database with specified UUID.	Provide existing UUID.
1755	Cursor place: %1!d! is out of range (%2!d!-%3!d!).	Error	Specified cursor place is out of range.	Provide valid cursor place.
1758	Set number of Security Keys error %1!d!: Value out of range for no_tls_psk_pairs. Value must be between %2!d! and %3!d!	Error	Set number of Security Keys error. Value out of range for no_tls_psk_pairs.	Value must be in specified range.
1765	Set Certificate Authority %1: Invalid value. CA not registered in the Active Directory as an Enrollment Service.	Error	Set Certificate Authority. Invalid value. CA not registered in the Active Directory as an Enrollment Service.	Register CA in the Active Directory as an Enrollment Service.
1766	Set Certificate Authority Host %1: Invalid value. The CA is not on the given host.	Error	Set Certificate Authority Host. Invalid value. The CA is not on the given host.	Provide host with specified CA.
1767	Set Certificate Template error %1: Invalid value. Value must be WebServer for StandAlone CA	Error	Set Certificate Template error. Invalid value.	Value must be WebServer for StandAlone CA.
1768	Set Certificate Template error %1: Invalid value. Invalid certificate name.	Error	Set Certificate Template error. Invalid value.	Provide valid certificate name.
1771	Set queue polling period error %1: Value out of range. Value must be between 1 and 60000	Error	Set queue polling period error. Value out of range.	Value must be between 1 and 60000.
1773	Set listen port error %1: Value out of range for hello_listen_port. Value must be between 1025 and 65535	Error	Set listen port error. Value out of range for hello_listen_port.	Provide value between 1025 and 65535.

Msg ID	Message Text	Message Type	Cause	Action
1778	Set VlanTag error %1: Value out of range. Value must be between %2!d! and %3!d!.	Error	Specified VlanTag is out of range.	Provide valid VlanTag.
1783	OTP can be required only if self-signed certificate is enabled.	Error	OTP can be required only if self-signed certificate is enabled.	Enable self-signed certificate.
1786	New AMT properties cursor size: %1!d! is out of range (%2!d!-%3!d!)	Error	Specified new AMT properties cursor size is out of range.	Provide valid cursor size.
1787	Invalid length of parameter %1. Length must be between %2!d! and %3!d!.	Error	Specified length of parameter is out of range.	Provide parameter's valid length.
1788	New AMT properties order by is invalid	Error	Order by the specified parameter is invalid.	Provide valid parameter.
1789	Action status cursor size: %1!d! is out of range (%2!d!-%3!d!)	Error	Specified "Action status cursor" size is out of range.	Provide valid size.
1790	Action requests status is out of range	Error	Specified "Action requests" status is out of range.	Provide valid status.
1791	Action status order by is invalid	Error	Order by the specified parameter is invalid.	Provide valid parameter.
1792	Action sub requests status is out of range	Error	Specified "Action sub requests" status is out of range.	Provide valid status.
1793	Log cursor size: %1!d! is out of range (%2!d!-%3!d!)	Error	Specified "Log cursor" size is out of range.	Provide valid size.
1794	Log order by is invalid	Error	Order by the specified parameter is invalid.	Provide valid parameter.
1795	Invalid combination of Access Permission and Realms	Error	Invalid combination of Access Permission and Realms	Provide valid combination
1796	The specified FQDN: %1 contains invalid characters or bad format. See product documentation for valid name	Error	The specified FQDN contains invalid characters or bad format.	Supply valid FQDN accordingly to product documentation.
1797	Cannot set user, got error %1!d!: %2	Error	Cannot set user, the specified error occurred.	Act accordingly to the error.
1801	AMT cursor size: %1!d! is out of range (%2!d!-%3!d!).	Error	Specified cursor size is out of range.	Provide valid cursor size.
1802	AMT cursor status is out of range.	Error	Specified "AMT cursor" size is out of range.	Provide valid size.

