

z/OS
3.2

*Getting started with TKE at your
enterprise*



Note

Before using this information and the product it supports, read the information in [“Notices” on page 35.](#)

This edition applies to IBM® z/OS® 3.2 (5655-ZOS) and to all subsequent releases and modifications until otherwise indicated in new editions.

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How to provide feedback to IBM

We welcome any feedback that you have, including comments on the clarity, accuracy, or completeness of the information. For more information, see [How to send feedback to IBM](#).

Summary of changes

This information includes terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations for the current edition are indicated by a vertical line to the left of the change.

Note: IBM z/OS policy for the integration of service information into the z/OS product documentation library is documented on the z/OS Internet Library under [IBM z/OS Product Documentation Update Policy](http://www.ibm.com/docs/en/zos/latest?topic=zos-product-documentation-update-policy) (www.ibm.com/docs/en/zos/latest?topic=zos-product-documentation-update-policy).

Summary of changes for z/OS 3.2

The following content is new, changed, or no longer included in z/OS 3.2.

New

The following content is new.

September 2025 release

- None.

Changed

The following content is changed.

September 2025 release

- None.

Deleted

The following content is deleted.

September 2025 release

- None.

Summary of changes for z/OS 3.1

The following content is new, changed, or no longer included in z/OS 3.1.

New

The following content is new.

February 2025 refresh

[Chapter 5, “Roadmap for HSM management from the TKE application for IBM Z and IBM LinuxONE servers,” on page 27.](#)

Changed

The following content is changed.

February 2025 refresh

Minor editorial changes.

Chapter 1. What is TKE?

The Trusted Key Entry (TKE) feature is an integrated solution that manages cryptographic keys in a secure environment. The TKE workstation enables basic local and remote key management and is an optional hardware feature of IBM Z that provides a management tool for Z host cryptographic coprocessors. The TKE contains a combination of hardware, firmware, and software. An optional smart card reader can be added to the TKE workstation.

TKE workstation and the most recent TKE 10.0 LIC are optional features of IBM z16.

Requirements: For information about the conditions you must meet before you can use TKE, see [Chapter 2, “Requirements for TKE,” on page 3](#).

Chapter 2. Requirements for TKE

This topic describes the requirements for TKE.

Identifying the console

For information about identifying the TKE console, see *Service Guide for Trusted Key Entry Workstations*.

Trusted Key Entry components

The Trusted Key Entry feature is a combination of workstation hardware and software that is used to manage Hardware Security Modules (HSMs) on IBM Z or LinuxONE servers.

TKE hardware

- TKE Workstation.
- IBM 4770 Cryptographic adapter.

The cryptographic adapter, which is the TKE workstation engine and has key storage for DES, AES, and PKA keys, supports a broad range of DES, AES, and public-key cryptographic processes.

Available with a TKE 10.0 workstation is:

- Feature 0900: 10 IBM part number 00RY790 smart cards.
- Feature 0891: 2 smart card readers and 20 IBM part number 00RY790 smart cards.

Notes:

1. You can carry your smart card readers from feature code 0885 or 0891 forward. Existing smart cards can be used on TKE 10.0 with these readers.
2. With Gemalto smart card readers, you must press the green Enter button after you enter the PIN or a character during the secure key entry process.
3. IDENTIV smart card readers do not have a display window. When you press on the pad, a tone comes from the reader that indicates that the pad was pressed. When the PIN is fully entered, a different pitched tone plays, signaling that the PIN is complete.
4. To manage EP11 host crypto modules, EP11 smart cards are required. The smart card part 45D3398 cannot be used to manage EP11 host crypto modules. This part was last sold with TKE 7.1.
5. DataKey smart cards are no longer usable with TKE 7.0 or later.
6. Older smart cards must be reinitialized on TKE 7.0 or later to be able to store ECC (APKA) master keys.

Two USB flash memory drives are shipped with TKE:

- Use one USB drive for saving and backing up TKE-related files in the TKE data directories.
- Use the other USB drive for backing up critical console data only.

TKE software

The following software is preinstalled on the TKE workstation:

- Trusted Key Entry Version 10.0 - FC 0882.

Notes:

1. Only IBM SSRs should install TKE firmware onto your TKE.
2. You can only upgrade your TKE workstation to TKE 10.0 software, FC 0882, if your workstation is assigned to an IBM z14 or later.

Supported host cryptographic adapters

The host cryptographic adapters supported by TKE 10.0 are:

- Crypto Express2 adapter (CEX2C).
- Crypto Express3 adapter (CEX3C).
- Crypto Express4 CCA adapter (CEX4C).
- Crypto Express4 PKCS #11 adapter (CEX4P).
- Crypto Express5S CCA adapter (CEX5C).
- Crypto Express5S PKCS #11 adapter (CEX5P).
- Crypto Express6S CCA adapter (CEX6C).
- Crypto Express6S PKCS #11 adapter (CEX6P).
- Crypto Express7S CCA adapter (CEX7C).
- Crypto Express7S PKCS #11 adapter (CEX7P).
- Crypto Express8S CCA adapter (CEX8C).
- Crypto Express8S PKCS #11 adapter (CEX8P).

These host cryptographic adapters:

- Provide a secure processing environment with hardware to provide DES, AES, TDES, RSA, SHA-1, and SHA-256 cryptographic services with secure key management and finance-industry special function support.
- Perform random number generation and modular math functions for RSA and similar public-key cryptographic algorithms.
- Include sensors to protect against attacks that involve probe penetration, power sequencing, radiation, and temperature manipulation.

CEX2C, CEX3C, CEX4C, CEX5C, CEX6C, CEX7C, and CEX8C adapters implement the IBM Common Cryptographic Architecture and are referred to as CCA coprocessors.

CEX4P, CEX5P, CEX6P, CEX7P, and CEX8P adapters implement the IBM Enterprise PKCS #11 architecture and are referred to as EP11 coprocessors.

Host crypto module

The supported host cryptographic card is the host system hardware device performing the cryptographic functions, referred to as the *host crypto module* or, simply, the *crypto module*.

When a host crypto module is manufactured, a unique 8-byte Crypto-Module ID (CMID) is generated and permanently stored on the crypto module. The CMID is returned in all reply messages sent from the host crypto module to the TKE workstation.

TKE release and feature codes available by CEC levels

Table 1 on page 5 shows the TKE licensed internal code (LIC) that is orderable based on the date and type of your CEC.

Most of the time, a new version of the TKE workstation is released at the same time as a new CEC. When you order a new TKE workstation, you receive the latest TKE hardware with the latest TKE licensed internal code (LIC) installed on it. For example, if you had placed an order for a new TKE workstation between November of 2018 and September of 2019, you would have received TKE 9.1 (or, in order words, hardware feature code 0085 or 0086 with LIC feature code 0880).

Table 1. TKE release and feature codes available by CEC level

TKE release (LIC)	Feature codes		Initial release date	CEC information				
	Hardware	LIC		IBM z12s	IBM z13s	IBM z14	IBM z15	IBM z16
TKE 8.0	0847	0877	Feb 2015	Yes	Yes	N/A	N/A	N/A
TKE 8.1	0847 or 0097	0878	Feb 2016	Yes	Yes	N/A	N/A	N/A
TKE 9.0	0085 or 0086	0879	Sept 2017	Yes	Yes	N/A	N/A	N/A
TKE 9.1	0085 or 0086	0880	Nov 2018	N/A	Yes	Yes	N/A	N/A
TKE 9.2	0085 or 0086	0881	Sept 2019	N/A	Yes	Yes	Yes	N/A
TKE 10.0	0057 or 0058	0882	May 2022	N/A	N/A	N/A	Yes	Yes

Your host cryptographic environment determines the level of TKE LIC that you can use. To determine which host cryptographic modules are supported by your TKE, see [Table 7 on page 11](#).

Smart card readers and smart cards orderable by TKE release

Table 2 on page 5 shows the smart card readers and smart cards that can be ordered for each TKE release.

Table 2. Smart card readers and smart cards orderable by TKE release

TKE release (LIC)	Smart card reader		Smart card	
	Feature code	Type	Feature code	Part number
TKE 5.3	0885	Omnikey/HID	0884	45D3398
TKE 6.0	0885	Omnikey/HID	0884	45D3398
				74Y0551* #
TKE 7.0	0885	Omnikey/HID	0884	45D3398
				74Y0551* #
TKE 7.1	0885	Omnikey/HID	0884	45D3398
				74Y0551*
TKE 7.2	0885	Omnikey/HID	0884	74Y0551*
TKE 7.3	0885	Omnikey/HID	0884	74Y0551*
TKE 8.0	0885 or 0891	Omnikey/HID	0884 or 0892	00JA710
TKE 8.1	0885 or 0891 @	Omnikey/HID/ Gemalto	0884 or 0892	00JA710
TKE 9.0	0885 or 0891 @	Omnikey/HID/ Gemalto/IDENTIV	0892	00JA710
TKE 9.1	0891	IDENTIV	0900	00RY790
TKE 9.2	0891	IDENTIV	0900	00RY790
TKE 10.0	0891	IDENTIV	0900	00RY790

*

Part number 74Y0551 replaced part number 45D3398 in feature code 0884.

