CEN

WORKSHOP

AGREEMENT

CWA 16926-11

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English version

Extensions for Financial Services (XFS) interface specification Release 3.50 - Part 11: Vendor Dependent Mode Device Class Interface - Programmer's Reference

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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European Foreword

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 2022-11-08, 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 2022-11-18.
The following organizations and individuals developed and approved this CEN Workshop Agreement:

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- CIMA SPA
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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.

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 3.40 (CWA 16296:2020) to Version 3.50 (this CWA) - Service Provider Interface (SPI) - Programmer's Reference

Part 62: Printer and Scanning Device Class Interface - Migration from Version 3.40 (CWA 16296:2020) to Version 3.50 (this CWA) - Programmer's Reference

Part 63: Identification Card Device Class Interface - Migration from Version 3.40 (CWA 16296:2020) to Version 3.50 (this CWA) - Programmer's Reference

Part 64: Cash Dispenser Device Class Interface - Migration from Version 3.40 (CWA 16296:2020) to Version 3.50 (this CWA) - Programmer's Reference

Part 65: PIN Keypad Device Class Interface - Migration from Version 3.40 (CWA 16296:2020) to Version 3.50 (this CWA) - Programmer's Reference

Part 66: Check Reader/Scanner Device Class Interface - Migration from Version 3.40 (CWA 16296:2020) to Version 3.50 (this CWA) - Programmer's Reference

Part 67: Depository Device Class Interface - Migration from Version 3.40 (CWA 16296:2020) to Version 3.50 (this CWA) - Programmer's Reference

Part 68: Text Terminal Unit Device Class Interface - Migration from Version 3.40 (CWA 16296:2020) to Version 3.50 (this CWA) - Programmer's Reference

Part 69: Sensors and Indicators Unit Device Class Interface - Migration from Version 3.40 (CWA 16296:2020) to Version 3.50 (this CWA) - Programmer's Reference

Part 70: Vendor Dependent Mode Device Class Interface - Migration from Version 3.40 (CWA 16296:2020) to Version 3.50 (this CWA) - Programmer's Reference

Part 71: Camera Device Class Interface - Migration from Version 3.40 (CWA 16296:2020) to Version 3.50 (this CWA) - Programmer's Reference

Part 72: Alarm Device Class Interface - Migration from Version 3.40 (CWA 16296:2020) to Version 3.50 (this CWA) - Programmer's Reference

Part 73: Card Embossing Unit Device Class Interface - Migration from Version 3.40 (CWA 16296:2020) to Version 3.50 (this CWA) - Programmer's Reference

Part 74: Cash-In Module Device Class Interface - Migration from Version 3.40 (CWA 16296:2020) to Version 3.50 (this CWA) - Programmer's Reference

Part 75: Card Dispenser Device Class Interface - Migration from Version 3.40 (CWA 16296:2020) to Version 3.50 (this CWA) - Programmer's Reference

Part 76: Barcode Reader Device Class Interface - Migration from Version 3.40 (CWA 16296:2020) to Version 3.50 (this CWA) - Programmer's Reference

Part 77: Item Processing Module Device Class Interface - Migration from Version 3.40 (CWA 16296:2020) to Version 3.50 (this CWA) - Programmer's Reference

Part 78: Biometric Device Class Interface - Migration from Version 3.40 (CWA 16296:2020) to Version 3.50 (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.cencenelec.eu/areas-of-work/cen-sectors/digital-society-cen/cwa-download-area/.

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.

Revision History:

3.00	October 18, 2000	Initial Release.
3.10	November 29, 2007	For a description of changes from version 3.00 to version 3.10 see the VDM 3.10 Migration document.
3.20	March 2, 2011	For a description of changes from version 3.10 to version 3.20 see the VDM 3.20 Migration document.
3.30	March 19, 2015	For a description of changes from version 3.20 to version 3.30 see the VDM 3.30 Migration document.
3.40	December 06, 2019	For a description of changes from version 3.30 to version 3.40 see the VDM 3.40 Migration document.
3.50	November 18, 2022	For a description of changes from version 3.40 to version 3.50 see the VDM 3.50 Migration document.

1. Introduction

1.1 Background to Release 3.50

The CEN/XFS Workshop aims to promote a clear and unambiguous specification defining a multi-vendor software interface to financial peripheral devices. The XFS (eXtensions for Financial Services) specifications are developed within the CEN (European Committee for Standardization/Information Society Standardization System) Workshop environment. CEN Workshops aim to arrive at a European consensus on an issue that can be published as a CEN Workshop Agreement (CWA).

The CEN/XFS Workshop encourages the participation of both banks and vendors in the deliberations required to create an industry standard. The CEN/XFS Workshop achieves its goals by focused sub-groups working electronically and meeting quarterly.

Release 3.50 of the XFS specification is based on a C API and is delivered with the continued promise for the protection of technical investment for existing applications. This release of the specification extends the functionality and capabilities of the existing devices covered by the specification:

- Addition of E2E security
- PIN Password Entry

1.2 XFS Service-Specific Programming

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

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

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

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

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

The requested capability is defined for the class of Service Providers by the XFS specification, the particular vendor implementation of that service does not support it, and the unsupported capability ***is*** considered to be fundamental to the service. In this case, a WFS_ERR_UNSUPP_COMMAND error for Execute commands or WFS_ERR_UNSUPP_CATEGORY error for Info commands is returned to the calling application. An example would be a request from an application to a cash dispenser to retract items where the dispenser hardware does not have that capability; the Service Provider recognizes the command but, since the cash dispenser it is managing is unable to fulfil the request, returns this error.

