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Extensions for Financial Services (XFS) interface specification - Release 3.0 - Part 6: Pin Keypad Device Class Interface

This CEN Workshop Agreement can in no way be held as being an official standard as developed by CEN National Members.

Ref. No CWA 14050-6:2000 E

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Foreword

This CWA is revision 3.0 of the XFS interface specification.

The move from an XFS 2.0 specification (CWA 13449) to a 3.0 specification has been prompted by a series of factors.

Initially, there has been a technical imperative to extend the scope of the existing specification of the XFS Manager to include new devices, such as the Card Embossing Unit.

Similarly, there has also been pressure, through implementation experience and the advance of the Microsoft technology, to extend the functionality and capabilities of the existing devices covered by the specification.

Finally, it is also clear that our customers and the market are asking for an update to a specification, which is now over 2 years old. Increasing market acceptance and the need to meet this demand is driving the Workshop towards this release.

The clear direction of the CEN/ISSS XFS Workshop, therefore, is the delivery of a new Release 3.0 specification based on a C API. It will be delivered with the promise of the protection of technical investment for existing applications and the design to safeguard future developments.

The CEN/ISSS XFS Workshop gathers suppliers as well as banks and other financial service companies. A list of companies participating in this Workshop and in support of this CWA is available from the CEN/ISSS Secretariat.

This CWA was formally approved by the XFS Workshop meeting on 2000-10-18. The specification is continuously reviewed and commented in the CEN/ISSS Workshop on XFS. It is therefore expected that an update of the specification will be published in due time as a CWA, superseding this revision 3.0.

The CWA is published as a multi-part document, consisting of:

Part 1: Application Programming Interface (API) - Service Provider Interface (SPI); Programmer's Reference

Part 2: Service Classes Definition; Programmer's Reference

Part 3: Printer Device Class Interface - Programmer's Reference

Part 4: Identification Card Device Class Interface - Programmer's Reference

Part 5: Cash Dispenser Device Class Interface - Programmer's Reference

Part 6: PIN Keypad Device Class Interface - Programmer's Reference

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Part 12: Camera Device Class Interface - Programmer's Reference

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Part 14: Card Embossing Unit Class Interface - Programmer's Reference

Part 15: Cash In Module Device Class Interface- Programmer's Reference

Part 16: Application Programming Interface (API) - Service Provider Interface (SPI) - Migration from Version 2.0 (see CWA 13449) to Version 3.0 (this CWA) - Programmer's Reference

Part 17: Printer Device Class Interface - Migration from Version 2.0 (see CWA 13449) to Version 3.0 (this CWA) - Programmer's Reference

Part 18: Identification Card Device Class Interface - Migration from Version 2.0 (see CWA 13449) to Version 3.0 (this CWA) - Programmer's Reference

Part 19: Cash Dispenser Device Class Interface - Migration from Version 2.0 (see CWA 13449) to Version 3.0 (this CWA) - Programmer's Reference

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Part 24: Camera Device Class Interface - Migration from Version 2.0 (see CWA 13449) to Version 3.0 (this CWA) - Programmer's Reference

Part 25: Identification Card Device Class Interface - PC/SC Integration Guidelines

In addition to these Programmer's Reference specifications, the reader of this CWA is also referred to a complementary document, called Release Notes. The Release Notes contain clarifications and explanations on the CWA specifications, which are not requiring functional changes. The current version of the Release Notes is available online from http://www.cenorm.be/isss/Workshop/XFS.

The information in this document represents the Workshop's current views on the issues discussed as of the date of publication. It is furnished for informational purposes only and is subject to change without notice. CEN/ISSS makes no warranty, express or implied, with respect to this document.

Revision History:

1.0	May 24, 1993	Initial release of API and SPI specification
1.11	February 3, 1995	Separation of specification into separate documents for API/SPI and service class definitions
2.00	November 11, 1996	Update release encompassing the self-service environment
3.00	October 18, 2000	Update release encompassing: - new commands to support the German ZKA chip card standard – support of Banksys Security Control Module - Added clarification note for Pin format 3624 - Added WFS_CMD_PIN_ENC_IO, which is currently used for the swiss proprietary protocol only. - Double and triple zero clarification in WFS_CMD_PIN_GET_DATA - key deletion in WFS_CMD_PIN_IMPORT_KEY inserted. For a detailed description see CWA 14050-20 PIN Migration from Version 2.00 to Version 3.00, Revision 1.00, October 18, 2000.