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An MCL is required to support part number 74Y0551 on TKE 6.0 and TKE 7.0.

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- Clients in the United States, Canada, and European Union (EU) might receive Gemalto CT700 readers.
- With Gemalto smart card readers, you must press the green Enter button after you enter the PIN or a character during the secure key entry process.

There are restrictions on what smart card part numbers can be used to create different smart card types. For more information, see [“Smart card compatibility issues”](#) on page 6.

DATAKEY smart cards are not supported on TKE 7.0 or later. If you are upgrading from TKE 6.0 to TKE 7.0 or later and have DATAKEY smart cards, you need to back up your CA smart cards by using a more current smart card part number and copy keys and key parts from your TKE smart cards onto TKE smart cards that are created from a more current smart card part number. See [“Datakey card usage”](#) on page 11 for information on migrating data to a new smart card.

To identify the part number of your smart card, look for the following:

DATAKEY

Has blue and orange art work and DATAKEY printed on them.

45D3398

Are white and do not have any part number printed on them.

74Y0551

Has part number 74Y0551 printed on them.

00JA710

Has part number 00JA710 printed on them.

Smart card compatibility issues

Features added in recent TKE releases (such as support for ECC authority signature keys in TKE 8.0) have required changes to the smart card applets. Because of these changes, there are restrictions on which smart cards can be used with a particular TKE release.

Applet version

When a new smart card is created, an applet is loaded onto the smart card. This occurs when initializing and personalizing CA or MCA smart cards, when creating a backup CA or MCA smart card, or when initializing and enrolling TKE, EP11, IA, or KPH smart cards in a zone. The applet version depends on the TKE release and type of smart card used, as shown in the following tables.

Table 3. Applet version by TKE release				
	CA smart card	TKE smart card	EP11 smart card	Smart card part
TKE 5.2 or earlier	applet version = 0.3	applet version = 0.3	Not supported	Any supported card
TKE 5.3	applet version = 0.3	applet version = 0.4	Not supported	Any supported card
TKE 6.0	applet version = 0.4	applet version = 0.5	Not supported	Any supported card
TKE 7.0	applet version = 0.4	applet version = 0.6	Not supported	Any supported card
TKE 7.1	applet version = 0.4	applet version = 0.7	Not supported	Any supported card
TKE 7.2	applet version = 0.4	applet version = 0.8	Not supported	45D3398

<i>Table 3. Applet version by TKE release (continued)</i>				
	CA smart card	TKE smart card	EP11 smart card	Smart card part
TKE 7.2	applet version = 0.4	applet version = 0.8	applet version = 0.1	74Y0551
TKE 7.3	applet version = 0.4	applet version = 0.8	Not supported	45D3398
TKE 7.3	applet version = 0.5	applet version = 0.9	applet version = 0.2	74Y0551
TKE 8.0	applet version = 0.4	applet version = 0.8	Not supported	45D3398
TKE 8.0	applet version = 0.5	applet version = 0.10	applet version = 0.2	74Y0551
TKE 8.0	applet version = 0.5	applet version = 0.10	applet version = 0.2	00JA710
TKE 8.1	applet version = 0.6	applet version = 0.11 ¹	Not supported	45D3398
TKE 8.1	applet version = 0.7	applet version = 0.12 ²	applet version = 0.3 ³	74Y0551
TKE 8.1	applet version = 0.7	applet version = 0.12 ²	applet version = 0.3 ³	00JA710
TKE 9.0	applet version = 0.6	applet version = 0.15 ⁴	Not supported	45D3398
TKE 9.0	applet version = 0.7	applet version = 0.16 ⁵	applet version = 0.4 ⁶	74Y0551
TKE 9.0	applet version = 0.7	applet version = 0.16 ⁵	applet version = 0.4 ⁶	00JA710
TKE 9.1 and TKE 9.2	applet version = 0.6	applet version = 0.17	Not supported	45D3398
TKE 9.1 and TKE 9.2	applet version = 0.7	applet version = 0.18	applet version = 0.5	74Y0551
TKE 9.1 and TKE 9.2	applet version = 0.7	applet version = 0.18	applet version = 0.5	00JA710
TKE 9.1	applet version = 0.8	applet version = 0.19	applet version = 0.6	00RY790
TKE 9.2	applet version = 0.9	applet version = 0.20	applet version = 0.7	00RY790
TKE 10.0	applet version = 0.10	applet version = 0.21	applet version = 0.7	00RY790

Notes:

1. A PTF available on TKE 8.1 changes the applet version to 0.13. The PTF adds support for an alternate zone when copying smart card contents.
2. A PTF available on TKE 8.1 changes the applet version to 0.14. The PTF adds support for an alternate zone when copying smart card contents.

3. A PTF available on TKE 8.1 changes the applet version to 0.4. The PTF adds support for an alternate zone when copying smart card contents.
4. A PTF available on TKE 9.0 changes the applet version to 0.17. The PTF modifies support for using an alternate zone when copying smart card contents.
5. A PTF available on TKE 9.0 changes the applet version to 0.18. The PTF modifies support for using an alternate zone when copying smart card contents.
6. A PTF available on TKE 9.0 changes the applet version to 0.5. The PTF modifies support for using an alternate zone when copying smart card contents.

<i>Table 4. Applet version by TKE release</i>				
	MCA smart card	IA smart card	KPH smart card	Smart card part
TKE 7.0 to TKE 7.2	applet version = 0.1	applet version = 0.1	applet version = 0.1	Any supported card
TKE 7.3	applet version = 0.1	applet version = 0.1	applet version = 0.1	45D3398
TKE 7.3	applet version = 0.2	applet version = 0.2	applet version = 0.2	74Y0551
TKE 8.0	applet version = 0.1	Not supported	Not supported	45D3398
TKE 8.0	applet version = 0.2	applet version = 0.3	applet version = 0.3	74Y0551
TKE 8.0	applet version = 0.2	applet version = 0.3	applet version = 0.3	00JA710
TKE 8.1, TKE 9.0, TKE 9.1, and TKE 9.2	applet version = 0.3	Not supported	Not supported	45D3398
TKE 8.1, TKE 9.0, TKE 9.1, and TKE 9.2	applet version = 0.4	applet version = 0.4	applet version = 0.4	74Y0551
TKE 8.1, TKE 9.0, TKE 9.1, and TKE 9.2	applet version = 0.4	applet version = 0.4	applet version = 0.4	00JA710
TKE 9.1 and TKE 9.2	applet version = 0.5	applet version = 0.5	applet version = 0.5	00RY790
TKE 10.0	applet version = 0.5	applet version = 0.5	applet version = 0.5 ¹	00RY790

Notes:

1. A PTF available on TKE 10.0 changes the applet version to 0.6. The PTF adds functions to the KPH smart card to support configuration migration using P521 EC migration zones for EP11 crypto modules.
2. In general, smart cards that are created on a particular TKE release cannot be used on TKE workstations that are at prior release levels. TKE 5.2 applets are not usable on TKE 7.1 and later because they can only be installed on DataKey smart cards, and DataKey smart cards are not supported.
3. If you are collecting data that will be applied to a Crypto Express 5 or later:
 - The KPH certificates must come from smart cards at the minimum applet version 0.3. This applet version was first available in TKE 8.0.

- The collect must be done from a TKE 8.0 or later.
4. If you are applying data to a Crypto Express 5 or later, you must use IA smart cards that are at applet version 0.3 or later. This applet version was first available in TKE 8.0.
 5. If you are using Gemalto CT700 smart card readers:
 - MCA smart cards must be at the minimum applet version 0.4. This applet version was first available in TKE 8.1.
 - IA smart cards must be at the minimum applet version of 0.4. This applet version was first available in TKE 8.1.
 - KPH smart cards must be at the minimum applet version of 0.4. This applet version was first available in TKE 8.1.
 6. If you want to collect data from a Common Cryptographic Architecture (CCA) module that has domains configured to run in PCI-compliant mode, all of your smart cards (the MCA, IA, and KPH smart cards):
 - Must be initialized and personalized on TKE 9.1 or later.
 - Must be the minimum part number of 00RY790 (the blue smart card).
 - The Migration Zone (MCA smart card) must have EC-521 strength zones.

Zone key type and length

TKE uses smart cards and establishes zones for two categories of operations: normal crypto module administration, which includes loading keys and key parts and signing commands to a crypto module, and configuration migration. CA, TKE, and EP11 smart cards are created for normal crypto module administration, and MCA, IA, and KPH smart cards are created for configuration migration. Support for configuration migration was added in TKE 7.0.

Zone keys establish secure communication between entities in a zone. Entities include smart cards and the TKE workstation crypto adapter.

Zones can be based on 1024-bit RSA keys, 2048-bit RSA keys, or P521 EC keys. As smart card capabilities have improved, the allowed smart card zone key types have changed.