The requested capability is ***not*** defined for the class of Service Providers by the XFS specification. In this case, a WFS_ERR_INVALID_COMMAND error for Execute commands or WFS_ERR_INVALID_CATEGORY error for Info commands is returned to the calling application.

This design allows implementation of applications that can be used with a range of services that provide differing

subsets of the functionalities that are defined for their service class. Applications may use the **WFSGetInfo** and **WFSAsyncGetInfo** commands to inquire about the capabilities of the service they are about to use, and modify their behavior accordingly, or they may use functions and then deal with error returns to make decisions as to how to use the service.

2. Vendor Dependent Mode

This specification describes the functionality of the services provided by the Vendor Dependent Mode (VDM) Service Provider under XFS, by defining the service-specific commands that can be issued, using the **WFSGetInfo, WFSAsyncGetInfo**, **WFSExecute** and **WFSAsyncExecute** functions.

In all device classes there needs to be some method of going into a vendor specific mode to allow for capabilities which go beyond the scope of the current XFS specifications. A typical usage of such a mode might be to handle some configuration or diagnostic type of function or perhaps perform some 'off-line' testing of the device. These functions are normally available on Self-Service devices in a mode traditionally referred to as Maintenance Mode or Supervisor Mode and usually require operator intervention. It is those vendor-specific functions not covered by (and not required to be covered by) XFS Service Providers that will be available once the device is in Vendor Dependent Mode.

This service provides the mechanism for switching to and from Vendor Dependent Mode. The VDM Service Provider can be seen as the central point through which all Enter and Exit VDM requests are synchronized.

Entry into, or exit from, Vendor Dependent Mode can be initiated either by an application or by the VDM Service Provider itself. If initiated by an application, then this application needs to issue the appropriate command to request entry or exit. If initiated by the VDM Service Provider i.e. some vendor dependent switch, then these request commands are in-appropriate and not issued.

Once the entry request has been made, all registered applications will be notified of the entry request by an event message. These applications must attempt to close all open sessions with XFS Service Providers (except for specific Service Providers which explicitly allow sessions to remain open) as soon as possible and then issue an acknowledgement command to the VDM Service Provider when ready. Once all applications have acknowledged, the VDM Service Provider will issue event messages to these applications to indicate that the System is in Vendor Dependent Mode.

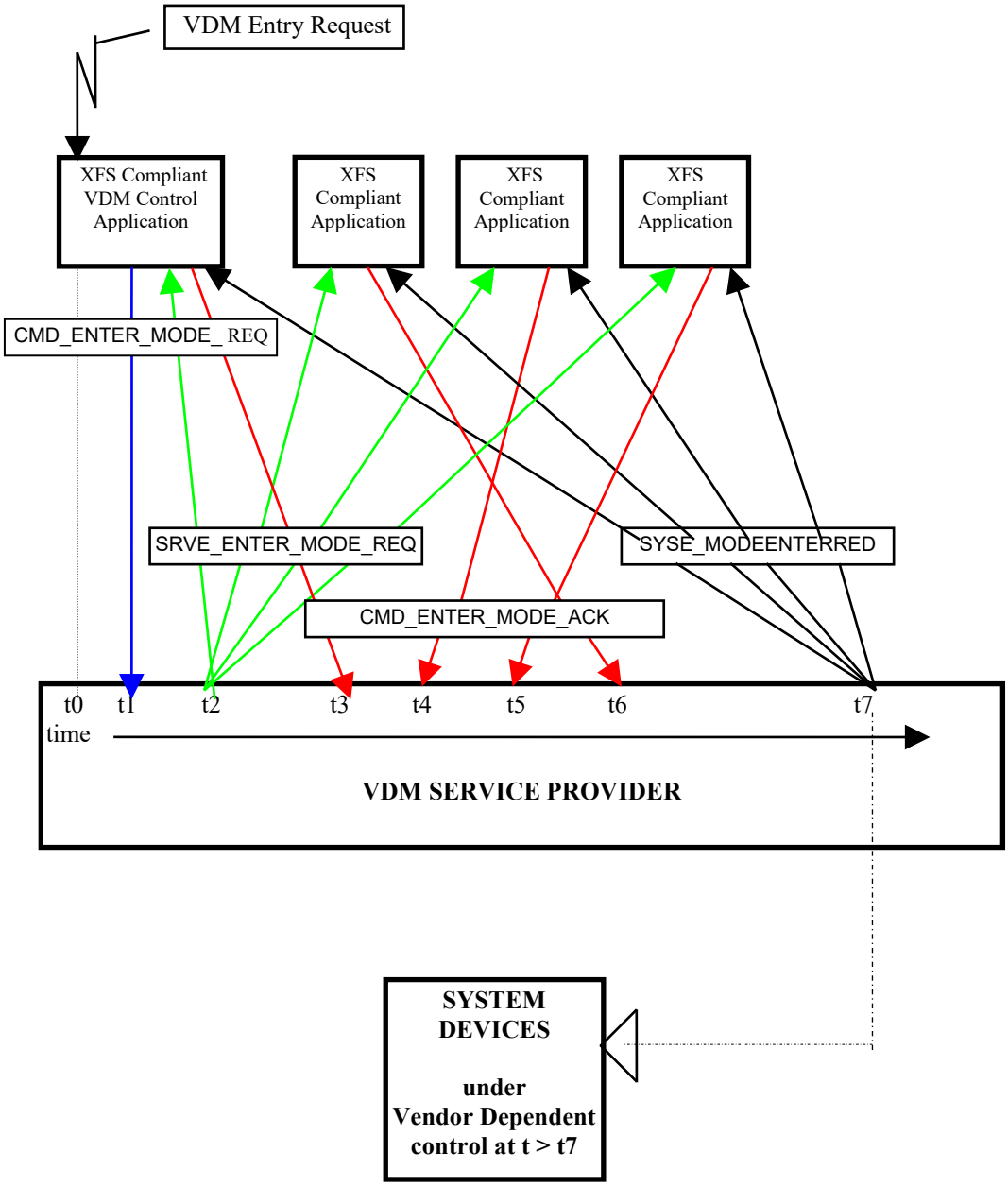
Similarly, once the exit request has been made all registered applications will be notified of the exit request by an event message. These applications must then issue an acknowledgement command to the VDM Service Provider immediately. Once all applications have acknowledged, the VDM Service Provider will issue event messages to these applications to indicate that the system has exited from Vendor Dependent Mode.

