

**CEN**

**CWA 16926-63**

**WORKSHOP**

February 2020

**AGREEMENT**

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English version

**Extensions for Financial Services (XFS) interface  
specification Release 3.40 - Part 63: Identification Card  
Device Class Interface - Migration from version 3.30 (CWA  
16926) to Version 3.40 (this CWA) - Programmer's  
Reference**

This CEN Workshop Agreement has been drafted and approved by a Workshop of representatives of interested parties, the constitution of which is indicated in the foreword of this Workshop Agreement.

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Ref. No.:CWA 16926-63:2020 E

# Table of Contents

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|   |           |
|---|-----------|
| European Foreword.....  | 4         |
| <b>1. Migration Information.....</b>                          | <b>8</b>  |
| <b>2. Identification Card Readers and Writers .....</b>       | <b>9</b>  |
| 2.1 Support for EMV Intelligent Contactless Card Readers..... | 10        |
| <b>3. References .....</b>                                    | <b>12</b> |
| <b>4. Info Commands .....</b>                                 | <b>13</b> |
| 4.1 WFS_INF_IDC_STATUS.....                                   | 13        |
| 4.2 WFS_INF_IDC_CAPABILITIES .....                            | 19        |
| 4.3 WFS_INF_IDC_FORM_LIST.....                                | 24        |
| 4.4 WFS_INF_IDC_QUERY_FORM.....                               | 25        |
| 4.5 WFS_INF_IDC_QUERY_IFM_IDENTIFIER.....                     | 27        |
| 4.6 WFS_INF_IDC_EMVCLESS_QUERY_APPLICATIONS .....             | 28        |
| <b>5. Execute Commands .....</b>                              | <b>29</b> |
| 5.1 WFS_CMD_IDC_READ_TRACK.....                               | 29        |
| 5.2 WFS_CMD_IDC_WRITE_TRACK .....                             | 31        |
| 5.3 WFS_CMD_IDC_EJECT_CARD.....                               | 33        |
| 5.4 WFS_CMD_IDC_RETAIN_CARD.....                              | 35        |
| 5.5 WFS_CMD_IDC_RESET_COUNT .....                             | 36        |
| 5.6 WFS_CMD_IDC_SETKEY .....                                  | 37        |
| 5.7 WFS_CMD_IDC_READ_RAW_DATA.....                            | 38        |
| 5.8 WFS_CMD_IDC_WRITE_RAW_DATA .....                          | 42        |
| 5.9 WFS_CMD_IDC_CHIP_IO .....                                 | 44        |
| 5.10 WFS_CMD_IDC_RESET.....                                   | 46        |
| 5.11 WFS_CMD_IDC_CHIP_POWER .....                             | 47        |
| 5.12 WFS_CMD_IDC_PARSE_DATA .....                             | 48        |
| 5.13 WFS_CMD_IDC_SET_GUIDANCE_LIGHT .....                     | 49        |
| 5.14 WFS_CMD_IDC_POWER_SAVE_CONTROL .....                     | 51        |
| 5.15 WFS_CMD_IDC_PARK_CARD .....                              | 52        |
| 5.16 WFS_CMD_IDC_EMVCLESS_CONFIGURE .....                     | 54        |
| 5.17 WFS_CMD_IDC_EMVCLESS_PERFORM_TRANSACTION .....           | 56        |
| 5.18 WFS_CMD_IDC_EMVCLESS_ISSUERUPDATE .....                  | 62        |
| 5.19 WFS_CMD_IDC_SYNCHRONIZE_COMMAND .....                    | 64        |
| <b>6. Events.....</b>   | <b>65</b> |
| 6.1 WFS_EXEE_IDC_INVALIDTRACKDATA.....                        | 65        |
| 6.2 WFS_EXEE_IDC_MEDIINSERTED .....                           | 66        |
| 6.3 WFS_SRVE_IDC_MEDIAREMOVED .....                           | 67        |

|                    |   |           |
|--------------------|---|-----------|
| 6.4                | WFS_EXEE_IDC_MEDIARETAINED .....                              | 68        |
| 6.5                | WFS_EXEE_IDC_INVALIDMEDIA .....                               | 69        |
| 6.6                | WFS_SRVE_IDC_CARDACTION .....                                 | 70        |
| 6.7                | WFS_USRE_IDC_RETAINBINTHRESHOLD .....                         | 71        |
| 6.8                | WFS_SRVE_IDC_MEDIADETECTED .....                              | 72        |
| 6.9                | WFS_SRVE_IDC_RETAINBINREMOVED .....                           | 73        |
| 6.10               | WFS_SRVE_IDC_RETAINBININSERTED .....                          | 74        |
| 6.11               | WFS_EXEE_IDC_INSERTCARD .....                                 | 75        |
| 6.12               | WFS_SRVE_IDC_DEVICEPOSITION .....                             | 76        |
| 6.13               | WFS_SRVE_IDC_POWER_SAVE_CHANGE .....                          | 77        |
| 6.14               | WFS_EXEE_IDC_TRACKDETECTED .....                              | 78        |
| 6.15               | WFS_EXEE_IDC_EMVCLESSREADSTATUS .....                         | 79        |
| 6.16               | WFS_SRVE_IDC_MEDIARETAINED .....                              | 80        |
| <b>7.</b>          | <b>Form Description .....</b>                                 | <b>81</b> |
| <b>8.</b>          | <b>C-Header file .....</b>                                    | <b>84</b> |
| <b>9.</b>          | <b>Intelligent Contactless Card Sequence Diagrams .....</b>   | <b>95</b> |
| 9.1                | Single Tap Transaction Without Issuer Update Processing ..... | 96        |
| 9.2                | Double Tap Transaction With Issuer Update Processing .....    | 97        |
| 9.3                | Card Removed Before Completion .....                          | 98        |
| <b>Appendix A.</b> | <b>Diagram Source .....</b>                                   | <b>99</b> |

## **European Foreword**

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This CEN Workshop Agreement has been developed in accordance with the CEN-CENELEC Guide 29 “CEN/CENELEC Workshop Agreements – The way to rapid consensus” and with the relevant provisions of CEN/CENELEC Internal Regulations – Part 2. It was approved by a Workshop of representatives of interested parties on 2019-10-08, the constitution of which was supported by CEN following several public calls for participation, the first of which was made on 1998-06-24. However, this CEN Workshop Agreement does not necessarily include all relevant stakeholders.

The final text of this CEN Workshop Agreement was provided to CEN for publication on 2019-12-12.

The following organizations and individuals developed and approved this CEN Workshop Agreement:

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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 and Scanning 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

Part 7: Check Reader/Scanner Device Class Interface - Programmer's Reference

Part 8: Depository Device Class Interface - Programmer's Reference

Part 9: Text Terminal Unit Device Class Interface - Programmer's Reference

Part 10: Sensors and Indicators Unit Device Class Interface - Programmer's Reference

Part 11: Vendor Dependent Mode Device Class Interface - Programmer's Reference

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

Part 13: Alarm Device Class Interface - Programmer's Reference

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

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

Part 16: Card Dispenser Device Class Interface - Programmer's Reference

Part 17: Barcode Reader Device Class Interface - Programmer's Reference

Part 18: Item Processing Module Device Class Interface - Programmer's Reference

Part 19: Biometrics Device Class Interface - Programmer's Reference

Parts 20 - 28: Reserved for future use.

Parts 29 through 47 constitute an optional addendum to this CWA. They define the integration between the SNMP standard and the set of status and statistical information exported by the Service Providers.

## **CWA 16926-63:2020 (E)**

Part 29: XFS MIB Architecture and SNMP Extensions - Programmer's Reference

Part 30: XFS MIB Device Specific Definitions - Printer Device Class

Part 31: XFS MIB Device Specific Definitions - Identification Card Device Class

Part 32: XFS MIB Device Specific Definitions - Cash Dispenser Device Class

Part 33: XFS MIB Device Specific Definitions - PIN Keypad Device Class

Part 34: XFS MIB Device Specific Definitions - Check Reader/Scanner Device Class

Part 35: XFS MIB Device Specific Definitions - Depository Device Class

Part 36: XFS MIB Device Specific Definitions - Text Terminal Unit Device Class

Part 37: XFS MIB Device Specific Definitions - Sensors and Indicators Unit Device Class

Part 38: XFS MIB Device Specific Definitions - Camera Device Class

Part 39: XFS MIB Device Specific Definitions - Alarm Device Class

Part 40: XFS MIB Device Specific Definitions - Card Embossing Unit Class

Part 41: XFS MIB Device Specific Definitions - Cash-In Module Device Class

Part 42: Reserved for future use.

Part 43: XFS MIB Device Specific Definitions - Vendor Dependent Mode Device Class

Part 44: XFS MIB Application Management

Part 45: XFS MIB Device Specific Definitions - Card Dispenser Device Class

Part 46: XFS MIB Device Specific Definitions - Barcode Reader Device Class

Part 47: XFS MIB Device Specific Definitions - Item Processing Module Device Class

Part 48: XFS MIB Device Specific Definitions - Biometrics Device Class

Parts 49 - 60 are reserved for future use.

Part 61: Application Programming Interface (API) - Migration from Version 3.30 (CWA 16926) to Version 3.40 (this CWA) - Service Provider Interface (SPI) - Programmer's Reference

Part 62: Printer and Scanning Device Class Interface - Migration from Version 3.30 (CWA 16926) to Version 3.40 (this CWA) - Programmer's Reference

Part 63: Identification Card Device Class Interface - Migration from Version 3.30 (CWA 16926) to Version 3.40 (this CWA) - Programmer's Reference

Part 64: Cash Dispenser Device Class Interface - Migration from Version 3.30 (CWA 16926) to Version 3.40 (this CWA) - Programmer's Reference

Part 65: PIN Keypad Device Class Interface - Migration from Version 3.30 (CWA 16926) to Version 3.40 (this CWA) - Programmer's Reference

Part 66: Check Reader/Scanner Device Class Interface - Migration from Version 3.30 (CWA 16926) to Version 3.40 (this CWA) - Programmer's Reference

Part 67: Depository Device Class Interface - Migration from Version 3.30 (CWA 16926) to Version 3.40 (this CWA) - Programmer's Reference

Part 68: Text Terminal Unit Device Class Interface - Migration from Version 3.30 (CWA 16926) to Version 3.40 (this CWA) - Programmer's Reference

Part 69: Sensors and Indicators Unit Device Class Interface - Migration from Version 3.30 (CWA 16926) to Version 3.40 (this CWA) - Programmer's Reference

Part 70: Vendor Dependent Mode Device Class Interface - Migration from Version 3.30 (CWA 16926) to Version 3.40 (this CWA) - Programmer's Reference

Part 71: Camera Device Class Interface - Migration from Version 3.30 (CWA 16926) to Version 3.40 (this CWA) - Programmer's Reference

Part 72: Alarm Device Class Interface - Migration from Version 3.30 (CWA 16926) to Version 3.40 (this CWA) -

Programmer's Reference

Part 73: Card Embossing Unit Device Class Interface - Migration from Version 3.30 (CWA 16926) to Version 3.40 (this CWA) - Programmer's Reference

Part 74: Cash-In Module Device Class Interface - Migration from Version 3.30 (CWA 16926) to Version 3.40 (this CWA) - Programmer's Reference

Part 75: Card Dispenser Device Class Interface - Migration from Version 3.30 (CWA 16926) to Version 3.40 (this CWA) - Programmer's Reference

Part 76: Barcode Reader Device Class Interface - Migration from Version 3.30 (CWA 16926) to Version 3.40 (this CWA) - Programmer's Reference

Part 77: Item Processing Module Device Class Interface - Migration from Version 3.30 (CWA 16926) to Version 3.40 (this CWA) - Programmer's Reference

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: [https://www.cen.eu/work/Sectors/Digital\\_society/Pages/WSXFS.aspx](https://www.cen.eu/work/Sectors/Digital_society/Pages/WSXFS.aspx).

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

## 1. Migration Information

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XFS 3.40 has been designed to minimize backwards compatibility issues. This document highlights the changes made to the IDC device class between version 3.30 and 3.40, by highlighting the additions and deletions to the text.



The responsibilities will depend on the type of EMV Contactless Product being implemented.

There are different EMVCo defined product types, they can be found in the EMVCo Type Approval – Contactless Product – Administrative Process document.

- In this specification when referring to the Contactless Product Type – Intelligent Card Reader :

The following must be included and handled below the XFS API:

- An EMVCo Approved Level 1 Contactless PCD
- Entry Point and POS System Architecture according to Book A and B
- EMV Kernels according to Book C1 to C7 (minimum one kernel needs to be supported)

The Network Interface & the Consumer, Merchant Interfaces will be managed above the XFS API.

## **2.1 Support for EMV Intelligent Contactless Card Readers**

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In relation to contactless transactions, the terminology used in this document is based on the EMV Contactless Specifications for Payment Systems, see the **Error! Reference source not found.** section.

There are a number of types of payment systems (or EMV) compliant contactless card readers, from the intelligent reader device; where the reader device handles most of the transaction processing and only returns the result, to a transparent card reader; where the contactless card reader device provides a generic communication channel to the card without having any in-built transaction processing capabilities.

A contactless payment system transaction can be performed in two different ways, magnetic stripe emulation; where the data returned from the chip is formatted as if it was read from the magnetic stripe, and EMV-like; where, in a similar way to a contact EMV transaction, the chip returns a full set of BER-TLV (Basic Encoding Rules-Tag Length Value) data. Each payment system defines when each type, or profile, is used for a transaction, but it is usually dependent on both the configuration of the terminal and contactless card being tapped.

This document will use “magnetic stripe emulation” and “EMV-like” to identify the two profiles of contactless transactions.

Support for a generic contactless communication channel to the card is provided via the WFS\_CMD\_IDC\_CHIP\_IO command. This is suitable for use with a transparent contactless card reader or with an intelligent contactless card reader device operating in a pass through mode.

The WFS\_CMD\_IDC\_READ\_RAW\_DATA command can be used with an intelligent contactless card reader device to provide magnetic track emulation transactions. Only magnetic track emulation transactions can be supported using this command.

When using an intelligent contactless card reader to support both EMV-like and magnetic track emulation transactions a number of commands are required. The WFS\_CMD\_IDC\_EMVCLESS\_CONFIGURE command allows the exchange of data to configure the reader for card acceptance and the WFS\_CMD\_IDC\_EMVCLESS\_PERFORM\_TRANSACTION command enables the reader and performs the transaction with the card when it is tapped. In most cases all the transaction steps involving the card are completed within the initial card tap. Section **Error! Reference source not found.**, Appendix provides a sequence diagram showing the expected IDC command sequences, as well as the cardholder and application actions when performing a contactless card based transaction.

Some contactless payment systems allow a 2<sup>nd</sup> tap of the contactless card. For example a 2<sup>nd</sup> tap can be used to process authorization data received from the host. In the case of issuer update data this second tap is performed via the WFS\_CMD\_IDC\_EMVCLESS\_ISSUERUPDATE command. Section 9, Appendix provides a sequence diagram showing the expected IDC command sequences, as well as the cardholder and application actions. The WFS\_INF\_IDC\_EMVCLESS\_QUERY\_APPLICATIONS and WFS\_CMD\_IDC\_EMVCLESS\_CONFIGURE commands specified later in this document refer to the EMV terminology “Application Identifier (AID) - Kernel Combinations”. A detailed explanation can be found in Reference [2] and Reference [3] documents.

This document refers to BER-TLV tags. These are defined by each individual payment systems and contain the data exchanged between the application, contactless card and an intelligent contactless card reader. They are used to configure and prepare the intelligent contactless card reader for a transaction and are also part of the data that is returned by the reader on completion of the cards tap.

Based on the applicable payment system the application is expected to know which tags are required to be configured, what values to use for the tags and how to interpret the tags returned. Intelligent readers are expected to

know the BER-TLV tag definitions supported per payment system application. The tags provided in this document are examples of the types of tags applicable to each command. They are not intended to be a definite list.

### 3. References

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|  |
|--|
| 1. XFS Application Programming Interface (API)/Service Provider Interface (SPI), Programmer's Reference Revision 3.40. |
| 2. EMVCo Integrated Circuit Card Specifications for Payment Systems Version 4.3  |
| 3. EMVCo Contactless Specifications for Payment Systems, Version 2.4   |
| 4. EMVCo Contactless Type Approval Administrative Process Version 2.4  |

## 4. Info Commands

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### 4.1 WFS\_INF\_IDC\_STATUS

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**Description** This command reports the full range of information available, including the information that is provided either by the Service Provider or, if present, by any of the security modules. In addition to that, the number of cards retained is transmitted for motor driven card reader/writer (for devices of the other categories this number is always set to zero).

**Input Param** None.

**Output Param** LPWFSIDCSTATUS lpStatus;

```
typedef struct _wfs_idc_status
{
    WORD                fwDevice;
    WORD                fwMedia;
    WORD                fwRetainBin;
    WORD                fwSecurity;
    USHORT              usCards;
    WORD                fwChipPower;
    LPSTR               lpszExtra;
    DWORD               dwGuidLights[WFS_IDC_GUIDLIGHTS_SIZE];
    WORD                fwChipModule;
    WORD                fwMagReadModule;
    WORD                fwMagWriteModule;
    WORD                fwFrontImageModule;
    WORD                fwBackImageModule;
    WORD                wDevicePosition;
    USHORT              usPowerSaveRecoveryTime;
    LPWORD              lpwParkingStationMedia;
    WORD                wAntiFraudModule;
} WFSIDCSTATUS, *LPWFSIDCSTATUS;
```

*fwDevice*

Specifies the state of the ID card device as one of the following flags:

| Value                | Meaning   |
|----------------------|---|
| WFS_IDC_DEVONLINE    | The device is present, powered on and online (i.e. operational, not busy processing a request and not in an error state).   |
| WFS_IDC_DEVOFFLINE   | The device is offline (e.g. the operator has taken the device offline by turning a switch).   |
| WFS_IDC_DEVPOWEROFF  | The device is powered off or physically not connected.  |
| WFS_IDC_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_IDC_DEVHWERROR   | The device is present but inoperable due to a hardware fault that prevents it from being used.  |
| WFS_IDC_DEVUSERERROR | The device is present but a person is preventing proper device operation. The application should suspend the device operation or remove the device from service until the Service Provider generates a device state change event indicating the condition of the device has changed e.g. the error is removed (WFS_IDC_DEVONLINE) or a permanent error condition has occurred (WFS_IDC_DEVHWERROR). |

|                           |   |
|---------------------------|---|
| WFS_IDC_DEVBUSY           | The device is busy and unable to process an Execute command at this time.   |
| WFS_IDC_DEVFRAUDATTEMPT   | The device is present but is inoperable because it has detected a fraud attempt.  |
| WFS_IDC_DEVPOTENTIALFRAUD | The device has detected a potential fraud attempt and is capable of remaining in service. In this case the application should make the decision as to whether to take the device offline. |

*fwMedia*

Specifies the state of the ID card unit as one of the following values. This status is independent of any media in the parking stations.

| Value                   | Meaning   |
|-------------------------|---|
| WFS_IDC_MEDIAPRESENT    | Media is present in the device, not in the entering position and not jammed. A card in a parking station is not considered to be present. On the latched dip device, this indicates that the card is present in the device and the card is unlatched. |
| WFS_IDC_MEDIANOTPRESENT | Media is not present in the device and not at the entering position.  |
| WFS_IDC_MEDIAJAMMED     | Media is jammed in the device; operator intervention is required.   |
| WFS_IDC_MEDIANOTSUPP    | Capability to report media position is not supported by the device (e.g. a typical swipe reader or contactless chip card reader).   |
| WFS_IDC_MEDIAUNKNOWN    | The media state cannot be determined with the device in its current state (e.g. the value of <i>fwDevice</i> is WFS_IDC_DEVNODEVICE, WFS_IDC_DEVPOWEROFF, WFS_IDC_DEVOFFLINE, or WFS_IDC_DEVHWERROR).   |
| WFS_IDC_MEDIAENTERING   | Media is at the entry/exit slot of a motorized device.  |
| WFS_IDC_MEDIALATCHED    | Media is present & latched in a latched dip card unit. This means the card can be used for chip card dialog.  |

*fwRetainBin*

Specifies the state of the ID card unit retain bin as one of the following values:

| Value                    | Meaning  |
|--------------------------|--|
| WFS_IDC_RETAINBINOK      | The retain bin of the ID card unit is in a good state. |
| .WFS_IDC_RETAINNOTSUPP   | The ID card unit does not support retain capability.   |
| WFS_IDC_RETAINBINFULL    | The retain bin of the ID card unit is full.            |
| WFS_IDC_RETAINBINHIGH    | The retain bin of the ID card unit is nearly full.     |
| WFS_IDC_RETAINBINMISSING | The retain bin of the ID card unit is missing.         |

*fwSecurity*

Specifies the state of the security unit as one of the following values:

| Value               | Meaning   |
|---------------------|---|
| WFS_IDC_SECNOTSUPP  | No security module is available.                                    |
| WFS_IDC_SECNOTREADY | The security module is not ready to process cards or is inoperable. |
| WFS_IDC_SECOPEN     | The security module is open and ready to process cards.             |

*usCards*

The number of cards retained; applicable only to motor driven ID card units for non-motorized card units this value is zero. This value is persistent it is reset to zero by the WFS\_CMD\_IDC\_RESET\_COUNT command.

*fwChipPower*

Specifies the state of the chip controlled by this service. Depending on the value of *fwType* within the WFS\_INF\_IDC\_CAPABILITIES structure, this can either be the chip on the currently inserted user card or the chip on a permanently connected chip card. The state of the chip is one of the following flags:

| Value                  | Meaning   |
|------------------------|---|
| WFS_IDC_CHIPONLINE     | The chip is present, powered on and online (i.e. operational, not busy processing a request and not in an error state).                                   |
| WFS_IDC_CHIPPOWEREDOFF | The chip is present, but powered off (i.e. not contacted).  |
| WFS_IDC_CHIPBUSY       | The chip is present, powered on, and busy (unable to process an Execute command at this time).  |
| WFS_IDC_CHIPNODEVICE   | A card is currently present in the device, but has no chip.   |
| WFS_IDC_CHIPHWERROR    | The chip is present, but inoperable due to a hardware error that prevents it from being used (e.g. MUTE, if there is an unresponsive card in the reader). |
| WFS_IDC_CHIPNOCARD     | There is no card in the device.   |
| WFS_IDC_CHIPNOTSUPP    | Capability to report the state of the chip is not supported by the ID card unit device. This value is returned for contactless chip card readers.         |
| WFS_IDC_CHIPUNKNOWN    | The state of the chip cannot be determined with the device in its current state.  |

*lpszExtra*

Pointer to 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 extensible by Service Providers. Each string is null-terminated, with the final string terminating with two null characters. An empty list may be indicated by either a NULL pointer or a pointer to two consecutive null characters.

*dwGuidLights [...]*

Specifies the state of the guidance light indicators. A number of guidance light types are defined below. Vendor specific guidance lights are defined starting from the end of the array. The maximum guidance light index is WFS\_IDC\_GUIDLIGHTS\_MAX.

Specifies the state of the guidance light indicator as WFS\_IDC\_GUIDANCE\_NOT\_AVAILABLE, WFS\_IDC\_GUIDANCE\_OFF or a combination of the following flags consisting of one type B, optionally one type C and optionally one type D.

| Value                          | Meaning                                     | Type |
|--------------------------------|---|------|
| WFS_IDC_GUIDANCE_NOT_AVAILABLE | The status is not available.                | A    |
| WFS_IDC_GUIDANCE_OFF           | The light is turned off.                    | A    |
| WFS_IDC_GUIDANCE_SLOW_FLASH    | The light is blinking slowly.               | B    |
| WFS_IDC_GUIDANCE_MEDIUM_FLASH  | The light is blinking medium frequency.     | B    |
| WFS_IDC_GUIDANCE_QUICK_FLASH   | The light is blinking quickly.              | B    |
| WFS_IDC_GUIDANCE_CONTINUOUS    | The light is turned on continuous (steady). | B    |
| WFS_IDC_GUIDANCE_RED           | The light is red.                           | C    |
| WFS_IDC_GUIDANCE_GREEN         | The light is green.                         | C    |
| WFS_IDC_GUIDANCE_YELLOW        | The light is yellow.                        | C    |
| WFS_IDC_GUIDANCE_BLUE          | The light is blue.                          | C    |

|                          |                                  |   |
|--------------------------|----------------------------------|---|
| WFS_IDC_GUIDANCE_CYAN    | The light is cyan.               | C |
| WFS_IDC_GUIDANCE_MAGENTA | The light is magenta.            | C |
| WFS_IDC_GUIDANCE_WHITE   | The light is white.              | C |
| WFS_IDC_GUIDANCE_ENTRY   | The light is in the entry state. | D |
| WFS_IDC_GUIDANCE_EXIT    | The light is in the exit state.  | D |

*dwGuidLights [WFS\_IDC\_GUIDANCE\_CARDUNIT]*

Specifies the state of the guidance light indicator on the card unit.