Prior to TKE 6.0, only zones based on 1024-bit RSA keys were supported. Beginning with TKE 6.0, customers are allowed to select either 1024-bit or 2048-bit RSA keys as the zone key type. Beginning in TKE 9.1, customers are allowed to select either 2048-bit RSA or P521 EC keys as the zone key type. You must use 00RY790 smart cards (blue smart cards) for P521 EC zones.

Use of 1024-bit RSA zones should be phased out. 1024-bit RSA keys are no longer considered highly secure.

When support for configuration migration was added in TKE 7.0, only 2048-bit RSA migration zones were supported. Beginning with CCA 6.1 and TKE 9.1, support for P521 EC migration zones was added. All EP11 crypto modules support 2048-bit RSA migration zones. Starting with the CEX8P EP11 crypto modules, they also support P521 EC migration zones.

Smart card usage

Table 5 on page 9 indicates in more detail where CA smart cards created in different releases can be used. Usage means employing a CA smart card to create TKE smart cards, creating a backup CA smart card, or enrolling a TKE workstation cryptographic adapter in the zone. OmniKey smart card readers are required to use CA smart cards with a zone key length of 2048-bits.

<i>Table 5. CA smart card usage</i>				
	Use on TKE 5.2 or earlier	Use on TKE 5.3	Use on TKE 6.0	Use on TKE 7.0 and later
Created on TKE 5.2 or before	Yes	Yes	Yes	No

<i>Table 5. CA smart card usage (continued)</i>				
	Use on TKE 5.2 or earlier	Use on TKE 5.3	Use on TKE 6.0	Use on TKE 7.0 and later
Created on TKE 5.3	No	Yes	Yes	Yes ¹
Created on TKE 6.0, 1024-bit zone key	No	Yes	Yes	Yes ¹
Created on TKE 6.0, 2048-bit zone key	No	No	Yes	Yes
Created on TKE 7.0 and above	No	No	No	Yes

¹ You must use smart cards associated with part number 45D3398 or 74Y0551 in this release of TKE. Datakey smart cards are not supported in TKE 7.0 and above.

Table 6 on page 10 indicates in more detail where TKE smart cards created in different releases can be used. Usage means employing a TKE smart card to store or load key parts or to generate and retain an authority signature key or a crypto adapter logon key, to copy keys and key parts from one smart card to another, to log on to the TKE workstation crypto adapter, or to create a profile for the TKE workstation crypto adapter. The TKE smart card must be enrolled in the zone where it is used, although this is not required to use the authority signature key or crypto adapter logon key on the smart card. The authority signature key and the crypto adapter logon key are not subject to zone constraints.

<i>Table 6. TKE smart card usage</i>				
	Use on TKE 5.2 or before	Use on TKE 5.3	Use on TKE 6.0	Use on TKE 7.0 and above
Created on TKE 5.2 or before	Yes	Yes	Yes	No
Created on TKE 5.3	No	Yes	Yes	Yes ²
Created on TKE 6.0, 1024-bit zone key	No	Yes ¹	Yes	Yes ²
Created on TKE 6.0, 2048-bit zone key	No	No	Yes	Yes
Created on TKE 7.0 and above	No	No	No	Yes

¹ This smart card could contain:

- Key parts.
- A 1024-bit or 2048-bit authority signature key.
- A 1024-bit or 2048-bit cryptographic adapter logon key.

In TKE 5.3, 2048-bit keys are not supported. Only the key parts and 1024-bit keys could be used in TKE 5.3.

² You must use smart cards associated with part number 45D3398 or 74Y0551 in this release of TKE. Datakey smart cards are not supported in TKE 7.0 or later.

When creating an EP11 smart card on TKE 8.1, you must use a smart card associated with part numbers 74Y0551 or 00JA710.

Datakey card usage

Support for Datakey smart cards was withdrawn in TKE 7.0. You can make a backup of an existing Datakey CA smart card onto a more current smart card part number or copy key parts from an existing Datakey TKE smart card onto a more current smart card part number, but you cannot otherwise use Datakey smart cards on TKE 7.0 or later.

Use the Smart Card Utility program to backup an existing Datakey CA smart card. This allows the zone of the Datakey CA smart card to continue to be used on TKE 7.0 or later. Use the *Backup CA smart card* option in the *CA Smart Card* pull-down menu to backup a CA smart card.

Copy key parts from an existing Datakey TKE smart card using the Cryptographic Node Management Utility. The target TKE smart card must be in the same zone as the source TKE smart card. This allows key parts from the Datakey TKE smart card to be used on TKE 7.0 or later. Use the *Copy Smart Card* option in the *Smart Card* pull-down menu to copy keys and key parts from one TKE smart card to another. The *Smart Card* pull-down menu is displayed only when smart card readers are enabled under the *File* pull-down menu.

Host cryptographic modules managed by TKE

TKE manages host cryptographic modules on any CEC where that particular host cryptographic module is supported. In other words, for example, TKE is unaware whether a CEX3C module is running on an IBM zEC12, IBM zBC12, IBM z13, IBM z14, IBM z15, or IBM z16.

Table 7 on page 11 identifies the host cryptographic modules that each TKE release can manage.

Table 7. Host cryptographic modules managed by TKE LIC								
TKE release (LIC)	Host cryptographic modules supported by TKE release							
	CEX5C	CEX5P	CEX6C	CEX6P	CEX7C	CEX7P	CEX8C	CEX8P
TKE 8.0	Yes@,+	Yes\$	No	No	No	No	No	No
TKE 8.1	Yes@,+	Yes\$	No	No	No	No	No	No
TKE 9.0	Yes@,+	Yes\$	Yes	Yes	No	No	No	No
TKE 9.1	Yes@,+	Yes\$	Yes	Yes	No	No	No	No
TKE 9.2	Yes@,+	Yes\$	Yes	Yes	Yes	Yes	No	No
TKE 10.0	Yes@,+	Yes\$	Yes	Yes	Yes	Yes	Yes	Yes

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TKE 8.1 with the TKE Tower Code level of 3 or higher is required to manage a CEX5C at level CCA 5.3. The TKE Tower Code is include in TKE LIC Control Level 004 and beyond.

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You must be using one of the following levels of ICSF:

- ICSF FMID HCR77B0 or later.
- ICSF FMID HCR77A1, HCR77A0, HCR7790, or HCR7780 in toleration mode (APAR OA45547) and also have the new function APAR OA44910.

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You must be using one of the following levels of ICSF:

- ICSF FMID HCR77B0 or later.
- ICSF FMID HCR77A1 in toleration mode (APAR OA45547) and also have the new function APAR OA44910.

Note: Modules running in EP11 mode require smart cards to hold administrator certificates and master key material. Smart card readers must be attached to the TKE workstation to administer these host crypto module types.

Some host cryptographic configurations (in other words, specific cryptographic features or combinations of the CEC, host cryptographic module, CCA or EP11 level, and ICSF) require minimum levels of TKE to support the environment.

TKE hardware support and migration information

For information about TKE hardware support and migration, see the following:

- [TKE Hardware Support and Migration Information \(www.ibm.com/support/pages/system/files/inline-files/TECH_DOC_TKE_Hardware_Support_Info_For_TKE_9.2v1.pdf\)](http://www.ibm.com/support/pages/system/files/inline-files/TECH_DOC_TKE_Hardware_Support_Info_For_TKE_9.2v1.pdf)

Chapter 3. Planning for TKE

This topic describes the installation, configuration, and migration actions you need to consider for TKE.

Installation

For information about installing the TKE console, see *Service Guide for Trusted Key Entry Workstations*.

This information applies to the following:

- TKE installation - 7327
- TKE installation - 7382
- TKE installation - 2461 (FC 0097/0080/0085)
- TKE installation - 2461 (FC 0087 and FC 0057)
- TKE installation - 2461 TKE (FC 0098/0081/0086)
- TKE installation - 2461 (FC 0088 and FC 0058)

Configuring the TKE Cryptographic Coprocessor Adapter

For information about configuring the TKE Cryptographic Coprocessor Adapter, see *Service Guide for Trusted Key Entry Workstations*.

TKE upgrade considerations

Considerations before upgrading a TKE or copying data from an existing TKE

- [“DVD-RAM is not supported on a TKE 7.2 or later system” on page 13](#)
- [“Copying files to the TKE 7.0 or TKE 7.1 hard drive” on page 13](#)
- [“Copying files to a USB flash memory drive while on a TKE 7.0 or TKE 7.1 system” on page 14](#)
- [“Preparing for a new TKE local crypto adapter” on page 16](#)

DVD-RAM is not supported on a TKE 7.2 or later system

Important: If you are still using DVD-RAM on a pre-TKE 7.2 system, DVD-RAM is not supported on TKE 7.2 or later systems. If you want to continue to use files that are on your DVD-RAM on a TKE 7.2 or later, you must copy the data from the DVD-RAM before your move to the TKE 7.2 or later system.