Thus, XFS compliant applications that do not request entry to Vendor Dependent Mode, must comply with the following:

- Every XFS application should open a session with the VDM Service Provider passing a valid *ApplId* and then register for all VDM entry and exit notices.
- Before opening a session with any other XFS Service Provider, check the status of the VDM Service Provider. If Vendor Dependent Mode is not “Inactive”, do not open a session.
- When getting a VDM entry notice, close all open sessions with all XFS Service Providers which require sessions to be closed as soon as possible and issue an acknowledgement for the entry to VDM.
- When getting a VDM exit notice, acknowledge at once.
- When getting a VDM exited notice, re-open any required sessions with other XFS Service Providers.

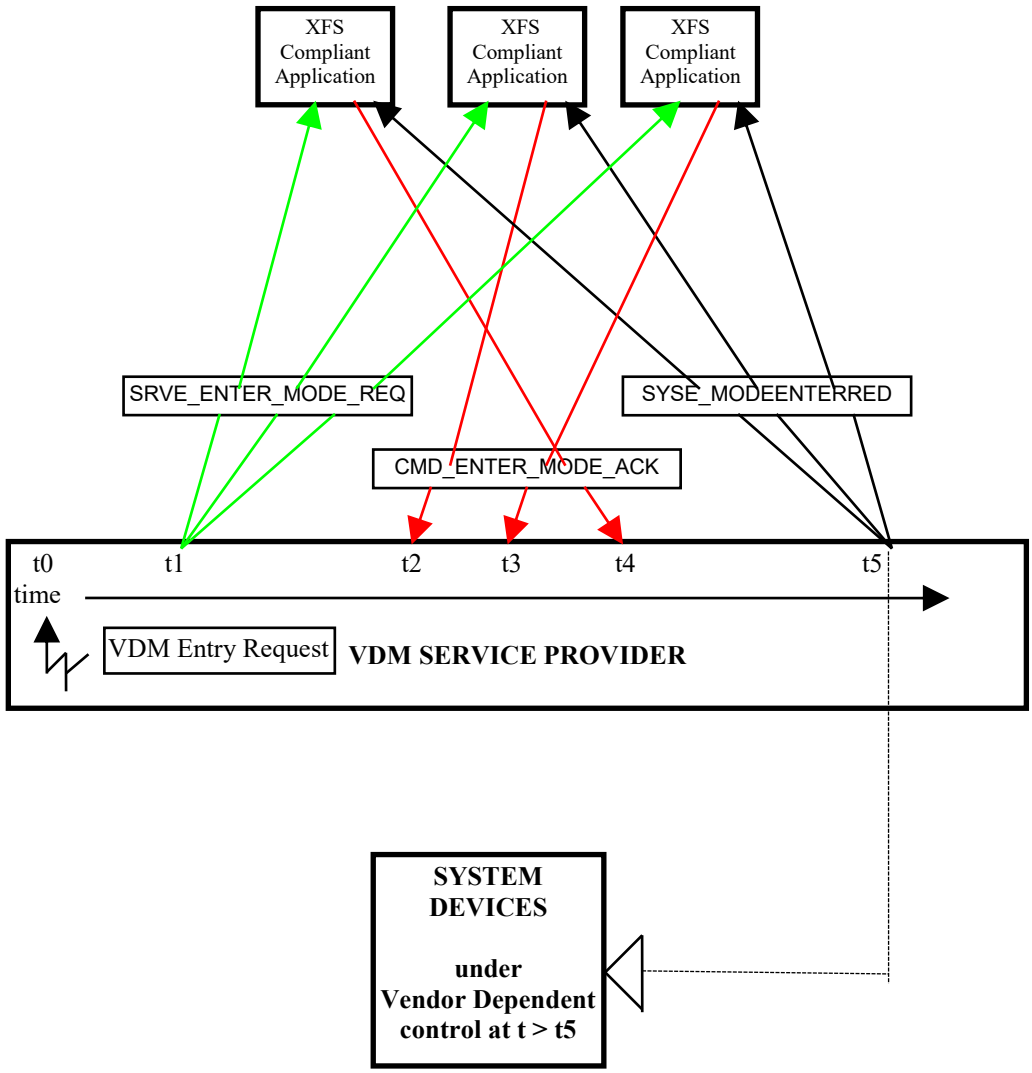
This is mandatory for self-service but optional for branch.