*fwChipModule*

Specifies the state of the chip card module reader as one of the following values:

| Value                  | Meaning   |
|------------------------|---|
| WFS_IDC_CHIPMODOK      | The chip card module is in a good state.                |
| WFS_IDC_CHIPMODINOP    | The chip card module is inoperable.                     |
| WFS_IDC_CHIPMODUNKNOWN | The state of the chip card module cannot be determined. |
| WFS_IDC_CHIPMODNOTSUPP | Reporting the chip card module status is not supported. |

*fwMagReadModule*

Specifies the state of the magnetic card reader as one of the following values:

| Value                 | Meaning  |
|-----------------------|--|
| WFS_IDC_MAGMODOK      | The magnetic card reading module is in a good state.           |
| WFS_IDC_MAGMODINOP    | The magnetic card reading module is inoperable.                |
| WFS_IDC_MAGMODUNKNOWN | The state of the magnetic reading module cannot be determined. |
| WFS_IDC_MAGMODNOTSUPP | Reporting the magnetic reading module status is not supported. |

*fwMagWriteModule*

Specifies the state of the magnetic card writer as one of the following values:

| Value                 | Meaning   |
|-----------------------|---|
| WFS_IDC_MAGMODOK      | The magnetic card writing module is in a good state.                |
| WFS_IDC_MAGMODINOP    | The magnetic card writing module is inoperable.                     |
| WFS_IDC_MAGMODUNKNOWN | The state of the magnetic card writing module cannot be determined. |
| WFS_IDC_MAGMODNOTSUPP | Reporting the magnetic writing module status is not supported.      |

*fwFrontImageModule*

Specifies the state of the front image reader as one of the following values:

| Value                 | Meaning   |
|-----------------------|---|
| WFS_IDC_IMGMODOK      | The front image reading module is in a good state.                |
| WFS_IDC_IMGMODINOP    | The front image reading module is inoperable.                     |
| WFS_IDC_IMGMODUNKNOWN | The state of the front image reading module cannot be determined. |
| WFS_IDC_IMGMODNOTSUPP | Reporting the front image reading module status is not supported. |

*fwBackImageModule*

Specifies the state of the back image reader as one of the following values:

| Value            | Meaning   |
|------------------|---|
| WFS_IDC_IMGMODOK | The back image reading module is in a good state. |

|                       |  |
|-----------------------|--|
| WFS_IDC_IMGMODINOP    | The back image reading module is inoperable.                     |
| WFS_IDC_IMGMODUNKNOWN | The state of the back image reading module cannot be determined. |
| WFS_IDC_IMGMODNOTSUPP | Reporting the back image reading module status is not supported. |

*wDevicePosition*

Specifies the device position. The device position value is independent of the *fwDevice* value, e.g. when the device position is reported as WFS\_IDC\_DEVICEINPOSITION, *fwDevice* can have any of the values defined above (including WFS\_IDC\_DEVONLINE or WFS\_IDC\_DEVOFFLINE). If the device is not in its normal operating position (i.e. WFS\_IDC\_DEVICEINPOSITION) then media may not be presented through the normal customer interface. This value is one of the following values:

| Value                    | Meaning  |
|--------------------------|--|
| WFS_IDC_DEVICEINPOSITION | The device is in its normal operating position, or is fixed in place and cannot be moved.    |
| WFS_IDC_DEVICEINPOSITION | The device has been removed from its normal operating position.                              |
| WFS_IDC_DEVICEPOSUNKNOWN | Due to a hardware error or other condition, the position of the device cannot be determined. |
| WFS_IDC_DEVICEPOSNOTSUPP | The physical device does not have the capability of detecting the position.                  |

*usPowerSaveRecoveryTime*

Specifies the actual number of seconds required by the device to resume its normal operational state from the current power saving mode. This value is zero if either the power saving mode has not been activated or no power save control is supported.

*lpwParkingStationMedia*

Pointer to a zero terminated array of WORDs which contains the states of the parking stations or card stacker module. The *lpwParkingStationMedia* is NULL if no parking station and no card stacker module is supported. The value is specified as one of the following values:

| Value                   | Meaning   |
|-------------------------|---|
| WFS_IDC_MEDIAPRESENT    | Media is present in the parking station, and not jammed.                        |
| WFS_IDC_MEDIANOTPRESENT | Media is not present in the parking station.                                    |
| WFS_IDC_MEDIAJAMMED     | The parking station is jammed; operator intervention is required.               |
| WFS_IDC_MEDIANOTSUPP    | Reporting the media status in a parking station is not supported by the device. |
| WFS_IDC_MEDIAUNKNOWN    | The media state cannot be determined.   |

*wAntiFraudModule*

Specifies the state of the anti-fraud module as one of the following values:

| Value                     | Meaning   |
|---------------------------|---|
| WFS_IDC_AFMNOTSUPP        | No anti-fraud module is available.                                      |
| WFS_IDC_AFMOK             | Anti-fraud module is in a good state and no foreign device is detected. |
| WFS_IDC_AFMINOP           | Anti-fraud module is inoperable.  |
| WFS_IDC_AFMDEVICEDETECTED | Anti-fraud module detected the presence of a foreign device.            |
| WFS_IDC_AFMUNKNOWN        | The state of the anti-fraud module cannot be determined.                |

**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 *lpzExtra* parameter may not be device or vendor-independent.

## CWA 16926-63:2020 (E)

The *fwDevice* field can indicate that the device is still available (i.e. WFS\_IDC\_DEVONLINE) even if one of the detailed device status fields (*fwSecurity*, *fwChipModule*, *fwMagReadModule*, *fwMagWriteModule* or *wAntiFraudModule*) indicates that there is a problem with one or more modules. In this case, only the functionality provided by modules that do not have a fault should be used.

In the case where communications with the device has been lost, the *fwDevice* field will report WFS\_IDC\_DEVPOWEROFF when the device has been removed or WFS\_IDC\_DEVHWERROR if the communications are unexpectedly lost. All other fields should contain a value based on the following rules and priority:

1. Report the value as unknown.
2. Report the value as a general h/w error.
3. Report the value as the last known value.

## 4.2 WFS\_INF\_IDC\_CAPABILITIES

---

**Description** This command is used to retrieve the capabilities of the ID card unit.

**Input Param** None.

**Output Param** LPWFSIDCCAPS lpCaps;

```
typedef struct _wfs_idc_caps
{
    WORD                wClass;
    WORD                fwType;
    BOOL                bCompound;
    WORD                fwReadTracks;
    WORD                fwWriteTracks;
    WORD                fwChipProtocols;
    USHORT              usCards;
    WORD                fwSecType;
    WORD                fwPowerOnOption;
    WORD                fwPowerOffOption;
    BOOL                bFluxSensorProgrammable;
    BOOL                bReadWriteAccessFollowingEject;
    WORD                fwWriteMode;
    WORD                fwChipPower;
    LPSTR               lpszExtra;
    WORD                fwDIPMode;
    LPWORD              lpwMemoryChipProtocols;
    DWORD               dwGuidLights[WFS_IDC_GUIDLIGHTS_SIZE];
    WORD                fwEjectPosition;
    BOOL                bPowerSaveControl;
    USHORT              usParkingStations;
    BOOL                bAntiFraudModule;
    LPDWORD             lpdwSynchronizableCommands;
} WFSIDCCAPS, *LPWFSIDCCAPS;
```

*wClass*

Specifies the logical service class as WFS\_SERVICE\_CLASS\_IDC.

*fwType*

Specifies the type of the ID card unit as one of the following values:

| Value                   | Meaning   |
|-------------------------|---|
| WFS_IDC_TYPEMOTOR       | The ID card unit is a motor driven card unit.   |
| WFS_IDC_TYPEWIPE        | The ID card unit is a swipe (pull-through) card unit.   |
| WFS_IDC_TYPEDIP         | The ID card unit is a dip card unit. This dip type is not capable of latching cards entered.  |
| WFS_IDC_TYPECONTACTLESS | The ID card unit is a contactless card unit, i.e. no insertion of the card is required.   |
| WFS_IDC_TYPELATCHEDDIP  | The ID card unit is a latched dip card unit. This device type is used when a dip IDC device supports chip communication. The latch ensures the consumer cannot remove the card during chip communication. Any card entered will automatically latch when a request to initiate a chip dialog is made (via the WFS_CMD_IDC_READ_RAW_DATA command). The WFS_CMD_IDC_EJECT_CARD command is used to unlatch the card. |
| WFS_IDC_TYPEPERMANENT   | The ID card unit is dedicated to a permanently housed chip card (no user interaction is available with this type of card).  |

## WFS\_IDC\_TYPEINTELLIGENTCONTACTLESS

The ID card unit is an intelligent contactless card unit, i.e. no insertion of the card is required and the card unit has built-in EMV or smart card application functionality that adheres to the EMVCo Contactless Specifications or individual payment system's specifications. The ID card unit is capable of performing both magnetic stripe emulation and EMV-like transactions.

*bCompound*

Specifies whether the logical device is part of a compound physical device.

*fwReadTracks*

Specifies the tracks that can be read by the ID card unit as a combination of the following flags:

| Value                 | Meaning   |
|-----------------------|---|
| WFS_IDC_NOTSUPP       | The ID card unit cannot access any track.   |
| WFS_IDC_TRACK1        | The ID card unit can access track 1.  |
| WFS_IDC_TRACK2        | The ID card unit can access track 2.  |
| WFS_IDC_TRACK3        | The ID card unit can access track 3.  |
| WFS_IDC_TRACK_WM      | The ID card unit can access the Swedish Watermark track.  |
| WFS_IDC_FRONT_TRACK_1 | The ID card unit can access the front track 1. In some countries this track is known as JIS II track. |
| WFS_IDC_FRONTIMAGE    | The ID card unit can read the front image of a card.  |
| WFS_IDC_BACKIMAGE     | The ID card unit can read the back image of a card.   |
| WFS_IDC_TRACK1_JIS1   | The ID card unit can access JIS I track 1.  |
| WFS_IDC_TRACK3_JIS1   | The ID card unit can access JIS I track 3.  |
| WFS_IDC_DDI           | The ID card unit can provide dynamic digital identification of the magnetic strip.                    |

*fwWriteTracks*

Specifies the tracks that can be written by the ID card unit (as a combination of the flags specified in the description of *fwReadTracks* except WFS\_IDC\_TRACK\_WM, WFS\_IDC\_FRONTIMAGE, WFS\_IDC\_BACKIMAGE and WFS\_IDC\_DDI).

*fwChipProtocols*

Specifies the chip card protocols that are supported by the Service Provider as a combination of the following flags:

| Value                              | Meaning  |
|------------------------------------|--|
| WFS_IDC_NOTSUPP                    | The ID card unit cannot handle chip cards.   |
| WFS_IDC_CHIPT0                     | The ID card unit can handle the T=0 protocol.  |
| WFS_IDC_CHIPT1                     | The ID card unit can handle the T=1 protocol.  |
| WFS_IDC_CHIP_PROTOCOL_NOT_REQUIRED | The ID card unit is capable of communicating with a chip card without requiring the application to specify any protocol. |
| WFS_IDC_CHIPTYPEA_PART3            | The ID card unit can handle the ISO 14443 (Part3) Type A contactless chip card protocol.                                 |
| WFS_IDC_CHIPTYPEA_PART4            | The ID card unit can handle the ISO 14443 (Part4) Type A contactless chip card protocol.                                 |

|                   |   |
|-------------------|---|
| WFS_IDC_CHIPTYPEB | The ID card unit can handle the ISO 14443 Type B contactless chip card protocol.            |
| WFS_IDC_CHIPNFC   | The ID card unit can handle the ISO 18092 (106/212/424kbps) contactless chip card protocol. |

*usCards*

Specifies the maximum numbers of cards that the retain bin and card stacker module bin can hold (zero if not available).

*fwSecType*

Specifies the type of security module used as one of the following values:

| Value              | Meaning                              |
|--------------------|--------------------------------------|
| WFS_IDC_SECNOTSUPP | Device has no security module.       |
| WFS_IDC_SECMBOX    | Security module of device is MMBBox. |
| WFS_IDC_SECCIM86   | Security module of device is CIM86.  |

*fwPowerOnOption*

Specifies the power-on capabilities of the device hardware as one of the following values (applicable only to motor driven ID card units):

| Value                   | Meaning  |
|-------------------------|--|
| WFS_IDC_NOACTION        | No power on actions are supported by the device.   |
| WFS_IDC_EJECT           | The card will be ejected on power-on (or off, see <i>fwPowerOffOption</i> below).  |
| WFS_IDC_RETAIN          | The card will be retained on power-on (off).   |
| WFS_IDC_EJECTTHENRETAIN | The card will be ejected for a specified time on power-on (off), then retained if not taken. The time for which the card is ejected is vendor dependent. |
| WFS_IDC_READPOSITION    | The card will be moved into the read position on power-on (off).   |

*fwPowerOffOption*

Specifies the power-off capabilities of the device hardware, as one of the flags specified for *fwPowerOnOption*; applicable only to motor driven ID card units.

*bFluxSensorProgrammable*

Specifies whether the Flux Sensor on the card unit is programmable, this can either be TRUE or FALSE.

*bReadWriteAccessFollowingEject*

Specifies whether a card may be read or written after having been pushed to the exit slot with an eject command. The card will be retracted back into the IDC.

*fwWriteMode*

A combination of the following flags specify the write capabilities, with respect to whether the device can write low coercivity (loco) and/or high coercivity (hico) magnetic stripes:

| Value           | Meaning   |
|-----------------|---|
| WFS_IDC_NOTSUPP | Does not support writing of magnetic stripes.   |
| WFS_IDC_LOCO    | Supports writing of loco magnetic stripes.  |
| WFS_IDC_HICO    | Supports writing of hico magnetic stripes.  |
| WFS_IDC_AUTO    | Service Provider is capable of automatically determining whether loco or hico magnetic stripes should be written. |

*fwChipPower*

Specifies the capabilities of the ID card unit (in relation to the user or permanent chip controlled by the service), for chip power management as a combination of the following flags:

| Value           | Meaning   |
|-----------------|---|
| WFS_IDC_NOTSUPP | The ID card unit cannot handle chip power management. |

|                       |   |
|-----------------------|---|
| WFS_IDC_CHIPPOWERCOLD | The ID card unit can power on the chip and reset it (Cold Reset). |
| WFS_IDC_CHIPPOWERWARM | The ID card unit can reset the chip (Warm Reset).                 |
| WFS_IDC_CHIPPOWEROFF  | The ID card unit can power off the chip.                          |

*lpzExtra*

Pointer to 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 extensible by Service Providers. Each string is null-terminated, with the final string terminating with two null characters. An empty list may be indicated by either a NULL pointer or a pointer to two consecutive null characters.

*fwDIPMode*

Specifies whether data track data is read on entry or exit from the dip card unit as one of the following flags:

| Value                  | Meaning  |
|------------------------|--|
| WFS_IDC_NOTSUPP        | The ID card unit is not a dip type.                                |
| WFS_IDC_DIP_EXIT       | The dip ID card unit reads card track data on exit only.           |
| WFS_IDC_DIP_ENTRY      | The dip ID card unit reads card track data on entry only.          |
| WFS_IDC_DIP_ENTRY_EXIT | The dip ID card unit reads card track data both on entry and exit. |
| WFS_IDC_DIP_UNKNOWN    | Unknown whether track data is read on entry or exit.               |

*lpwMemoryChipProtocols*

Pointer to a zero terminated list of WORD values which represent the memory card protocols that are supported by the Service Provider as an array of constants. If this parameter is NULL then the Service Provider does not support any memory card protocols. Valid Memory Card Identifiers are:

| Value                   | Meaning  |
|-------------------------|--|
| WFS_IDC_MEM_SIEMENS4442 | The device supports the Siemens 4442 Card Protocol (also supported by the Gemplus GPM2K card). |
| WFS_IDC_MEM_GPM896      | The device supports the Gemplus GPM 896 Card Protocol.   |

*dwGuidLights [...]*

Specifies which guidance lights are available. A number of guidance light types are defined below. Vendor specific guidance lights are defined starting from the end of the array. The maximum guidance light index is WFS\_IDC\_GUIDLIGHTS\_MAX.

In addition to supporting specific flash rates and colors, some guidance lights also have the capability to show directional movement representing “entry” and “exit”. The “entry” state gives the impression of leading a user to place a card into the device. The “exit” state gives the impression of ejection from a device to a user and would be used for retrieving a card from the device.

The elements of this array are specified as a combination of the following flags and indicate all of the possible flash rates (type B) , colors (type C) and directions (type D) that the guidance light indicator is capable of handling. If the guidance light indicator only supports one color then no value of type C is returned. If the guidance light indicator does not support direction then no value of type D is returned. A value of WFS\_IDC\_GUIDANCE\_NOT\_AVAILABLE indicates that the device has no guidance light indicator or the device controls the light directly with no application control possible.

| Value                          | Meaning  | Type |
|--------------------------------|--|------|
| WFS_IDC_GUIDANCE_NOT_AVAILABLE | There is no guidance light control available at this position. | A    |
| WFS_IDC_GUIDANCE_OFF           | The light can be off.  | B    |

|                               |                                       |   |
|-------------------------------|---------------------------------------|---|
| WFS_IDC_GUIDANCE_SLOW_FLASH   | The light can blink slowly.           | B |
| WFS_IDC_GUIDANCE_MEDIUM_FLASH | The light can blink medium frequency. | B |
| WFS_IDC_GUIDANCE_QUICK_FLASH  | The light can blink quickly.          | B |
| WFS_IDC_GUIDANCE_CONTINUOUS   | The light can be continuous (steady). | B |
| WFS_IDC_GUIDANCE_RED          | The light can be red.                 | C |
| WFS_IDC_GUIDANCE_GREEN        | The light can be green.               | C |
| WFS_IDC_GUIDANCE_YELLOW       | The light can be yellow.              | C |
| WFS_IDC_GUIDANCE_BLUE         | The light can be blue.                | C |
| WFS_IDC_GUIDANCE_CYAN         | The light can be cyan.                | C |
| WFS_IDC_GUIDANCE_MAGENTA      | The light can be magenta.             | C |
| WFS_IDC_GUIDANCE_WHITE        | The light can be white.               | C |
| WFS_IDC_GUIDANCE_ENTRY        | The light can be in the entry state.  | D |
| WFS_IDC_GUIDANCE_EXIT         | The light can be in the exit state.   | D |

*dwGuidLights [WFS\_IDC\_GUIDANCE\_CARDUNIT]*

Specifies whether the guidance light indicator on the card unit is available.

*fwEjectPosition*

Specifies the target position that is supported for the eject operation, as a combination of the following flags:

| Value                     | Meaning  |
|---------------------------|--|
| WFS_IDC_EXITPOSITION      | The device can eject a card to the exit position, from which the user can remove it.   |
| WFS_IDC_TRANSPORTPOSITION | The device can eject a card to the transport just behind the exit position, from which the user cannot remove it. The device which supports this flag must also support the WFS_IDC_EXITPOSITION flag. |

*bPowerSaveControl*

Specifies whether power saving control is available. This can either be TRUE if available or FALSE if not available.

*usParkingStations*

Specifies the number of supported parking stations or card stackers. If a zero value is specified there is no parking station and no card stacker module supported.

*bAntiFraudModule*

Specifies whether the anti-fraud module is available. This can either be TRUE if available or FALSE if not available.

*lpdwSynchronizableCommands*

Pointer to a zero-terminated list of DWORDs which contains the execute command IDs that can be synchronized. If no execute command can be synchronized then this parameter will be NULL.

**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 *lpzExtra* parameter may not be device or vendor-independent.

### 4.3 WFS\_INF\_IDC\_FORM\_LIST

---

|                     |  |
|---------------------|--|
| <b>Description</b>  | This command is used to retrieve the list of forms available on the device.  |
| <b>Input Param</b>  | None.  |
| <b>Output Param</b> | LPSTR lpszFormList;<br><br><i>lpszFormList</i><br>Pointer to a list of null-terminated form names, with the final name terminating with two null characters. |
| <b>Error Codes</b>  | Only the generic error codes defined in [Ref. 1] can be generated by this command.   |
| <b>Comments</b>     | None.  |

## 4.4 WFS\_INF\_IDC\_QUERY\_FORM

---

**Description** This command is used to retrieve details of the definition of a specified form.

**Input Param** LPSTR lpszFormName;

*lpszFormName*

Points to the null-terminated form name on which to retrieve details.

**Output Param** LPWFSIDCFORM lpForm;

```
typedef struct _wfs_idc_form
{
    LPSTR                lpszFormName;
    char                 cFieldSeparatorTrack1;
    char                 cFieldSeparatorTrack2;
    char                 cFieldSeparatorTrack3;
    WORD                 fwAction;
    LPSTR                lpszTracks;
    BOOL                 bSecure;
    LPSTR                lpszTrack1Fields;
    LPSTR                lpszTrack2Fields;
    LPSTR                lpszTrack3Fields;
    LPSTR                lpszFrontTrack1Fields;
    char                 cFieldSeparatorFrontTrack1;
    LPSTR                lpszJIS1Track1Fields;
    LPSTR                lpszJIS1Track3Fields;
    CHAR                 cFieldSeparatorJIS1Track1;
    CHAR                 cFieldSeparatorJIS1Track3;
} WFSIDCFORM, *LPWFSIDCFORM;
```

*lpszFormName*

Specifies the null-terminated name of the form.

*cFieldSeparatorTrack1*

Specifies the value of the field separator of Track 1.

*cFieldSeparatorTrack2*

Specifies the value of the field separator of Track 2.

*cFieldSeparatorTrack3*

Specifies the value of the field separator of Track 3.

*fwAction*

Specifies the form action; can be one of the following flags:

| Value               | Meaning                   |
|---------------------|---------------------------|
| WFS_IDC_ACTIONREAD  | The form reads the card.  |
| WFS_IDC_ACTIONWRITE | The form writes the card. |

*lpszTracks*

Specifies the read algorithm or the track to write.

*bSecure*

Specifies whether or not to do a security check.

*lpszTrack1Fields*

Pointer to a list of null-terminated field names of Track 1, with the final name terminating with two null characters.

*lpszTrack2Fields*

Pointer to a list of null-terminated field names of Track 2, with the final name terminating with two null characters.

*lpszTrack3Fields*

Pointer to a list of null-terminated field names of Track 3, with the final name terminating with two null characters.

**CWA 16926-63:2020 (E)**

*lpszFrontTrack1Fields*

Pointer to a list of null-terminated field names of Front Track 1, with the final name terminating with two null characters.

*cFieldSeparatorFrontTrack1*

Specifies the value of the field separator of Front Track 1.

*lpszJIS1Track1Fields*

Pointer to a list of null-terminated field names of JIS I Track 1, with the final name terminating with two null characters.

*lpszJIS1Track3Fields*

Pointer to a list of null-terminated field names of JIS I Track 3, with the final name terminating with two null characters.

*cFieldSeparatorJIS1Track1*

Specifies the value of the field separator of JIS I Track 1.

*cFieldSeparatorJIS1Track3*

Specifies the value of the field separator of JIS I Track 3.

**Error Codes** In addition to the generic error codes defined in [Ref. 1], the following error codes can be generated by this command:

| <u>Value</u>             | <u>Meaning</u>                      |
|--------------------------|-------------------------------------|
| WFS_ERR_IDC_FORMNOTFOUND | The specified form cannot be found. |
| WFS_ERR_IDC_FORMINVALID  | The specified form is invalid.      |

**Comments** None.

## 4.5 WFS\_INF\_IDC\_QUERY\_IFM\_IDENTIFIER

---

**Description** This command is used to retrieve the complete list of registration authority Interface Module (IFM) identifiers. The primary registration authority is EMVCo but other organizations are also supported for historical or local country requirements.

New registration authorities may be added in the future so applications should be able to handle the return of new (as yet undefined) IFM identifiers.

**Input Param** None.

**Output Param** LPWFSIDCIFMIDENTIFIER \*lppIFMIdentifier;

Pointer to a NULL terminated array of pointers to data structures. There is one array element for each IFM identifier supported by the Service Provider (in no particular order). If there is no IFM identifier available for one of the defined IFM authorities then no element is returned in the array for that authority. If there are no IFM identifiers for the device then the output parameter *lppIFMIdentifier* will be NULL.

```
typedef struct _wfs_idc_ifm_identifier
{
    WORD                wIFMAuthority;
    LPSTR               lpszIFMIdentifier;
} WFSIDCIFMIDENTIFIER, *LPWFSIDCIFMIDENTIFIER;
```

*wIFMAuthority*

Specifies the IFM authority that issued the IFM identifier:

| Value              | Meaning   |
|--------------------|---|
| WFS_IDC_IFMEMV     | The Level 1 Type Approval IFM identifier assigned by EMVCo.   |
| WFS_IDC_IFMEUROPAY | The Level 1 Type Approval IFM identifier assigned by Europay. |
| WFS_IDC_IFMVISA    | The Level 1 Type Approval IFM identifier assigned by VISA.    |
| WFS_IDC_IFMGIECB   | The IFM identifier assigned by GIE Cartes Bancaires.          |

*lpszIFMIdentifier*

Returns an ASCII string containing the IFM Identifier of the chip card reader (or IFM) as assigned by the specified authority.

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

**Comments** If this command is not supported then this does not necessarily mean that the device is not certified by one or more certification authorities.