Msg ID	Message Text	Message Type	Cause	Action
1803	AMT order by filter is invalid.	Error	AMT order by filter is invalid	N/A
1804	General Exception.	Error	General Exception	N/A
1805	Cannot fetch response from %1.	Error	Failed to set request status	N/A
1807	Unexpected failure.	Error	Unexpected failure	N/A
1854	Trusted Root Certificate already exists with newer or similar expiration date.	Error	Trusted Root Certificate already exists with newer or similar expiration date.	Select another certificate with newer expiration date.
1856	There is no TLS server certificate defined for profile %1!d!.	Info	There is no TLS server certificate defined for profile nn.	Provide TLS server certificate defined for profile nn.
1857	Failed to generate unique profile name.	Info	Failed to generate unique profile name	Try to create another profile
1859	Client certificate is missing.	Info	Client certificate is missing.	Provide client certificate.
1860	Server certificate is missing.	Info	Server certificate is missing.	Provide server certificate.
1862	The configuration profile ID=%1!d! is configured with wired 802.1x profile containing a protocol which is not supported by NAC. Please select a wired 802.1x profile with EAP-FAST-MSCHAPV2 or EAP-FAST-GTC protocol.	Info	The configuration profile ID is configured with wired 802.1x profile containing a protocol which is not supported by NAC.	Select a wired 802.1x profile with EAP-FAST-MSCHAPV2 or EAP-FAST-GTC protocol.
1863	User %1 does not have sufficient privileges to perform the operation.	Error	The user does not have sufficient privileges to perform the operation.	N/A
1864	The specified FQDN and UUID already included at different mapping, please revise your mapping.	Error	The specified FQDN and UUID already included at different mapping.	Please revise your mapping.
1865	%1 attempted to assume another platforms identity.	Error	FQDN attempted to assume another platforms identity	N/A
1866	Failed to search for user's group membership. Application will check authorization of user account itself.	Error	Lost connection to DB.	Check connection to DB.
1901	Failed to allow dial-in on Intel AMT device Active Directory object. Host: %1, error: %2!d!.	Error	Failed to allow dial-in on Intel AMT device Active Directory object	N/A
1958	Environment detection suffix is missing.	Error	Environment detection suffix is missing	N/A
1963	Too many environment detection suffixes in one profile.	Error	Too many environment detection suffixes in one profile.	Remove one or more environment detection suffixes from profile.

Msg ID	Message Text	Message Type	Cause	Action
1965	Invalid environment detection suffix.	Error	Invalid environment detection suffix.	N/A.
1970	The maximum number of profiles has been reached.	Error	The maximum number of profiles has been reached.	N/A.
1971	The specified profile is associated with at least one Intel® AMT System and cannot be deleted.	Warning	Trying to delete configuration profile which is used by at least one Intel AMT device.	De-associate all Intel AMT devices from this profile and try to delete it again.
1972	You must disable NAC before you can complete this operation.	Error	NAC is currently enabled in this profile. You must use EAP-FAST protocol in either / both wired 802.1x profile or at least one of the wireless profiles.	Please disable NAC prior to the operation.
1973	Client certificates count in profile id=%1!d! has exceeded the maximum allowed %2!d!.	Error	Client certificates count in profile has exceeded the maximum allowed.	Remove unused client certificates or share same certificate for different uses.
1974	Mutual authentication is enabled; hence you must have at least one trusted root certificate in the profile. Please disable mutual authentication for be able to remove trusted root certificate.	Error	Mutual authentication is enabled, hence you must have at least one trusted root certificate in the profile. Please disable mutual authentication for be able to remove trusted root certificate.	Disable mutual authentication.
1975	A Wired 8021X profile must be set in order to enable 8021X PXE boot.	Error	A Wired 8021X profile must be set in order to enable 8021X PXE boot.	A Wired 8021X profile must be set in order to enable 8021X PXE boot.
1976	A Wired 8021X profile must be set in order to enable 8021X in S0.	Error	A Wired 8021X profile must be set in order to enable 8021X in S0.	A Wired 8021X profile must be set in order to enable 8021X in S0.
1977	Environment detection must be enabled in order to enable wireless without profiles.	Error	Environment detection must be enabled in order to enable wireless without profiles.	Environment detection must be enabled in order to enable wireless without profiles.
1978	Wireless without profiles was disabled.	Info	Environment detection must be enabled in order to enable wireless without profiles.	N/A.
1979	8021X in S0 was disabled.	Info	A Wired 8021X profile must be set in order to enable 8021X in S0.	N/A.
1980	8021X PXE boot was disabled.	Info	A Wired 8021X profile must be set in order to enable 8021X PXE boot.	N/A.

## Log Mapping

Several logs on the service platform capture messages that can be used to analyze events, including difficulties with installation or performance problems during execution. Additional logs and tools can aid in looking a performance issues and other problems. The following table lists the location of installation logs and the GUI console execution log.

**Table 10: Log Mapping**

Component Name	Log File
Windows Service + Web Service + DB + Client Sample Installation	[InstallDrive]:\Program Files\InstallShield Installation Information\DA4F4037-6EB2-4309-86EB-A8902CBC12EC\setup.ilg
GUI Console Installation	[InstallDrive]:\Program Files\InstallShield Installation Information\66469B6E-D328-4416-BD1E-C4692C4A1A96\setup.ilg
GUI Console	[InstallDrive]:\Program Files\Intel\AMTConsole\amtconsole.log

### **Other Logging Sources**

The Management Console displays the three logs kept within the SCS database—the system log, the actions status log and the security log—and can export these logs for further analysis.