2.1 VDM Entry triggered by XFS Application



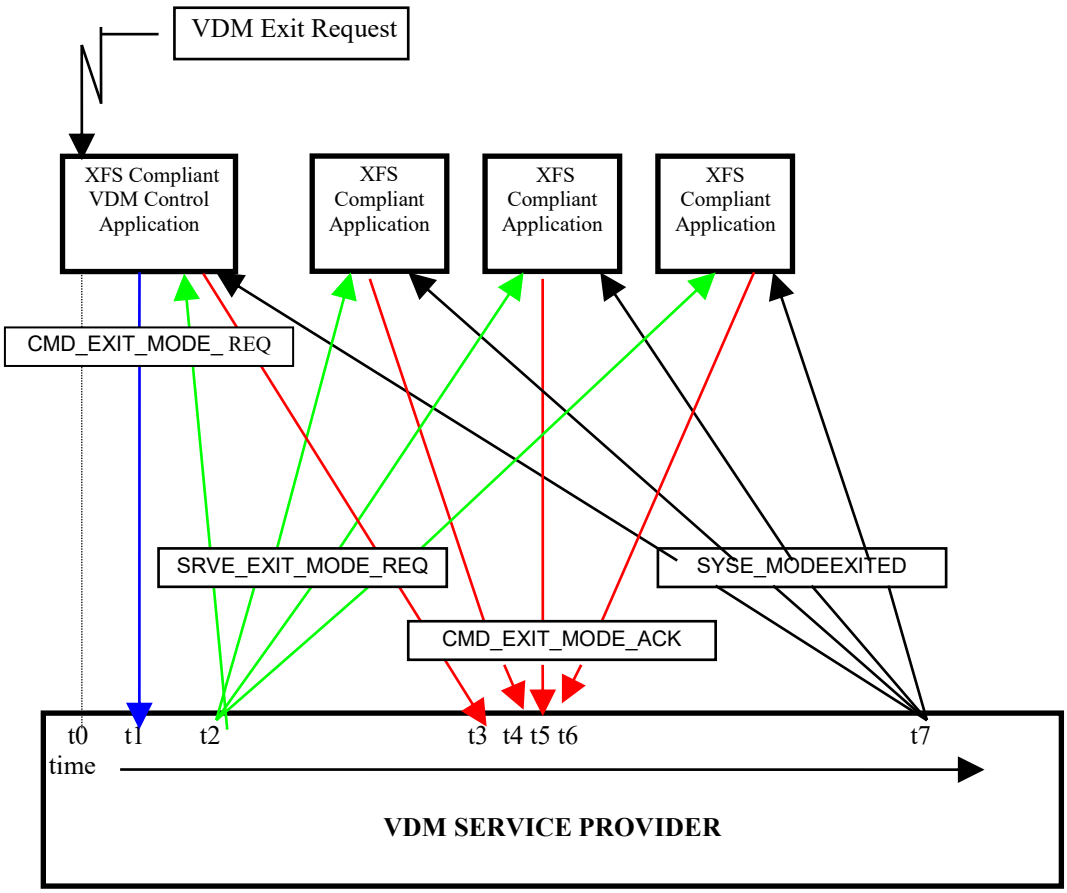
At time t0, status is “Inactive” and a request to Enter VDM arises from within the Application system.
At time t1, an Application Process/Thread/Function issues the CMD_ENTER_MODE_REQ Execute cmd. Status then becomes “Enter Pending”.
At time t2, the VDM Service Provider issues the SRVE_ENTER_MODE_REQ Event to all registered applications.
At time t3, the VDM Service Provider receives a CMD_ENTER_MODE_ACK Execute command from a XFS Compliant Application.
At time t4, the VDM Service Provider receives a CMD_ENTER_MODE_ACK Execute command from a XFS Compliant Application.
At time t5, the VDM Service Provider receives a CMD_ENTER_MODE_ACK Execute command from another XFS Compliant Application.
At time t6, the VDM Service Provider receives a CMD_ENTER_MODE_ACK Execute command from the last XFS Compliant Application.
At time t7, the VDM Service Provider issues the SYSE_MODEENTERED Event to all registered applications Status then becomes “Active”.
The system is now in Vendor Dependent Mode and a Vendor Dependent Application can exclusively use the system devices in a Vendor Dependent manner.

2.2 VDM Entry triggered by Vendor Dependent Switch



At time t0, status is “Inactive” and a request to Enter VDM arises from within the Vendor System.
Status then becomes “Enter Pending”.
At time t1, the VDM Service Provider issues the SRVE_ENTER_MODE_REQ Event to all registered applications.
At time t2, the VDM Service Provider receives a CMD_ENTER_MODE_ACK Execute command from a XFS Compliant Application.
At time t3, the VDM Service Provider receives a CMD_ENTER_MODE_ACK Execute command from another XFS Compliant Application.
At time t4, the VDM Service Provider receives a CMD_ENTER_MODE_ACK Execute command from the last XFS Compliant Application.
At time t5, the VDM Service Provider issues the SYSE_MODEENTERED Event to all registered applications
Status then becomes “Active”.
The system is now in Vendor Dependent Mode and a Vendor Dependent Application can exclusively use the system devices in a Vendor Dependent manner.