## 4.6 WFS\_INF\_IDC\_EMVCLESS\_QUERY\_APPLICATIONS

---

|                     |   |
|---------------------|---|
| <b>Description</b>  | This command is used to retrieve the supported payment system applications available within an intelligent contactless card unit. The payment system application can either be identified by an AID or by the AID in combination with a Kernel Identifier. The Kernel Identifier has been introduced by the EMVCo specifications; see Reference [3].  |
| <b>Input Param</b>  | None.   |
| <b>Output Param</b> | LPWFSIDCAPPDATA *lppAppData;<br><br><i>lppAppData</i><br>Pointer to a NULL terminated array of pointers to the following data structure, each of which specifies a supported application identifier (AID) and the associated Kernel Identifier.<br><br><pre>typedef struct wfs_idc_app_data {     LPWFSIDCHEXDATA    lpAID;     LPWFSIDCHEXDATA    lpKernelIdentifier; } WFSIDCAPPDATA, *LPWFSIDCAPPDATA;</pre><br><i>lpAID</i><br>Contains the payment system application identifier (AID) supported by the intelligent contactless card unit.<br><br><i>lpKernelIdentifier</i><br>Contains the Kernel Identifier associated with the <i>lpAID</i> . This data may return NULL if the reader does not support Kernel Identifiers for example in the case of legacy approved contactless readers. |
| <b>Error Codes</b>  | Only the generic error codes defined in [Ref. 1] can be generated by this command.  |
| <b>Comments</b>     | None.   |

## 5. Execute Commands

---

### 5.1 WFS\_CMD\_IDC\_READ\_TRACK

---

**Description** For motor driven card readers, the ID card unit checks whether a card has been inserted. If so, the tracks are read immediately as described in the form specified by the *lpstrFormName* parameter.

If no card has been inserted, and for all other categories of card readers, the ID card unit waits for the period of time specified in the **WFSExecute** call for a card to be either inserted or pulled through. Again the next step is reading the tracks specified in the form (see Section 7, Form Definition, for a more detailed description of the forms mechanism). When the SECURE tag is specified in the associated form, the results of a security check via a security module (i.e. MM, CIM86) are specified and added to the track data.

The WFS\_EXEE\_IDC\_INSERTCARD event will be generated when there is no card in the card reader and the device is ready to accept a card.

If the security check fails however this should not stop valid data being returned. The error WFS\_ERR\_IDC\_SECURITYFAIL will be returned if the form specifies only security data to be read and the security check could not be executed, in all other cases WFS\_SUCCESS will be returned with the security field of the output parameter set to the relevant value including WFS\_IDC\_SEC\_HWERROR.

**Input Param** LPSTR lpstrFormName;  
*lpstrFormName*  
Points to the name of the form that defines the behavior for the reading of tracks (see Section 7, Form Definition).

**Output Param** LPSTR lpstrTrackData;  
*lpstrTrackData*  
Points to the data read successfully from the selected tracks (and value of security module if available).

**Error Codes** In addition to the generic error codes defined in [Ref. 1], the following error codes can be generated by this command:

| Value                        | Meaning   |
|------------------------------|---|
| WFS_ERR_IDC_MEDIAJAM         | The card is jammed. Operator intervention is required.  |
| WFS_ERR_IDC_SHUTTERFAIL      | The open of the shutter failed due to manipulation or hardware error. Operator intervention is required.  |
| WFS_ERR_IDC_INVALIDDATA      | The read operation specified by the forms definition could not be completed successfully due to invalid track data. This is returned if all tracks in an 'or' (!) operation cannot be read or if any track in an 'and' (&) operation cannot be read. <i>lpstrTrackData</i> points to data from the successfully read tracks (if any). One |
| WFS_EXEE_IDC_INVALIDTRACKDAT | A execute event is generated for each specified track which could not be read successfully. See the form description for the rules defining how tracks are specified.   |

|                          |  |
|--------------------------|--|
| WFS_ERR_IDC_NOMEDIA      | The card was removed before completion of the read action (the event WFS_EXEE_IDC_MEDIINSERTED has been generated). For motor driven devices, the read is disabled; i.e. another command has to be issued to enable the reader for card entry. |
| WFS_ERR_IDC_INVALIDMEDIA | No track found; card may have been inserted or pulled through the wrong way.   |
| WFS_ERR_IDC_FORMNOTFOUND | The specified form cannot be found.  |
| WFS_ERR_IDC_FORMINVALID  | The specified form definition is invalid (e.g. syntax error).  |
| WFS_ERR_IDC_SECURITYFAIL | The security module failed reading the cards security sign.  |
| WFS_ERR_IDC_CARDTOOSHORT | The card that was inserted is too short. When this error occurs the card remains at the exit slot.   |
| WFS_ERR_IDC_CARDTOOLONG  | The card that was inserted is too long. When this error occurs the card remains at the exit slot.  |

**Events** In addition to the generic events defined in [Ref.1], the following events can be generated by this command:

| Value                         | Meaning   |
|-------------------------------|---|
| WFS_EXEE_IDC_INVALIDTRACKDATA | One event is generated for each blank track (no data) or invalid track (either data error reading the track or the data does not conform to the specified form definition).                                       |
| WFS_EXEE_IDC_MEDIINSERTED     | This event is generated when a card is detected in the device, giving early warning of card entry to an application, allowing it to remove a user prompt and/or do other processing while the card is being read. |
| WFS_SRVE_IDC_MEDIAREMOVED     | This event is generated when a card is removed before completion of a read operation.   |
| WFS_EXEE_IDC_INVALIDMEDIA     | The user is attempting to insert the media in the wrong orientation. The card has not been accepted into the device. The device is still ready to accept a card inserted in the correct orientation.              |
| WFS_EXEE_IDC_INSERTCARD       | Device is ready to accept a card from the user.   |
| WFS_EXEE_IDC_TRACKDETECTED    | Track data has been detected during the insertion of the card.  |

**Comments** The track data is preceded by the keyword for the track, separated by a ':'. The field data is always preceded by the corresponding keyword, separated by a '='. The fields are separated by 0x00. The data of the different tracks is separated by an additional 0x00. The end of the buffer is marked by another additional 0x00 (see example below). Data encoding is defined in Section 7, Form Definition.

Example of *lpstrTrackData*:

TRACK2:ALL=47.\0\0TRACK3:MII=59\0PAN=500.\0\0\0

## 5.2 WFS\_CMD\_IDC\_WRITE\_TRACK

---

**Description** For motor-driven card readers, the ID card unit checks whether a card has been inserted. If so, the data is written to the track as described in the form specified by the *lpstrFormName* parameter, and the other parameters.

If no card has been inserted, and for all other categories of devices, the ID card unit waits for the period of time specified in the **WFSExecute** call for a card to be either inserted or pulled through. The next step is writing the data defined by the form and the parameters to the respective track (see Section 7, Form Definition, for a more detailed description of the forms mechanism).

This procedure is followed by data verification.

The WFS\_EXEE\_IDC\_INSERTCARD event will be generated when there is no card in the card reader and the device is ready to accept a card.

If power fails during a write the outcome of the operation will be vendor specific, there is no guarantee that the write will have succeeded.

**Input Param** LPWFSIDCWREDITRACK lpWriteTrack;

```
typedef struct _wfs_idc_write_track
{
    LPSTR          lpstrFormName;
    LPSTR          lpstrTrackData;
    WORD           fwWriteMethod;
} WFSIDCWREDITRACK, *LPWFSIDCWREDITRACK;
```

*lpstrFormName*

Points to the name of the form to be used.

*lpstrTrackData*

Points to the data to be used in the form.

*fwWriteMethod*

Indicates whether a low coercivity or high coercivity magnetic stripe is being written.

| Value        | Meaning   |
|--------------|---|
| WFS_IDC_LOCO | Low coercivity magnetic stripe is being written.  |
| WFS_IDC_HICO | High coercivity magnetic stripe is being written.                                       |
| WFS_IDC_AUTO | Service Provider will determine whether low or high coercivity stripe is to be written. |

**Output Param** None.

**Error Codes** In addition to the generic error codes defined in [Ref. 1], the following error codes can be generated by this command:

| Value                   | Meaning  |
|-------------------------|--|
| WFS_ERR_IDC_MEDIAJAM    | The card is jammed. Operator intervention is required.   |
| WFS_ERR_IDC_SHUTTERFAIL | The open of the shutter failed due to manipulation or hardware error. Operator intervention is required.   |
| WFS_ERR_IDC_NOMEDIA     | The card was removed before completion of the write action (the event WFS_EXEE_IDC_MEDIINSERTED has been generated). For motor driven devices, the write is disabled; i.e. another command has to be issued to enable the reader for card entry. |
| WFS_ERR_IDC_INVALIDDATA | An error occurred while writing the track.   |

|                          |   |
|--------------------------|---|
| WFS_ERR_IDC_DATASYNTAX   | The syntax of the data pointed to by <i>lpstrTrackData</i> is in error, or does not conform to the form definition. |
| WFS_ERR_IDC_INVALIDMEDIA | No track found; card may have been inserted or pulled through the wrong way.  |
| WFS_ERR_IDC_FORMNOTFOUND | The specified form cannot be found.   |
| WFS_ERR_IDC_FORMINVALID  | The specified form definition is invalid (e.g. syntax error).   |
| WFS_ERR_IDC_WRITE_METHOD | The <i>fwWriteMethod</i> value is inconsistent with device capabilities.  |
| WFS_ERR_IDC_CARDTOOSHORT | The card that was inserted is too short. When this error occurs the card remains at the exit slot.                  |
| WFS_ERR_IDC_CARDTOOLONG  | The card that was inserted is too long. When this error occurs the card remains at the exit slot.                   |

**Events**

In addition to the generic events defined in [Ref.1], the following events can be generated by this command:

| Value                         | Meaning  |
|-------------------------------|--|
| WFS_EXEE_IDC_INVALIDTRACKDATA | One event is generated for each blank track (no data) or invalid track (either data error reading the track or the data does not conform to the specified form definition).  |
| WFS_EXEE_IDC_MEDIINSERTED     | This event is generated when a card is detected in the device, giving early warning of card entry to an application, allowing it to remove a user prompt and/or do other processing while the card is being written. |
| WFS_SRVE_IDC_MEDIAREMOVED     | This event is generated when a card is removed before completion of a write operation.   |
| WFS_EXEE_IDC_INVALIDMEDIA     | The user is attempting to insert the media in the wrong orientation. The card has not been accepted into the device. The device is still ready to accept a card inserted in the correct orientation.                 |
| WFS_EXEE_IDC_INSERTCARD       | Device is ready to accept a card from the user.  |

**Comments**

The field data is always preceded by the corresponding keyword, separated by an '='. This keyword could be one of the fields defined in the form or the predefined keyword 'ALL'. Fields are separated by 0x00. The end of the buffer is marked with an additional 0x00. (See the example below and Section 7, Form Definition.). This specification means that only one track can be written in the same command. This is a fundamental capability of an ID card unit; thus if a write request is received by a device with no write capability, the WFS\_ERR\_UNSUPP\_COMMAND error is returned.

Example of *lpstrTrackData*:  
 RETRYCOUNT=3\0DATE=3132\0\0

### 5.3 WFS\_CMD\_IDC\_EJECT\_CARD

---

**Description** This command is only applicable to motor driven card readers and latched dip card readers. For motorized card readers the default operation is that the card is driven to the exit slot from where the user can remove it. After successful completion of this command, a service event message is generated to inform the application when the card is taken. The card remains in position for withdrawal until either it is taken or another command is issued that moves the card.

For latched dip readers, this command causes the card to be unlatched (if not already unlatched), enabling removal.

After successful completion of this command, a WFS\_SRVE\_IDC\_MEDIAREMOVED event is generated to inform the application when the card is taken.

**Input Param** LPWFSIDCEJECTCARD lpEjectCard;

```
typedef struct _wfs_idc_eject_card
{
    WORD                wEjectPosition;
} WFSIDCEJECTCARD, *LPWFSIDCEJECTCARD;
```

*wEjectPosition*

Specifies the destination of the card ejection for motorized card readers. Possible values are one of the following:

| Value                     | Meaning   |
|---------------------------|---|
| WFS_IDC_EXITPOSITION      | The card will be transferred to the exit slot from where the user can remove it. In the case of a latched dip the card will be unlatched, enabling removal.   |
| WFS_IDC_TRANSPORTPOSITION | The card will be transferred to the transport just behind the exit slot. If a card is already at this position then WFS_SUCCESS will be returned. Another WFS_CMD_IDC_EJECT_CARD command is required with the <i>wEjectPosition</i> set to WFS_IDC_EXITPOSITION in order to present the card to the user for removal. |

If *lpEjectCard* is a NULL pointer, the card will be transferred to the exit slot from where the user can remove it. In the case of a latched dip the card will be unlatched, enabling removal. This action is the same as when WFS\_IDC\_EXITPOSITION is specified for *wEjectPosition*.

**Output Param** None.

**Error Codes** In addition to the generic error codes defined in [Ref. 1], the following error codes can be generated by this command:

| Value                     | Meaning   |
|---------------------------|---|
| WFS_ERR_IDC_MEDIAJAM      | The card is jammed. Operator intervention is required. A possible scenario is also when an attempt to retain the card was made during attempts to eject it. The retain bin is full; no more cards can be retained. The current card is still in the device. |
| WFS_ERR_IDC_SHUTTERFAIL   | The open of the shutter failed due to manipulation or hardware error. Operator intervention is required.  |
| WFS_ERR_IDC_NOMEDIA       | No card is present.   |
| WFS_ERR_IDC_MEDIARETAINED | The card has been retained during attempts to eject it. The device is clear and can be used.  |

**Events** In addition to the generic events defined in [Ref.1], the following events can be generated by this command:

**CWA 16926-63:2020 (E)**

| Value                           | Meaning                                   |
|---------------------------------|---|
| WFS_SRVE_IDC_MEDIAREMOVED       | The card has been taken by the user.      |
| WFS_USRE_IDC_RETAINBINTHRESHOLD | The retain bin reached a threshold value. |

**Comments** This is a fundamental capability of an ID card unit; thus if an eject request is received by a device with no eject capability, the WFS\_ERR\_UNSUPP\_COMMAND error is returned.

## 5.4 WFS\_CMD\_IDC\_RETAIN\_CARD

---

**Description** The card is removed from its present position (card inserted into device, card entering, unknown position) and stored in the retain bin; applicable to motor-driven card readers only. The ID card unit sends an event, if the storage capacity of the retain bin is reached. If the storage capacity has already been reached, and the command cannot be executed, an error is returned and the card remains in its present position.

**Input Param** None.

**Output Param** LPWFSIDCRETAINCARD lpRetainCard;

```
typedef struct _wfs_idc_retain_card
{
    USHORT          usCount;
    WORD            fwPosition;
} WFSIDCRETAINCARD, *LPWFSIDCRETAINCARD;
```

*usCount*

Total number of ID cards retained up to and including this operation, since the last WFS\_CMD\_IDC\_RESET\_COUNT command was executed.

*fwPosition*

Position of card; only relevant if card could not be retained. Possible positions:

| Value                 | Meaning   |
|-----------------------|---|
| WFS_IDC_MEDIAUNKNOWN  | The position of the card cannot be determined with the device in its current state. |
| WFS_IDC_MEDIAPRESENT  | The card is present in the reader.  |
| WFS_IDC_MEDIAENTERING | The card is in the entering position (shutter).                                     |

**Error Codes** In addition to the generic error codes defined in [Ref. 1], the following error codes can be generated by this command:

| Value                     | Meaning  |
|---------------------------|--|
| WFS_ERR_IDC_MEDIAJAM      | The card is jammed. Operator intervention is required.   |
| WFS_ERR_IDC_NOMEDIA       | No card has been inserted. The <i>fwPosition</i> parameter has the value WFS_IDC_MEDIAUNKNOWN.           |
| WFS_ERR_IDC_RETAINBINFULL | The retain bin is full; no more cards can be retained. The current card is still in the device.          |
| WFS_ERR_IDC_SHUTTERFAIL   | The open of the shutter failed due to manipulation or hardware error. Operator intervention is required. |

**Events** In addition to the generic events defined in [Ref.1], the following events can be generated by this command:

| Value                           | Meaning  |
|---------------------------------|--|
| WFS_USRE_IDC_RETAINBINTHRESHOLD | The retain bin reached a threshold value.  |
| WFS_SRVE_IDC_MEDIAREMOVED       | The card has been taken by the user.   |
| WFS_EXEE_IDC_MEDIARETAINED      | The card has been retained. This event is only fired if the command completes successfully (with WFS_SUCCESS). |

**Comments** This is a fundamental capability of an ID card unit; thus if a retain request is received by a device with no retain capability, the WFS\_ERR\_UNSUPP\_COMMAND error is returned.

## 5.5 WFS\_CMD\_IDC\_RESET\_COUNT

---

**Description** This function resets the present value for number of cards retained to zero. The function is possible for motor-driven card readers only.

The number of cards retained is controlled by the service and can be requested before resetting via the WFS\_INF\_IDC\_STATUS.

**Input Param** None.

**Output Param** None.

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

**Events** In addition to the generic events defined in [Ref.1], the following events can be generated by this command:

| Value                           | Meaning                     |
|---------------------------------|-----------------------------|
| WFS_USRE_IDC_RETAINBINTHRESHOLD | The retain bin was emptied. |

**Comments** This is a fundamental capability of an ID card unit; thus if this request is received by a device with no retain capability, the WFS\_ERR\_UNSUPP\_COMMAND error is returned.

## 5.6 WFS\_CMD\_IDC\_SETKEY

---

**Description** This command is used for setting the DES key that is necessary for operating a CIM86 module. The command must be executed before the first read command is issued to the card reader.

**Input Param** LPWFSIDCSETKEY lpSetkey;

```
typedef struct _wfs_idc_setkey
{
    USHORT          usKeyLen;
    LPBYTE          lpbKeyValue;
} WFSIDCSETKEY, *LPWFSIDCSETKEY;
```

*usKeyLen*

Specifies the length of the following key value.

*lpbKeyValue*

Pointer to a byte array containing the CIM86 DES key. This key is supplied by the vendor of the CIM86 module.

**Output Param** None.

**Error Codes** In addition to the generic error codes defined in [Ref. 1], the following error codes can be generated by this command:

| Value                  | Meaning                                      |
|------------------------|--|
| WFS_ERR_IDC_INVALIDKEY | The key does not fit to the security module. |

**Events** Only the generic events defined in [Ref. 1] can be generated by this command.

**Comments** None.

## 5.7 WFS\_CMD\_IDC\_READ\_RAW\_DATA

---

**Description** For motor driven card readers, the ID card unit checks whether a card has been inserted. If so, all specified tracks are read immediately. If reading the chip is requested, the chip will be contacted and reset and the ATR (Answer To Reset) data will be read. When this command completes the chip will be in contacted position. This command can also be used for an explicit cold reset of a previously contacted chip.

This command should only be used for user cards and should not be used for permanently connected chips.

If no card has been inserted, and for all other categories of card readers, the ID card unit waits for the period of time specified in the **WFSExecute** call for a card to be either inserted or pulled through. The next step is trying to read all tracks specified.

The WFS\_EXEE\_IDC\_INSERTCARD event will be generated when there is no card in the card reader and the device is ready to accept a card.

If the magnetic stripe track data is not already in 8 bit form, the data is converted from its 5 or 7 bit character form to 8 bit ASCII form. The parity bit from each 5 or 7 bit magnetic stripe character is discarded. Start and end sentinel characters are not returned to the application. Field separator characters are returned to the application, and are also converted to 8 bit ASCII form.

In addition to that, a security check via a security module (i.e. MM, CIM86) can be requested. If the security check fails however this should not stop valid data being returned. The error WFS\_ERR\_IDC\_SECURITYFAIL will be returned if the command specifies only security data to be read and the security check could not be executed, in all other cases WFS\_SUCCESS will be returned with the *lpwData* field of the output parameter set to the relevant value including WFS\_IDC\_SEC\_HWERROR.

For non-motorized Card Readers which read track data on card exit, the WFS\_ERR\_INVALID\_DATA error code is returned when a call to WFS\_CMD\_IDC\_READ\_RAW\_DATA is made to read both track data and chip data.

If the card unit is a latched dip unit then the device will latch the card when the chip card will be read, i.e. WFS\_IDC\_CHIP is specified (see below). The card will remain latched until a call to WFS\_CMD\_IDC\_EJECT\_CARD is made.

For contactless chip card readers a collision of two or more card signals may happen. In this case, if the device is not able to pick the strongest signal, the WFS\_ERR\_IDC\_CARDCOLLISION error code will be returned.

**Input Param** LPWORD lpwReadData;

*lpwReadData*

If *lpwReadData* points to a zero value any previously ejected card will be moved back inside the device and no data will be returned. Otherwise, *lpwReadData* specifies the data that should be read as a combination of the following flags:

| Value                 | Meaning  |
|-----------------------|--|
| WFS_IDC_TRACK1        | Track 1 of the magnetic stripe will be read.   |
| WFS_IDC_TRACK2        | Track 2 of the magnetic stripe will be read.   |
| WFS_IDC_TRACK3        | Track 3 of the magnetic stripe will be read.   |
| WFS_IDC_CHIP          | The chip will be read.   |
| WFS_IDC_SECURITY      | A security check will be performed.  |
| WFS_IDC_FLUXINACTIVE  | If the IDC Flux Sensor is programmable it will be disabled in order to allow chip data to be read on cards which have no magnetic stripes. |
| WFS_IDC_TRACK_WM      | The Swedish Watermark track will be read.  |
| WFS_IDC_MEMORY_CHIP   | The memory chip will be read.  |
| WFS_IDC_FRONT_TRACK_1 | Track 1 data is read from the magnetic stripe located on the front of the card. In some countries this track is known as JIS II track.     |

|                     |   |
|---------------------|---|
| WFS_IDC_FRONTIMAGE  | The front image of the card will be read in BMP format.   |
| WFS_IDC_BACKIMAGE   | The back image of the card will be read in BMP format.  |
| WFS_IDC_TRACK1_JIS1 | Track 1 of Japanese cash transfer card will be read. In some countries this track is known as JIS I track 1 (8bits/char). |
| WFS_IDC_TRACK3_JIS1 | Track 3 of Japanese cash transfer card will be read. In some countries this track is known as JIS I track 3 (8bits/char). |
| WFS_IDC_DDI         | Dynamic Digital Identification data of the magnetic stripe will be read.  |

**Output Param** LPWFSIDCCARDDATA \*lppCardData;

*lppCardData*

Pointer to a NULL terminated array of pointers to card data structures or if no data has been requested *lppCardData* will be NULL:

```
typedef struct _wfs_idc_card_data
{
    WORD                wDataSource;
    WORD                wStatus;
    ULONG               ulDataLength;
    LPBYTE              lpbData;
    WORD                fwWriteMethod;
} WFSIDCCARDDATA, *LPWFSIDCCARDDATA;
```

*wDataSource*

Specifies the source of the card data as one of the following flags:

| Value                 | Meaning  |
|-----------------------|--|
| WFS_IDC_TRACK1        | <i>lpbData</i> contains data read from track 1.  |
| WFS_IDC_TRACK2        | <i>lpbData</i> contains data read from track 2.  |
| WFS_IDC_TRACK3        | <i>lpbData</i> contains data read from track 3.  |
| WFS_IDC_CHIP          | <i>lpbData</i> contains ATR data read from the chip. For contactless chip card readers, multiple identification information can be returned if the card reader detects more than one chip. Each chip identification information is returned as an individual <i>lppCardData</i> array element. |
| WFS_IDC_SECURITY      | <i>lpbData</i> contains the value returned by the security module.   |
| WFS_IDC_TRACK_WM      | <i>lpbData</i> contains data read from the Swedish Watermark track.  |
| WFS_IDC_MEMORY_CHIP   | <i>lpbData</i> contains Memory Card Identification data read from the memory chip.   |
| WFS_IDC_FRONT_TRACK_1 | <i>lpbData</i> contains data read from the front track 1. In some countries this track is known as JIS II track.   |
| WFS_IDC_FRONTIMAGE    | <i>lpbData</i> contains a null-terminated string containing the full path and file name of the BMP image file for the front of the card.   |
| WFS_IDC_BACKIMAGE     | <i>lpbData</i> contains a null-terminated string containing the full path and file name of the BMP image file for the back of the card.  |
| WFS_IDC_TRACK1_JIS1   | <i>lpbData</i> contains data read from JIS I track 1 (8bits/char).   |
| WFS_IDC_TRACK3_JIS1   | <i>lpbData</i> contains data read from JIS I track 3 (8bits/char).   |
| WFS_IDC_DDI           | <i>lpbData</i> contains dynamic digital identification data read from magnetic stripe.   |

*wStatus*

Status of reading the card data. Possible values are:

| Value                  | Meaning   |
|------------------------|---|
| WFS_IDC_DATAOK         | The data is OK.   |
| WFS_IDC_DATAMISSING    | The track/chip/memory chip is blank.  |
| WFS_IDC_DATAINVALID    | The data contained on the track/chip/memory chip is invalid. This will typically be returned when <i>lpbData</i> reports WFS_IDC_SEC_BADREADLEVEL or WFS_IDC_SEC_DATAINVAL.   |
| WFS_IDC_DATATOOLONG    | The data contained on the track/chip/memory chip is too long.   |
| WFS_IDC_DATATOOSHORT   | The data contained on the track/chip/memory chip is too short.  |
| WFS_IDC_DATASRCNOTSUPP | The data source to read from is not supported by the Service Provider.  |
| WFS_IDC_DATASRCMISSING | The data source to read from is missing on the card, or is unable to be read due to a hardware problem, or the module has not been initialized. For example, this will be returned on a request to read a Memory Card and the customer has entered a magnetic card without associated memory chip. This will also be reported when <i>lpbData</i> reports WFS_IDC_SEC_NODATA, WFS_IDC_SEC_NOINIT or WFS_IDC_SEC_HWERROR. This will also be reported when the image reader could not create a BMP file due to the state of the image reader or due to a failure. |

*ulDataLength*

Specifies the length of the following field *lpbData*.