1. Introduction

1.1 Background to Release 3.0

The CEN XFS Workshop is a continuation of the Banking Solution Vendors Council workshop and maintains a technical commitment to the Win 32 API. However, the XFS Workshop has extended the franchise of multi vendor software by encouraging the participation of both banks and vendors to take part in the deliberations of the creation of an industry standard. This move towards opening the participation beyond the BSVC's original membership has been very succesful with a current membership level of more than 20 companies.

The fundamental aims of the XFS Workshop are to promote a clear and unambiguous specification for both service providers and application developers. This has been achieved to date by sub groups working electronically and quarterly meetings.

The move from an XFS 2.0 specification to a 3.0 specification has been prompted by a series of factors. Initially, there has been a technical imperative to extend the scope of the existing specification of the XFS Manager to include new devices, such as the Card Embossing Unit.

Similarly, there has also been pressure, through implementation experience and the advance of the Microsoft technology, to extend the functionality and capabilities of the existing devices covered by the specification.

Finally, it is also clear that our customers and the market are asking for an update to a specification, which is now over 2 years old. Increasing market acceptance and the need to meet this demand is driving the Workshop towards this release.

The clear direction of the XFS Workshop, therefore, is the delivery of a new Release 3.0 specification based on a C API. It will be delivered with the promise of the protection of technical investment for existing applications and the design to safeguard future developments.

1.2 XFS Service-Specific Programming

The service classes are defined by their service-specific commands and the associated data structures, error codes, messages, etc. These commands are used to request functions that are specific to one or more classes of service providers, but not all of them, and therefore are not included in the common API for basic or administration functions.

When a service-specific command is common among two or more classes of service providers, the syntax of the command is as similar as possible across all services, since a major objective of the Extensions for Financial Services is to standardize command codes and structures for the broadest variety of services. For example, using the **WFSExecute** function, the commands to read data from various services are as similar as possible to each other in their syntax and data structures.

In general, the specific command set for a service class is defined as the union of the specific capabilities likely to be provided by the developers of the services of that class; thus any particular device will normally support only a subset of the defined command set.

There are three cases in which a service provider may receive a service-specific command that it does not support:

- The requested capability is defined for the class of service providers by the XFS specification, the particular vendor implementation of that service does not support it, and the unsupported capability is ***not*** considered to be fundamental to the service. In this case, the service provider returns a successful completion, but does no operation. An example would be a request from an application to turn on a control indicator on a passbook printer; the service provider recognizes the command, but since the passbook printer it is managing does not include that indicator, the service provider does no operation and returns a successful completion to the application.
- The requested capability is defined for the class of service providers by the XFS specification, the particular vendor implementation of that service does not support it, and the unsupported capability ***is*** considered to be fundamental to the service. In this case, a WFS_ERR_UNSUPP_COMMAND error is returned to the calling

application. An example would be a request from an application to a cash dispenser to dispense coins; the service provider recognizes the command but, since the cash dispenser it is managing dispenses only notes, returns this error.

- The requested capability is ***not*** defined for the class of service providers by the XFS specification. In this case, a WFS_ERR_INVALID_COMMAND error is returned to the calling application .

This design allows implementation of applications that can be used with a range of services that provide differing subsets of the functionalities that are defined for their service class. Applications may use the **WFSGetInfo** and **WFSAsyncGetInfo** commands to inquire about the capabilities of the service they are about to use, and modify their behavior accordingly, or they may use functions and then deal with WFS_ERR_UNSUPP_COMMAND error returns to make decisions as to how to use the service.

2. Personal Identification Number (PIN) Keypads

This section describes the application program interface for personal identification number keypads (PIN pads) and other encryption/decryption devices. This description includes definitions of the service-specific commands that can be issued, using the **WFSAsyncExecute**, **WFSExecute**, **WFSGetInfo** and **WFSAsyncGetInfo** functions.

This section describes the general interface for the following functions:

- Administration of encryption devices
- Loading of encryption keys
- Encryption / decryption
- Entering Personal Identification Numbers (PINs)
- PIN verification
- PIN block generation (encrypted PIN)
- Clear text data handling
- Function key handling
- PIN presentation to chipcard
- Read and write safety critical Terminal Data from/to HSM
- HSM and Chipcard Authentication

If the PIN Pad device has local display capability, display handling should be handled using the Text Terminal Unit (TTU) interface.

The adoption of this specification does not imply the adoption of a specific security standard.