2.3 VDM Exit triggered by XFS Application

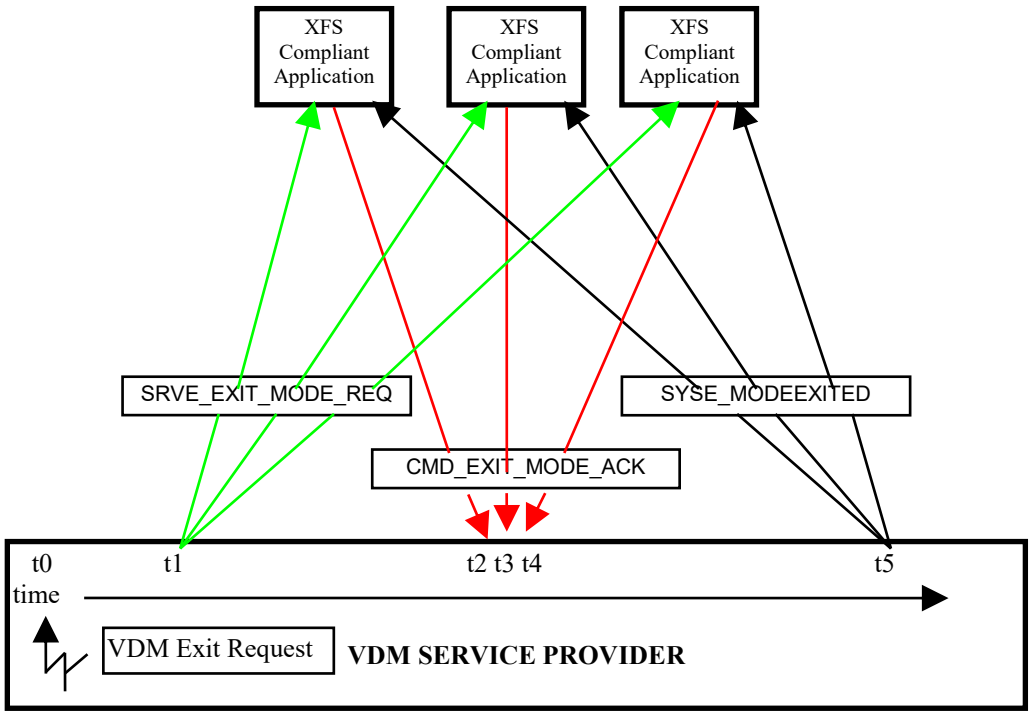


SYSTEM DEVICES

under CEN/XFS control at t > t7

At time t0, status is “Active” and a request to Exit VDM arises from within the Application system.
At time t1, an Application Process/Thread/Function issues the CMD_EXIT_MODE_REQ Execute cmd.
Status then becomes “Exit Pending”.
At time t2, the VDM Service Provider issues the SRVE_EXIT_MODE_REQ Event to all registered applications.
At time t3, the VDM Service Provider receives a CMD_EXIT_MODE_ACK Execute command from a XFS Compliant Application.
At time t4, the VDM Service Provider receives a CMD_EXIT_MODE_ACK Execute command from a XFS Compliant Application.
At time t5, the VDM Service Provider receives a CMD_EXIT_MODE_ACK Execute command from another XFS Compliant Application.
At time t6, the VDM Service Provider receives a CMD_EXIT_MODE_ACK Execute command from the last XFS Compliant Application.
At time t7, the VDM Service Provider issues the SYSE_MODEEXITED Event to all registered applications
Status then becomes “Inactive”.
The system is now no longer in Vendor Dependent Mode and the XFS Compliant Applications can re-open any required services with other XFS Service Providers.