*lpbData*

Points to the data read from the track/chip, the value returned by the security module or a null-terminated string containing the full path and file name of the BMP image file. This value is terminated with a single null character and cannot contain UNICODE characters.

The security module can return one of the following values:

| Value                    | Meaning   |
|--------------------------|---|
| WFS_IDC_SEC_READLEVEL1   | The security data readability level is 1.   |
| WFS_IDC_SEC_READLEVEL2   | The security data readability level is 2.   |
| WFS_IDC_SEC_READLEVEL3   | The security data readability level is 3.   |
| WFS_IDC_SEC_READLEVEL4   | The security data readability level is 4.   |
| WFS_IDC_SEC_READLEVEL5   | The security data readability level is 5.   |
| WFS_IDC_SEC_BADREADLEVEL | The security data reading quality is not acceptable.  |
| WFS_IDC_SEC_NODATA       | There are no security data on the card.   |
| WFS_IDC_SEC_DATAINVAL    | The validation of the security data with the specific data on the magnetic stripe was not successful. |
| WFS_IDC_SEC_HWERROR      | The security module could not be used because of a hardware error.                                    |
| WFS_IDC_SEC_NOINIT       | The security module could not be used because it was not initialized (e.g. CIM key is not loaded).    |

The memory card returns the memory card protocol used to communicate with the card in the first WORD of the buffer, with the actual data following the protocol WORD. See *lpwMemoryChipProtocols* from WFS\_INF\_IDC\_CAPABILITIES for a description of possible memory card protocols.

*fwWriteMethod*

Ignored for this command.

**Error Codes** In addition to the generic error codes defined in [Ref. 1], the following error codes can be generated by this command:

| Value                     | Meaning   |
|---------------------------|---|
| WFS_ERR_IDC_MEDIAJAM      | The card is jammed. Operator intervention is required.  |
| WFS_ERR_IDC_SHUTTERFAIL   | The open of the shutter failed due to manipulation or hardware error. Operator intervention is required.  |
| WFS_ERR_IDC_NOMEDIA       | The card was removed before completion of the read action (the event WFS_EXEE_IDC_MEDIAINsertED has been generated). For motor driven devices, the read is disabled; i.e. another command has to be issued to enable the reader for card entry. |
| WFS_ERR_IDC_INVALIDMEDIA  | No track or chip found; card may have been inserted or pulled through the wrong way.  |
| WFS_ERR_IDC_CARDTOOSHORT  | The card that was inserted is too short. When this error occurs the card remains at the exit slot.  |
| WFS_ERR_IDC_CARDTOOLONG   | The card that was inserted is too long. When this error occurs the card remains at the exit slot.   |
| WFS_ERR_IDC_SECURITYFAIL  | The security module failed reading the cards security sign.   |
| WFS_ERR_IDC_CARDCOLLISION | There was an unresolved collision of two or more contactless card signals.  |

**Events** In addition to the generic events defined in [Ref. 1], the following events can be generated by this command:

| Value                      | Meaning   |
|----------------------------|---|
| WFS_EXEE_IDC_MEDIAINsertED | This event is generated when a card is detected in the device, giving early warning of card entry to an application, allowing it to remove a user prompt and/or do other processing while the card is being read. |
| WFS_SRVE_IDC_MEDIAREMOVED  | This event is generated when a card is removed before completion of a read operation.   |
| WFS_EXEE_IDC_INVALIDMEDIA  | The user is attempting to insert the media in the wrong orientation. The card has not been accepted into the device. The device is still ready to accept a card inserted in the correct orientation.              |
| WFS_EXEE_IDC_INSERTCARD    | Device is ready to accept a card from the user.   |
| WFS_EXEE_IDC_TRACKDETECTED | Track data has been detected during the insertion of the card.  |

**Comments** None.

## 5.8 WFS\_CMD\_IDC\_WRITE\_RAW\_DATA

---

**Description** For motor-driven card readers, the ID card unit checks whether a card has been inserted. If so, the data is written to the tracks.

If no card has been inserted, and for all other categories of devices, the ID card unit waits for the period of time specified in the **WFSExecute** call for a card to be either inserted or pulled through. The next step is writing the data to the respective tracks.

The **WFS\_EXEE\_IDC\_INSERTCARD** event will be generated when there is no card in the card reader and the device is ready to accept a card.

The application must pass the magnetic stripe data in ASCII without any sentinels. The data will be converted by the Service Provider (ref **WFS\_CMD\_IDC\_READ\_RAW\_DATA**). If the data passed in is too long the **WFS\_ERR\_INVALID\_DATA** error code will be returned.

This procedure is followed by data verification.

If power fails during a write the outcome of the operation will be vendor specific, there is no guarantee that the write will have succeeded.

**Input Param** LPWFSIDCCARDDATA \*lppCardData;

Pointer to a NULL terminated array of pointers to card data structures:

```
typedef struct _wfs_idc_card_data
{
    WORD          wDataSource;
    WORD          wStatus;
    ULONG        ulDataLength;
    LPBYTE       lpbData;
    WORD          fwWriteMethod;
} WFSIDCCARDDATA, *LPWFSIDCCARDDATA;
```

*wDataSource*

Specifies the source of the card data as one of the following flags:

| Value                 | Meaning   |
|-----------------------|---|
| WFS_IDC_TRACK1        | <i>lpbData</i> contains the data to be written to track 1.  |
| WFS_IDC_TRACK2        | <i>lpbData</i> contains the data to be written to track 2.  |
| WFS_IDC_TRACK3        | <i>lpbData</i> contains the data to be written to track 3.  |
| WFS_IDC_FRONT_TRACK_1 | <i>lpbData</i> contains the data to be written to the front track 1. In some countries this track is known as JIS II track. |
| WFS_IDC_TRACK1_JIS1   | <i>lpbData</i> contains the data to be written to JIS I track 1 (8bits/char).   |
| WFS_IDC_TRACK3_JIS1   | <i>lpbData</i> contains the data to be written to JIS I track 3 (8bits/char).   |

*wStatus*

This parameter is ignored by this command.

*ulDataLength*

Specifies the length of the following field *lpbData*.

*lpbData*

Points to the data to be written to the track.

*fwWriteMethod*

Indicates whether a loco or hico magnetic stripe is being written.

| Value        | Meaning  |
|--------------|--|
| WFS_IDC_LOCO | Low coercivity magnetic stripe is being written. |

|              |   |
|--------------|---|
| WFS_IDC_HICO | High coercivity magnetic stripe is being written.                                       |
| WFS_IDC_AUTO | Service Provider will determine whether low or high coercivity stripe is to be written. |

**Output Param** None.

**Error Codes** In addition to the generic error codes defined in [Ref. 1], the following error codes can be generated by this command:

| Value                    | Meaning   |
|--------------------------|---|
| WFS_ERR_IDC_MEDIAJAM     | The card is jammed. Operator intervention is required.  |
| WFS_ERR_IDC_SHUTTERFAIL  | The open of the shutter failed due to manipulation or hardware error. Operator intervention is required.  |
| WFS_ERR_IDC_NOMEDIA      | The card was removed before completion of the write action (the event WFS_EXEE_IDC_MEDIAINsertED has been generated). For motor driven devices, the write is disabled; i.e. another command has to be issued to enable the reader for card entry. |
| WFS_ERR_IDC_INVALIDMEDIA | No track found; card may have been inserted or pulled through the wrong way.  |
| WFS_ERR_IDC_WRITE_METHOD | The <i>fwWriteMethod</i> value is inconsistent with device capabilities.  |
| WFS_ERR_IDC_CARDTOOSHORT | The card that was inserted is too short. When this error occurs the card remains at the exit slot.  |
| WFS_ERR_IDC_CARDTOOLONG  | The card that was inserted is too long. When this error occurs the card remains at the exit slot.   |

**Events** In addition to the generic events defined in [Ref. 1], the following events can be generated by this command:

| Value                      | Meaning  |
|----------------------------|--|
| WFS_EXEE_IDC_MEDIAINsertED | This event is generated when a card is detected in the device, giving early warning of card entry to an application, allowing it to remove a user prompt and/or do other processing while the card is being written. |
| WFS_SRVE_IDC_MEDIAREMOVED  | This event is generated when a card is removed before completion of a write operation.   |
| WFS_EXEE_IDC_INVALIDMEDIA  | The user is attempting to insert the media in the wrong orientation. The card has not been accepted into the device. The device is still ready to accept a card inserted in the correct orientation.                 |
| WFS_EXEE_IDC_INSERTCARD    | Device is ready to accept a card from the user.  |

**Comments** This is a fundamental capability of an ID card unit; thus if a write request is received by a device with no write capability, the WFS\_ERR\_UNSUPP\_COMMAND error is returned.

## 5.9 WFS\_CMD\_IDC\_CHIP\_IO

---

- Description** This command is used to communicate with the chip. Transparent data is sent from the application to the chip and the response of the chip is returned transparently to the application.
- The identification information e.g. ATR of the chip must be obtained before issuing this command. The identification information for a user card or the Memory Card Identification (when available) must initially be obtained through WFS\_CMD\_IDC\_READ\_RAW\_DATA. The identification information for subsequent resets of a user card can be obtained either through WFS\_CMD\_IDC\_READ\_RAW\_DATA command or through WFS\_CMD\_IDC\_CHIP\_POWER. The ATR for permanent connected chips is always obtained through WFS\_CMD\_IDC\_CHIP\_POWER.
- For contactless chip card readers, applications need to specify which chip to contact with, as part of *lpbChipData*, if more than one chip has been detected and multiple identification data has been returned by the WFS\_CMD\_IDC\_READ\_RAW\_DATA command.
- For contactless chip card readers a collision of two or more card signals may happen. In this case, if the device is not able to pick the strongest signal, the WFS\_ERR\_IDC\_CARDCOLLISION error code will be returned.
- Input Param** LPWFSIDCCHIPIO lpChipIoIn;
- ```
typedef struct _wfs_idc_chip_io
{
    WORD                wChipProtocol;
    ULONG               ulChipDataLength;
    LPBYTE              lpbChipData;
} WFSIDCCHIPIO, *LPWFSIDCCHIPIO;
```
- wChipProtocol*  
Identifies the protocol that is used to communicate with the chip. Possible values are those described in WFS\_INF\_IDC\_CAPABILITIES. This field is ignored in communications with Memory Cards. The Service Provider knows which memory card type is currently inserted and therefore there is no need for the application to manage this.
- ulChipDataLength*  
Specifies the length of the following field *lpbChipData*.
- lpbChipData*  
Points to the data sent to the chip.
- Output Param** LPWFSIDCCHIPIO lpChipIoOut;
- ```
typedef struct _wfs_idc_chip_io
{
    WORD                wChipProtocol;
    ULONG               ulChipDataLength;
    LPBYTE              lpbChipData;
} WFSIDCCHIPIO, *LPWFSIDCCHIPIO;
```
- wChipProtocol*  
Identifies the protocol that is used to communicate with the chip. This field contains the same value as the corresponding field in the input structure. This field should be ignored in Memory Card dialogs and will contain WFS\_IDC\_NOTSUPP when returned for any Memory Card dialog.
- ulChipDataLength*  
Specifies the length of the following field *lpbChipData*.
- lpbChipData*  
Points to the data responded from the chip.
- Error Codes** In addition to the generic error codes defined in [Ref. 1], the following error codes can be generated by this command:

| Value                | Meaning  |
|----------------------|--|
| WFS_ERR_IDC_MEDIAJAM | The card is jammed. Operator intervention is required. |

|                             |  |
|-----------------------------|--|
| WFS_ERR_IDC_NOMEDIA         | There is no card inside the device.  |
| WFS_ERR_IDC_INVALIDMEDIA    | No chip found; card may have been inserted the wrong way.                  |
| WFS_ERR_IDC_INVALIDDATA     | An error occurred while communicating with the chip.                       |
| WFS_ERR_IDC_PROTOCOLNOTSUPP | The protocol used was not supported by the Service Provider.               |
| WFS_ERR_IDC_ATRNOTOBTAINED  | The ATR has not been obtained.   |
| WFS_ERR_IDC_CARDCOLLISION   | There was an unresolved collision of two or more contactless card signals. |

**Events** In addition to the generic events defined in [Ref. 1], the following events can be generated by this command:

| Value                     | Meaning   |
|---------------------------|---|
| WFS_SRVE_IDC_MEDIAREMOVED | This event is generated when a card is removed before completion of an operation. |

**Comments** None.

## 5.10 WFS\_CMD\_IDC\_RESET

---

**Description** This command is used by the application to perform a hardware reset which will attempt to return the IDC device to a known good state. This command does not over-ride a lock obtained by another application or service handle.

If the device is a user ID card unit, the device will attempt to either retain, eject or will perform no action on any user cards found in the IDC as specified in the *lpwResetIn* parameter. It may not always be possible to retain or eject the items as specified because of hardware problems. If a user card is found inside the device the WFS\_SRVE\_IDC\_MEDIADETECTED event will inform the application where card was actually moved to. If no action is specified the user card will not be moved even if this means that the IDC cannot be recovered.

If the device is a permanent chip card unit, this command will power-off the chip.

For devices with parking station capability there will be one WFS\_SRVE\_IDC\_MEDIADETECTED event for each card found.

**Input Param** LPWORD lpwResetIn;

Specifies the action to be performed on any user card found within the ID card unit as one of the following values:

| Value            | Meaning  |
|------------------|--|
| WFS_IDC_EJECT    | Eject any card found.                            |
| WFS_IDC_RETAIN   | Retain any card found.                           |
| WFS_IDC_NOACTION | No action should be performed on any card found. |

If *lpwResetIn* is NULL the Service Provider will determine where to move any card found.

**Output Param** None.

**Error Codes** In addition to the generic error codes defined in [Ref. 1], the following error codes can be generated by this command:

| Value                     | Meaning   |
|---------------------------|---|
| WFS_ERR_IDC_MEDIAJAM      | The card is jammed. Operator intervention is required.  |
| WFS_ERR_IDC_SHUTTERFAIL   | The device is unable to open and close its shutter.   |
| WFS_ERR_IDC_RETAINBINFULL | The retain bin is full; no more cards can be retained. The current card is still in the device. |

**Events** In addition to the generic events defined in [Ref. 1], the following events can be generated by this command:

| Value                           | Meaning   |
|---------------------------------|---|
| WFS_SRVE_IDC_MEDIADETECTED      | This event is generated when a media is detected during a reset. For devices with parking station capability there will be one event for each card found. |
| WFS_SRVE_IDC_MEDIAREMOVED       | The card has been taken by the user.  |
| WFS_USRE_IDC_RETAINBINTHRESHOLD | The retain bin reached a threshold value.   |

**Comments** None.

## 5.11 WFS\_CMD\_IDC\_CHIP\_POWER

---

| <b>Description</b>           | <p>This command handles the power actions that can be done on the chip.</p> <p>For user chips, this command is only used after the chip has been contacted for the first time using the WFS_CMD_IDC_READ_RAW_DATA command. For contactless user chips, this command may be used to deactivate the contactless card communication.</p> <p>For permanently connected chip cards, this command is the only way to control the chip power.</p>  |       |         |                              |  |                       |   |                      |  |                          |   |                         |  |                            |   |
|------------------------------|---|-------|---------|------------------------------|--|-----------------------|---|----------------------|--|--------------------------|---|-------------------------|--|----------------------------|---|
| <b>Input Param</b>           | <p>LPWORD lpwChipPower;</p> <p><i>lpwChipPower</i><br/>Specifies the action to perform as one of the following flags:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Value</th> <th style="text-align: left;">Meaning</th> </tr> </thead> <tbody> <tr> <td>WFS_IDC_CHIPPOWERCOLD</td> <td>The chip is powered on and reset (Cold Reset).</td> </tr> <tr> <td>WFS_IDC_CHIPPOWERWARM</td> <td>The chip is reset (Warm Reset).</td> </tr> <tr> <td>WFS_IDC_CHIPPOWEROFF</td> <td>The chip is powered off.</td> </tr> </tbody> </table>  | Value | Meaning | WFS_IDC_CHIPPOWERCOLD        | The chip is powered on and reset (Cold Reset).                                     | WFS_IDC_CHIPPOWERWARM | The chip is reset (Warm Reset).   | WFS_IDC_CHIPPOWEROFF | The chip is powered off.   |                          |   |                         |  |                            |   |
| Value                        | Meaning   |       |         |                              |  |                       |   |                      |  |                          |   |                         |  |                            |   |
| WFS_IDC_CHIPPOWERCOLD        | The chip is powered on and reset (Cold Reset).  |       |         |                              |  |                       |   |                      |  |                          |   |                         |  |                            |   |
| WFS_IDC_CHIPPOWERWARM        | The chip is reset (Warm Reset).   |       |         |                              |  |                       |   |                      |  |                          |   |                         |  |                            |   |
| WFS_IDC_CHIPPOWEROFF         | The chip is powered off.  |       |         |                              |  |                       |   |                      |  |                          |   |                         |  |                            |   |
| <b>Output Param</b>          | <p>NULL or LPWFSIDCCHIPPOWEROUT lpChipPowerOut;</p> <pre>typedef struct _wfs_idc_chip_power_out {     ULONG                ulChipDataLength;     LPBYTE               lpbChipData; } WFSIDCCHIPPOWEROUT, *LPWFSIDCCHIPPOWEROUT;</pre> <p><i>ulChipDataLength</i><br/>Specifies the length of the following field <i>lpbChipData</i>.</p> <p><i>lpbChipData</i><br/>Points to the ATR data responded from the chip. NULL if the action was not a power on.</p>   |       |         |                              |  |                       |   |                      |  |                          |   |                         |  |                            |   |
| <b>Error Codes</b>           | <p>In addition to the generic error codes defined in [Ref. 1], the following error codes can be generated by this command:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Value</th> <th style="text-align: left;">Meaning</th> </tr> </thead> <tbody> <tr> <td>WFS_ERR_IDC_CHIPPOWERNOTSUPP</td> <td>The specified action is not supported by the hardware device.</td> </tr> <tr> <td>WFS_ERR_IDC_MEDIAJAM</td> <td>The card is jammed (only applies to contact user chips). Operator intervention is required.</td> </tr> <tr> <td>WFS_ERR_IDC_NOMEDIA</td> <td>There is no card inside the device (may not apply for contactless user chips).</td> </tr> <tr> <td>WFS_ERR_IDC_INVALIDMEDIA</td> <td>No chip found; card may have been inserted or pulled through the wrong way.</td> </tr> <tr> <td>WFS_ERR_IDC_INVALIDDATA</td> <td>An error occurred while communicating with the chip.</td> </tr> <tr> <td>WFS_ERR_IDC_ATRNOTOBTAINED</td> <td>The ATR has not been obtained (only applies to user chips).</td> </tr> </tbody> </table> | Value | Meaning | WFS_ERR_IDC_CHIPPOWERNOTSUPP | The specified action is not supported by the hardware device.                      | WFS_ERR_IDC_MEDIAJAM  | The card is jammed (only applies to contact user chips). Operator intervention is required. | WFS_ERR_IDC_NOMEDIA  | There is no card inside the device (may not apply for contactless user chips). | WFS_ERR_IDC_INVALIDMEDIA | No chip found; card may have been inserted or pulled through the wrong way. | WFS_ERR_IDC_INVALIDDATA | An error occurred while communicating with the chip. | WFS_ERR_IDC_ATRNOTOBTAINED | The ATR has not been obtained (only applies to user chips). |
| Value                        | Meaning   |       |         |                              |  |                       |   |                      |  |                          |   |                         |  |                            |   |
| WFS_ERR_IDC_CHIPPOWERNOTSUPP | The specified action is not supported by the hardware device.   |       |         |                              |  |                       |   |                      |  |                          |   |                         |  |                            |   |
| WFS_ERR_IDC_MEDIAJAM         | The card is jammed (only applies to contact user chips). Operator intervention is required.   |       |         |                              |  |                       |   |                      |  |                          |   |                         |  |                            |   |
| WFS_ERR_IDC_NOMEDIA          | There is no card inside the device (may not apply for contactless user chips).  |       |         |                              |  |                       |   |                      |  |                          |   |                         |  |                            |   |
| WFS_ERR_IDC_INVALIDMEDIA     | No chip found; card may have been inserted or pulled through the wrong way.   |       |         |                              |  |                       |   |                      |  |                          |   |                         |  |                            |   |
| WFS_ERR_IDC_INVALIDDATA      | An error occurred while communicating with the chip.  |       |         |                              |  |                       |   |                      |  |                          |   |                         |  |                            |   |
| WFS_ERR_IDC_ATRNOTOBTAINED   | The ATR has not been obtained (only applies to user chips).   |       |         |                              |  |                       |   |                      |  |                          |   |                         |  |                            |   |
| <b>Events</b>                | <p>In addition to the generic events defined in [Ref. 1], the following events can be generated by this command:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Value</th> <th style="text-align: left;">Meaning</th> </tr> </thead> <tbody> <tr> <td>WFS_SRVE_IDC_MEDIAREMOVED</td> <td>This event is generated when a card is removed before completion of the operation.</td> </tr> </tbody> </table>   | Value | Meaning | WFS_SRVE_IDC_MEDIAREMOVED    | This event is generated when a card is removed before completion of the operation. |                       |   |                      |  |                          |   |                         |  |                            |   |
| Value                        | Meaning   |       |         |                              |  |                       |   |                      |  |                          |   |                         |  |                            |   |
| WFS_SRVE_IDC_MEDIAREMOVED    | This event is generated when a card is removed before completion of the operation.  |       |         |                              |  |                       |   |                      |  |                          |   |                         |  |                            |   |
| <b>Comments</b>              | <p>The NULL return value for the output parameter is provided for backwards compatibility and is only valid for user cards. Permanent chips must return the ATR in the output parameter. User cards should return the ATR in the output parameter.</p>  |       |         |                              |  |                       |   |                      |  |                          |   |                         |  |                            |   |

## 5.12 WFS\_CMD\_IDC\_PARSE\_DATA

---

**Description** This command takes form name and the output of a successful WFS\_CMD\_IDC\_READ\_RAW\_DATA command and returns the parsed string.

**Input Param** LPWFSIDCPARSEDATA lpParseData;

```
typedef struct _wfs_idc_parse_data
{
    LPSTR lpstrFormName;
    LPWFSIDCCARDDATA *lppCardData;
} WFSIDCPARSEDATA, *LPWFSIDCPARSEDATA;
```

*lpstrFormName*

Points to the name of the form that defines the behavior for the reading of tracks (see Section 7, Form Description).

*lppCardData*

Points to a NULL terminated array of pointers to card data structures, as returned from the WFS\_CMD\_IDC\_READ\_RAW\_DATA command.

**Output Param** LPSTR lpstrTrackData;

*lpstrTrackData*

Points to the data read successfully from the selected tracks (and value of security module if available).

**Error Codes** In addition to the generic error codes defined in [Ref. 1], the following error codes can be generated by this command:

| Value                    | Meaning   |
|--------------------------|---|
| WFS_ERR_IDC_INVALIDDATA  | The read operation specified by the forms definition could not be completed successfully due to invalid or incomplete track data being passed in. This is returned if none of the tracks in an 'or' ( ) operation is contained in the <i>lppCardData</i> array or if any track in an 'and' (&) operation is not found in the input. One execute event (WFS_EXEE_IDC_INVALIDTRACKDATA) is generated for each specified track which could not be parsed successfully. See the form description for the rules defining how tracks are specified. |
| WFS_ERR_IDC_FORMNOTFOUND | The specified form cannot be found.   |
| WFS_ERR_IDC_FORMINVALID  | The specified form definition is invalid (e.g. syntax error).   |

**Events** In addition to the generic events defined in [Ref. 1], the following events can be generated by this command:

| Value                         | Meaning   |
|-------------------------------|---|
| WFS_EXEE_IDC_INVALIDTRACKDATA | One event is generated for each blank track (no data) or invalid track (either data error reading the track or the data does not conform to the specified form definition). |

**Comments** The track data is preceded by the keyword for the track, separated by a ':'. The field data is always preceded by the corresponding keyword, separated by a '='. The fields are separated by 0x00. The data of the different tracks is separated by an additional 0x00. The end of the buffer is marked by another additional 0x00 (see example below). Data encoding is defined in Section 7, Form Definition.

Example of *lpstrTrackData*:

```
TRACK2:ALL=47..\0\0TRACK3:MII=59\0PAN=500..\0\0\0
```

## 5.13 WFS\_CMD\_IDC\_SET\_GUIDANCE\_LIGHT

**Description** This command is used to set the status of the IDC guidance lights. This includes defining the flash rate, the color and the direction. When an application tries to use a color or direction that is not supported then the Service Provider will return the generic error WFS\_ERR\_UNSUPP\_DATA.

**Input Param** LPWFSIDCSETGUIDLIGHT lpSetGuidLight;

```
typedef struct _wfs_idc_set_guidlight
{
    WORD                wGuidLight;
    DWORD               dwCommand;
} WFSIDCSETGUIDLIGHT, *LPWFSIDCSETGUIDLIGHT;
```

*wGuidLight*

Specifies the index of the guidance light to set as one of the values defined within the capabilities section.