Important Notes:

- This revision of this specification does not define key management procedures; key management is vendor-specific.
- Key space management is customer-specific, and is therefore handled by vendor-specific mechanisms.
- Only numeric PIN pads are handled in this specification.

This specification also supports the Hardware Security Module (HSM), which is necessary for the German ZKA Electronic Purse transactions. Furthermore the HSM stores terminal specific data.
This data will be compared against the message data fields (Sent and Received ISO8583 messages) prior to HSM-MAC generation/verification. HSM-MACs are generated/verified only if the message fields match the data stored.

Keys used for cryptographic HSM functions are stored separate from other keys. This must be considered when importing keys.

This version of PinPad complies to the current ZKA specification 3.0. It supports loading and unloading against card account for both card types (Type 0and Type 1) of the ZKA electronic purse. It also covers the necessary functionality for ‘Loading against other legal tender’.

Key values are passed to the API as binary hexadecimal values, for example:

0123456789ABCDEF = 0x01 0x23 0x45 0x67 0x89 0xAB 0xCD 0xEF

3. References

1. XFS Application Programming Interface (API)/Service Provider Interface (SPI), Programmer's Reference Revision 3.00, October 18, 2000

4. Info Commands

4.1 WFS_INF_PIN_STATUS

Description The WFS_INF_PIN_STATUS command returns several kinds of status information.

Input Param None.

Output Param

```
LPWFSPINSTATUS      lpStatus;

typedef struct _wfs_pin_status
    {
    WORD            fwDevice;
    WORD            fwEncStat;
    LPSTR           lpszExtra;
    } WFSPINSTATUS, * LPWFSPINSTATUS;
```

fwDevice
Specifies the state of the PIN pad device as one of the following flags:

Value	Meaning
WFS_PIN_DEVONLINE	The device is online (i.e. powered on and operable).
WFS_PIN_DEVOFFLINE	The device is offline (e.g., the operator has taken the device offline by turning a switch or pulling out the device).
WFS_PIN_DEVPOWEROFF	The device is powered off or physically not connected.
WFS_PIN_DEVNODEVICE	There is no device intended to be there; e.g. this type of self service machine does not contain such a device or it is internally not configured.
WFS_PIN_DEVHWERROR	The device is inoperable due to a hardware error.
WFS_PIN_DEVUSERERROR	The device is present but a person is preventing proper device operation.
WFS_PIN_DEVBUSY	The device is busy and unable to process an execute command at this time.

fwEncStat
Specifies the state of the Encryption Module as one of the following flags:

Value	Meaning
WFS_PIN_ENCREADY	The encryption module is initialized and ready (at least one key is imported into the encryption module).
WFS_PIN_ENCNOTREADY	The encryption module is not ready.
WFS_PIN_ENCNOTINITIALIZED	The encryption module is not initialized (no master key loaded).
WFS_PIN_ENCBUSY	The encryption module is busy (implies that the device is busy).
WFS_PIN_ENCUNDEFINED	The encryption module state is undefined.
WFS_PIN_ENCINITIALIZED	The encryption module is initialized and master key (where required) and any other initial keys are loaded; ready to import other keys.

lpszExtra
Specifies a list of vendor-specific, or any other extended, information. The information is returned as a series of "*key=value*" strings so that it is easily extendable by service providers. Each string will be null-terminated, with the final string terminating with two null characters.

Error Codes Only the generic error codes defined in [Ref. 1] can be generated by this command.

Comments Applications which require or expect specific information to be present in the *lpszExtra* parameter may not be device or vendor-independent.

4.2 WFS_INF_PIN_CAPABILITIES

Description This command is used to retrieve the capabilities of the PIN pad.

Input Param None.

Output Param

```
LPWFSPINCAPS lpCaps;

typedef struct _wfs_pin_caps
   {
   WORD          wClass;
   WORD          fwType;
   BOOL          bCompound;
   USHORT        usKeyNum;
   WORD          fwAlgorithms;
   WORD          fwPinFormats;
   WORD          fwDerivationAlgorithms;
   WORD          fwPresentationAlgorithms;
   WORD          fwDisplay;
   BOOL          bIDConnect;
   WORD          fwIDKey;
   WORD          fwValidationAlgorithms;
   WORD          fwKeyCheckModes;
   LPSTR         lpszExtra;
   } WFSPINCAPS, * LPWFSPINCAPS;
```

wClass
Specifies the logical service class, value is:
WFS_SERVICE_CLASS_PIN

fwType
Specifies the type of the PIN pad security module as a combination of the following flags. PIN entry is only possible when at least WFS_PIN_TYPEEPP and WFS_PIN_TYPEEDM are set. In order to use the ZKA-Electronic purse, all flags must be set.

