

*IBM Tivoli Directory Integrator  
Compliance for NIST SP800-131A  
Specifications*

**IBM**



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## About this publication

IBM Tivoli Directory Integrator is an open-architecture, integration solution. You can use this solution to synchronize and exchange information across multiple applications and platforms for providing a consistent enterprise-level view of identity or generic data.

*IBM Tivoli Directory Integrator Compliance for NIST SP800-131A Specifications* document describes how to configure Tivoli Directory Integrator components to comply with the requirements as defined by National Institute of Standards and Technology (NIST) Special Publications 800-131A.

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## Access to publications and terminology

This section provides:

- A list of publications in the “IBM Tivoli Directory Integrator library.”
- Links to “Online publications” on page 2.
- A link to the “IBM Terminology website” on page 2.

### IBM Tivoli Directory Integrator library

Use these short descriptions of publications and of external sources that can help you understand methodology and components.

*IBM Tivoli Directory Integrator V7.1.1 Getting Started*

Contains a brief tutorial and introduction to Tivoli Directory Integrator. Includes examples to create interaction and hands-on learning of Tivoli Directory Integrator.

*IBM Tivoli Directory Integrator V7.1.1 Installation and Administrator Guide*

Includes complete information about installation, migration from a previous version, configuration the logging functionality, and the security model underlying the Remote Server API of Tivoli Directory Integrator. Contains information about how to deploy and manage solutions.

*IBM Tivoli Directory Integrator V7.1.1 Users Guide*

Contains information about using Tivoli Directory Integrator. Contains instructions for designing solutions with the Directory Integrator designer tool (the Configuration Editor) or running the ready-made solutions from the command line. Also, provides information about interfaces, concepts, and AssemblyLine creation.

*IBM Tivoli Directory Integrator V7.1.1 Reference Guide*

Contains detailed information about the individual components of Tivoli Directory Integrator such as Connectors, Function Components, Parsers, Objects, and so on. These components are the building blocks of the AssemblyLine.

*IBM Tivoli Directory Integrator V7.1.1 Problem Determination Guide*

Provides information about Tivoli Directory Integrator tools, resources, and techniques that can aid in the identification and resolution of problems.

*IBM Tivoli Directory Integrator V7.1.1 Messages Guide*

Provides a list of all informational, warning, and error messages that are associated with the Tivoli Directory Integrator.

### *IBM Tivoli Directory Integrator V7.1.1 Password Synchronization Plug-ins Guide*

Includes complete information for installing and configuring each of the five IBM® Password Synchronization Plug-ins: Windows Password Synchronizer, Sun Directory Server Password Synchronizer, IBM Tivoli Directory Server Password Synchronizer, Domino® Password Synchronizer, and Password Synchronizer for UNIX and Linux. Also, provides configuration instructions for the LDAP Password Store and JMS Password Store.

### *IBM Tivoli Directory Integrator V7.1.1 Release Notes*

Describes new features and late-breaking information about Tivoli Directory Integrator that did not get included in the documentation.

## **Online publications**

IBM posts product publications when the product is released and when the publications are updated at the following locations:

### **IBM Tivoli Directory Integrator Information Center**

The [http://publib.boulder.ibm.com/infocenter/tivihelp/v2r1/topic/com.ibm.IBMDI.doc\\_7.1.1/welcome.htm](http://publib.boulder.ibm.com/infocenter/tivihelp/v2r1/topic/com.ibm.IBMDI.doc_7.1.1/welcome.htm) site displays the information center welcome page for this product.

### **IBM Security Information Center**

The <http://publib.boulder.ibm.com/infocenter/tivihelp/v2r1/index.jsp> site displays an alphabetical list of and general information about all IBM Security product documentation.

### **IBM Publications Center**

The <http://www-05.ibm.com/e-business/linkweb/publications/servlet/pbi.wss> site offers customized search functions to help you find all the IBM publications that you need.

## **IBM Terminology website**

The IBM Terminology website consolidates terminology for product libraries in one location. You can access the Terminology website at <http://www.ibm.com/software/globalization/terminology>.

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## **Accessibility**

Accessibility features help users with a physical disability, such as restricted mobility or limited vision, to use software products successfully. With this product, you can use assistive technologies to hear and navigate the interface. You can also use the keyboard instead of the mouse to operate all features of the graphical user interface.

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## **Technical training**

For technical training information, see the following IBM Education website at <http://www.ibm.com/software/tivoli/education>.

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## **Support information**

IBM Support provides assistance with code-related problems and routine, short duration installation or usage questions. You can directly access the IBM Software Support site at <http://www.ibm.com/software/support/probsub.html>.

**Note:** The **Community and Support** tab on the product information center can provide additional support resources.



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## NIST SP 800-131A specifications

National Institute of Standards and Technology (NIST) Special Publication (SP) 800-131A guidelines provide cryptographic key management guidance.