The Windows\* Event log contains errors that cannot be written to the database, for example, failure to connect to the database or an SCS crash. Look for SCS message in both the Application and System sections of the log.

Use network tracing tools such as Ethereal to analyze low level connection problems.

Errors using the SOAP API may be recorded in the IIS log file.

### **Enabling the SCS Debug Log**

The SCS will produce a detailed debug log if it is configured specially to do so. To enable the debug log, do the following:

1. Run regedit.
2. Open HKEY\_LOCAL\_MACHINE\SOFTWARE\Intel\AMTConfServer.
3. Create a new key with the name “Log”.
4. Create a New String Value “LogLevel” in Log.
5. Set LogLevel to “V”.

The SCS will create a log file in folder C:\ This is a fixed location, regardless of the root drive where the service is installed.

## Glossary

Term	Definition
Access Control List (ACL)	A set of data associated with a file, directory or other network resource that defines the permissions that users, groups, processes or devices have for accessing it. In Intel AMT, a list of users and their access privileges.
Active Directory (AD)	Active Directory is an advanced, hierarchical directory service that comes with Windows 2000/2003 servers. It is LDAP (Lightweight Directory Access Protocol—a protocol used to access a directory listing) compliant and built on the Internet's Domain Naming System (DNS). Workgroups are given domain names, just like Web sites, and any LDAP-compliant client (Windows, Mac, Unix, etc.) can gain access to it.
AD OU Active Directory Organizational Unit	Organizational Units (OUs) within an Active Directory are a way to delegate control over part of the directory to a user or group of users. Subsets of users, groups and/or computers can be delegated to different groups, allowing a greater degree of control and granularity without the need to run dedicated domain controllers for that group.
Intel AMT	Intel Active Management Technology is a technology developed by Intel that enables Administrators to remotely manage and repair networked computers even when they are powered down. Three primary features of Intel AMT are better asset management, reduced downtime and minimized desk-side visits, also called by Intel the “discover, heal and protect process.”
API	Application Programming Interface: A language and message format used by an application program to communicate with the operating system or some other control program such as a database management system (DBMS) or communications protocol. APIs are implemented by writing function calls in the program, which provide the linkage to the required subroutine for execution. Thus, an API implies that some program module is available in the computer to perform the operation or that it must be linked into the existing program to perform the tasks.
Authentication	A security measure designed to establish the validity of a transmission, message, or originator.

<b>Term</b>	<b>Definition</b>
Authentication Server (AS)	A Kerberos element in a KDS that recognizes a client at log-on time based on information in its trusted database.
Authenticator	An authentication protocol string created each time authentication occurs and sent with the ticket to the server. It contains a time-stamp encrypted in the session key that can reliably show that the authentication request actually came from the client identified in the ticket.
Authorization	The process of determining what types of activities are permitted. Usually, authorization is in the context of authentication: once you have authenticated a user, the user may be authorized for different types of access or activity.
CRL	Certificate Revocation Lists. The CRL is a list of time stamped entries which indicate which lists have been revoked.
Domain	Part of the DNS (domain naming system) name that specifies details about a host. A domain is the main subdivision of Internet addresses, the last three letters after the final dot, and it tells you what kind of organization you are dealing with. In the context of Active Directory, every host is a member of a domain. A user logs in to the domain of which he is a member.
DNS	A system for converting host names and domain names into IP addresses on the Internet or on local networks that use the TCP/IP protocol. For example, when a Web site address is given to the DNS, DNS servers return the IP address of the server associated with that name.
EACL	Enterprise Access Control List
FPACL	Factory Partners Access Control List
FQDN	Fully qualified domain name: the human-readable name corresponding to the IP address of a network interface, as found on a computer, router or other networked device. It includes both its host name and its domain name.
Group	In Active Directory, a collection of users and objects that share properties and permissions. A group may have another group as a member. The second group is then a sub-group of the first group.
GSS-API	Generic Security Services Application Programming Interface. The generic API for performing client-server authentication.