*dwCommand*

Specifies the state of the guidance light indicator as WFS\_IDC\_GUIDANCE\_OFF or a combination of the following flags consisting of one type B, optionally one type C and optionally one type D. If no value of type C is specified then the default color is used. The Service Provider determines which color is used as the default color.

| Value                         | Meaning   | Type |
|-------------------------------|---|------|
| WFS_IDC_GUIDANCE_OFF          | The light indicator is turned off.                      | A    |
| WFS_IDC_GUIDANCE_SLOW_FLASH   | The light indicator is set to flash slowly.             | B    |
| WFS_IDC_GUIDANCE_MEDIUM_FLASH | The light indicator is set to flash medium frequency.   | B    |
| WFS_IDC_GUIDANCE_QUICK_FLASH  | The light indicator is set to flash quickly.            | B    |
| WFS_IDC_GUIDANCE_CONTINUOUS   | The light indicator is turned on continuously (steady). | B    |
| WFS_IDC_GUIDANCE_RED          | The light indicator color is set to red.                | C    |
| WFS_IDC_GUIDANCE_GREEN        | The light indicator color is set to green.              | C    |
| WFS_IDC_GUIDANCE_YELLOW       | The light indicator color is set to yellow.             | C    |
| WFS_IDC_GUIDANCE_BLUE         | The light indicator color is set to blue.               | C    |
| WFS_IDC_GUIDANCE_CYAN         | The light indicator color is set to cyan.               | C    |
| WFS_IDC_GUIDANCE_MAGENTA      | The light indicator color is set to magenta.            | C    |
| WFS_IDC_GUIDANCE_WHITE        | The light indicator color is set to white.              | C    |
| WFS_IDC_GUIDANCE_ENTRY        | The light indicator is set to the entry state.          | D    |
| WFS_IDC_GUIDANCE_EXIT         | The light indicator is set to the exit state.           | D    |

**Output Param** None.

**Error Codes** In addition to the generic error codes defined in [Ref. 1], the following error codes can be generated by this command:

| Value                    | Meaning  |
|--------------------------|--|
| WFS_ERR_IDC_INVALID_PORT | An attempt to set a guidance light to a new value was invalid because the guidance light does not exist. |

**Events** Only the generic events defined in [Ref. 1] can be generated by this command:

## **CWA 16926-63:2020 (E)**

**Comments**      Guidance light support was added into the IDC primarily to support guidance lights for workstations where more than one instance of an IDC is present. The original SIU guidance light mechanism was not able to manage guidance lights for workstations with multiple IDCs. This command can also be used to set the status of the IDC guidance lights when only one instance of an IDC is present.

The slow and medium flash rates must not be greater than 2.0 Hz. It should be noted that in order to comply with American Disabilities Act guidelines only a slow or medium flash rate must be used.

## 5.14 WFS\_CMD\_IDC\_POWER\_SAVE\_CONTROL

---

| <b>Description</b>                | <p>This command activates or deactivates the power-saving mode.</p> <p>If the Service Provider receives another execute command while in power saving mode, the Service Provider automatically exits the power saving mode, and executes the requested command. If the Service Provider receives an information command while in power saving mode, the Service Provider will not exit the power saving mode.</p>   |       |         |                                |  |                                   |  |
|-----------------------------------|---|-------|---------|--------------------------------|--|-----------------------------------|--|
| <b>Input Param</b>                | <p>LPWFSIDCPOWERSAVECONTROL lpPowerSaveControl;</p> <pre>typedef struct _wfs_idc_power_save_control {     USHORT                usMaxPowerSaveRecoveryTime; } WFSIDCPOWERSAVECONTROL, *LPWFSIDCPOWERSAVECONTROL;</pre> <p><i>usMaxPowerSaveRecoveryTime</i><br/>Specifies the maximum number of seconds in which the device must be able to return to its normal operating state when exiting power save mode. The device will be set to the highest possible power save mode within this constraint. If <i>usMaxPowerSaveRecoveryTime</i> is set to zero then the device will exit the power saving mode.</p>  |       |         |                                |  |                                   |  |
| <b>Output Param</b>               | None.   |       |         |                                |  |                                   |  |
| <b>Error Codes</b>                | <p>In addition to the generic error codes defined in [Ref. 1], the following error codes can be generated by this command:</p> <table border="0"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;">Value</th> <th style="text-align: left; border-bottom: 1px solid black;">Meaning</th> </tr> </thead> <tbody> <tr> <td>WFS_ERR_IDC_POWERSAVETOOSHORT</td> <td>The power saving mode has not been activated because the device is not able to resume from the power saving mode within the specified <i>usMaxPowerSaveRecoveryTime</i> value.</td> </tr> <tr> <td>WFS_ERR_IDC_POWERSAVEMEDIAPRESENT</td> <td>The power saving mode has not been activated because media is present inside the device.</td> </tr> </tbody> </table> | Value | Meaning | WFS_ERR_IDC_POWERSAVETOOSHORT  | The power saving mode has not been activated because the device is not able to resume from the power saving mode within the specified <i>usMaxPowerSaveRecoveryTime</i> value. | WFS_ERR_IDC_POWERSAVEMEDIAPRESENT | The power saving mode has not been activated because media is present inside the device. |
| Value                             | Meaning   |       |         |                                |  |                                   |  |
| WFS_ERR_IDC_POWERSAVETOOSHORT     | The power saving mode has not been activated because the device is not able to resume from the power saving mode within the specified <i>usMaxPowerSaveRecoveryTime</i> value.  |       |         |                                |  |                                   |  |
| WFS_ERR_IDC_POWERSAVEMEDIAPRESENT | The power saving mode has not been activated because media is present inside the device.  |       |         |                                |  |                                   |  |
| <b>Events</b>                     | <p>In addition to the generic events defined in [Ref. 1], the following events can be generated by this command:</p> <table border="0"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;">Value</th> <th style="text-align: left; border-bottom: 1px solid black;">Meaning</th> </tr> </thead> <tbody> <tr> <td>WFS_SRVE_IDC_POWER_SAVE_CHANGE</td> <td>The power save recovery time has changed.</td> </tr> </tbody> </table>   | Value | Meaning | WFS_SRVE_IDC_POWER_SAVE_CHANGE | The power save recovery time has changed.  |                                   |  |
| Value                             | Meaning   |       |         |                                |  |                                   |  |
| WFS_SRVE_IDC_POWER_SAVE_CHANGE    | The power save recovery time has changed.   |       |         |                                |  |                                   |  |
| <b>Comments</b>                   | None.   |       |         |                                |  |                                   |  |

## 5.15 WFS\_CMD\_IDC\_PARK\_CARD

---

**Description** This command is used to move a card that is present in the reader to a parking station. A parking station is defined as an area in the IDC, which can be used to temporarily store the card while the device performs operations on another card. This command is also used to move a card from the parking station to the read/write, chip I/O or transport position. When a card is moved from the parking station to the read/write, chip I/O or transport position (WFSIDCPARKCARD.*wDirection* = PARK\_OUT), the read/write, chip I/O or transport position must not be occupied with another card, otherwise the error WFS\_ERR\_IDC\_CARDPRESENT will be returned.

After moving a card to a parking station, another card can be inserted and read by calling e.g. the WFS\_CMD\_IDC\_READ\_RAW\_DATA or WFS\_CMD\_IDC\_READ\_TRACK command.

Cards in parking stations will not be affected by any IDC commands until they are removed from the parking station using this command, except for the WFS\_CMD\_IDC\_RESET command. The WFS\_CMD\_IDC\_RESET command will move the cards in the parking stations as specified in its *lpwResetIn* parameter as part of the reset action if possible.

**Input Param** LPWFSIDCPARKCARD lpParkCard;

```
typedef struct _wfs_idc_park_card
{
    WORD                wDirection;
    USHORT              usParkingStation;
} WFSIDCPARKCARD, *LPWFSIDCPARKCARD;
```

*wDirection*

Specifies which way to move the card as one of the following values:

| Value            | Meaning  |
|------------------|--|
| WFS_IDC_PARK_IN  | The card is moved to the parking station from the read/write, chip I/O or transport position.  |
| WFS_IDC_PARK_OUT | The card is moved from the parking station to the read/write, chip I/O or transport position. Once the card has been moved any command can be executed e.g. WFS_CMD_IDC_EJECT_CARD or WFS_CMD_IDC_READ_RAW_DATA. |

*usParkingStation*

Specifies which parking station should be used for this command. This value is the same index as is identified in the *lpwParkingStationMedia* array of the WFS\_INF\_IDC\_STATUS query.

**Output Param** None.

**Error Codes** In addition to the generic error codes defined in [Ref. 1], the following error codes can be generated by this command:

| Value                       | Meaning  |
|-----------------------------|--|
| WFS_ERR_IDC_MEDIAJAM        | The card is jammed. Operator intervention is required.   |
| WFS_ERR_IDC_NOMEDIA         | No card is present at the read/write, chip I/O or transport position and the WFS_IDC_PARK_IN option has been selected. Or no card is in the parking station and the WFS_IDC_PARK_OUT option has been selected. |
| WFS_ERR_IDC_CARDPRESENT     | Another card is present and is preventing successful movement of the card specified by <i>usParkingStation</i> .   |
| WFS_ERR_IDC_POSITIONINVALID | The specified parking station is invalid.  |

**Events** Only the generic events defined in [Ref. 1] can be generated by this command.

**Comments**     None.

## 5.16 WFS\_CMD\_IDC\_EMVCLESS\_CONFIGURE

---

**Description** This command is used to configure an intelligent contactless card reader before performing a contactless transaction. This command sets terminal related data elements, the list of terminal acceptable applications with associated application specific data and any encryption key data required for offline data authentication.

This command should be used prior to the WFS\_CMD\_IDC\_EMVCLESS\_PERFORM\_TRANSACTION command. It may be called once on application start up or when any of the configuration parameters require to be changed. The configuration set by this command is persistent.

This command should be called with a complete list of acceptable payment system applications as any previous configurations will be replaced.

**Input Param** LPWFSIDCEMVCLESSCONFIGDATA lpClessConfigData;

```
typedef struct _wfs_idc_emvcless_config_data
{
    LPWFSIDCHEXDATA    lpTerminalData;
    LPWFSIDCAIDDATA    *lppAIDData;
    LPWFSIDCKEYDATA    *lppKeyData;
} WFSIDCEMVCLESSCONFIGDATA, *LPWFSIDCEMVCLESSCONFIGDATA;
```

### *lpTerminalData*

Specifies the BER-TLV formatted data for the terminal e.g. Terminal Type, Transaction Category Code, Merchant Name & Location etc. Any terminal based data elements referenced in the Payment Systems Specifications or EMVCo Contactless Payment Systems Specifications Books may be included (see References [2] to [14] section for more details).

### *lppAIDData*

Pointer to a NULL terminated array of pointers to data structures.

This data structure specifies the list of acceptable payment system applications. For EMVCo approved contactless card readers each AID is associated with a Kernel Identifier and a Transaction Type. Legacy approved contactless readers may use only the AID.

Each AID-Transaction Type or each AID-Kernel-Transaction Type combination will have its own unique set of configuration data. See References [2] and [3] for more details.

```
typedef struct _wfs_idc_aid_data
{
    LPWFSIDCHEXDATA    lpAID;
    BOOL                bPartialSelection;
    ULONG               ulTransactionType;
    LPWFSIDCHEXDATA    lpKernelIdentifier;
    LPWFSIDCHEXDATA    lpConfigData;
} WFSIDCAIDDATA, *LPWFSIDCAIDDATA;
```

### *lpAID*

Specifies the application identifier to be accepted by the contactless chip card reader. The WFS\_INF\_IDC\_EMVCLESS\_QUERY\_APPLICATIONS command will return the list of supported application identifiers.

### *bPartialSelection*

If *bPartialSelection* is TRUE, partial name selection of the specified AID is enabled. If *bPartialSelection* is FALSE, partial name selection is disabled. A detailed explanation for partial name selection is given in EMV 4.3 Book 1, Section 11.3.5.

### *ulTransactionType*

Specifies the transaction type supported by the AID. This indicates the type of financial transaction represented by the first two digits of the ISO 8583:1987 Processing Code.

### *lpKernelIdentifier*

Specifies the EMVCo defined kernel identifier associated with the *lpAID*. This field will be ignored if the reader does not support kernel identifiers.

*lpConfigData*

Contains the list of BER-TLV formatted configuration data, applicable to the specific AID-Kernel ID-Transaction Type combination. The appropriate payment systems specifications define the BER-TLV tags to be configured.

*lppKeyData*

A pointer to a NULL terminated array of pointers to data structures, each includes encryption key information required by an intelligent contactless chip card reader for offline data authentication.

```
typedef struct _wfs_idc_key_data
{
    LPWFSIDCHEXDATA    lpRID;
    WORD                wCAPublicKeyIndex;
    WORD                wAPublicKeyAlgorithmIndicator;
    LPWFSIDCHEXDATA    lpCAPublicKeyExponent;
    LPWFSIDCHEXDATA    lpCAPublicKeyModulus;
    LPBYTE              lpbCAPublicKeyChecksum;
} WFSIDCKEYDATA, *LPWFSIDCKEYDATA;
```

*lpRID*

Specifies the payment system's Registered Identifier (RID). RID is the first 5 bytes of the AID and identifies the payments system.

*wCAPublicKeyIndex*

Specifies the CA Public Key Index for the specific RID.

*wAPublicKeyAlgorithmIndicator*

Specifies the algorithm used in the calculation of the CA Public Key checksum. A detailed description of secure hash algorithm values is given in EMV Book 2, Annex B3; see reference [2]. For example, if the EMV specification indicates the algorithm is '01', the value of the algorithm is coded as 0x01.

*lpCAPublicKeyExponent*

Specifies the CA Public Key Exponent for the specific RID. This value is represented by the minimum number of bytes required. A detailed description of public key exponent values is given in EMV Book 2, Annex B2; see reference [2]. For example, representing value  $2^{16} + 1$  requires 3 bytes in hexadecimal (0x01, 0x00, 0x01), while value '3' is coded as 0x03.

*lpCAPublicKeyModulus*

Specifies the CA Public Key Modulus for the specific RID.

*lpbCAPublicKeyChecksum*

Specifies the 20 byte checksum value for the CA Public Key.

**Output Param** None

**Error Codes** In addition to the generic error codes defined in [Ref. 1], the following error codes can be generated by this command:

| Value                           | Meaning  |
|---------------------------------|--|
| WFS_ERR_IDC_INVALIDTERMINALDATA | Input data <i>lpTerminalData</i> was invalid. Contactless chip card reader could not be configured successfully. |
| WFS_ERR_IDC_INVALIDAIDDATA      | Input data <i>lppAIDData</i> was invalid. Contactless chip card reader could not be configured successfully.     |
| WFS_ERR_IDC_INVALIDKEYDATA      | Input data <i>lppKeyData</i> was invalid. Contactless chip card reader could not be configured successfully.     |

**Events** Only the generic events defined in [Ref. 1] can be generated by this command.

**Comments** None.

## 5.17 WFS\_CMD\_IDC\_EMVCLESS\_PERFORM\_TRANSACTION

**Description** This command is used to enable an intelligent contactless card reader. The transaction will start as soon as the card tap is detected.

Based on the configuration of the contactless chip card and the reader device, this command could return data formatted either as magnetic stripe information or as a set of BER-TLV encoded EMV tags.

This command supports magnetic stripe emulation cards and EMV-like contactless cards but cannot be used on storage contactless cards. The latter must be managed using the WFS\_CMD\_IDC\_READ\_RAW\_DATA and WFS\_CMD\_IDC\_CHIP\_IO commands.

For specific payment system's card profiles an intelligent card reader could return a set of EMV tags along with magnetic stripe formatted data. In this case, two contactless card data structures will be returned, one containing the magnetic stripe like data and one containing BER-TLV encoded tags.

If no card has been tapped, the contactless chip card reader waits for the period of time specified in the **WFSExecute** call for a card to be tapped.

For intelligent contactless card readers, any in-built audio/visual feedback such as Beep/LEDs, need to be controlled directly by the reader. These indications should be implemented based on the EMVCo and payment system's specifications.

**Input Param** LPWFSIDCEMVCLESSTXDATA lpClessTxData;

```
typedef struct _wfs_idc_emvless_tx_data
{
    LPWFSIDCHEXDATA          lpData;
} WFSIDCEMVCLESSTXDATA, *LPWFSIDCEMVCLESSTXDATA;
```

*lpData*

Supplies EMV data elements in a BER-TLV format required to perform a transaction.

The types of object that could be listed in the *lpData* are:

- Transaction Type (9C)
- Amount Authorized (9F02)
- Transaction Date (9A)\*
- Transaction Time (9F21)\*
- Transaction Currency Code (5F2A)

Individual payment systems could define further data elements.

Tags are not mandatory with this command and this value can be NULL.

\* Tags 9A and 9F21 could be managed internally by the reader. If tags are not supplied, tag values may be used from the configuration sent previously in the WFS\_CMD\_IDC\_EMVCLESS\_CONFIGURE command.

**Output Param** LPWFSIDCEMVCLESSTXDATAOUTPUT \*lppClessTxDataOutput;

*lppClessTxDataOutput*

Pointer to a NULL terminated array of pointers to contactless card data structures. If no data has been returned *lppClessTxDataOutput* will be NULL:

```
typedef struct _wfs_idc_emvless_tx_data_output
{
    WORD          wDataSource;
    WORD          wTxOutcome;
    WORD          wCardholderAction;
    LPWFSIDCHEXDATA          lpDataRead;
    LPWFSIDCEMVCLESSESSOUTCOME          lpClessOutcome;
} WFSIDCEMVCLESSTXDATAOUTPUT, *LPWFSIDCEMVCLESSTXDATAOUTPUT;
```

*wDataSource*

The flag is set according to whether the contactless chip transaction has been completed in a mag-stripe mode or an EMV mode. Specifies the source of the card data as one of the following flags :

| Value          | Meaning  |
|----------------|--|
| WFS_IDC_TRACK1 | <i>lpDataRead</i> contains the chip returned data formatted in as track 1. This value is set after the contactless transaction has been completed with mag-stripe mode.            |
| WFS_IDC_TRACK2 | <i>lpDataRead</i> contains the chip returned data formatted in as track 2. This value is set after the contactless transaction has been completed with mag-stripe mode.            |
| WFS_IDC_TRACK3 | <i>lpDataRead</i> contains the chip returned data formatted in as track 3. This value is set after the contactless transaction has been completed with mag-stripe mode.            |
| WFS_IDC_CHIP   | <i>lpDataRead</i> contains the BER-TLV formatted data read from the chip. This value is set after the contactless transaction has been completed with EMV mode or mag-stripe mode. |

*wTxOutcome*

If multiple data sources are returned, this parameter should be the same for each one.

Specifies the contactless transaction outcome as one of the following flags:

| Value   | Meaning   |
|---|---|
| WFS_IDC_CLESS_MULTIPLECARDS                   | Transaction could not be completed as more than one contactless card was tapped.  |
| WFS_IDC_CLESS_APPROVE                         | Transaction was approved offline.   |
| WFS_IDC_CLESS_DECLINE                         | Transaction was declined offline.   |
| WFS_IDC_CLESS_ONLINEREQUEST                   | Transaction was requested for online authorization.   |
| WFS_IDC_CLESS_ONLINEREQUESTCOMPLETIONREQUIRED | Transaction requested online authorization and will be completed after a re-tap of the card. Transaction should be completed by issuing the WFS_CMD_IDC_EMVCLESS_ISSUERUP DATE command.   |
| WFS_IDC_CLESS_TRYAGAIN                        | Transaction could not be completed due to a card read error. The contactless card could be tapped again to re-attempt the transaction.  |
| WFS_IDC_CLESS_TRYANOTHERINTERFACE             | Transaction could not be completed over the contactless interface. Another interface may be suitable for this transaction (for example contact).  |
| WFS_IDC_CLESS_ENDAPPLICATION                  | Transaction cannot be completed on the contactless card due to an irrecoverable error.  |
| WFS_IDC_CLESS_CONFIRMATIONREQUIRED            | Transaction was not completed as a result of a requirement to allow entry of confirmation code on a mobile device. Transaction should be completed by issuing the WFS_CMD_IDC_EMVCLESS_PERFORM_TRANSACTION after a card removal and a re-tap of the card. |

NOTE: The values for *wTxOutcome* have been mapped against the EMV Entry Point Outcome structure values defined in the EMVCo Specifications for Contactless Payment Systems (Book A and B).

*wCardholderAction*

If multiple data sources are returned, this parameter should be the same for each one.

Specifies the cardholder action as one of the following flags:

| Value                  | Meaning   |
|------------------------|---|
| WFS_IDC_CLESS_NOACTION | Transaction was completed. No further action is required.   |
| WFS_IDC_CLESS_RETAP    | The contactless card should be re-tapped to complete the transaction. This value can be returned when <i>wTxOutcome</i> is WFS_IDC_CLESS_ONLINEREQUESTCOMPLETIONREQUIRED or WFS_IDC_CLESS_CONFIRMATIONREQUIRED. |
| WFS_IDC_CLESS_HOLDCARD | The contactless card should not be removed from the field until the transaction is completed.   |

*lpDataRead*

Points to the data read from the chip after a contactless transaction has been completed successfully. If the value of *wDataSource* is equal to WFS\_IDC\_CHIP, the BER-TLV formatted data contains cryptogram tag (9F26) after a contactless chip transaction has been completed successfully. If the value of *wDataSource* is equal to WFS\_IDC\_TRACK1, WFS\_IDC\_TRACK2 or WFS\_IDC\_TRACK3, *lpDataRead* points to the data read from the chip, i.e the value returned by the card reader device and no cryptogram tag (9F26). This value is terminated with a single null character and cannot contain UNICODE characters.

*lpClessOutcome*

Pointer to a structure that represents the Entry Point Outcome structure specified in EMVCo Specifications for Contactless Payment Systems (Book A and B). The *lpClessOutcome* can be NULL for contactless chip card readers that do not follow EMVCo Entry Point Specifications.

```
typedef struct _wfs_idc_emvcless_outcome
{
    WORD                wCVM;
    WORD                wAlternateInterface;
    BOOL                bReceipt;
    LPWFSIDCEMVCLESSUI lpClessUIOutcome;
    LPWFSIDCEMVCLESSUI lpClessUIRestart;
    ULONG               ulClessFieldOffHoldTime;
    ULONG               ulCardRemovalTimeoutValue;
    LPWFSIDCHEXDATA     lpDiscretionaryData;
} WFSIDCEMVCLESSOUTCOME, *LPWFSIDCEMVCLESSOUTCOME;
```

*wCVM*

Specifies the cardholder verification method (CVM) to be performed as one of the following flags:

| Value                                  | Meaning   |
|--|---|
| WFS_IDC_CLESS_ONLINEPIN                | Online PIN should be entered by the cardholder.   |
| WFS_IDC_CLESS_CONFIRMATIONCODEVERIFIED | A confirmation code entry has been successfully done on a mobile device.                                      |
| WFS_IDC_CLESS_SIGN                     | Application should obtain cardholder signature.   |
| WFS_IDC_CLESS_NOCVM                    | No CVM is required for this transaction.  |
| WFS_IDC_CLESS_NOCVMPREFERENCE          | There is no CVM preference, but application can follow the payment system's rules to process the transaction. |

*wAlternateInterface*

If *wTxOutcome* is **not** WFS\_IDC\_CLESS\_TRYANOTHERINTERFACE, this should be ignored. If *wTxOutcome* is WFS\_IDC\_CLESS\_TRYANOTHERINTERFACE, this specifies the alternative interface to be used to complete a transaction as one of the following flags:

| Value                        | Meaning   |
|------------------------------|---|
| WFS_IDC_CLESS_CONTACT        | Contact chip interface should be used to complete a transaction.    |
| WFS_IDC_CLESS_MAGNETICSTRIPE | Magnetic stripe interface should be used to complete a transaction. |

*bReceipt*

Specifies whether a receipt should be printed. TRUE indicates that a receipt is required.

*lpClessUIOutcome*

Pointer to a structure representing the user interface details required to be displayed to the cardholder after processing the outcome of a contactless transaction. If no user interface details are required, this will be NULL. Please refer to EMVCo Contactless Specifications for Payment Systems Book A, Section 6.2 for details of the data within this structure:

```
typedef struct _wfs_idc_emvcless_ui
{
    WORD                wMessageId;
    WORD                wStatus;
    ULONG               ulHoldTime;
    WORD                wValueQualifier;
    LPSTR               lpszValue;
    LPSTR               lpszCurrencyCode;
    LPSTR               lpszLanguagePreferenceData;
} WFSIDCEMVCLESSUI, *LPWFSIDCEMVCLESSUI;
```

*wMessageId*

A single byte hexadecimal value which represents the EMVCo defined message identifier that indicates the text string to be displayed e.g. 0x1B is the “Authorising Please Wait” message (see EMVCo Contactless Specifications for Payment Systems Book A, Section 9.4).

*wStatus*

Represents the EMVCo defined transaction status value to be indicated through the Beep/LEDs as one of the following flags:

| Value                         | Meaning   |
|-------------------------------|---|
| WFS_IDC_CLESS_NOT_READY       | Contactless card reader is not able to communicate with a card. This status occurs towards the end of a contactless transaction or if the reader is not powered on. |
| WFS_IDC_CLESS_IDLE            | Contactless card reader is powered on, but the reader field is not yet active for communication with a card.  |
| WFS_IDC_CLESS_READYTOREAD     | Contactless card reader is powered on and attempting to initiate communication with a card.   |
| WFS_IDC_CLESS_PROCESSING      | Contactless card reader is in the process of reading the card.  |
| WFS_IDC_CLESS_CARDREADOK      | Contactless card reader was able to read a card successfully.   |
| WFS_IDC_CLESS_PROCESSINGERROR | Contactless card reader was not able to process the card successfully.  |

*ulHoldTime*

Represents the hold time in units of 100 milliseconds for which the application should display the message before processing the next user interface data.