NIST SP 800-131A specification mandates changes to the rules for cryptography. These specifications enforce major changes to algorithm strength rules and use of secure sockets (TLS 1.2). NIST SP 800-131A specification mandates:

- SHA1 is not allowed for digital signatures
- RSA 1024 keys are not allowed
- RSA keys with minimum of 2048 bits are allowed
- DES keys are not allowed
- AES keys of any length are allowed
- TLS 1.2 protocol must be enabled

For more information about NIST SP 800-131A, see *Transitions: Recommendation for Transitioning the Use of Cryptographic Algorithms and Key Lengths* at: <http://csrc.nist.gov/publications/PubsSPs.html>

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## Support for NIST SP 800-131A

You must upgrade Tivoli Directory Integrator to support NIST SP 800-131A requirements.

Make the following modifications to Tivoli Directory Integrator to comply with NIST SP 800-131A requirements to strengthen the security.

- Encrypt and decrypt data files as per the requirements.
- Enable TLS 1.2 protocol.
- Use NIST-compliant digital signatures.

**Note:** For IBM Tivoli Directory Integrator V7.1 and V7.1.1, verify that the minimum JRE is IBM JRE 1.6 SR10. See “Upgrading JRE” on page 9 for more details.

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## Modifications to properties files

You must configure the `solution.properties` and `global.properties` files to support the NIST requirements.

Add the following property to the `global.properties` and `solution.properties` files.

```
com.ibm.di.server.NIST.on=true
```

The default value of this property is `false`. When you set the value to `true`, Tivoli Directory Integrator uses TLS 1.2 protocol to establish the SSL connections.

Modify the `com.ibm.di.securityTransformation` property to use `AES/ECB/NOpadding`.

The following example shows the new `global.properties` file when **com.ibm.di.securityTransformation** is set to its default value:

```
com.ibm.di.securityTransformation=DES/ECB/NoPadding

## NIST Setting
#com.ibm.di.server.NIST.on=true
#com.ibm.di.securityTransformation=AES/ECB/NoPadding
```

The **com.ibm.di.securityTransformation** property in the `global.properties` and `solution.properties` files determines the cipher for the encryption or decryption of Tivoli Directory Integrator configurations. The default value is set to `DES/ECB/NoPadding`.

**Note:** You must migrate the existing encrypted files, if there is any change of the key or the cipher that the Tivoli Directory Integrator Server uses for encryption. To migrate an encrypted file, you must decrypt it with the old encryption key or old cipher, and encrypt it with the new one.

Files that are encrypted or contain encrypted parts are:

- Tivoli Directory Integrator configuration files
- Server API User registry file
- Tivoli Directory Integrator properties files

**Note:** Tivoli Directory Integrator properties files can contain encrypted properties, even if the files are not encrypted as a whole.

By default, all sensitive properties, such as passwords, in the `global.properties` file or the `solution.properties` file are encrypted. You must migrate `global.properties` and `solution.properties` files when you change the server encryption key. For more information about encryption and decryption of data in Tivoli Directory Integrator, see: [http://pic.dhe.ibm.com/infocenter/tivihelp/v2r1/index.jsp?topic=%2Fcom.ibm.IBMDI.doc\\_7.1.1%2Fadminguide57.htm&path%3D7\\_4\\_11\\_3](http://pic.dhe.ibm.com/infocenter/tivihelp/v2r1/index.jsp?topic=%2Fcom.ibm.IBMDI.doc_7.1.1%2Fadminguide57.htm&path%3D7_4_11_3)

When Tivoli Directory Integrator supports NIST, the following connectors can communicate over TLS 1.2 protocol:

- HTTP Server Connector
- DSMLv2SOAPServer Connector
- LDAP Server Connector
- TCP Server Connector

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## Creating NIST-compliant self-signed certificates

To create NIST-compliant self-signed certificates, you must use minimum of SHA2 for digital signatures and cryptographic with a minimum key strength of 112 bits.

### About this task

This task describes how to create NIST-compliant self-signed certificates with the `ikeyman` tool. For Tivoli Directory Integrator installation instructions, see the Installation instructions for IBM Tivoli Directory Integrator topic in [http://pic.dhe.ibm.com/infocenter/tivihelp/v2r1/topic/com.ibm.IBMDI.doc\\_7.1.1/welcome.htm](http://pic.dhe.ibm.com/infocenter/tivihelp/v2r1/topic/com.ibm.IBMDI.doc_7.1.1/welcome.htm).

## Procedure

1. Start the `ikeyman.exe` tool present in the `<TDI_install_dir>\jvm\jre\bin\ikeyman.exe` directory.
2. Select **Key Database File > New**.
3. In the **File Name** field, type an appropriate file name, for example, `nist_testserver.jks`.
4. Click **OK**.
5. In the **Password** field, type the password.
6. Click **OK**.
7. Click **New Self\_Signed**.
8. Type the appropriate values in the data fields as shown:

Option	Description
Key Label	admin
Version	X509 V3
Key Size	2048
Signature Algorithm	SHA2WithRSA

9. Click **OK**.
10. Extract the resultant certificate in a der file. For example: `nist_testserver.der`
11. Create the `nist_testadmin.jks` and `nist_testadmin.der` files by following the steps 1 - 9.
12. Import the `nist_testserver.der` file into Signer certificates of `nist_testadmin.jks` with the label as `server`.
13. Import the `nist_testadmin.der` into Signer certificates of `nist_testserver.jks` with the label as `admin`.