Value	Meaning
WFS_PIN_TYPEEPP	electronic PIN pad (keyboard data entry device)
WFS_PIN_TYPEEDM	encryption/decryption module
WFS_PIN_TYPEHSM	hardware security module (electronic PIN pad and encryption module within the same physical unit)

bCompound
Specifies whether the logical device is part of a compound physical device and is either TRUE or FALSE.

usKeyNum
Number of the keys which can be stored in the encryption/decryption module.

fwAlgorithms
Supported encryption modes; a combination of the following flags:

Value	Meaning
WFS_PIN_CRYPTDESECB	Electronic Code Book
WFS_PIN_CRYPTDESCBC	Cipher Block Chaining
WFS_PIN_CRYPTDESCFB	Cipher Feed Back
WFS_PIN_CRYPTRSA	RSA Encryption
WFS_PIN_CRYPTECMA	ECMA Encryption
WFS_PIN_CRYPTDESMAC	MAC calculation using CBC
WFS_PIN_CRYPTTRIDESECB	Triple DES with Electronic Code Book
WFS_PIN_CRYPTTRIDESCBC	Triple DES with Cipher Block Chaining
WFS_PIN_CRYPTTRIDESCFB	Triple DES with Cipher Feed Back
WFS_PIN_CRYPTTRIDESMAC	Triple DES MAC calculation using CBC

fwPinFormats

Supported PIN formats; a combination of the following flags:

Value	Meaning
WFS_PIN_FORM3624	PIN left justified, filled with padding characters, PIN length 4-16 digits. The Padding Character is a Hexadecimal Digit in the range 0x00 to 0x0F.
WFS_PIN_FORMANSI	PIN is preceded by 0x00 and the length of the PIN (0x04 to 0x0C), filled with padding character 0x0F to the right, PIN length 4-12 digits, XORed with PAN (Primary Account Number, minimum 12 digits without check number)
WFS_PIN_FORMISO0	PIN is preceded by 0x00 and the length of the PIN (0x04 to 0x0C), filled with padding character 0x0F to the right, PIN length 4-12 digits, XORed with PAN (Primary Account Number, no minimum length specified, missing digits are filled with 0x00)
WFS_PIN_FORMISO1	PIN is preceded by 0x01 and the length of the PIN (0x04 to 0x0C), padding characters are taken from a transaction field (10 digits).
WFS_PIN_FORMECI2	(similar to WFS_PIN_FORM3624), PIN only 4 digits
WFS_PIN_FORMECI3	PIN is preceded by the length (digit), PIN length 4-6 digits, the padding character can range from X'0' through X'F'.
WFS_PIN_FORMVISA	PIN is preceded by the length (digit), PIN length 4-6 digits. If the PIN length is less than six digits the PIN is filled with X'0' to the length of six, the padding character can range from X ' 0 ' through X ' 9 ' (This format is also referred to as VISA2).
WFS_PIN_FORMDIEBOLD	PIN is padded with the padding character and may be not encrypted, single encrypted or double encrypted.
WFS_PIN_FORMDIEBOLDCO	PIN with the length of 4 to 12 digits, each one with a value of X'0' to X'9', is preceded by the one-digit coordination number with a value from X'0' to X'F', padded with the padding character with a value from X'0' to X'F' and may be not encrypted, single encrypted or double encrypted.
WFS_PIN_FORMVISA3	PIN with the length of 4 to 12 digits, each one with a value of X'0' to X'9', is followed by a delimiter with the value of X'F' and then padded by the padding character with a value between X'0' to X'F'.
WFS_PIN_FORMBANKSYS	PIN is encrypted and formatted according to the Banksys Pin Block specifications.

fwDerivationAlgorithms

Supported derivation algorithms; a combination of the following flags:

Value	Meaning
WFS_PIN_CHIP_ZKA	Algorithm for the derivation of a chip card individual key as described by the German ZKA.

fwPresentationAlgorithms

Supported presentation algorithms; a combination of the following flags:

Value	Meaning
WFS_PIN_PRESENT_CLEAR	Algorithm for the presentation of a clear text PIN to a chipcard.

fwDisplay

Specifies the type of the display used in the PIN pad module as one of the following flags:

Value	Meaning
WFS_PIN_DISPNONE	no display unit
WFS_PIN_DISPLEDTHROUGH	lights next to text guide user

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