2.4 VDM Exit triggered by Vendor Dependent Switch



SYSTEM DEVICES

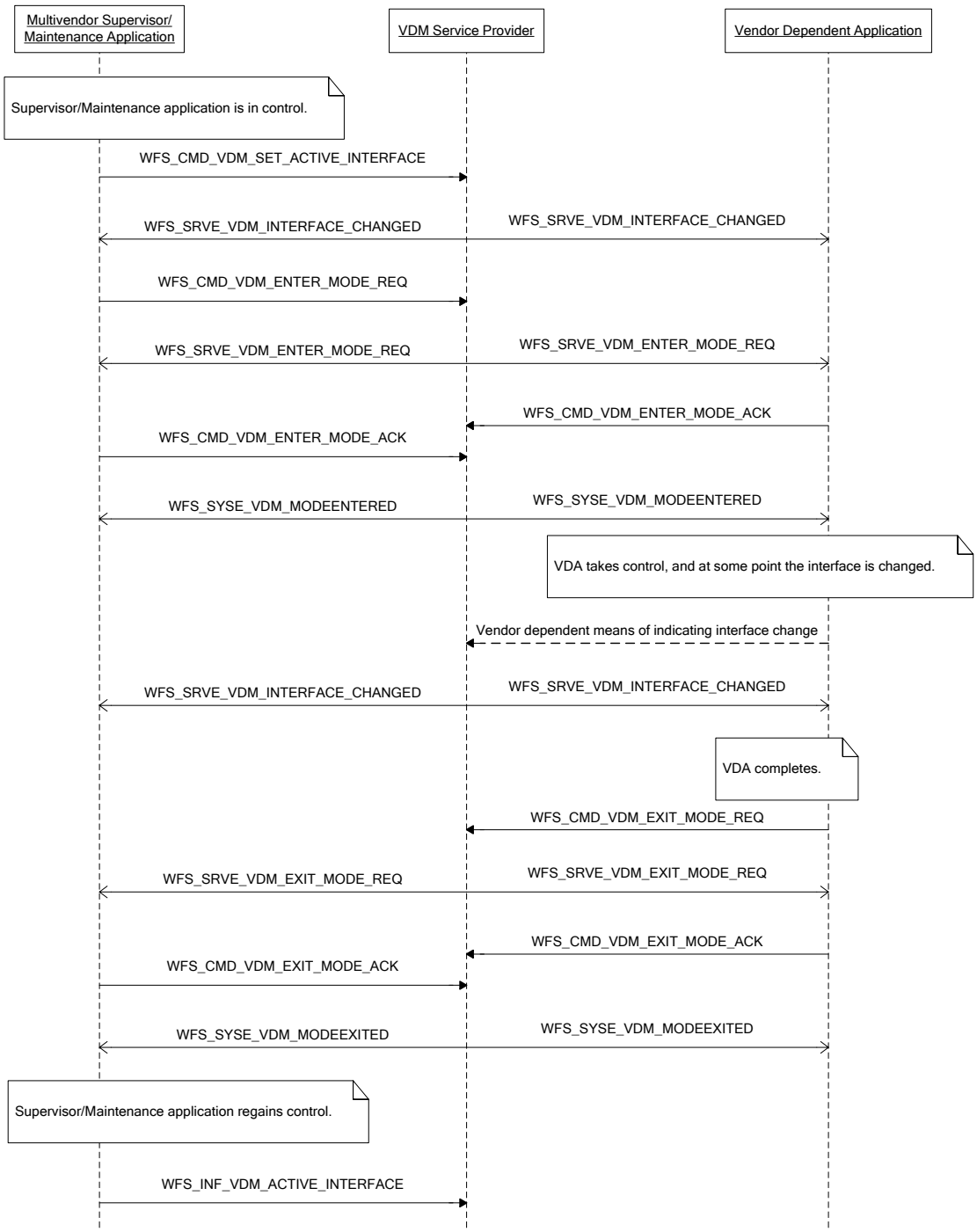
under CEN/XFS control at t > t5

At time t0, status is “Active” and a request to Exit VDM arises from within the Vendor System.
Status then becomes “Exit Pending”.
At time t1, the VDM Service Provider issues the SRVE_EXIT_MODE_REQ Event to all registered applications.
At time t2, the VDM Service Provider receives a CMD_EXIT_MODE_ACK Execute command from a XFS Compliant Application.
At time t3, the VDM Service Provider receives a CMD_EXIT_MODE_ACK Execute command from another XFS Compliant Application.
At time t4, the VDM Service Provider receives a CMD_EXIT_MODE_ACK Execute command from the last XFS Compliant Application.
At time t5, the VDM Service Provider issues the SYSE_MODEEXITED Event to all registered applications.
Status then becomes “Inactive”.
The system is now no longer in Vendor Dependent Mode and the XFS Compliant Applications can re-open any required services with other XFS Service Providers.

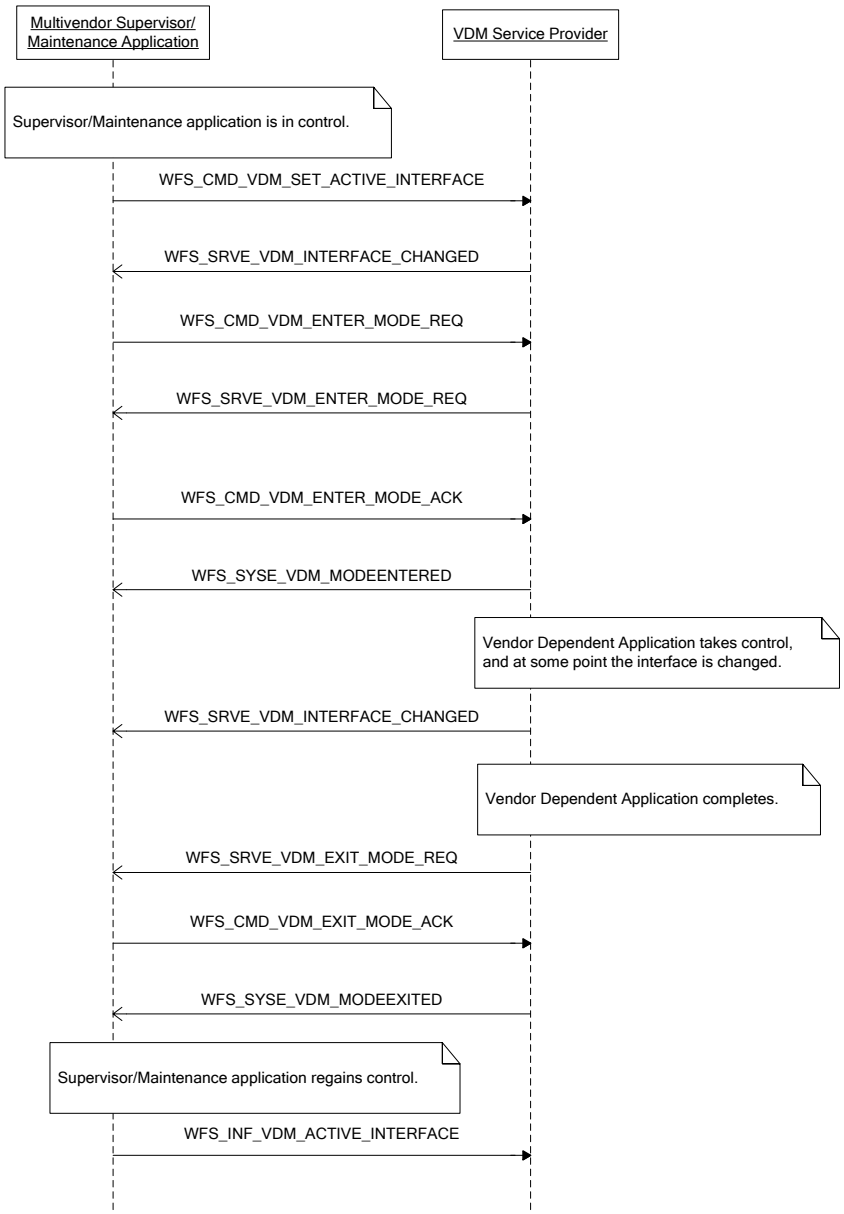
2.5 Controlling / Determining the Active Interface