Beginning with TKE 7.2, you can no longer read files from a DVD-RAM. Therefore, if you have a DVD-RAM that is formatted for TKEDATA (TKEDATA DVD-RAM) and you want to use the files from the TKEDATA DVD-RAM on a TKE 7.2 or later system, do one of the following procedures:

- Copy the files from the TKEDATA DVD-RAM to the TKE's hard drive before upgrading the TKE to version 7.2 or later. For more information, see [“Copying files to the TKE 7.0 or TKE 7.1 hard drive” on page 13](#).
- Copy the files from the TKEDATA DVD-RAM to a USB flash memory drive that is formatted for TKEDATA from a TKE 7.0 or TKE 7.1 system. For more information, see [“Copying files to a USB flash memory drive while on a TKE 7.0 or TKE 7.1 system” on page 14](#).

Copying files to the TKE 7.0 or TKE 7.1 hard drive

Because DVD-RAM is no longer supported on TKE 7.2 or later systems, perform the following steps if you do not need to use removable media in the future. To copy any files you have on a TKEDATA DVD-RAM to the TKE's hard drive on the TKE 7.0 or TKE 7.1 system before upgrading to TKE 7.2 or later:

1. From the Trusted Key Entry Console on your TKE 7.0 or TKE 7.1 system, open the Trusted Key Entry window pane.
2. Perform the following setup steps for the source DVD-RAM:
 - a. Insert the TKEDATA DVD-RAM into the DVD drive.
 - b. Open the TKE Media Manager utility.

Note: The TKE Media Manager is in the Utilities list on the Trusted Key Entry window pane.
 - c. Select “Activate read only CD/DVD inserted in DVD drive” and press OK.

Note: When complete, the “DVD Drive Status” is “Active (Read Only)”.
 - d. Press Cancel to close the TKE Media Manager.
 - e. Press OK to close the informational warning message. Remember, the DVD drawer will not open until the DVD drive is deactivated.
3. Perform the following steps to copy the files from the DVD-RAM to the TKE 7.0 or TKE 7.1 hard drive:
 - a. Open the TKE File Management Utility.

Note: The TKE File Management Utility is in the Utilities list on the Trusted Key Entry window.
 - b. On the left side of the File Management Utility window, select the CD/DVD Drive radio button.
 - c. On the right side of the File Management Utility window, select the Local Hard Drive radio button.
 - d. Select the files from the CD/DVD Drive file list and use the “Copy ->” button to copy files from the CD/DVD Drive to the local hard drive.

Note: In general, store each file from the TKEDATA DVD-RAM into the directory that the file originally came from. General information about the three most common types of files that are saved on TKEDATA DVD-RAM include:

 - Key part files should be stored in the TKE Data Directory.
 - Profile and role definition files should be stored in the CNM Directory.
 - Data from either of the host migration wizards should be stored in the Configuration Data Directory.

Note: After the files are saved on the TKE 7.0 or TKE 7.1 system, the files are included in the data that is saved and applied when the TKE system is upgraded to TKE 7.2 or later.
4. Perform the following clean-up steps:
 - a. Close the File Management Utility by selecting either “Exit” or “Exit and logoff” to close the TKE application window.
 - b. Open the TKE Media Manager utility.

Note: The TKE Media Manager is in the Utilities list on the Trusted Key Entry window pane.
 - c. Select “Deactivate media inserted into DVD drive” and press OK. When complete, the “DVD Drive Status” is “Deactivated”.
 - d. Remove the TKEDATA DVD-RAM from the DVD drive.

Copying files to a USB flash memory drive while on a TKE 7.0 or TKE 7.1 system

Because DVD-RAM is no longer supported on TKE 7.2 or later systems, perform the following steps if you want to use removable media on a TKE 7.2 or later system. To copy your TKEDATA DVD-RAM files to a USB flash memory drive that is formatted for TKEDATA from a TKE 7.0 or TKE 7.1 system:

1. From the Trusted Key Entry Console on your TKE 7.0 or TKE 7.1 system, open the Trusted Key Entry window pane.
2. Perform the following setup steps for the source DVD-RAM:
 - a. Insert the TKEDATA DVD-RAM into the DVD drive.

- b. Open the TKE Media Manager utility.
Note: The TKE Media Manager is in the Utilities list on the Trusted Key Entry window pane.
 - c. Select “Activate read only CD/DVD inserted in DVD drive” and press OK.
Note: When complete, the “DVD Drive Status” is “Active (Read Only)”.
 - d. Press Cancel to close the TKE Media Manager.
 - e. Press OK to close the informational warning message. Remember, the DVD drawer will not open until the DVD drive is deactivated.
3. Perform the following setup steps for the new USB flash memory removable media:
- a. Insert the USB flash memory drive into any open USB port on the TKE 7.0 or TKE 7.1 workstation and wait for the “USB Device Status” message to appear.
Note:
 - It can take up to 1 minute for the message to appear.
 - You can press OK to close the “USB Device Status” message or wait for it to close in 10 seconds.
 - b. Perform the following steps only if you want to format the USB flash memory drive. Proceed to Step [“4” on page 15](#) if you do not want to format the USB flash memory drive.
The USB flash memory drive must be formatted if:
 - The drive is not formatted for TKEDATA.
 - You want to remove any existing data from the USB flash memory drive before you copy your files.You can use a USB flash memory drive that was formatted for TKEDATA on a TKE 7.2 or later system. To format the USB flash memory drive:
 - i) From the Trusted Key Entry Console on your TKE 7.0 or TKE 7.1 system, open the Service Management window pane.
 - ii) Open the Format Media application.
 - iii) Select the “Trusted Key Entry Data” radio button and press the FORMAT button.
 - iv) Select the radio button for the USB flash memory drive device you want to format and press OK.
 - v) You might receive the “file system setting” window before the confirm format message. If you do, take the default setting and press the FORMAT button.
 - vi) Press YES to confirm that you want to format the media.
 - vii) Press OK to close the completion message.
4. Perform the following steps to copy the files from the TKEDATA DVD-RAM to the USB flash memory drive:
- a. From the Trusted Key Entry Console on your TKE 7.0 or TKE 7.1 system, open the Trusted Key Entry window pane.
 - b. Open the TKE File Management Utility.
Note: The TKE File Management Utility is in the Utilities list on the Trusted Key Entry window.
 - c. On the left side of the File Management Utility window, select the CD/DVD Drive radio button.
 - d. On the right side of the File Management Utility window, select the USB Flash Memory Drive radio button.
 - e. Select the files from the CD/DVD Drive file list and use the “Copy ->” button to copy files from the CD/DVD Drive to the USB flash memory drive.
Important: The directory pull-down menu does not apply to the USB flash memory drive. Do not change the directory or it will also select the Local Hard Drive radio button.
Note: After all the files are stored on the USB flash memory drive:
 - The USB flash memory drive can be used as removable media on any TKE 7.0 or later system.

- You can remove the USB flash memory drive at any time.
5. Perform the following clean-up steps:
 - a. Close the File Management Utility by selecting either “Exit” or “Exit and logoff” to close the TKE application window.
 - b. Open the TKE Media Manager utility.

Note: The TKE Media Manager is in the Utilities list on the Trusted Key Entry window pane.
 - c. Select “Deactivate media inserted into DVD drive” and press OK. When complete, the “DVD Drive Status” is “Deactivated”.
 - d. Remove the TKEDATA DVD-RAM from the DVD drive.

Preparing for a new TKE local crypto adapter

All TKEs have a local crypto adapter. After a TKE has been configured according to your TKE security policy, the TKE local crypto adapter will contain user-defined profiles and sometimes user-defined roles. You might want to configure a new TKE local crypto adapter with an existing set of user-defined roles and user-defined profiles if:

- Your TKE is given a new TKE local crypto adapter as part of an upgrade. For example, an upgrade from TKE 9.2 to TKE 10.0 requires the 4768 TKE crypto adapter to be replaced with the 4770 TKE local crypto adapter.
- You want to configure a new TKE workstation local crypto adapter with the same user-defined roles and user-defined profiles found on an existing TKE local crypto adapter.

You might prefer to manually configure the new TKE local crypto adapter, but there are three methods for creating files with user-defined role and user-defined profile definitions that can be copied and later used to load the roles and profiles onto a new TKE local crypto adapter. The different methods for creating role and profile definition files that can be used to load the roles and profiles onto a TKE local crypto adapter are:

- [“Method 1: Creating TKESavedRoles.dat and TKESavedProfiles.dat files from CNM” on page 16](#)
- [“Method 2: Creating TKESavedRoles.dat and TKESavedProfiles.dat files from the TKE Workstation Setup wizard” on page 16](#)
- [“Method 3: Creating individual user-defined role and user-defined profile definition files” on page 17](#)

Method 1: Creating TKESavedRoles.dat and TKESavedProfiles.dat files from CNM

Beginning in TKE 8.0, the Crypto Node Management utility provides a feature that allows you to collect all the user-defined role and user-defined profile definitions in one operation. If any user-defined roles are found, the definitions are placed in the TKESavedRoles.dat file. If any user-defined profiles are found, the definitions are placed in the TKESavedProfiles.dat file. The following steps can be used to create these files:

1. From the Trusted Key Entry Console, select **Cryptographic Node Management Utility**.
2. Select **Access Control > Save User Roles and Profiles**.