*wValueQualifier*

If *lpzValue* is NULL, this should be ignored as the Value Qualifier is not present. If the Value Qualifier is present, it will be specified as one of the following flags:

| Value                 | Meaning                     |
|-----------------------|-----------------------------|
| WFS_IDC_CLESS_AMOUNT  | Value Qualifier is Amount.  |
| WFS_IDC_CLESS_BALANCE | Value Qualifier is Balance. |

*lpzValue*

Represents the value of the amount or balance to be displayed when a Value Qualifier is present. If no Value Qualifier is present, this will be NULL.

*lpzCurrencyCode*

Represents the numeric value of currency code as per ISO 4217. This will be NULL if the Currency Code is not available.

*lpzLanguagePreferenceData*

Represents the language preference (EMV Tag '5F2D') if returned by the card. If not returned, this will be NULL. The application should use this data to display all messages in the specified language until the transaction concludes.

*lpClessUIRestart*

Pointer to a structure representing the user interface details required to be displayed to the cardholder when a transaction needs to be completed with a re-tap. If no user interface details are required, this will be NULL. For structure description see the *lpClessUIOutcome* field description.

*ulClessFieldOffHoldTime*

The application should wait for this specific hold time in units of 100 milliseconds, before re-enabling the contactless card reader by issuing either the WFS\_CMD\_IDC\_EMVCLESS\_PERFORM\_TRANSACTION command or the WFS\_CMD\_IDC\_EMVCLESS\_ISSUERUPDATE command depending on the value of *wTxOutcome*. For intelligent contactless card readers, the completion of this command ensures that the contactless chip card reader field is automatically turned off, so there is no need for the application to disable the field.

*ulCardRemovalTimeoutValue*

Specifies a timeout value in units of 100 milliseconds for prompting the user to remove the card.

*lpDiscretionaryData*

Points to the payment system's specific discretionary data read from the chip, in a BER-TLV format, after a contactless transaction has been completed. If discretionary data is not present, this will be NULL.

**Error Codes** In addition to the generic error codes defined in [Ref. 1], the following error codes can be generated by this command:

| Value                           | Meaning  |
|---------------------------------|--|
| WFS_ERR_IDC_NOMEDIA             | The card was removed before completion of the read operation.  |
| WFS_ERR_IDC_INVALIDMEDIA        | No track or chip was found or the card tapped cannot be used with this command (e.g. contactless storage cards). |
| WFS_ERR_IDC_READERNOTCONFIGURED | This command was issued before calling WFS_CMD_IDC_EMVCLESS_CONFIGURE command.                                   |

**Events** In addition to the generic events defined in [Ref. 1], the following events can be generated by this command:

| Value                           | Meaning   |
|---------------------------------|---|
| WFS_EXEE_IDC_EMVCLESSREADSTATUS | This event is generated to notify the application that the card reader is ready for a contactless card tap and the status after the contactless card tap. |
| WFS_SRVE_IDC_MEDIAREMOVED       | This event is generated when the card is removed before completion of the read operation.   |

**Comments** For example scenarios of events that can be generated from this command, see section 9, Intelligent Contactless Card Sequence Diagrams.

## 5.18 WFS\_CMD\_IDC\_EMVCLESS\_ISSUERUPDATE

**Description** This command performs the post authorization processing on payment systems contactless cards.

Before an online authorized transaction is considered complete, further chip processing may be requested by the issuer. This is only required when the authorization response includes issuer update data; either issuer scripts or issuer authentication data.

The command enables the contactless card reader and waits for the customer to re-tap their card.

The contactless chip card reader waits for the period of time specified in the **WFSExecute** call for a card to be tapped.

**Input Param** LPWFSIDCEMVCLESSTXDATA lpClessTxData;

```
typedef struct _wfs_idc_emvcless_tx_data
{
    LPWFSIDCHEXDATA    lpData;
} WFSIDCEMVCLESSTXDATA, *LPWFSIDCEMVCLESSTXDATA;
```

### *lpData*

Supplies BER-TLV formatted EMV data elements received from the authorization response that are required to complete the transaction processing.

The types of object that could be listed in *lpData* are:

- Authorization Code (if present)
- Issuer Authentication Data (if present)
- Issuer Scripts or proprietary payment system's data elements (if present) and any other data elements if required.

**Output Param** LPWFSIDCEMVCLESSTXDATAOUTPUT lpClessTxDataOutput;

### *lpClessTxDataOutput*

Pointer to the contactless card data structure or if no data has been returned *lpClessTxDataOutput* will be NULL:

```
typedef struct _wfs_idc_emvcless_tx_data_output
{
    WORD                wDataSource;
    WORD                wTxOutcome;
    WORD                wCardholderAction;
    LPWFSIDCHEXDATA    lpDataRead;
    LPWFSIDCEMVCLESSOUTCOME lpClessOutcome;
} WFSIDCEMVCLESSTXDATAOUTPUT, *LPWFSIDCEMVCLESSTXDATAOUTPUT;
```

### *wDataSource*

Specifies the source of the card data as the following flag:

| Value        | Meaning   |
|--------------|---|
| WFS_IDC_CHIP | <i>lpDataRead</i> contains the BER-TLV formatted data read from the chip. |

### *wTxOutcome*

Specifies the contactless transaction outcome as one of the following flags:

| Value                        | Meaning  |
|------------------------------|--|
| WFS_IDC_CLESS_MULTIPLECARDS  | Transaction could not be completed as more than one contactless card was tapped.   |
| WFS_IDC_CLESS_ENDAPPLICATION | Post authorization processing has been completed on the contactless card.  |
| WFS_IDC_CLESS_APPROVE        | Transaction was approved offline.  |
| WFS_IDC_CLESS_DECLINE        | Transaction was declined offline.  |
| WFS_IDC_CLESS_TRYAGAIN       | Transaction could not be completed due to a card read error. The contactless card could be tapped again to re-attempt the transaction. |

## WFS\_IDC\_CLESS\_TRYANOTHERINTERFACE

Transaction could not be completed over the contactless interface. Another interface may be suitable for this transaction (for example contact).

*wCardholderAction*

Specifies the cardholder action as the following flag:

| Value                  | Meaning  |
|------------------------|--|
| WFS_IDC_CLESS_NOACTION | Transaction was completed. No further action required. |

*lpDataRead*

Points to the data read from the chip or issuer script results after a contactless transaction has been completed successfully.

*lpClessOutcome*

Pointer to a structure that represents the Entry Point Outcome structure specified in EMVCo Specifications for Contactless Payment Systems (Book A and B). The *lpClessOutcome* can be NULL for contactless chip card readers that do not follow EMVCo Entry Point Specifications. See the outcome parameter of WFS\_CMD\_IDC\_EMVCLESS\_PERFORM\_TRANSACTION command for details of *lpClessOutcome* data structure.

**Error Codes**

In addition to the generic error codes defined in [Ref. 1], the following error codes can be generated by this command:

| Value                               | Meaning  |
|-------------------------------------|--|
| WFS_ERR_IDC_NOMEDIA                 | The card was removed before completion of the read action.   |
| WFS_ERR_IDC_INVALIDMEDIA            | No track or chip found or card tapped cannot be used with this command (e.g. contactless storage cards or a different card than what was used to complete the WFS_CMD_IDC_EMVCLESS_PERFORM_TRANSACTION command). |
| WFS_ERR_IDC_TRANSACTIONNOTINITIATED | This command was issued before calling the WFS_CMD_IDC_EMVCLESS_PERFORM_TRANSACTION command.   |

**Events**

In addition to the generic events defined in [Ref. 1], the following events can be generated by this command:

| Value                           | Meaning   |
|---------------------------------|---|
| WFS_EXEE_IDC_EMVCLESSREADSTATUS | This event is generated to notify the application that the card reader is ready for a contactless card tap and the status after the contactless card tap. |
| WFS_SRVE_IDC_MEDIAREMOVED       | This event is generated when a card is removed before completion of a read operation.   |

**Comments**

For example scenarios of events that can be generated from this command, see section 9, Intelligent Contactless Card Sequence Diagrams.

## 5.19 WFS\_CMD\_IDC\_SYNCHRONIZE\_COMMAND

---

**Description** This command is used to reduce response time of a command (e.g. for synchronization with display) as well as to synchronize actions of the different device classes. This command is intended to be used only on hardware which is capable of synchronizing functionality within a single device class or with other device classes.

The list of execute commands which this command supports for synchronization is retrieved in the *lpdwSynchronizableCommands* parameter of the WFS\_INF\_IDC\_CAPABILITIES.

This command is optional, i.e. any other command can be called without having to call it in advance. Any preparation that occurs by calling this command will not affect any other subsequent command. However, any subsequent execute command other than the one that was specified in the *dwCommand* input parameter will execute normally and may invalidate the pending synchronization. In this case the application should call the WFS\_CMD\_IDC\_SYNCHRONIZE\_COMMAND again in order to start a synchronization.

**Input Param** LPWFSIDCSYNCHRONIZECOMMAND lpSynchronizeCommand;

```
typedef struct _wfs_idc_synchronize_command
{
    DWORD                dwCommand;
    LPVOID               lpCmdData;
} WFSIDCSYNCHRONIZECOMMAND, *LPWFSIDCSYNCHRONIZECOMMAND;
```

*dwCommand*

The command ID of the command to be synchronized and executed next.

*lpCmdData*

Pointer to data or a data structure that represents the parameter that is normally associated with the command that is specified in *dwCommand*. For example, if *dwCommand* is WFS\_CMD\_CIP\_IO then *lpCmdData* will point to a WFSIDCCHIPIO structure. This parameter can be NULL if no command input parameter is needed or if this detail is not needed to synchronize for the command.

It will be device-dependent whether the synchronization is effective or not in the case where the application synchronizes for a command with this command specifying a parameter but subsequently executes the synchronized command with a different parameter. This case should not result in an error; however, the preparation effect could be different from what the application expects. The application should, therefore, make sure to use the same parameter between *lpCmdData* of this command and the subsequent corresponding execute command.

**Output Param** None.

**Error Codes** In addition to the generic error codes defined in [Ref. 1], the following error codes can be generated by this command:

| Value                         | Meaning  |
|-------------------------------|--|
| WFS_ERR_IDC_COMMANDUNSUPP     | The command specified in the <i>dwCommand</i> field is not supported by the Service Provider.  |
| WFS_ERR_IDC_SYNCHRONIZEUNSUPP | The preparation for the command specified in the <i>dwCommand</i> with the parameter specified in the <i>lpCmdData</i> is not supported by the Service Provider. |

**Events** Only the generic events defined in [Ref. 1] can be generated by this command.

**Comments** For sample flows of this synchronization see the [Ref 1] Appendix C.

## 6. Events

---

### 6.1 WFS\_EXEE\_IDC\_INVALIDTRACKDATA

---

**Description** This execute event specifies that a track contained invalid or no data.

**Event Param** LPWFSIDCTRACKEVENT lpTrackEvent;

```
typedef struct _wfs_idc_track_event
{
    WORD                fwStatus;
    LPSTR               lpstrTrack;
    LPSTR               lpstrData;
} WFSIDCTRACKEVENT, *LPWFSIDCTRACKEVENT;
```

*fwStatus*

Status of reading the track. Possible values are:

| Value                | Meaning                                       |
|----------------------|---|
| WFS_IDC_DATAMISSING  | The track is blank.                           |
| WFS_IDC_DATAINVALID  | The data contained on the track is invalid.   |
| WFS_IDC_DATATOOLONG  | The data contained on the track is too long.  |
| WFS_IDC_DATATOOSHORT | The data contained on the track is too short. |

*lpstrTrack*

Points to the keyword of the track on which the error occurred.

*lpstrData*

Points to the data that could be read (that may be only a fragment of the track), terminated by a null character. This data is simply a stream of characters; it does not contain keywords.

**Comments** None.

## 6.2 WFS\_EXEE\_IDC\_MEDIINSERTED

---

|                    |  |
|--------------------|--|
| <b>Description</b> | This execute event specifies that a card was inserted into the device. |
| <b>Event Param</b> | None.  |
| <b>Comments</b>    | None.  |

### 6.3 WFS\_SRVE\_IDC\_MEDIAREMOVED

---

|                    |   |
|--------------------|---|
| <b>Description</b> | This service event specifies that the inserted card was manually removed by the user during the processing of a read/write command, during the processing of a chip_io/power command, during or after a retain/reset operation, after an eject operation or after the card is removed by the user in a latched dip card unit. |
| <b>Event Param</b> | None.   |
| <b>Comments</b>    | None.   |

## 6.4 WFS\_EXEE\_IDC\_MEDIARETAINED

---

|                    |  |
|--------------------|--|
| <b>Description</b> | This execute event specifies that the card was retained. |
| <b>Event Param</b> | None.  |
| <b>Comments</b>    | None.  |

## 6.5 WFS\_EXEE\_IDC\_INVALIDMEDIA

---

|                    |  |
|--------------------|--|
| <b>Description</b> | This execute event specifies that the media the user is attempting to insert is not a valid card or it is a card but it is in the wrong orientation. |
| <b>Event Param</b> | None.  |
| <b>Comments</b>    | None.  |

## 6.6 WFS\_SRVE\_IDC\_CARDACTION

---

**Description** This service event specifies that a card has been retained or ejected by either the automatic power on or power off action of the device.

**Event Param** LPWFSIDCCARDACT lpCardAct;

```
typedef struct _wfs_idc_card_act
{
    WORD                wAction;
    WORD                wPosition;
} WFSIDCCARDACT, *LPWFSIDCCARDACT;
```

*wAction*

Specifies which action has been performed with the card. Possible values are:

| Value                    | Meaning                                       |
|--------------------------|---|
| WFS_IDC_CARDRETAINED     | The card has been retained.                   |
| WFS_IDC_CARDEJECTED      | The card has been ejected.                    |
| WFS_IDC_CARDREADPOSITION | The card has been moved to the read position. |

*wPosition*

Position of card before being retained or ejected. Possible values are:

| Value                 | Meaning  |
|-----------------------|--|
| WFS_IDC_MEDIAUNKNOWN  | The position of the card cannot be determined. |
| WFS_IDC_MEDIAPRESENT  | The card was present in the reader.            |
| WFS_IDC_MEDIAENTERING | The card was entering the reader.              |

**Comments** None.

## 6.7 WFS\_USRE\_IDC\_RETAINBINTHRESHOLD

---

**Description** This user event specifies that the retain bin holding the retained cards has reached a threshold condition or the threshold condition is removed.

**Event Param** LPWORD lpfwRetainBin;

*lpfwRetainBin*

Specifies the state of the ID card unit retain bin as one of the following values:

| Value                 | Meaning  |
|-----------------------|--|
| WFS_IDC_RETAINBINOK   | The retain bin of the ID card unit was emptied.    |
| WFS_IDC_RETAINBINFULL | The retain bin of the ID card unit is full.        |
| WFS_IDC_RETAINBINHIGH | The retain bin of the ID card unit is nearly full. |

**Comments** None.

## 6.8 WFS\_SRVE\_IDC\_MEDIADETECTED

---

**Description** This service event is generated if media is detected during a reset (WFS\_CMD\_IDC\_RESET). The parameter on the event informs the application of the position of the card on the completion of the reset. For devices with parking station capability there will be one event for each card found.

**Event Param** LPWORD lpwResetOut;

*lpwResetOut*

Specifies the action that was performed on any card found within the IDC as one of the following values:

| Value                    | Meaning                           |
|--------------------------|-----------------------------------|
| WFS_IDC_CARDEJECTED      | The card was ejected.             |
| WFS_IDC_CARDRETAINED     | The card was retained.            |
| WFS_IDC_CARDREADPOSITION | The card is in read position.     |
| WFS_IDC_CARDJAMMED       | The card is jammed in the device. |

**Comments** None.

## 6.9 WFS\_SRVE\_IDC\_RETAINBINREMOVED

---

|                    |  |
|--------------------|--|
| <b>Description</b> | This event specifies that the retain bin has been removed. |
| <b>Event Param</b> | None.  |
| <b>Comments</b>    | None.  |

**6.10 WFS\_SRVE\_IDC\_RETAINBININSERTED**

---

**Description**     This event specifies that the retain bin has been inserted.  
**Event Param**    None.  
**Comments**        None.

## 6.11 WFS\_EXEE\_IDC\_INSERTCARD

---

|                    |   |
|--------------------|---|
| <b>Description</b> | This mandatory event notifies the application when the device is ready for the user to insert a card. |
| <b>Event Param</b> | None.   |
| <b>Comments</b>    | None.   |

## 6.12 WFS\_SRVE\_IDC\_DEVICEPOSITION

---

**Description** This service event reports that the device has changed its position status.

**Event Param** LPWFSIDCDEVICEPOSITION lpDevicePosition;

```
typedef struct _wfs_idc_device_position
{
    WORD wPosition;
} WFSIDCDEVICEPOSITION, *LPWFSIDCDEVICEPOSITION;
```

*wPosition*

Position of the device as one of the following values:

| Value                       | Meaning   |
|-----------------------------|---|
| WFS_IDC_DEVICEINPOSITION    | The device is in its normal operating position.                 |
| WFS_IDC_DEVICENOTINPOSITION | The device has been removed from its normal operating position. |
| WFS_IDC_DEVICEPOSUNKNOWN    | The position of the device cannot be determined.                |

**Comments** None.

## 6.13 WFS\_SRVE\_IDC\_POWER\_SAVE\_CHANGE

---

|                    |   |
|--------------------|---|
| <b>Description</b> | This service event specifies that the power save recovery time has changed.   |
| <b>Event Param</b> | <p>LPWFSIDCPOWERSAVECHANGE lpPowerSaveChange;</p> <pre>typedef struct _wfs_idc_power_save_change {     USHORT                usPowerSaveRecoveryTime; } WFSIDCPOWERSAVECHANGE, *LPWFSIDCPOWERSAVECHANGE;</pre> <p><i>usPowerSaveRecoveryTime</i><br/>Specifies the actual number of seconds required by the device to resume its normal operational state. This value is zero if the device exited the power saving mode.</p> |
| <b>Comments</b>    | If another device class compound with this device enters into a power saving mode this device will automatically enter into the same power saving mode and this event will be generated.  |

## 6.14 WFS\_EXEE\_IDC\_TRACKDETECTED

---

**Description** This execute event notifies the application what track data the inserted card has, before the reading of the data has completed. This event will be posted once when tracks are detected during card insertion.

**Event Param** LPWFSIDCTRAKDETECTED lpTrackDetected;

```
typedef struct _wfs_idc_track_detected
{
    WORD fwTracks;
} WFSIDCTRAKDETECTED, *LPWFSIDCTRAKDETECTED;
```

*fwTracks*

Specifies which tracks are on the card, as a combination of the following flags (zero if there is no track on the inserted card):

| Value                 | Meaning                                   |
|-----------------------|---|
| WFS_IDC_TRACK1        | The card has track 1.                     |
| WFS_IDC_TRACK2        | The card has track 2.                     |
| WFS_IDC_TRACK3        | The card has track 3.                     |
| WFS_IDC_TRACK_WM      | The card has the Swedish Watermark track. |
| WFS_IDC_FRONT_TRACK_1 | The card has the front track 1.           |

**Comments** None.

## 6.15 WFS\_EXEE\_IDC\_EMVCLESSREADSTATUS

---

**Description** This execute event notifies the application that the intelligent contactless card reader is ready for a contactless card tap and the status after the contactless card tap when communication (i.e. the commands exchanged linked to the tap) between the card and the intelligent contactless card reader are complete. The application can use this event to display intermediate messages, progress of card read, audio signals or anything else that might be required. The intelligent contactless card reader will continue the processing and the result of the processing will be returned in the out parameters of the WFS\_CMD\_IDC\_EMVCLESS\_PERFORM\_TRANSACTION command.

**Event Param** LPWFSIDCMVCLESSREADSTATUS lpReadStatus;

```
typedef struct _wfs_idc_emv_cless_read_status
{
    LPWFSIDCEMVCLESSUI lpClessUI;
} WFSIDCMVCLESSREADSTATUS, *LPWFSIDCMVCLESSREADSTATUS;
```

*lpClessUI*

For details of this structure, see definition in the WFS\_CMD\_IDC\_EMVCLESS\_PERFORM\_TRANSACTION command.

**Comments** For example scenarios illustrating when this event can be generated during a WFS\_CMD\_IDC\_EMVCLESS\_PERFORM\_TRANSACTION or WFS\_CMD\_IDC\_EMVCLESS\_ISSUERUPDATE command, see section 9, Intelligent Contactless Card Sequence Diagrams.

## 6.16 WFS\_SRVE\_IDC\_MEDIARETAINED

---

|                    |   |
|--------------------|---|
| <b>Description</b> | This service event is generated if the device is a compound device and a card has been retained as a result of an operation on another device class. For example, the WFS_CMD_CRD_RETAIN_CARD command on the CRD. |
| <b>Event Param</b> | None.   |
| <b>Comments</b>    | None.   |

## 7. Form Description

---

This section describes the forms mechanism used to define the tracks to be read or written. Forms are contained in a single file, with one section for each defined form. The name of each section is the form name parameter in the WFS\_CMD\_IDC\_READ\_TRACK and WFS\_CMD\_IDC\_WRITE\_TRACK commands.

The way to specify the location of a form file is vendor dependent.

As an example the following registry information can be used:

```
WOSA/XFS_ROOT
  FORMS
    IDCU
      formfile=<path><filename>
```

The read form defines which tracks should be read in the WFS\_CMD\_IDC\_READ\_TRACK command and what the response should be to a read failure. The read form can also be used to define logical track data, i.e. fields like “account number”, “issuer identifier”, and their position within the physical track data. For example, the output parameter of the WFS\_CMD\_IDC\_READ\_TRACK command with input parameter *lpstrFormName* = READTRACK3GERMAN could look like (see example 1 below):

```
"TRACK3:MII=59\0COUNTRY=280\0ISSUERID=50050500\0ACCOUNT=1234567890\0LUHNT3=1\0EXPIRATION=9912\0SECURE=1\0\0"
```

The write form defines which track is to be written, the logical track data that is handed over in the WFS\_CMD\_IDC\_WRITE\_TRACK command, and how the write data is to be converted to the physical data to be written.

| Reserved Keywords/Operands 1 | Meaning  |
|------------------------------|--|
| []                           | Form name delimiters.  |
| TRACK1                       | Keyword to identify track 1.   |
| TRACK2                       | Keyword to identify track 2.   |
| TRACK3                       | Keyword to identify track 3.   |
| TRACK1_JIS1                  | Keyword to identify JIS I track 1.   |
| TRACK3_JIS1                  | Keyword to identify JIS I track 3.   |
| FRONTTRACK1                  | Keyword to identify front track 1 (in some countries this track is known as JIS II track).       |
| FIELDSEPT1                   | Value of field separator of track 1.   |
| FIELDSEPT2                   | Value of field separator of track 2.   |
| FIELDSEPT3                   | Value of field separator of track 3.   |
| FIELDSEPTFRONT1              | Value of field separator of front track 1.   |
| FIELDSEPT1_JIS1              | Value of field separator of JIS I track 1.   |
| FIELDSEPT3_JIS1              | Value of field separator of JIS I track 3.   |
| READ                         | Description of read action; the track identifier keywords are processed left to right.           |
| WRITE                        | Description of write action.   |
| ALL                          | Read or write the complete track.  |
| SECURE                       | Do the security check via the security module (CIM86 or MM). This check is done on Track 3 only. |
| &                            | Read/write all tracks specified, abort reading on read failure.                                  |

<sup>1</sup> Attributes are not required in any mandatory order.

|              |  |
|--------------|--|
|              | Read/write at least one of the tracks specified, continue reading on read failure.   |
| FIELDSEPPOSn | Position of the nth occurrence of field separator on track. FIELDSEPPOS0 specifies the beginning of the data.  |
| ,            | Separator in a list of logical fields.   |
| DEFAULT      | String for default substitution of track data to be written, that is not defined explicitly by the form fields. DEFAULT also allows an application to input fewer fields than those defined by the form. |
| ?            | Reserved value for DEFAULT keyword: substitute track data to write with its value read before.   |
| ENDTRACK     | Represents the end of the data. It is used to identify fields positioned after the last field separator.   |

## Notes

The & and | operands may be combined in a single READ statement; for example:

- read track3 or track2, trying track3 first:  
READ= TRACK3 | TRACK2
  - read track 3 and at least one of track2 or track1:  
READ= TRACK3 & (TRACK2 | TRACK1)
- or:
- READ= TRACK2 | TRACK1 & TRACK3

The keywords FIELDSEPPOS0 and ENDTRACK are used as follows:

- read the first 2 bytes of a track:  
FIRST= FIELDSEPPOS0 + 1, FIELDSEPPOS0 + 2
- read the last 2 bytes of a track:  
LAST= ENDTRACK - 2, ENDTRACK - 1

Use of field separators in track layouts is to replace optional fields and terminate variable length fields.

Write forms are designed for updating specific fields without altering the position of the field separators.

The application may alter the position of the field separators by rewriting the card tracks (ALL option or DEFAULT option with default track data).