While in a supervisor/maintenance application or Vendor Dependent Mode, it is possible to transfer from the consumer interface to the operator interface and vice-versa. The active interface can be determined and controlled, as described here.

2.5.1 Vendor Dependent Application independent of the VDM Service Provider



2.5.2 Vendor Dependent Application under Control of the VDM Service Provider



3. References

1. XFS Application Programming Interface (API)/Service Provider Interface (SPI), Programmer's Reference Revision 3.50

4. Info Commands

4.1 WFS_INF_VDM_STATUS

Description This command indicates whether or not the system is in Vendor Dependent Mode. It will also indicate which applications have not responded to the WFS_SRVE_ENTER_MODE_REQ event or WFS_SRVE_EXIT_MODE_REQ event if the current service status is WFS_VDM_ENTERPENDING or WFS_VDM_EXITPENDING respectively.

Input Param None.

Output Param LPWFSVDMSTATUS lpStatus;

```
typedef struct _wfs_vdm_status
     {
     WORD                 wDevice;
     WORD                 wService;
     LPWFSVDMAPPSTATUS    *lppAppStatus;
     LPSTR                lpszExtra;
     WORD                 wAccessLevel;
     } WFSVDMSTATUS, *LPWFSVDMSTATUS;
```

wDevice
Specifies the status of the Vendor Dependent Mode Service Provider. Status will be one of the following flags:

Value	Meaning
WFS_VDM_DEVONLINE	Vendor Dependent Mode service available.
WFS_VDM_DEVOFFLINE	Vendor Dependent Mode service unavailable.

wService
Specifies the Service state as one of the following flags:

Value	Meaning
WFS_VDM_ENTERPENDING	Vendor Dependent Mode enter request pending.
WFS_VDM_ACTIVE	Vendor Dependent Mode active.
WFS_VDM_EXITPENDING	Vendor Dependent Mode exit request pending.
WFS_VDM_INACTIVE	Vendor Dependent Mode inactive.

lppAppStatus
Pointer to a NULL-terminated array of pointers to WFSVDMAPPSTATUS structures:

```
typedef struct _wfs_vdm_appstatus
     {
     LPSTR                lpszAppID;
     WORD                 wAppStatus;
     } WFSVDMAPPSTATUS, *LPWFSVDMAPPSTATUS;
```

lpszAppID
Application ID string.

wAppStatus
Specifies whether the particular application is ready for the system to enter or exit Vendor Dependent Mode. Values can be one of the following:

Value	Meaning
WFS_VDM_ENTERPENDING	Application not yet ready to enter VDM.
WFS_VDM_ACTIVE	Application ready to enter VDM.
WFS_VDM_EXITPENDING	Application not yet ready to exit VDM.
WFS_VDM_INACTIVE	Application ready to exit VDM.

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

wAccessLevel
Reports the current access level as one of the following flags:

Value	Meaning
WFS_VDM_ACCESSNOTSUPPORTED	The reporting of the current access level is not supported.
WFS_VDM_ACCESSNA	The Vendor Dependent Mode is not active and the access level has not been set.
WFS_VDM_ACCESSUNKNOWN	The Vendor Dependent Mode is active but the access level has not been set. Or due to an error condition the reporting of the currently access level is not supported.
WFS_VDM_ACCESSBASIC	The Vendor Dependent Mode is active for the basic access level.
WFS_VDM_ACCESSINTERMEDIATE	The Vendor Dependent Mode is active for the intermediate access level.
WFS_VDM_ACCESSFULL	The Vendor Dependent Mode is active for the full access level.

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

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

4.2 WFS_INF_VDM_CAPABILITIES

Description This command is used to retrieve the capabilities of the VDM Service Provider.

Input Param None.

Output Param LPWFSVDMCAPS lpCaps;

```
typedef struct _wfs_vdm_caps
     {
     WORD                 wClass;
     LPSTR                lpszExtra;
     WORD                 fwSupportedAccessLevels;
     } WFSVDMCAPS, *LPWFSVDMCAPS;
```

wClass
Specifies the logical service class as SERVICE_CLASS_VDM.