Method 2: Creating TKESavedRoles.dat and TKESavedProfiles.dat files from the TKE Workstation Setup wizard

Beginning in TKE 7.3, the TKESavedRoles.dat and TKESavedProfiles.dat files can be created by a step inside the TKE Workstation Setup wizard. In TKE 7.3, only the tasks in the TKE Workstation setup wizard can use these files. The following steps can be used to create these files:

1. On the source TKE workstation, close all windows except the pre-logon screen. The pre-logon screen has the title Welcome to the Trusted Key Entry Console.
2. Select **Privileged Mode access**.
3. Enter *admin* for the user ID.

4. Enter the password. The default password for the admin user ID is password.
5. From the Trusted Key Entry Console, select **Trusted Key Entry**.
6. Open the **TKE Workstation Setup** wizard.
7. Click **Next** as many times as necessary to skip to the Save User Roles and Profiles task.
8. Select **Yes**.
9. Click **Next** to perform the save.
 - If a file exists, you are asked whether it can be overwritten.
 - You are told if there are no user-defined roles and profiles on your system.
10. Click **Finish** to exit the wizard.

Method 3: Creating individual user-defined role and user-defined profile definition files

In all releases of the TKE, you can use a feature in the Cryptographic Node Management (CNM) utility to create individual role and profile definition files for each of your user-defined roles and profiles on the TKE's local crypto adapter. The files contain all the information that is required to load the roles and profiles onto a TKE's local crypto adapter. You can use the following steps to create individual role and profile definition files. **Note:** Use this method only if you are not on TKE 7.3 or later.

Procedure

1. On the source TKE workstation, from the Trusted Key Entry Console, select **Trusted Key Entry**.
2. Open the **Cryptographic Node Management** utility.
3. Sign on to the TKE crypto adapter if you are prompted to do so.
4. If you do not have customer-defined roles for which you need to create files, skip to step [“7” on page 17](#).
5. **Select Access Control > Roles.**
For each user-defined role:
 - a) Highlight the user-defined role.
 - b) Click **Edit**.
 - c) Click **Save**.
 - d) Enter a file name.
File naming suggestion: Use *role name.rol*.
 - e) Click **Save**.
A message window opens confirming that the role has been saved.
 - f) Click **OK** to close the message window.
 - g) Click **Done** to end the edit session.
6. After the last user-defined role is saved, click **Done**.
7. If you do not have user-defined profiles, skip to step [“10” on page 18](#).
8. For each user-defined profile:
 - a) Select **Access Controls > Profiles**.
 - b) Highlight the user-defined profile.
 - c) Click **Edit**.
 - d) For passphrase profiles, enter a password.
The password does not have to match the password that the profile has on the crypto adapter.
 - e) Click **Save**.
 - f) Enter a file name.
File naming suggestion: Use *profile name.pro*.
 - g) Click **Save**.

A message window opens confirming that the profile has been saved.

h) Click **OK** to close the message window.

i) Click **Done** to end the edit session.

9. After the last user-defined profile is saved, click **Done**.

10. Select **File > Exit** to exit the utility.

TKE (LIC) upgrade paths

Table 8 on page 18 shows which TKE licensed internal code (LIC) can be upgraded to a new LIC level.

Table 8. Summary of when a TKE workstation can be upgraded								
Starting point			Upgradable to TKE LIC level					
TKE release (LIC)	Hard-ware feature code	TKE crypto adapter type	TKE 8.0 (FC 0877)	TKE 8.1 (FC 0878)	TKE 9.0 (FC 0879)	TKE 9.1 (FC 0880)	TKE 9.2 (FC 0881)	TKE 10.0 (FC 0882)
TKE 8.0	0847	4767	Base*	Yes	Yes	Yes	Yes	Yes
TKE 8.1	0847	4767	N/A	Base*	Yes	Yes	Yes	Yes
	0097							
TKE 9.0	0085	4768	N/A	N/A	Base*	Yes	Yes	Yes
	0086							
TKE 9.1	0085	4768	N/A	N/A	N/A	Base*	Yes	Yes
	0086							
TKE 9.2	0085	4768	N/A	N/A	N/A	N/A	Base*	Yes
	0086							
TKE 10.0	0057	4770	N/A	N/A	N/A	N/A	N/A	Base*
	0058							

Base*

The initial TKE LIC level installed on the TKE workstation before it was shipped.

Notes:

- This table only shows the 'new order' hardware feature codes for the TKE. However, sometimes when you upgrade a TKE to a new level, you are assigned a feature code that is not listed in this table. IBM will keep track of this for you.
- In general, a TKE workstation can be upgraded to a new 'point release' simply by loading new TKE LIC code. For example, you can upgrade from TKE 9.1 to TKE 9.2 without any hardware changes.
- In general, the TKE is given a new version number when the TKE's HSM level is changed. Therefore, if you are allowed to upgrade a TKE from one release to another, you will have to purchase a new level of HSM for your TKE workstation. For example, you can upgrade from TKE 9.2 to TKE 10.0 with the purchase of a 4770 HSM for the TKE.

TKE migration actions

Upgrading an existing TKE workstation to TKE 10.0

Notes:

- A TKE can only be upgraded to TKE 10.0 if the TKE feature is assigned to an IBM z14 or later.
- Only TRENTON workstations can be upgraded to TKE 10.0.
- TKE 10.0 firmware is only available on USB media or through a network install.

When you upgrade an existing workstation to TKE 10.0, the TKE licensed internal code (LIC) is updated and a new TKE local crypto adapter is installed in the workstation. Both of these actions are completed by an IBM System Service Representative (SSR). At the end of the process, when the SSR runs the TKE

Workstation Setup wizard, you need to make the necessary customer-based decisions. The following steps are an overview of the entire upgrade process:

1. You need to create the **TKESavedRoles.dat** and **TKESavedProfiles.dat** files that are used to load your roles and profiles onto the new 4770 TKE local crypto adapter that the TKE workstation receives. For instructions on how to create these files, see [“Preparing for a new TKE local crypto adapter” on page 16](#). These files are included in the data that is collected during the save upgrade data.
2. Before the SSR starts the firmware upgrade, the SSR collects customer data on the workstation by using the **Save Upgrade Data** utility. The data is placed on a USB flash memory drive.
3. The SSR powers down the TKE workstation and replaces the 4767crypto adapter with the 4770 crypto adapter.

Notes:

- When the 4767 crypto adapter is replaced with the 4770 crypto adapter, the TKE workstation's feature code also changes.

Table 9. TKE feature code changes	
Starting TKE workstation feature code	New TKE workstation feature code
0097	0080
0098	0081

- Code is not placed on the new 4770 crypto adapter until the TKE Workstation Setup wizard is run.
4. The SSR installs the new TKE firmware on the TKE workstation by using the Install/Recovery procedure.
 5. The SSR reapplies the customer data onto the TKE workstation by using the frame roll installation procedure. The USB flash memory drive with the **saved upgrade data** is used during this procedure. This step also restores the network settings.
 6. The SSR runs the TKE Workstation Setup wizard to complete the workstation setup process. The wizard includes a step for updating the code on the new TKE workstation's local crypto adapter.
 7. During a TKE workstation upgrade, you need to make the following customer configuration decisions. If you are not present when the SSR runs the TKE Workstation Setup wizard, you can run the TKE Workstation Setup wizard on your own. The following are a list of wizard steps that require your attention:

Initialize TKE crypto adapter

The new 4770 TKE local crypto adapter must be initialized. You need to decide whether the TKE local crypto adapter is to be initialized for use with passphrase or smart card profiles.

Note that initializing the TKE local adapter zeroizes the adapter. Initialize the TKE local crypto adapter only one time or when you want to return to a known starting point.

Hints:

- If your user-defined TKE local adapter profiles use the system-supplied roles of TKEUSER or TKEADM, you want to initialize your adapter for use with Passphrase profiles.
- If your user-defined TKE local adapter profiles use the system-supplied roles of SCTKEUSR or SCTKADM, you want to initialize your adapter for use with smart card profiles.

Enable smart card readers

If you use smart cards, select **Yes**.

Customize displayed hash size

If you are subject to any regulations or policies that require you to limit the length of your displayed key verification patterns, you can select a reduced display length.

Load user roles and profiles

In the TKE 10.0 upgrade, the TKE workstation received a new TKE local crypto adapter. Your user-defined roles and profiles need to be loaded onto this new adapter. If you created and saved

the **TKESavedRoles.dat** and **TKESavedProfiles.dat** files, as mentioned in step 1, the wizard finds the files and reloads your roles and profiles.

Note: You must set the passphrase for any passphrase profile you load onto the new TKE crypto adapter.

Add new access control points to your user roles

If you have any user-defined roles, you might need to add new access control points to the roles.