It is valid to define a field that spans another field separator, e.g. FIELDSEPPOS1+1, FIELDSEPPOS3+1 is valid as is FIELDSEPPOS3-4, FIELDSEPPOS3-1 where a field separator (e.g. FIELDSEPPOS2) lies within this range on the data read from the card. During a read track the field separator is returned within the track data. During a write track the application must ensure the correct number of field separators at the correct location with the correct spacing is included in the data, otherwise a WFS\_ERR\_IDC\_DATASYNTAX error will be returned.

**Example 1**

Reading tracks:

```
[READTRACK3GERMAN]
FIELDSEPT1= = /* field separator of track 1 */
FIELDSEPT2= = /* field separator of track 2 */
FIELDSEPT3= = /* field separator of track 3 */

READ= TRACK3 & TRACK1 & TRACK2 /* all tracks must be read */

/* read logical fields as defined below; also check the security */
TRACK3= MII, COUNTRY, ISSUERID, ACCOUNT, LUHNT3, EXPIRATION, SECURE
MII= FIELDSEPPOS0 + 3, FIELDSEPPOS0 + 4
ISSUERID= FIELDSEPPOS0 + 5, FIELDSEPPOS1 - 1
ACCOUNT= FIELDSEPPOS1 + 1, FIELDSEPPOS2 - 2
```

```

LUHNT3= FIELDSEPPOS2 - 1, FIELDSEPPOS2 - 1
TRACK2= ALL /* return track 2 complete, don't return logical fields*/
TRACK1= ALL /* return track 1 complete, don't return logical fields*/

```

All tracks must be read ('READ'), that is, the read fails if an error occurs on reading any one of the tracks (the '&' operand). The field "major industry identifier" ('MII') is located after the first field separator ('FIELDSEPPOS1') and its length is two bytes. The "issuer identifier" field ('ISSUERID') is located after the MII field, with a length of eight bytes. The next field, "account number" ('ACCOUNT') is variable length; it ends before the luhn digit field ('LUHNT3') that is the last digit in front of the second field separator ('FIELDSEPPOS2').

**Example 2** Write a track:

---

```

[WRITETRACK3]
FIELDSEPT3= =
DEFAULT= ? /* fields not specified in the write form are to be left
unchanged, i.e. read and the same data written back to them */
WRITE= TRACK3
TRACK3= RETRYCOUNT, DATE
RETRYCOUNT= FIELDSEPPOS2 + 22, FIELDSEPPOS2 + 22
DATE= FIELDSEPPOS5 + 1, FIELDSEPPOS5 + 4

```

Track 3 is to be written. In the example only the retry counter and the date of the last transaction are updated, the other fields are unchanged.

A sample of input data to be used with this form is as follows:

```
RETRYCOUNT=3\0DATE=3132\0\0
```

**Example 3** Write a track:

---

```

[WRITETRACK3ALL]
WRITE= TRACK3
TRACK3= ALL

```

Track 3 is to be written. By specifying ALL, the data passed in the WFS\_CMD\_IDC\_WRITE\_TRACK command is written to the physical track without formatting.

A sample of input data to be used with this form is as follows:

```
ALL=123456789123\0\0
```

**Example 4** Reading tracks:

---

```

[READTRACK2ANDFRONTTRACK1]
READ= TRACK2&FRONTTRACK1 /* track 2 and front track 1 must be read */
TRACK2= ALL
FRONTTRACK1= ALL

```

Track 2 and Front track 1 are to be read by the WFS\_CMD\_IDC\_READ\_TRACK command. By specifying '&', reading is aborted if either track fails to read. By specifying 'ALL' the physical track is read to the output data without field level formatting.

A sample of output data produced with this form is as follows:

```
TRACK2:ALL=123456789123\0\0FRONTTRACK1:ALL=123456789123\0\0\0
```

## 8. C-Header file

---

```

/*****
*
* xfsidc.h      XFS - Identification card unit (IDC) definitions
*
*              Version 3.40   (December 6 2019)
*
*****/

#ifndef __INC_XFSIDC_H
#define __INC_XFSIDC_H

#ifdef __cplusplus
extern "C" {
#endif

#include <xfsapi.h>

/* be aware of alignment */
#pragma pack(push,1)

/* values of WFSIDCCAPS.wClass */

#define WFS_SERVICE_CLASS_IDC          (2)
#define WFS_SERVICE_CLASS_NAME_IDC    "IDC"
#define WFS_SERVICE_CLASS_VERSION_IDC (0x2803) /* Version 3.40 */

#define IDC_SERVICE_OFFSET            (WFS_SERVICE_CLASS_IDC * 100)

/* IDC Info Commands */

#define WFS_INF_IDC_STATUS              (IDC_SERVICE_OFFSET + 1)
#define WFS_INF_IDC_CAPABILITIES       (IDC_SERVICE_OFFSET + 2)
#define WFS_INF_IDC_FORM_LIST          (IDC_SERVICE_OFFSET + 3)
#define WFS_INF_IDC_QUERY_FORM         (IDC_SERVICE_OFFSET + 4)
#define WFS_INF_IDC_QUERY_IFM_IDENTIFIER (IDC_SERVICE_OFFSET + 5)
#define WFS_INF_IDC_EMVCLESS_QUERY_APPLICATIONS (IDC_SERVICE_OFFSET + 6)

/* IDC Execute Commands */

#define WFS_CMD_IDC_READ_TRACK          (IDC_SERVICE_OFFSET + 1)
#define WFS_CMD_IDC_WRITE_TRACK        (IDC_SERVICE_OFFSET + 2)
#define WFS_CMD_IDC_EJECT_CARD         (IDC_SERVICE_OFFSET + 3)
#define WFS_CMD_IDC_RETAIN_CARD        (IDC_SERVICE_OFFSET + 4)
#define WFS_CMD_IDC_RESET_COUNT        (IDC_SERVICE_OFFSET + 5)
#define WFS_CMD_IDC_SETKEY             (IDC_SERVICE_OFFSET + 6)
#define WFS_CMD_IDC_READ_RAW_DATA      (IDC_SERVICE_OFFSET + 7)
#define WFS_CMD_IDC_WRITE_RAW_DATA     (IDC_SERVICE_OFFSET + 8)
#define WFS_CMD_IDC_CHIP_IO            (IDC_SERVICE_OFFSET + 9)
#define WFS_CMD_IDC_RESET              (IDC_SERVICE_OFFSET + 10)
#define WFS_CMD_IDC_CHIP_POWER         (IDC_SERVICE_OFFSET + 11)
#define WFS_CMD_IDC_PARSE_DATA         (IDC_SERVICE_OFFSET + 12)
#define WFS_CMD_IDC_SET_GUIDANCE_LIGHT (IDC_SERVICE_OFFSET + 13)
#define WFS_CMD_IDC_POWER_SAVE_CONTROL (IDC_SERVICE_OFFSET + 14)
#define WFS_CMD_IDC_PARK_CARD          (IDC_SERVICE_OFFSET + 15)
#define WFS_CMD_IDC_EMVCLESS_CONFIGURE (IDC_SERVICE_OFFSET + 16)
#define WFS_CMD_IDC_EMVCLESS_PERFORM_TRANSACTION (IDC_SERVICE_OFFSET + 17)
#define WFS_CMD_IDC_EMVCLESS_ISSUERUPDATE (IDC_SERVICE_OFFSET + 18)
#define WFS_CMD_IDC_SYNCHRONIZE_COMMAND (IDC_SERVICE_OFFSET + 19)

/* IDC Messages */

#define WFS_EXEE_IDC_INVALIDTRACKDATA  (IDC_SERVICE_OFFSET + 1)
#define WFS_EXEE_IDC_MEDIAINsertED    (IDC_SERVICE_OFFSET + 3)
#define WFS_SRVE_IDC_MEDIAREMOVED      (IDC_SERVICE_OFFSET + 4)
#define WFS_SRVE_IDC_CARDACTION        (IDC_SERVICE_OFFSET + 5)

```

```

#define WFS_USRE_IDC_RETAINBINTHRESHOLD (IDC_SERVICE_OFFSET + 6)
#define WFS_EXEE_IDC_INVALIDMEDIA (IDC_SERVICE_OFFSET + 7)
#define WFS_EXEE_IDC_MEDIARETAINED (IDC_SERVICE_OFFSET + 8)
#define WFS_SRVE_IDC_MEDIADETECTED (IDC_SERVICE_OFFSET + 9)
#define WFS_SRVE_IDC_RETAINBININSERTED (IDC_SERVICE_OFFSET + 10)
#define WFS_SRVE_IDC_RETAINBINREMOVED (IDC_SERVICE_OFFSET + 11)
#define WFS_EXEE_IDC_INSERTCARD (IDC_SERVICE_OFFSET + 12)
#define WFS_SRVE_IDC_DEVICEPOSITION (IDC_SERVICE_OFFSET + 13)
#define WFS_SRVE_IDC_POWER_SAVE_CHANGE (IDC_SERVICE_OFFSET + 14)
#define WFS_EXEE_IDC_TRACKDETECTED (IDC_SERVICE_OFFSET + 15)
#define WFS_EXEE_IDC_EMVCLESSEADSTATUS (IDC_SERVICE_OFFSET + 16)
#define WFS_SRVE_IDC_MEDIARETAINED (IDC_SERVICE_OFFSET + 17)

/* values of WFSIDCSTATUS.fwDevice */

#define WFS_IDC_DEVONLINE WFS_STAT_DEVONLINE
#define WFS_IDC_DEVOFFLINE WFS_STAT_DEVOFFLINE
#define WFS_IDC_DEVPPOWEROFF WFS_STAT_DEVPPOWEROFF
#define WFS_IDC_DEVNODEVICE WFS_STAT_DEVNODEVICE
#define WFS_IDC_DEVHWERROR WFS_STAT_DEVHWERROR
#define WFS_IDC_DEVUSERERROR WFS_STAT_DEVUSERERROR
#define WFS_IDC_DEVBUSY WFS_STAT_DEVBUSY
#define WFS_IDC_DEVFRAUDATTEMPT WFS_STAT_DEVFRAUDATTEMPT
#define WFS_IDC_DEVPOTENTIALFRAUD WFS_STAT_DEVPOTENTIALFRAUD

/* values of WFSIDCSTATUS.fwMedia,
   WFSIDCRETAINCARD.fwPosition,
   WFSIDCCARDACT.wPosition,
   WFSIDCSTATUS.lpwParkingStationMedia */

#define WFS_IDC_MEDIAPRESENT (1)
#define WFS_IDC_MEDIANOTPRESENT (2)
#define WFS_IDC_MEDIAJAMMED (3)
#define WFS_IDC_MEDIANOTSUPP (4)
#define WFS_IDC_MEDIAUNKNOWN (5)
#define WFS_IDC_MEDIAENTERING (6)
#define WFS_IDC_MEDIALATCHED (7)

/* values of WFSIDCSTATUS.fwRetainBin */

#define WFS_IDC_RETAINBINOK (1)
#define WFS_IDC_RETAINNOTSUPP (2)
#define WFS_IDC_RETAINBINFULL (3)
#define WFS_IDC_RETAINBINHIGH (4)
#define WFS_IDC_RETAINBINMISSING (5)

/* values of WFSIDCSTATUS.fwSecurity */

#define WFS_IDC_SECNOTSUPP (1)
#define WFS_IDC_SECNOTREADY (2)
#define WFS_IDC_SECOPEX (3)

/* values of WFSIDCSTATUS.fwChipPower */

#define WFS_IDC_CHIPONLINE (0)
#define WFS_IDC_CHIPPOWEREDOFF (1)
#define WFS_IDC_CHIPBUSY (2)
#define WFS_IDC_CHIPNODEVICE (3)
#define WFS_IDC_CHIPHWERROR (4)
#define WFS_IDC_CHIPNOCARD (5)
#define WFS_IDC_CHIPNOTSUPP (6)
#define WFS_IDC_CHIPUNKNOWN (7)

/* Size and max index of dwGuidLights array */

#define WFS_IDC_GUIDLIGHTS_SIZE (32)
#define WFS_IDC_GUIDLIGHTS_MAX (WFS_IDC_GUIDLIGHTS_SIZE - 1)

```

## CWA 16926-63:2020 (E)

```
/* Indices of WFSIDCSTATUS.dwGuidLights [...]
   WFSIDCCAPS.dwGuidLights [...] */

#define      WFS_IDC_GUIDANCE_CARDUNIT          (0)

/* Values of WFSIDCSTATUS.dwGuidLights [...]
   WFSIDCCAPS.dwGuidLights [...] */

#define      WFS_IDC_GUIDANCE_NOT_AVAILABLE    (0x00000000)
#define      WFS_IDC_GUIDANCE_OFF              (0x00000001)
#define      WFS_IDC_GUIDANCE_SLOW_FLASH      (0x00000004)
#define      WFS_IDC_GUIDANCE_MEDIUM_FLASH   (0x00000008)
#define      WFS_IDC_GUIDANCE_QUICK_FLASH    (0x00000010)
#define      WFS_IDC_GUIDANCE_CONTINUOUS     (0x00000080)
#define      WFS_IDC_GUIDANCE_RED            (0x00000100)
#define      WFS_IDC_GUIDANCE_GREEN          (0x00000200)
#define      WFS_IDC_GUIDANCE_YELLOW         (0x00000400)
#define      WFS_IDC_GUIDANCE_BLUE          (0x00000800)
#define      WFS_IDC_GUIDANCE_CYAN          (0x00001000)
#define      WFS_IDC_GUIDANCE_MAGENTA       (0x00002000)
#define      WFS_IDC_GUIDANCE_WHITE         (0x00004000)
#define      WFS_IDC_GUIDANCE_ENTRY         (0x00100000)
#define      WFS_IDC_GUIDANCE_EXIT          (0x00200000)

/* values of WFSIDCSTATUS.fwChipModule */

#define      WFS_IDC_CHIPMODOK                (1)
#define      WFS_IDC_CHIPMODINOP             (2)
#define      WFS_IDC_CHIPMODUNKNOWN         (3)
#define      WFS_IDC_CHIPMODNOTSUPP         (4)

/* values of WFSIDCSTATUS.fwMagReadModule and
   WFSIDCSTATUS.fwMagWriteModule */

#define      WFS_IDC_MAGMODOK                (1)
#define      WFS_IDC_MAGMODINOP             (2)
#define      WFS_IDC_MAGMODUNKNOWN         (3)
#define      WFS_IDC_MAGMODNOTSUPP         (4)

/* values of WFSIDCSTATUS.fwFrontImageModule and
   WFSIDCSTATUS.fwBackImageModule */

#define      WFS_IDC_IMGMODOK                (1)
#define      WFS_IDC_IMGMODINOP             (2)
#define      WFS_IDC_IMGMODUNKNOWN         (3)
#define      WFS_IDC_IMGMODNOTSUPP         (4)

/* values of WFSIDCSTATUS.wDevicePosition
   WFSIDCDEVICEPOSITION.wPosition */

#define      WFS_IDC_DEVICEINPOSITION        (0)
#define      WFS_IDC_DEVICENOTINPOSITION    (1)
#define      WFS_IDC_DEVICEPOSUNKNOWN       (2)
#define      WFS_IDC_DEVICEPOSNOTSUPP      (3)

/* values of WFSIDCCAPS.fwType */

#define      WFS_IDC_TYPEMOTOR               (1)
#define      WFS_IDC_TYPERWIPE              (2)
#define      WFS_IDC_TYPEDIP                (3)
#define      WFS_IDC_TYPECONTACTLESS        (4)
#define      WFS_IDC_TYPELATCHEDDIP         (5)
#define      WFS_IDC_TYPEPERMANENT          (6)
#define      WFS_IDC_TYPEINTELLIGENTCONTACTLESS (7)

/* values of WFSIDCCAPS.fwReadTracks,
   WFSIDCCAPS.fwWriteTracks,
   WFSIDCCARDDATA.wDataSource,
```

```

        WFSIDCCAPS.fwChipProtocols,
        WFSIDCCAPS.fwWriteMode,
        WFSIDCCAPS.fwChipPower */

#define      WFS_IDC_NOTSUPP                0x0000

/* values of WFSIDCCAPS.fwReadTracks,
   WFSIDCCAPS.fwWriteTracks,
   WFSIDCCARDDATA.wDataSource,
   WFS_CMD_IDC_READ_RAW_DATA */

#define      WFS_IDC_TRACK1                0x0001
#define      WFS_IDC_TRACK2                0x0002
#define      WFS_IDC_TRACK3                0x0004
#define      WFS_IDC_FRONT_TRACK_1        0x0080
#define      WFS_IDC_TRACK1_JIS1          0x0400
#define      WFS_IDC_TRACK3_JIS1          0x0800

/* further values of WFSIDCCARDDATA.wDataSource (except WFS_IDC_FLUXINACTIVE),
   WFS_CMD_IDC_READ_RAW_DATA */

#define      WFS_IDC_CHIP                  0x0008
#define      WFS_IDC_SECURITY              0x0010
#define      WFS_IDC_FLUXINACTIVE          0x0020
#define      WFS_IDC_TRACK_WM             0x8000
#define      WFS_IDC_MEMORY_CHIP          0x0040
#define      WFS_IDC_FRONTIMAGE           0x0100
#define      WFS_IDC_BACKIMAGE            0x0200
#define      WFS_IDC_DDI                   0x4000

/* values of WFSIDCCAPS.fwChipProtocols */

#define      WFS_IDC_CHIPT0                0x0001
#define      WFS_IDC_CHIPT1                0x0002
#define      WFS_IDC_CHIP_PROTOCOL_NOT_REQUIRED 0x0004
#define      WFS_IDC_CHIPTYPEA_PART3      0x0008
#define      WFS_IDC_CHIPTYPEA_PART4      0x0010
#define      WFS_IDC_CHIPTYPEB            0x0020
#define      WFS_IDC_CHIPNFC              0x0040

/* values of WFSIDCCAPS.fwSecType */

#define      WFS_IDC_SECNOTSUPP            (1)
#define      WFS_IDC_SECMBOX               (2)
#define      WFS_IDC_SECCIM86              (3)

/* values of WFSIDCCAPS.fwPowerOnOption,
   WFSIDCCAPS.fwPowerOffOption*/

#define      WFS_IDC_NOACTION              (1)
#define      WFS_IDC_EJECT                 (2)
#define      WFS_IDC_RETAIN                (3)
#define      WFS_IDC_EJECTTHENRETAIN      (4)
#define      WFS_IDC_READPOSITION          (5)

/* values of WFSIDCCAPS.fwWriteMode,
   WFSIDCWREDITRACK.fwWriteMethod,
   WFSIDCCARDDATA.fwWriteMethod */

/* Note: WFS_IDC_UNKNOWN was removed as it was an invalid value */
#define      WFS_IDC_LOCO                   0x0002
#define      WFS_IDC_HICO                   0x0004
#define      WFS_IDC_AUTO                   0x0008

/* values of WFSIDCCAPS.fwChipPower */

#define      WFS_IDC_CHIPPOWERCOLD         0x0002
#define      WFS_IDC_CHIPPOWERWARM        0x0004

```

## CWA 16926-63:2020 (E)

```
#define      WFS_IDC_CHIPPOWEROFF          0x0008

/* values of WFSIDCCAPS.fwDIPMode */

#define      WFS_IDC_DIP_UNKNOWN          0x0001
#define      WFS_IDC_DIP_EXIT            0x0002
#define      WFS_IDC_DIP_ENTRY          0x0004
#define      WFS_IDC_DIP_ENTRY_EXIT      0x0008

/* values of WFSIDCCAPS.lpwMemoryChipProtocols */

#define      WFS_IDC_MEM_SIEMENS4442      0x0001
#define      WFS_IDC_MEM_GPM896          0x0002

/* values of WFSIDCFORM.fwAction */

#define      WFS_IDC_ACTIONREAD           0x0001
#define      WFS_IDC_ACTIONWRITE         0x0002

/* values of WFSIDCTRACKEVENT.fwStatus,
   WFSIDCCARDDATA.wStatus */

#define      WFS_IDC_DATAOK              (0)
#define      WFS_IDC_DATAMISSING         (1)
#define      WFS_IDC_DATAINVALID         (2)
#define      WFS_IDC_DATATOOLONG        (3)
#define      WFS_IDC_DATATOOSHORT       (4)
#define      WFS_IDC_DATASRCNOTSUPP     (5)
#define      WFS_IDC_DATASRCMISSING     (6)

/* values of WFSIDCCARDDACT.wAction */

#define      WFS_IDC_CARDRETAINED        (1)
#define      WFS_IDC_CARDEJECTED         (2)
#define      WFS_IDC_CARDREADPOSITION    (3)
#define      WFS_IDC_CARDJAMMED         (4)

/* values of WFSIDCCARDDATA.lpbData if security is read */

#define      WFS_IDC_SEC_READLEVEL1      '1'
#define      WFS_IDC_SEC_READLEVEL2      '2'
#define      WFS_IDC_SEC_READLEVEL3      '3'
#define      WFS_IDC_SEC_READLEVEL4      '4'
#define      WFS_IDC_SEC_READLEVEL5      '5'
#define      WFS_IDC_SEC_BADREADLEVEL    '6'
#define      WFS_IDC_SEC_NODATA          '7'
#define      WFS_IDC_SEC_DATAINVAL       '8'
#define      WFS_IDC_SEC_HWERROR         '9'
#define      WFS_IDC_SEC_NOINIT          'A'

/* values of WFSIDCIFMIDENTIFIER.wIFMAuthority */

#define      WFS_IDC_IFMEMV              (1)
#define      WFS_IDC_IFMEUROPAY          (2)
#define      WFS_IDC_IFMVISA             (3)
#define      WFS_IDC_IFMGIECB           (4)

/* values of WFSIDCCAPS.fwEjectPosition,
   WFSIDCEJECTCARD.wEjectPosition */

#define      WFS_IDC_EXITPOSITION         (0x0001)
#define      WFS_IDC_TRANSPORTPOSITION   (0x0002)

/* values of WFSIDCPARKCARD.wDirection */

#define      WFS_IDC_PARK_IN             0x0001
#define      WFS_IDC_PARK_OUT            0x0002
```

```

/* values of WFSIDCSTATUS.wAntiFraudModule */

#define WFS_IDC_AFMNOTSUPP (0)
#define WFS_IDC_AFMOK (1)
#define WFS_IDC_AFMINOP (2)
#define WFS_IDC_AFMDEVICEDETECTED (3)
#define WFS_IDC_AFMUNKNOWN (4)

/* values of WFSIDCEMVCLESSDATA.wTxOutcome */

#define WFS_IDC_CLESS_MULTIPLECARDS (0)
#define WFS_IDC_CLESS_APPROVE (1)
#define WFS_IDC_CLESS_DECLINE (2)
#define WFS_IDC_CLESS_ONLINEREQUEST (3)
#define WFS_IDC_CLESS_ONLINEREQUESTCOMPLETIONREQUIRED (4)
#define WFS_IDC_CLESS_TRYAGAIN (5)
#define WFS_IDC_CLESS_TRYANOTHERINTERFACE (6)
#define WFS_IDC_CLESS_ENDAPPLICATION (7)
#define WFS_IDC_CLESS_CONFIRMATIONREQUIRED (8)

/* values of WFSIDCEMVCLESSOUTCOME.wCardholderAction */

#define WFS_IDC_CLESS_NOACTION (0)
#define WFS_IDC_CLESS_RETAP (1)
#define WFS_IDC_CLESS_HOLDCARD (2)

/* values of WFSIDCEMVCLESSOUTCOME.wCVM */

#define WFS_IDC_CLESS_ONLINEPIN (0)
#define WFS_IDC_CLESS_CONFIRMATIONCODEVERIFIED (1)
#define WFS_IDC_CLESS_SIGN (2)
#define WFS_IDC_CLESS_NOCVM (3)
#define WFS_IDC_CLESS_NOCVMPREFERENCE (4)

/* values of WFSIDCEMVCLESSOUTCOME.wAlternateInterface */

#define WFS_IDC_CLESS_CONTACT (0)
#define WFS_IDC_CLESS_MAGNETICSTRIPE (1)

/* values of WFSIDCEMVCLESSUI.wStatus */

#define WFS_IDC_CLESS_NOT_READY (0)
#define WFS_IDC_CLESS_IDLE (1)
#define WFS_IDC_CLESS_READYTOREAD (2)
#define WFS_IDC_CLESS_PROCESSING (3)
#define WFS_IDC_CLESS_CARDREADOK (4)
#define WFS_IDC_CLESS_PROCESSINGERROR (5)

/* values of WFSIDCEMVCLESSUI.wValueQualifier */

#define WFS_IDC_CLESS_AMOUNT (0)
#define WFS_IDC_CLESS_BALANCE (1)

/* WOSA/XFS IDC Errors */

#define WFS_ERR_IDC_MEDIAJAM (-(IDC_SERVICE_OFFSET + 0))
#define WFS_ERR_IDC_NOMEDIA (-(IDC_SERVICE_OFFSET + 1))
#define WFS_ERR_IDC_MEDIARETAINED (-(IDC_SERVICE_OFFSET + 2))
#define WFS_ERR_IDC_RETAINBINFULL (-(IDC_SERVICE_OFFSET + 3))
#define WFS_ERR_IDC_INVALIDDATA (-(IDC_SERVICE_OFFSET + 4))
#define WFS_ERR_IDC_INVALIDMEDIA (-(IDC_SERVICE_OFFSET + 5))
#define WFS_ERR_IDC_FORMNOTFOUND (-(IDC_SERVICE_OFFSET + 6))
#define WFS_ERR_IDC_FORMINVALID (-(IDC_SERVICE_OFFSET + 7))
#define WFS_ERR_IDC_DATASYNTAX (-(IDC_SERVICE_OFFSET + 8))
#define WFS_ERR_IDC_SHUTTERFAIL (-(IDC_SERVICE_OFFSET + 9))
#define WFS_ERR_IDC_SECURITYFAIL (-(IDC_SERVICE_OFFSET + 10))
#define WFS_ERR_IDC_PROTOCOLNOTSUPP (-(IDC_SERVICE_OFFSET + 11))