Term	Definition
ISV	Independent Software Vendors that develop applications that use Intel AMT capabilities.
Kerberos	An Access Control System that was developed at MIT in the 1980s. The Kerberos concept uses a “master ticket” obtained at logon, which is used to obtain additional “service tickets” when a particular resource is required. It is named after a mythological creature.
Key	A key is a piece of information that controls the operation of a cryptography algorithm. In encryption, a key specifies the particular transformation of plaintext into ciphertext, or vice versa during decryption. Keys are also used in other cryptographic algorithms, such as digital signature schemes and keyed-hash functions (also known as MACs), often used for authentication.
Key Distribution Center (KDC)	In the Kerberos protocol, a trusted third party that has secret information (passwords) for all clients and services under its supervision.
Mutual Authentication	Mutual authentication, also known as two-way authentication, is a process whereby two parties, typically a client and a server, authenticate each other in such a way that both parties are assured of the others' identity. In mutual authentication, the server also requests a certificate from the client.
Provisioning	Provisioning deals with planning, setting up and configuring the hardware, software and networks that deliver access to data and network resources for the users.
Proxy	A firewall mechanism that replaces the IP address of a host on the internal (protected) network with its own IP address for all traffic passing through it. A software agent that acts on behalf of a user, typical proxies accept a connection from a user, make a decision as to whether or not the user or client IP address is permitted to use the proxy, perhaps does additional authentication, and then completes a connection on behalf of the user to a remote destination.
PSK Pre-Shared Key	The use of secret passwords or encryption keys that are entered into both sides of the message exchange ahead of time. Pre-shared keys are typed into the clients and servers (authentication servers, access points, etc.) or entered via floppy, CD-ROM or smart card. Contrast with “server-based keys,” in which one side generates a key and sends it to the other side during the authentication session.



<b>Term</b>	<b>Definition</b>
RC4-HMAC	An encryption type based on the RC4 encryption algorithm that uses an MD5 HMAC for checksum. It is included in the Windows implementation of Kerberos.
Realm	In Kerberos, a realm is the same as an Active Directory domain. Kerberos V5 expects realms to have all capital letters. Intel AMT functionality is divided among different realms, for example, the Storage Realm and the Storage Administration Realm. ACLs associate a user or an SID with one or more realms.
RNG Random Number Generator	A computer Random Number Generator is a software routine that implements an algorithm to generate random numbers. Modern cryptography rests on the assumption that ciphers can be constructed whose output is indistinguishable from random noise without knowledge of a secret key used in the algorithm. See “Key”.
Schema	A conceptual model of the structure of a database that defines the data contents and relationships. The Microsoft Active Directory schema contains formal definitions of every object class that can be created. One of these objects is the computer object. The Intel - Management-Engine-Class, based on the computer object, is added to the Active Directory schema and used to define AMT objects. The SCS database schema defines the data tables maintained in the database and the relationships of the tables.
Security Identifier (SID)	A numeric value that identifies a logged-on user who has been authenticated by Active Directory or a user group.
SOAP Simple Object Access Protocol	A message-based protocol based on XML for accessing services on the Web. SOAP employs XML syntax to send text commands across the Internet using HTTP.
SOL/IDER Serial-over-LAN/IDE-Redirection	The proprietary protocols defined for Intel AMT for redirecting keyboard/text or floppy disk/CD transfers from a local host to a remote workstation.
SPEGNO Simple and Protected GSS-API Negotiation Mechanism	SPNEGO is a standard GSS-API pseudo-mechanism for peers to determine which GSS-API mechanisms are shared, select one and then establish a security context with it.
SPN	A service principal name - the name by which a client uniquely identifies an instance of a service.
Ticket Granting Server (TGS)	A Kerberos element in a KDC that creates tickets used to by clients to access servers.

Term	Definition
<p>TLS Transport Layer Security</p>	<p>A protocol intended to secure and authenticate communications across a public network by using data encryption. TLS uses digital certificates to authenticate the user as well as authenticate the network (in a wireless network, the user could be logging on to a rogue access point). The TLS client uses the public key from the server to encrypt a random number and send it back to the server. The random number, combined with additional random numbers previously sent to each other, is used to generate a secret session key to encrypt the subsequent message exchange.</p>
<p>Token</p>	<p>In Kerberos, a fixed length element that contains a user's SID and includes the user's rights and group memberships.</p>
<p>UUID Universally Unique Identifier</p>	<p>A UUID is an identifier standard used in software construction. The intent of UUIDs is to enable distributed systems to uniquely identify information without central coordination. Thus, anyone can create a UUID and use it to identify something. Information labelled with UUIDs can therefore be combined into a single database without need to resolve name conflicts.</p> <p>A UUID is essentially a 16-byte number and in its canonical form a UUID may look like this: 550E8400-E29B-11D4-A716-446655440000</p>
<p>VLAN Virtual LAN</p>	<p>A VLAN is a logical subgroup within a local area network that is created via software rather than manually moving cables in the wiring closet. It combines user stations and network devices into a single unit regardless of the physical LAN segment they are attached to and thereby allows traffic to flow more efficiently within populations of mutual interest.</p>