Check TKE crypto adapter group profiles

In the past, it was recommended that members of a TKE local crypto adapter group profile be assigned the role of DEFAULT. TKE now contains the system-supplied role of TKEGRPMB (TKE group member role). The TKEGRPMB role contains only the required ACPs. Checking TKE crypto adapter group profiles determines whether you have any TKE local adapter group profile members with the role of DEFAULT. If you do, the wizard offers you the option to change the member's role to TKEGRPMB.

Save user roles and profiles

If you changed any group member profiles, you might want to save your updated user-defined roles and profiles.

Convert crypto module groups to domain groups

If you have any crypto module groups from a pre-TKE 8.0 system, you can use this utility to create new domain groups based on the existing group definition.

Note: You can do this process only when you are willing and able to open the hosts included in the group. You might want to do the conversion later.

Enroll TKE crypto adapter in a zone

If your TKE was enrolled in a zone before the upgrade, you need to enroll your new 4770 TKE local crypto adapter in your zone. The CA smart card with the zone is required for this operation.

Add migration zone

If you use the Configuration Migration Tasks application, the list of known MCAs was cleared when the new 4770 crypto module was initialized. You need to add your MCAs to your MCA zone list. The MCA smart card or cards are required for this operation.

Add key part holder certificates

The upgrade operation saved and restored customer data. The list of known key part holders (KPHs) is restored. You do not need to add your KPH certificates again.

Change enhanced password encryption policy

The TKE always uses the best available method for protecting the host password during a sign-on operation. When ICSF is at FMID HCR77B0 or later, enhanced password protection is used. You can select a policy that only allows a host sign-on attempt if enhanced password protection is used. IBM recommends that you move to the minimum ICSF level of FMID HCR77B0 and that you select the TKE policy that only allows a sign-on to systems that support enhanced password protection.

Your TKE 10.0 is ready for use when all preceding steps are completed.

TKE host crypto module migration

See [Overview of the IBM TKE host crypto module migration feature \(mediacenter.ibm.com/media/Host+Crypto+Module+Migration+Video+1+-+Overview+of+the+IBM+TKE+Host+Module+Migration+Feature/1_xd0juqn1\)](https://mediacenter.ibm.com/media/Host+Crypto+Module+Migration+Video+1+-+Overview+of+the+IBM+TKE+Host+Module+Migration+Feature/1_xd0juqn1) for information on host crypto module migration.

Chapter 4. Setting up TKE

Use the following sections to set up a TKE workstation:

- “TKE workstation setup and customization” on page 21
- “TKE workstation setup wizard” on page 21
- “TKE best practices” on page 21
 - “Checklist for loading a TKE machine - passphrase” on page 21
 - “Checklist for loading a TKE machine - smart card” on page 23

TKE workstation setup and customization

For information about setting up and customizing the TKE workstation, see *Service Guide for Trusted Key Entry Workstations*.

TKE workstation setup wizard

See Initialize your new Trusted Key Entry (TKE) using the TKE Workstation Setup wizard (mediacenter.ibm.com/media/1_5vrbxdo1) for information about the TKE workstation setup wizard.

TKE best practices

This information describes the setup required for TKE to manage host crypto modules, and a set of setup steps to perform on the TKE workstation. TKE workstations initialized for passphrase and initialized for smart card use are considered separately.

Checklist for loading a TKE machine - passphrase

Expectations

- You are working with CCA host crypto modules
- The support element has enabled TKE on these host crypto modules
- LPARs are established
- TKE licensed internal code (LIC) is loaded on the TKE workstation
- Segments 1, 2, and 3 have been loaded on the TKE workstation crypto adapter
- The TKE host transaction program has been configured and started in the host TKE LPAR
- ICSF is started in each LPAR

Setup

- 2 TKEs both running the same level of software
 - One for production
 - One for backup
- 2 Central electronic complex (CEC) cards being shared
 - One Test LPARs (Domain 0)
 - Three Production LPARs (Domain 1, 2, 3)

TKE can load the master key in a group of domains as defined by a domain group.

- Host TKE LPAR 1

When defining the LPAR activation profile, the usage domain will be 1 and the control domain will be 0, 1, 2, 3.

The following User IDs are used to restrict access to the TKE workstation crypto adapter:

- TKEUSER - can run the main TKE application
- TKEADM - can create and update TKE roles and profiles
- KEYMAN1 - can clear TKE new master keys and load first master key parts
- KEYMAN2 - can load TKE middle and last key parts and reencipher TKE workstation key storage

Authorities are used to restrict access to the CCA crypto modules on the host machine.

One way to control access to CCA host crypto modules is with a minimum of seven host authorities.

- ISSUER
 - Disable host crypto module
 - Enable host crypto module issue
 - Access control issue
 - Zeroize domain issue
 - Domain control change issue
- COSIGN
 - Access control co-sign
 - Enable host crypto module co-sign
 - Zeroize domain co-sign
 - Domain control change co-sign
- MKFIRST
 - AES, DES, ECC (APKA), or RSA load first master key part
 - Clear new master key register
 - Clear old master key register
- MKMIDDLE
 - AES, DES, ECC (APKA), or RSA combine middle master key parts
- MKLAST
 - AES, DES, ECC (APKA), or RSA combine final master key part
 - Set RSA master key
- FIRSTCLEAR
 - Load first operational key part
 - Clear operational key register
- ADDCOMP
 - Load additional operational key part
 - Complete key

The following tasks should be run using the TKE workstation to set up the TKE workstation and the host crypto modules for use. Be aware that the Service Management tasks available to you will vary depending on the console user name you used to log on.

1. Customize Network Settings
2. Customize Console Date/Time
3. Initialize the TKE workstation crypto adapter for passphrase use
 - a. Predefined TKE roles and profiles are loaded.

- b. The TKE master keys are set and TKE key storages are initialized.
- 4. Logon to CNM with KEYMAN1 - OPTIONAL
 - a. Clear the new DES/PKA and AES master key registers
 - b. Enter known first master key parts for the DES/PKA and AES master keys.
 - c. Logoff
- 5. Logon to CNM with KEYMAN2 - OPTIONAL
 - a. Enter known middle and last master key parts for the DES/PKA and AES master keys.
 - b. Reencipher DES, PKA, and AES key storage
 - c. Logoff
- 6. Logon to CNM with TKEADM
 - a. Create user defined roles - OPTIONAL
 - b. Create user defined profiles - OPTIONAL
 - c. Create groups and add users - OPTIONAL
 - Note:** Group members should already be defined.
 - d. Change the passphrases for all of the predefined profiles - TKEADM, TKEUSER, KEYMAN1, and KEYMAN2
- 7. Log on to the main TKE application with TKEUSER profile or another profile with the same authority
 - a. Load the default authority key for key index 0
 - b. Change these options of your security policy via the TKE preferences menu
 - Blind Key Entry
 - Removable media only
 - c. Create a Host
 - d. Create domain groups - OPTIONAL
 - e. Open a host or a domain group (requires host logon)
 - f. Open a crypto module notebook or domain group notebook
 - g. Create role or roles
 - h. Generate authority key or keys and save them to binary file or files
 - i. Create different authorities using the different authority key or keys that were just generated.
 - j. Delete the authority 00 or change the authority key to a key that is not the default key. If you delete authority 00 make sure that you have 2 other known authority keys that have the Domain control change issue and co-sign.
- 8. Configure 3270 Emulators
- 9. Backup Critical Console Data onto a USB flash memory drive.
- 10. Customize Scheduled Operations to schedule the backup critical console data task

Checklist for loading a TKE machine - smart card

Expectations:

- You are working with CCA or EP11 host crypto modules.
- The support element has enabled TKE on these host crypto modules.
- LPARs are established (set up and predefined).
- TKE licensed internal code (LIC) is loaded on the TKE workstation.
- Segments 1, 2, and 3 have been loaded on the TKE workstation crypto adapter.
- The TKE host transaction program has been configured and started in the host TKE LPAR.

- ICSF is started in each LPAR.
- Smart card readers are attached.

Setup

- 2 TKEs both running the same level of software
 - One for production
 - One for backup
- 2 CECs cards being shared
 - One Test LPARs (Domain 0)
 - Three Production LPARs (Domain 1, 2, 3)

TKE can load the master key in a group of domains as defined by a domain group.

- Host TKE LPAR 1

When defining the LPAR activation profile, the usage domain will be 1 and the control domain will be 0, 1, 2, 3.

Profiles and roles are used to restrict access to the TKE workstation crypto adapter. There are two roles, listed below, that are needed to use the TKE and CNM applications. Profiles are created by first generating a crypto adapter logon key and then creating a profile using the crypto adapter logon key.

- SCTKEUSR - can run the main TKE application
- SCTKEADM - can run CNM to create and update TKE roles and profiles

Authorities are used to restrict access to the CCA crypto modules on the host machine.

Administrators are used to restrict access to the EP11 crypto modules on the host machine.

One way to control access to the CCA host crypto modules is with a minimum of seven host authorities.