## Results

Tivoli Directory Integrator Version 7.1, Fix Pack 7 and Tivoli Directory Integrator Version 7.1.1, Fix Pack 2 onwards, sample NIST certificates are shipped. You can find these certificates in the `<fix_pack_install_dir>\NIST\Sample Certificates` directory. The keystore passwords for these jks files are as follows:

Key Store	Password
<code>nist_testserver.jks</code>	<code>server</code>
<code>nist_testadmin.jks</code>	<code>administrator</code>

## Example

You might need to edit the following example `solution.properties` or `global.properties` file when NIST is enabled.

```
com.ibm.di.server.NIST.on=true
```

```
## server authentication
javax.net.ssl.trustStore=serverapi/nist_testadmin.jks
{protect}-javax.net.ssl.trustStorePassword=administrator
```

```
## client authentication
javax.net.ssl.keyStore=serverapi/nist_testadmin.jks
{protect}-javax.net.ssl.keyStorePassword=administrator
```

```

api.keystore=nist_testserver.jks
api.key.alias=server
{protect}-api.keystore.password=server

api.truststore=nist_testserver.jks
{protect}-api.truststore.pass=server

com.ibm.di.server.encryption.keystore=nist_testserver.jks

## Server API client properties
api.client.ssl.custom.properties.on=true
api.client.keystore=serverapi/nist_testadmin.jks
{protect}-api.client.keystore.pass=

{protect}-api.client.key.pass=administrator
api.client.truststore=serverapi/nist_testadmin.jks
{protect}-api.client.truststore.pass=administrator

```

**Note:** The truststore and keystore values shown in this example are based on the sample certificates that are shipped with the Tivoli Directory Integrator Fix Pack.

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## AMC and new certificates

You must configure Administration and Monitoring Console (AMC) if you start the Tivoli Directory Integrator server with the `com.ibm.di.server.NIST` property set to true.

For more information about AMC, see the “AMC and Action Manager security” topic at: [http://pic.dhe.ibm.com/infocenter/tivihelp/v2r1/topic/com.ibm.IBMDI.doc\\_7.1.1/welcome.htm](http://pic.dhe.ibm.com/infocenter/tivihelp/v2r1/topic/com.ibm.IBMDI.doc_7.1.1/welcome.htm)

To monitor the Tivoli Directory Integrator server through AMC, make the following changes:

1. Run the following script file to stop AMC.
  - `stop_tdiamc.bat` for Windows
  - `stop_tdiamc.sh` for Linux
2. Update the AMC keystores to use the new NIST-compliant certificates. Copy the `nist_testadmin.jks` file into the AMC deployment directory. The default AMC deployment directory is `<TDI_Install_dir>\lwi\runtime\isc\eclipse\plugins\AMC_7.X.X`.
3. In the `<TDI_Install_dir>\lwi\runtime\isc\eclipse\plugins\AMC_7.X.X\amc.properties` file, update the following properties to point to the new certificates:

```

api.truststore=nist_testadmin.jks
api.truststore.pass=administrator
api.truststore.type=jks
api.client.keystore=nist_testadmin.jks
api.client.keystore.pass=administrator
api.client.keystore.type=jks

```
4. Run the following script file to start AMC.
  - `start_tdiamc.bat` for Windows
  - `start_tdiamc.sh` for Linux

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## Upgrading JRE

You must verify that the minimum JRE is IBM JRE 1.6 SR10 or higher for IBM Tivoli Directory Integrator V7.1 and V7.1.1.

### About this task

Use the following command to determine the current JRE version:

```
<tdi-install-dir>\jvm\jre\bin>java -version
```

**Note:** JRE upgrade is required only for Tivoli Directory Integrator Version 7.1.

### Procedure

1. Stop all components such as Tivoli Directory Integrator Server, Configuration Editor, Administration and Monitoring Console, and **tdisrvctl** utility.
2. Contact L2 support for the fix with latest JRE fixes. See <http://www-01.ibm.com/support/docview.wss?uid=swg21621588>
3. Extract the fix package to a temporary directory.
4. Back up the older <TDI\_Install\_dir>\jvm folder from the system where Tivoli Directory Integrator is installed.
5. Extract the jvm.tar.gz or jvm.zip file.
6. Replace the older jvm folder with the jvm folder extracted from the jvm.tar.gz or jvm.zip file.

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## Verification of NIST configuration

You can verify the NIST configuration by confirming whether the new cipher suites are used.

1. Modify the solution.properties file by adding:  
javax.net.debug=ssl
2. Start the Tivoli Directory Integrator server in daemon mode.
3. Run the following command:  
tdisrvctl.bat -T "..\nist\_testserver.jks" -W server -K "..\nist\_testadmin.jks"  
-P administrator -op srvinfo

**Note:** The syntax is based on the sample jks files. The files are placed in the installation directory.

Successful configuration of NIST shows the following SSL cipher data in the Tivoli Directory Integrator server log file:

```
JsseJCE: Using cipher AES/GCM/NoPadding from provider
```



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