```

## CWA 16926-63:2020 (E)

```
#define WFS_ERR_IDC_ATRNOTOBTAINED          (- (IDC_SERVICE_OFFSET + 12))
#define WFS_ERR_IDC_INVALIDKEY              (- (IDC_SERVICE_OFFSET + 13))
#define WFS_ERR_IDC_WRITE_METHOD            (- (IDC_SERVICE_OFFSET + 14))
#define WFS_ERR_IDC_CHIPPÖVERNOTSUPP        (- (IDC_SERVICE_OFFSET + 15))
#define WFS_ERR_IDC_CARDTOOSHÖRT            (- (IDC_SERVICE_OFFSET + 16))
#define WFS_ERR_IDC_CARDTOOLÖNG            (- (IDC_SERVICE_OFFSET + 17))
#define WFS_ERR_IDC_INVALID_PORT            (- (IDC_SERVICE_OFFSET + 18))
#define WFS_ERR_IDC_POWERSAVETOOSHÖRT        (- (IDC_SERVICE_OFFSET + 19))
#define WFS_ERR_IDC_POWERSAVEMEDIAPRESENT    (- (IDC_SERVICE_OFFSET + 20))
#define WFS_ERR_IDC_CARDPRESENT              (- (IDC_SERVICE_OFFSET + 21))
#define WFS_ERR_IDC_POSITIONINVALID          (- (IDC_SERVICE_OFFSET + 22))
#define WFS_ERR_IDC_INVALIDTERMINALDATA      (- (IDC_SERVICE_OFFSET + 23))
#define WFS_ERR_IDC_INVALIDAIDDATA           (- (IDC_SERVICE_OFFSET + 24))
#define WFS_ERR_IDC_INVALIDKEYDATA           (- (IDC_SERVICE_OFFSET + 25))
#define WFS_ERR_IDC_READERNOTCONFIGURED      (- (IDC_SERVICE_OFFSET + 26))
#define WFS_ERR_IDC_TRANSACTIONNOTINITIATED (- (IDC_SERVICE_OFFSET + 27))
#define WFS_ERR_IDC_COMMANDUNSUPP           (- (IDC_SERVICE_OFFSET + 28))
#define WFS_ERR_IDC_SYNCHRONIZEUNSUPP        (- (IDC_SERVICE_OFFSET + 29))
#define WFS_ERR_IDC_CARDCOLLISION            (- (IDC_SERVICE_OFFSET + 30))
```

```
/*=====*/
/* IDC Info Command Structures and variables */
/*=====*/
```

```
typedef struct _wfs_idc_status
{
    WORD          fwDevice;
    WORD          fwMedia;
    WORD          fwRetainBin;
    WORD          fwSecurity;
    USHORT        usCards;
    WORD          fwChipPower;
    LPSTR         lpszExtra;
    DWORD         dwGuidLights[WFS_IDC_GUIDLIGHTS_SIZE];
    WORD          fwChipModule;
    WORD          fwMagReadModule;
    WORD          fwMagWriteModule;
    WORD          fwFrontImageModule;
    WORD          fwBackImageModule;
    WORD          wDevicePosition;
    USHORT        usPowerSaveRecoveryTime;
    LPWORD        lpwParkingStationMedia;
    WORD          wAntiFraudModule;
} WFSIDCSTATUS, *LPWFSIDCSTATUS;
```

```
typedef struct _wfs_idc_caps
{
    WORD          wClass;
    WORD          fwType;
    BOOL          bCompound;
    WORD          fwReadTracks;
    WORD          fwWriteTracks;
    WORD          fwChipProtocols;
    USHORT        usCards;
    WORD          fwSecType;
    WORD          fwPowerOnOption;
    WORD          fwPowerOffOption;
    BOOL          bFluxSensorProgrammable;
    BOOL          bReadWriteAccessFollowingEject;
    WORD          fwWriteMode;
    WORD          fwChipPower;
    LPSTR         lpszExtra;
    WORD          fwDIPMode;
    LPWORD        lpwMemoryChipProtocols;
    DWORD         dwGuidLights[WFS_IDC_GUIDLIGHTS_SIZE];
    WORD          fwEjectPosition;
    BOOL          bPowerSaveControl;
    USHORT        usParkingStations;
```

```

        BOOL                bAntiFraudModule;
        LPDWORD             lpdwSynchronizableCommands;
    } WFSIDCCAPS, *LPWFSIDCCAPS;

typedef struct _wfs_idc_form
{
    LPSTR                lpszFormName;
    CHAR                 cFieldSeparatorTrack1;
    CHAR                 cFieldSeparatorTrack2;
    CHAR                 cFieldSeparatorTrack3;
    WORD                 fwAction;
    LPSTR                lpszTracks;
    BOOL                 bSecure;
    LPSTR                lpszTrack1Fields;
    LPSTR                lpszTrack2Fields;
    LPSTR                lpszTrack3Fields;
    LPSTR                lpszFrontTrack1Fields;
    CHAR                 cFieldSeparatorFrontTrack1;
    LPSTR                lpszJIS1Track1Fields;
    LPSTR                lpszJIS1Track3Fields;
    CHAR                 cFieldSeparatorJIS1Track1;
    CHAR                 cFieldSeparatorJIS1Track3;
} WFSIDCFORM, *LPWFSIDCFORM;

typedef struct _wfs_idc_ifm_identifier
{
    WORD                 wIFMAuthority;
    LPSTR                lpszIFMIdentifier;
} WFSIDCIFMIDENTIFIER, *LPWFSIDCIFMIDENTIFIER;

typedef struct _wfs_idc_hex_data
{
    ULONG                ulLength;
    LPBYTE               lpbData;
} WFSIDCHEXDATA, *LPWFSIDCHEXDATA;

typedef struct wfs_idc_app_data
{
    LPWFSIDCHEXDATA      lpAID;
    LPWFSIDCHEXDATA      lpKernelIdentifier;
} WFSIDCAPPDATA, *LPWFSIDCAPPDATA;

/*=====*/
/* IDC Execute Command Structures */
/*=====*/

typedef struct _wfs_idc_write_track
{
    LPSTR                lpstrFormName;
    LPSTR                lpstrTrackData;
    WORD                 fwWriteMethod;
} WFSIDCWTRITETRACK, *LPWFSIDCWTRITETRACK;

typedef struct _wfs_idc_retain_card
{
    USHORT               usCount;
    WORD                 fwPosition;
} WFSIDCRETAINCARD, *LPWFSIDCRETAINCARD;

typedef struct _wfs_idc_setkey
{
    USHORT               usKeyLen;
    LPBYTE               lpbKeyValue;
} WFSIDCSETKEY, *LPWFSIDCSETKEY;

typedef struct _wfs_idc_card_data
{

```

## CWA 16926-63:2020 (E)

```
WORD                wDataSource;
WORD                wStatus;
ULONG              ulDataLength;
LPBYTE             lpbData;
WORD               fwWriteMethod;
} WFSIDCCARDDATA, *LPWFSIDCCARDDATA;

typedef struct _wfs_idc_chip_io
{
    WORD                wChipProtocol;
    ULONG              ulChipDataLength;
    LPBYTE             lpbChipData;
} WFSIDCCHIPIO, *LPWFSIDCCHIPIO;

typedef struct _wfs_idc_chip_power_out
{
    ULONG              ulChipDataLength;
    LPBYTE             lpbChipData;
} WFSIDCCHIPPOWEROUT, *LPWFSIDCCHIPPOWEROUT;

typedef struct _wfs_idc_parse_data
{
    LPSTR              lpstrFormName;
    LPWFSIDCCARDDATA *lppCardData;
} WFSIDCPARSEDATA, *LPWFSIDCPARSEDATA;

typedef struct _wfs_idc_set_guidlight
{
    WORD                wGuidLight;
    DWORD              dwCommand;
} WFSIDCSETGUIDLIGHT, *LPWFSIDCSETGUIDLIGHT;

typedef struct _wfs_idc_eject_card
{
    WORD                wEjectPosition;
} WFSIDCEJECTCARD, *LPWFSIDCEJECTCARD;

typedef struct _wfs_idc_power_save_control
{
    USHORT             usMaxPowerSaveRecoveryTime;
} WFSIDCPOWERSAVECONTROL, *LPWFSIDCPOWERSAVECONTROL;

typedef struct _wfs_idc_park_card
{
    WORD                wDirection;
    USHORT             usParkingStation;
} WFSIDCPARKCARD, *LPWFSIDCPARKCARD;

typedef struct _wfs_idc_aid_data
{
    LPWFSIDCHEXDATA    lpAID;
    BOOL                bPartialSelection;
    ULONG              ulTransactionType;
    LPWFSIDCHEXDATA    lpKernelIdentifier;
    LPWFSIDCHEXDATA    lpConfigData;
} WFSIDCAIDDATA, *LPWFSIDCAIDDATA;

typedef struct _wfs_idc_key_data
{
    LPWFSIDCHEXDATA    lpRID;
    WORD                wCAPublicKeyIndex;
    WORD                wAPublicKeyAlgorithmIndicator;
    LPWFSIDCHEXDATA    lpCAPublicKeyExponent;
    LPWFSIDCHEXDATA    lpCAPublicKeyModulus;
    LPBYTE             lpbCAPublicKeyChecksum;
} WFSIDCKEYDATA, *LPWFSIDCKEYDATA;

typedef struct _wfs_idc_emvclass_config_data
```

```

{
    LPWFSIDCHEXDATA        lpTerminalData;
    LPWFSIDCAIDDATA        *lppAIDData;
    LPWFSIDCKEYDATA        *lppKeyData;
} WFSIDCEMVCLESSECONFIGDATA, *LPWFSIDCEMVCLESSECONFIGDATA;

typedef struct _wfs_idc_emvcless_tx_data
{
    LPWFSIDCHEXDATA        lpData;
} WFSIDCEMVCLESSESTXDATA, *LPWFSIDCEMVCLESSESTXDATA;

typedef struct _wfs_idc_emvcless_ui
{
    WORD                    wMessageId;
    WORD                    wStatus;
    ULONG                   ulHoldTime;
    WORD                    wValueQualifier;
    LPSTR                   lpszValue;
    LPSTR                   lpszCurrencyCode;
    LPSTR                   lpszLanguagePreferenceData;
} WFSIDCEMVCLESSEUI, *LPWFSIDCEMVCLESSEUI;

typedef struct _wfs_idc_emvcless_outcome
{
    WORD                    wCVM;
    WORD                    wAlternateInterface;
    BOOL                    bReceipt;
    LPWFSIDCEMVCLESSEUI    lpClessUIOutcome;
    LPWFSIDCEMVCLESSEUI    lpClessUIRestart;
    ULONG                   ulClessFieldOffHoldTime;
    ULONG                   ulCardRemovalTimeoutValue;
    LPWFSIDCHEXDATA        lpDiscretionaryData;
} WFSIDCEMVCLESSEOUTCOME, *LPWFSIDCEMVCLESSEOUTCOME;

typedef struct _wfs_idc_emvcless_tx_data_output
{
    WORD                    wDataSource;
    WORD                    wTxOutcome;
    WORD                    wCardholderAction;
    LPWFSIDCHEXDATA        lpDataRead;
    LPWFSIDCEMVCLESSEOUTCOME lpClessOutcome;
} WFSIDCEMVCLESSESTXDATAOUTPUT, *LPWFSIDCEMVCLESSESTXDATAOUTPUT;

typedef struct _wfs_idc_synchronize_command
{
    DWORD                   dwCommand;
    LPVOID                  lpCmdData;
} WFSIDCSYNCHRONIZECOMMAND, *LPWFSIDCSYNCHRONIZECOMMAND;

/*=====*/
/* IDC Message Structures */
/*=====*/

typedef struct _wfs_idc_track_event
{
    WORD                    fwStatus;
    LPSTR                   lpstrTrack;
    LPSTR                   lpstrData;
} WFSIDCTRACKEVENT, *LPWFSIDCTRACKEVENT;

typedef struct _wfs_idc_card_act
{
    WORD                    wAction;
    WORD                    wPosition;
} WFSIDCCARDACT, *LPWFSIDCCARDACT;

typedef struct _wfs_idc_device_position

```

## CWA 16926-63:2020 (E)

```
{
    WORD                wPosition;
} WFSIDCDEVICEPOSITION, *LPWFSIDCDEVICEPOSITION;

typedef struct _wfs_idc_power_save_change
{
    USHORT              usPowerSaveRecoveryTime;
} WFSIDCPOWERSAVECHANGE, *LPWFSIDCPOWERSAVECHANGE;

typedef struct _wfs_idc_track_detected
{
    WORD                fwTracks;
} WFSIDCTRACKDETECTED, *LPWFSIDCTRACKDETECTED;

typedef struct _wfs_idc_emv_cless_read_status
{
    LPWFSIDCEMVCLESSUI    lpClessUI;
} WFSIDCMVCLESSREADSTATUS, *LPWFSIDCMVCLESSREADSTATUS;

/* restore alignment */
#pragma pack(pop)

#ifdef __cplusplus
} /*extern "C"*/
#endif

#endif /* __INC_XFSIDC__H */
```

## **9. Intelligent Contactless Card Sequence Diagrams**

---

This section illustrates the sequence diagrams of EMV-like intelligent contactless transactions.

### 9.1 Single Tap Transaction Without Issuer Update Processing

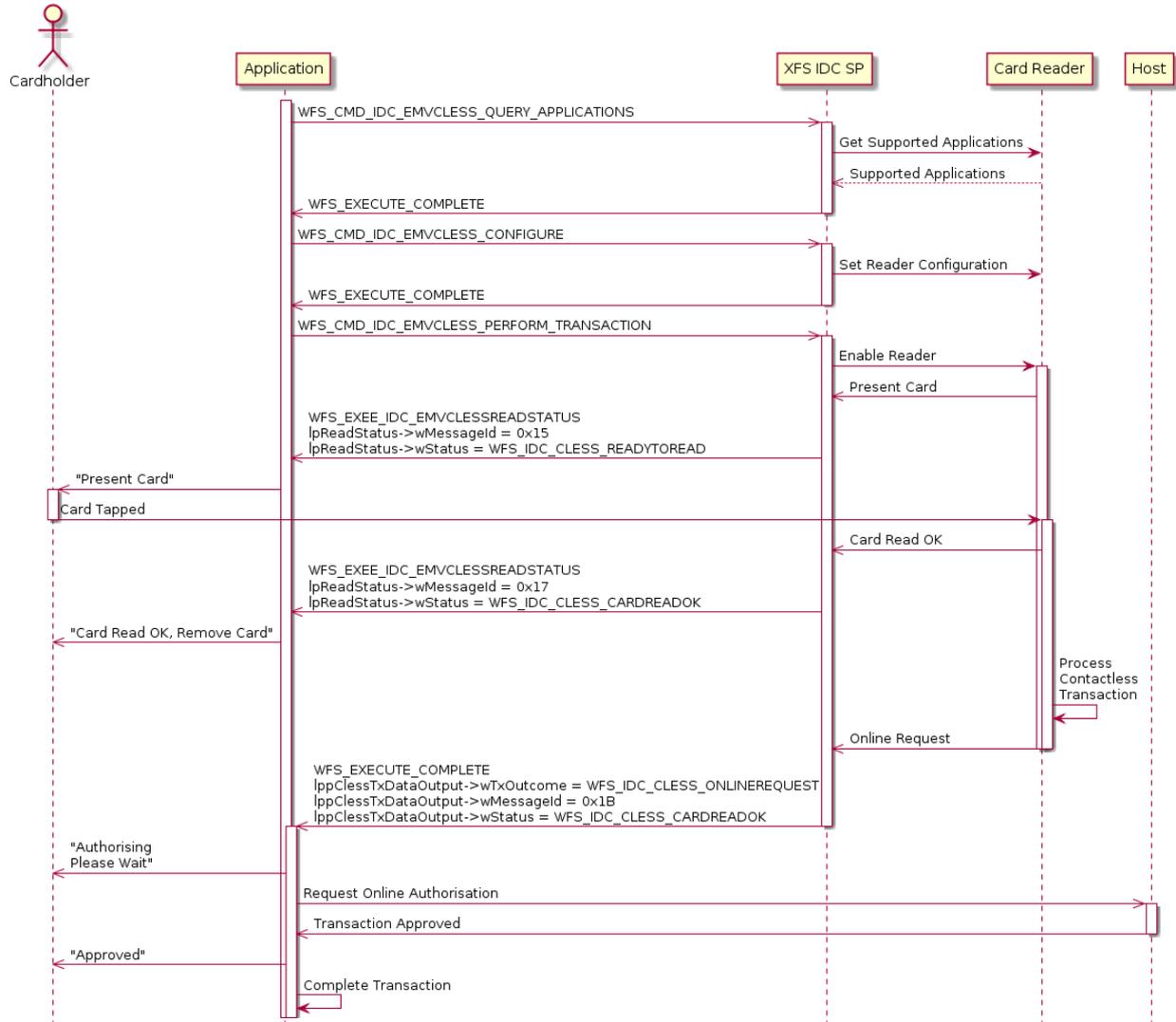


Figure 1 - Single tap transaction with no issuer update data received from host

## 9.2 Double Tap Transaction With Issuer Update Processing

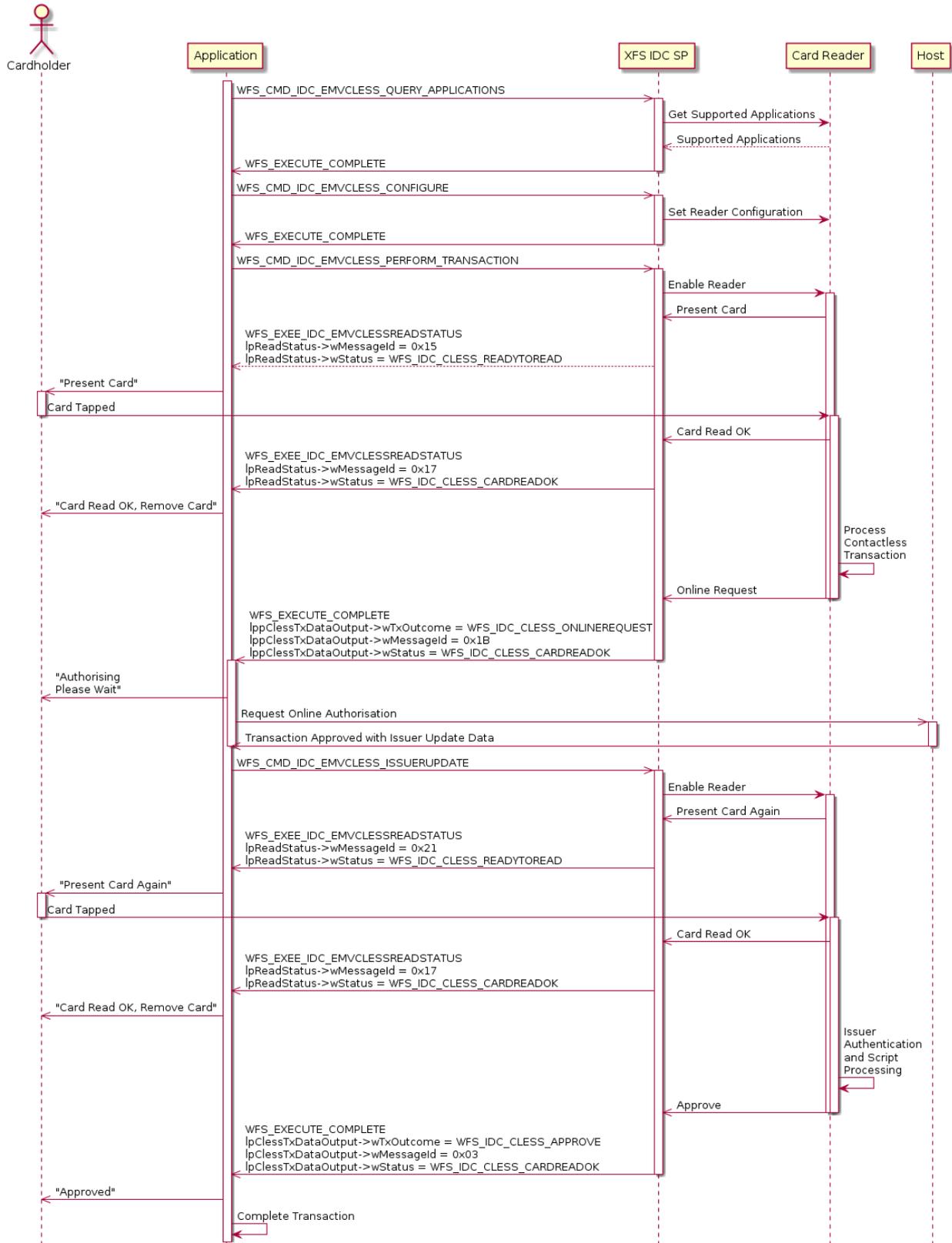


Figure 2 - Double tap transaction with issuer update data received from host

### 9.3 Card Removed Before Completion

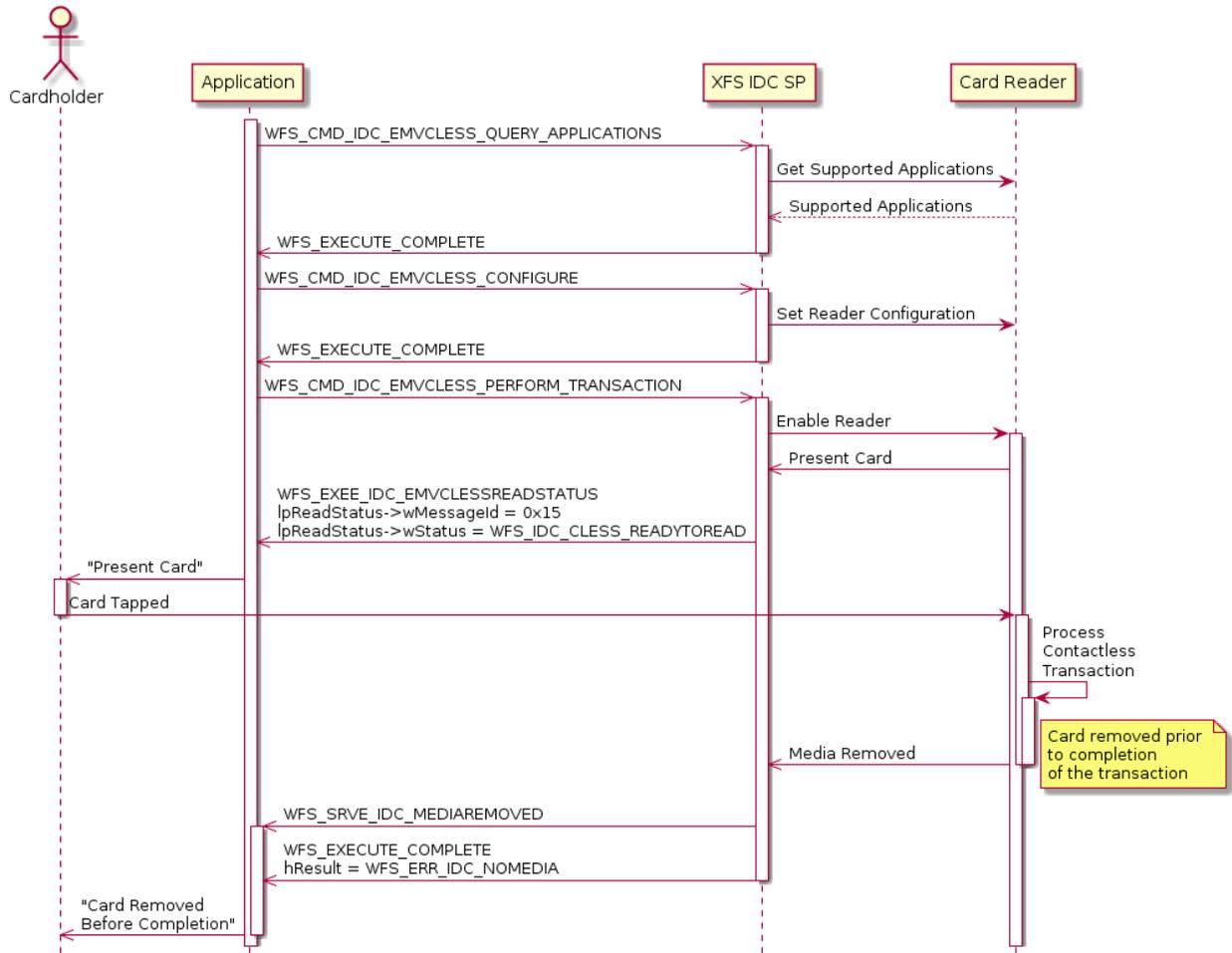


Figure 3 Card removed before completion

## Appendix A. Diagram Source

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Attached <http://plantuml.com> source for sequence diagrams in section 9. These can be loaded into various editors (e.g. VSCode, Atom) with an appropriate PlantUML extension installed, or online (e.g. [www.planttext.com](http://www.planttext.com)) or from the command line using the plantuml.jar file.



Diagram Source.zip