- ISSUER
 - Disable host crypto module
 - Enable host crypto module issue
 - Access control issue
 - Zeroize domain issue
 - Domain control change issue
- COSIGN
 - Access control co-sign
 - Enable host crypto module co-sign
 - Zeroize domain co-sign
 - Domain control change co-sign
- MKFIRST
 - AES, DES, ECC (APKA), or RSA load first master key part
 - Clear new master key register
 - Clear old master key register
- MKMIDDLE
 - AES, DES, ECC (APKA), or RSA combine middle master key parts
- MKLAST
 - AES, DES, ECC (APKA), or RSA combine final master key part
 - Set RSA master key
- FIRSTCLEAR

- Load first operational key part
- Clear operational key register
- ADDCOMP
 - Load additional operational key part
 - Complete key

The steps to set up the TKE workstation for smart card use are as follows. Be aware that the Service Management tasks available to you will vary depending on the console user name you used to log on.

1. Customize Network Settings.
2. Customize Console Date/Time.
3. Initialize the TKE workstation crypto adapter for smart card use:
 - a. Predefined TKE roles and profiles are loaded.
 - b. The TKE master keys are set and TKE key storages are initialized.
4. Open the SCUP application.
 - a. Create a CA smart card.
 - b. Backup CA smart cards.
 - c. Create TKE smart cards.

Note: In general, smart cards created on a particular TKE release cannot be used on TKE workstations that are at prior release levels. There are exceptions.

- d. Create EP11 smart cards.
 - e. Enroll the TKE workstation crypto adapter with the CA card.
5. Open CNM.

Note: Choose the "Default Logon". The temp default role will be used, and has full access to do everything on the crypto adapter.

- a. Enter known DES/PKA and AES master keys. (Optional)
 - Do this only if you want to have known master keys to use again.
 - b. Reencrypt DES, PKA, and AES key storage. (Optional)
 - Do this only if you entered your own master keys.
 - c. Generate TKE workstation crypto adapter logon keys for each smart card that will be logging on to the TKE or CNM applications.
 - d. Create new profile or profiles for the smart cards under the Access Control menu. The roles for these profiles are loaded in the crypto adapter when TKE's Crypto Adapter Initialization task is run.
 - e. Create group or groups and add users.

Note: Group members should already be defined.
 - f. Load the default role.
 - When the TKE workstation crypto adapter is initialized the TEMPDEFAULT role is loaded. You need to load the DEFAULT role to secure the TKE workstation.
6. Log on to the main TKE application with the SCTKEUSR profile or another profile with the same authority.
 - a. Load the default authority key for key index 0.
 - b. Change these options of your security policy via the TKE preferences menu
 - Blind Key Entry
 - Removable media only
 - c. Create a Host.

- d. Create domain groups. (Optional)
- e. Open a host or a domain group (requires host logon).
- f. Open a crypto module notebook or domain group notebook.
- g. For CCA host crypto modules:
 - i) Create roles.
 - ii) Generate authority keys and save them to TKE smart cards.

Note: You can generate and save 1024-bit and 2048-bit RSA keys and BP-320 ECC keys on TKE smart cards. Authorities with 2048-bit RSA keys are supported starting with the CEX3C. Authorities with BP-320 ECC keys are supported starting with the CEX5C.
 - iii) Create different authorities using the different authority keys that were just generated.
 - iv) Delete the authority 00 or change the authority key to a key that is not the default key. If you delete authority 00 make sure that you have 2 other known authority keys that have the Domain control change issue and cosign.
- h. For EP11 host crypto modules:
 - i) Generate administrator keys and save them to EP11 smart cards.
 - ii) Zeroize the host crypto module or the set of domains you want to administer. Zeroizing a host crypto module or domain puts it in "imprint mode", where administrators can be added without using signed commands.
 - iii) Add crypto module and domain administrators.
 - iv) Set the signature threshold and revocation signature threshold on each crypto module and domain. This ends imprint mode.
- 7. Configure 3270 Emulators.
- 8. Backup Critical Console Data.
- 9. Customize Scheduled Operations to schedule the backup critical console data task.

Chapter 5. Roadmap for HSM management from the TKE application for IBM Z and IBM LinuxONE servers

Whether you are new to HSM (Hardware Security Module) management from the TKE application or a long-time TKE user, the following activities are required when managing HSMs from a TKE. Most of the activities are IBM Z and IBM LinuxONE independent. The operating system specific activities (z/OS or Linux on IBM Z or IBM LinuxONE) are shown before the step where the TKE actually connects to the LPAR where the HSMs are located.

Note: Those operating system specific activities (z/OS or Linux on IBM Z or IBM LinuxONE) can be done before any TKE application activity is completed if you want.

For additional HSM information, see [Introduction to Trusted Key Entry \(mediacenter.ibm.com/media/1_csb6z99p\)](https://mediacenter.ibm.com/media/1_csb6z99p). This video discusses the importance of HSMs and the role TKE has in helping you manage your HSMs.

For an overview of the video series about the activities required to load master keys from the TKE product, see [Trusted Key Entry \(TKE\) CCA Playlist \(mediacenter.ibm.com/media/1_tcn7d7qj\)](https://mediacenter.ibm.com/media/1_tcn7d7qj).

Table 10. Managing HSMs from a TKE application		
Required for z/OS	Required for Linux on IBM Z or IBM LinuxONE	Required activities when managing HSMs from a TKE application
Yes	Yes	<p>Use the TKE Workstation setup wizard to perform the initial TKE workstation setup activities.</p> <p>Notes:</p> <ul style="list-style-type: none">• Complete the initial TKE workstation setup activities before initializing your smart cards because there are tasks that must be completed before you can open the smart card utility program.• If you are a first time user and you have to create all your smart cards, you can do this task before or after you create your smart card environment. <p>For additional information, see Initialize your new Trusted Key Entry (TKE) using the TKE Workstation Setup wizard (mediacenter.ibm.com/media/1_5vrboxdo1). This video shows you how to setup your TKE workstation using the TKE Workstation setup wizard.</p>
Yes	Yes	<p>Use the TKE smart card wizard to initialize your smart cards.</p> <p>Note: If you are an established TKE user, you may already have your smart card environment and would not need to do this activity.</p> <p>For additional information, see Using Trusted Key Entry (TKE) to initialize smart cards (mediacenter.ibm.com/media/1_tq4cfu63). This video shows you how to initialize all the smart card you will need to access your TKE workstation and manage CCA host crypto module and domains.</p>

Table 10. Managing HSMs from a TKE application (continued)

Required for z/OS	Required for Linux on IBM Z or IBM LinuxONE	Required activities when managing HSMs from a TKE application
Yes	Yes	<p>Use the TKE Workstation Logon Profile wizard to perform the user profile administration activity on the TKE workstation.</p> <p>For additional information, see Create TKE local crypto adapter profiles using the TKE Workstation Logon Profile wizard (mediacenter.ibm.com/media/1_btlnb4g). This video shows you how to create the profiles you need to access your TKE workstation. These profiles are used when you open TKE applications and utilities.</p>
Yes	No	Setup and start the TKE Host Transaction Program (TKE HTP) on the LPARs you want the TKE to work through and point to specific zOS activities.
No	Yes	Setup and start the TKE Host Transaction Program (TKE HTP) on the LPARs you want the TKE to work through and point to specific Linux on IBM Z or IBM LinuxONE activities.
Yes	Yes	<p>Create host definitions on the TKE application. These are objects with enough network information to reach the TKE Host Transaction Program (TKE HTP) that is running on either zOS or Linux.</p> <p>Note: TKE is not aware of which operating system is being used by the LPAR.</p> <p>For additional information, see Create and open Trusted Key Entry (TKE) host definitions (mediacenter.ibm.com/media/1_l0yq9j7n). This video shows you how to create host definition objects. These are used to access the LPARs or systems that are running the TKE host transaction program. You open a host to access the IBM Z and LinuxONE modules you will manage from the TKE.</p>
Yes	Yes	<p>Create domain group definitions on the TKE application. These are objects that identify which domains will share the same settings. You select three items when you pick a domain:</p> <ol style="list-style-type: none"> 1. The LPAR where the HSM is found. 2. The HSM with the domain. 3. The domain on the HSM. <p>Any number of LPARs, HSMs, and domains can be included in a domain group.</p> <p>For additional information about creating CCA domain groups, see Create and open Trusted Key Entry (TKE) CCA domain groups (mediacenter.ibm.com/media/1_3eujuv5g). This video shows you how to create CCA domain groups. These are collections of modules and domains that will have the same administrative settings. From a domain group, every module-wide command is sent to every module included in the group. Every domain-specific command is sent to every domain included in the group.</p> <p>For additional information about creating EP11 domain groups, see Create and Open Trusted Key Entry (TKE) EP11 Domain Groups (mediacenter.ibm.com/media/1_7dp6g7pq). This video shows you how to create EP11 domain groups. These are collections of HSMs and domains that will have the same administrative settings. From a domain group, every HSM-wide command is sent to every HSM included in the group. Every domain-specific command is sent to every domain included in the group.</p>

Table 10. Managing HSMs from a TKE application (continued)

Required for z/OS	Required for Linux on IBM Z or IBM LinuxONE	Required activities when managing HSMs from a TKE application
Yes	Yes	<p>Generate master key parts. These are stored on smart cards.</p> <p>For additional information about creating CCA Master Key parts, see Creating CCA master key parts using the 'Generate a Set of Master Key Parts' feature of Trusted Key Entry (TKE) (mediacenter.ibm.com/media/1_2q4wytv4). This video shows you how to create CCA master key parts. The video uses the “Generate a Set of Master Key Parts” function of the TKE. This is the easiest and most efficient way to generate new master key parts.</p> <p>For additional information about creating EP11 master key parts, see Creating EP11 Master Key Parts (mediacenter.ibm.com/media/1_357la25o). This video shows you how to create EP11 Master Wrapping key parts and backup EP11 smart card data.</p>
Yes	Yes	<p>Perform user administration on the HSMs you want to manage. This is normally done through a domain group.</p> <ul style="list-style-type: none"> • HSM-wide commands are sent to every HSM included in the group. • Domain-specific commands are sent to every domain in the group. <p>There are lots of wizards for doing this activity. Depending on your situation, you may need to use one or more of these wizards:</p> <ul style="list-style-type: none"> • CCA: Setup module policy (For CCA normal mode HSM management). • CCA: Setup PCI Environment (For a CCA domain that will be put in PCI mode). • EP11: Setup module policy (For EP11 HSM-wide administration). • EP11: Setup domain policy (For EP11 Domain-specific administration). <p>For additional information about managing CCA HSM with domains in normal mode, see Creating roles and profiles for managing CCA modules using the Trusted Key Entry (TKE) Setup Module Policy wizard (mediacenter.ibm.com/media/1_igid8h1r). This video shows you how to create roles and profiles used to control who can manage the administrative setting of your CCA modules and domains. The user management activities are done using the CCA Setup Module Policy wizard.</p> <p>For additional information about managing EP11 HSMs and domains, see Setup EP11 HSM and Domain Management Policies (mediacenter.ibm.com/media/1_qot1s0zm). This video shows you how to use the EP11 Setup Module Policy and EP11 Setup Domain Policy wizards to define EP11 administrators and to take EP11 HSMs and domain out of imprint mode. This must be done before you can load your master wrapping key.</p>

Table 10. Managing HSMs from a TKE application (continued)

Required for z/OS	Required for Linux on IBM Z or IBM LinuxONE	Required activities when managing HSMs from a TKE application
Yes	Yes	<p>Perform a master key load ceremony. This is normally done through a domain group.</p> <ul style="list-style-type: none"> Domain-specific commands are sent to every domain in the group. <p>There are CCA and EP11 wizard-like features to guide you through the process.</p> <p>For additional information about loading Master Keys into CCA HSMs, see Loading CCA master key parts using the “Load All New Master Keys” feature of Trusted Key Entry (TKE) (mediacenter.ibm.com/media/1_zo63p677). This video shows you how to load CCA master key parts. The demonstration shows you how to load 3-part master keys. However, it does tell you how to load a 2-part master key. The video uses the “Load All New Master Keys” function of the TKE. This is the easiest and most efficient way to load master keys.</p> <p>For additional information about loading master keys into EP11 HSMs, see Load and Commit EP11 Master Keys (mediacenter.ibm.com/media/1_6pbvvmjz). This video shows you load and commit the EP11 Master Wrapping key.</p>
Yes	Yes	<p>Manage non-master key HSM setting if necessary. This is normally done through a domain group.</p> <ul style="list-style-type: none"> HSM-wide commands are sent to every HSM included in the group. Domain-specific commands are sent to every domain in the group. <p>The most common things changed are:</p> <ul style="list-style-type: none"> EP11: Domain control points (The list of services, key strengths, and algorithms that applications are allowed to use). CCA: Domain controls (The list of services, key strengths, and algorithms that applications are allowed to use).

Appendix A. Other resources

Here are other resources that will help you learn more about TKE.

[Initialize your new Trusted Key Entry \(TKE\) using the TKE Workstation Setup wizard \(mediacenter.ibm.com/media/1_5vrbxdo1\)](https://mediacenter.ibm.com/media/1_5vrbxdo1): This video shows you how to setup your TKE workstation using the Trusted Key Entry Workstation Setup Wizard.

[IBM TKE easy way to migrate or clone a TKE workstation \(mediacenter.ibm.com/media/IBM+TKE+Easy+Way+to+Migrate+or+Clone+a+TKE+Workstation/1_5ihmp5sq\)](https://mediacenter.ibm.com/media/IBM+TKE+Easy+Way+to+Migrate+or+Clone+a+TKE+Workstation/1_5ihmp5sq): This video shows you how to migrate or clone a TKE workstation.

[Trusted Key Entry \(TKE\) CCA Playlist \(mediacenter.ibm.com/media/1_tcn7d7qj\)](https://mediacenter.ibm.com/media/1_tcn7d7qj): An 8-video series that shows you everything you need to do in order to load master keys from the TKE product.

[Overview of the IBM TKE host crypto module migration feature \(mediacenter.ibm.com/media/Host+Crypto+Module+Migration+Video+1+-+Overview+of+the+IBM+TKE+Host+Module+Migration+Feature/1_xd0juqn1\)](https://mediacenter.ibm.com/media/Host+Crypto+Module+Migration+Video+1+-+Overview+of+the+IBM+TKE+Host+Module+Migration+Feature/1_xd0juqn1): This video provides an introduction to the host crypto module migration feature of the IBM Trusted Key Entry (TKE).

[Using Trusted Key Entry \(TKE\) to initialize smart cards \(mediacenter.ibm.com/media/1_tq4cfu63\)](https://mediacenter.ibm.com/media/1_tq4cfu63): This video shows you how to initialize all the smart card you will need to access your TKE workstation and manage CCA host crypto module and domains.

[Create TKE local crypto adapter profiles using the TKE Workstation Logon Profile wizard \(mediacenter.ibm.com/media/1_btlonb4g\)](https://mediacenter.ibm.com/media/1_btlonb4g): This video shows you how to create the profiles you need to access your TKE workstation. These profiles are used when you open TKE applications and utilities.

[Create and open Trusted Key Entry \(TKE\) host definitions \(mediacenter.ibm.com/media/1_l0yq9j7n\)](https://mediacenter.ibm.com/media/1_l0yq9j7n)

[Create and open Trusted Key Entry \(TKE\) CCA domain groups \(mediacenter.ibm.com/media/1_3eujuv5g\)](https://mediacenter.ibm.com/media/1_3eujuv5g)

[Creating roles and profiles for managing CCA modules using the Trusted Key Entry \(TKE\) Setup Module Policy wizard \(mediacenter.ibm.com/media/1_igid8h1r\)](https://mediacenter.ibm.com/media/1_igid8h1r)

[Creating CCA master key parts using the 'Generate a Set of Master Key Parts' feature of Trusted Key Entry \(TKE\) \(mediacenter.ibm.com/media/1_2q4wytv4\)](https://mediacenter.ibm.com/media/1_2q4wytv4)

[Loading CCA master key parts using the "Load All New Master Keys" feature of Trusted Key Entry \(TKE\) \(mediacenter.ibm.com/media/1_zo63p677\)](https://mediacenter.ibm.com/media/1_zo63p677)

IBM techdoc on TKE hardware support and migration:

- [TKE Hardware Support and Migration Information \(www.ibm.com/support/pages/system/files/inline-files/TECH_DOC_TKE_Hardware_Support_Info_For_TKE_9.2v1.pdf\)](http://www.ibm.com/support/pages/system/files/inline-files/TECH_DOC_TKE_Hardware_Support_Info_For_TKE_9.2v1.pdf)

z/OS publications updated in support of TKE:

- [z/OS 3.1 ICSF pubs \(www.ibm.com/docs/en/zos/3.1.0?topic=zos-cryptographic-services\)](http://www.ibm.com/docs/en/zos/3.1.0?topic=zos-cryptographic-services)
- [z/OS V2R5 ICSF pubs \(www.ibm.com/docs/en/zos/2.5.0?topic=zos-cryptographic-services\)](http://www.ibm.com/docs/en/zos/2.5.0?topic=zos-cryptographic-services)
- [z Systems Processor Resource/Systems Manager Planning Guide \(www.ibm.com/support/pages/z-systems-processor-resourcesystems-manager-planning-guide-0\)](http://www.ibm.com/support/pages/z-systems-processor-resourcesystems-manager-planning-guide-0)

Appendix B. Accessibility

Accessible publications for this product are offered through [IBM Documentation for z/OS \(www.ibm.com/docs/en/zos\)](http://www.ibm.com/docs/en/zos).

If you experience difficulty with the accessibility of any z/OS documentation see [How to Send Feedback to IBM](#) to leave documentation feedback.

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- For information about software support lifecycle, see: [IBM Lifecycle Support for z/OS \(www.ibm.com/software/support/systemsz/lifecycle\)](http://www.ibm.com/software/support/systemsz/lifecycle)
- For information about currently-supported IBM hardware, contact your IBM representative.

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