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

fwSupportedAccessLevels
Specifies the supported access levels. This allows the Vendor Dependent Mode to show a user interface with reduced or extended functionality depending on the access levels. The exact meaning or functionalities definition is left to the vendor. If no access levels are supported this field will be WFS_VDM_ACCESSNOTSUPPORTED. Otherwise this field will be set to a combination of the following flags:

Value	Meaning
WFS_VDM_ACCESSBASIC	The Vendor Dependent Mode is active for the basic access level. Once the Vendor Dependent Mode is active the Vendor Dependent Mode interface will show the user interface for the basic access level.
WFS_VDM_ACCESSINTERMEDIATE	The Vendor Dependent Mode is active for the intermediate access level. Once the Vendor Dependent Mode is active the Vendor Dependent Mode interface will show the user interface for the intermediate access level.
WFS_VDM_ACCESSFULL	The Vendor Dependent Mode is active for the full access level. Once the Vendor Dependent Mode is active the Vendor Dependent Mode interface will show the user interface for the full access level.

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

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

4.3 WFS_INF_VDM_ACTIVE_INTERFACE

Description This command is used to retrieve the interface that should be used by supervisor/maintenance mode applications.

Input Param None.

Output Param LPWFSVDMACTIVEINTERFACE lpActiveInterface;

```
typedef struct _wfs_vdm_active_interface
     {
     WORD                 wActiveInterface;
     } WFSVDMACTIVEINTERFACE, *LPWFSVDMACTIVEINTERFACE;
```

wActiveInterface
Specifies the interface as one of the following values:

Value	Meaning
WFS_VDM_CONSUMER_INTERFACE	The consumer interface.
WFS_VDM_OPERATOR_INTERFACE	The operator interface.

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

Comments None.

5. Execute Commands

5.1 WFS_CMD_VDM_ENTER_MODE_REQ

Description This command is issued by an application to indicate a logical request to enter Vendor Dependent Mode. The VDM Service Provider will then indicate the request to all registered applications by sending a WFS_SRVE_VDM_ENTER_MODE_REQ event and then wait for an acknowledgement back from each registered application before putting the system into Vendor Dependent Mode. The Service Provider status will change to WFS_VDM_ENTERPENDING on receipt of this command and will prevail until all applications have acknowledged, at which time the status will change to WFS_VDM_ACTIVE and the WFS_CMD_VDM_ENTER_MODE_REQ completes.

If the command fails when the status is WFS_VDM_ENTERPENDING, the status is changed to WFS_VDM_INACTIVE and a WFS_SYSE_VDM_MODEEXITED event is sent to all registered applications.

Input Param This input parameter should be NULL if the capability *fwSupportedAccessLevels* is WFS_VDM_ACCESSNOTSUPPORTED. If NULL is specified then the service provider will determine the level of access available. If the level of access is to be changed then a VDM exit should be performed, followed by another enter mode request specifying the new level of access.

LPWFSVDMENTERMODEREQCMD lpEnterModeReqCmd;

```
typedef struct _wfs_vdm_enter_mode_req_cmd
     {
     WORD                  wAccessLevel;
     } WFSVDMENTERMODEREQCMD, *LPWFSVDMENTERMODEREQCMD;
```

wAccessLevel
Defines the access level for the Vendor Dependent Mode interface as one of the flags reported with the *fwSupportedAccessLevels* capability.

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_SRVE_VDM_ENTER_MODE_REQ	Request to enter VDM Mode.
WFS_SYSE_VDM_MODEENTERED	The system has entered VDM.
WFS_SYSE_VDM_MODEEXITED	The system has exited VDM.

Comments None.

5.2 WFS_CMD_VDM_ENTER_MODE_ACK

Description	This command is issued by a registered application as an acknowledgement to the WFS_SRVE_VDM_ENTER_MODE_REQ event and it indicates that the application is ready for the system to enter Vendor Dependent Mode. All registered applications (including the application that issued the request to enter Vendor Dependent Mode) must respond before Vendor Dependent Mode will be entered. Completion of this command is immediate. **Note:** Applications must be prepared to allow the Vendor Dependent Application to display on the active interface. This means that applications should no longer try to be the foreground or topmost window to ensure that the Vendor Dependent Application is visible.
Input Param	None.
Output Param	None.
Error Codes	Only the generic error codes defined in [Ref. 1] can be generated by this command.
Events	Only the generic events defined in [Ref. 1] can be generated by this command.
Comments	None.

5.3 WFS_CMD_VDM_EXIT_MODE_REQ

Description This command is issued by an application to indicate a logical request to exit Vendor Dependent Mode. The VDM Service Provider will then indicate the request to all registered applications by sending a WFS_SRVE_VDM_EXIT_MODE_REQ event and then wait for an acknowledgement back from each registered application before removing the system from Vendor Dependent Mode. The Service Class status will change to WFS_VDM_EXITPENDING on receipt of this command and will prevail until all applications have acknowledged, at which time the status will change to WFS_VDM_INACTIVE and the WFS_CMD_VDM_EXIT_MODE_REQ completes.

If the command fails when the status is WFS_VDM_EXITPENDING, the status is changed to WFS_VDM_ACTIVE and a WFS_SYSE_VDM_MODEENTERED event is sent to all registered applications.

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_SRVE_VDM_EXIT_MODE_REQ	Request to exit VDM.
WFS_SYSE_VDM_MODEENTERED	The system has entered VDM.
WFS_SYSE_VDM_MODEEXITED	The system has exited VDM.

Comments None.

5.4 WFS_CMD_VDM_EXIT_MODE_ACK

Description	This command is issued by a registered application as an acknowledgement to the WFS_SRVE_VDM_EXIT_MODE_REQ event and it indicates that the application is ready for the system to exit Vendor Dependent Mode. All registered applications (including the application that issued the request to exit Vendor Dependent Mode) must respond before Vendor Dependent Mode will be exited. Completion of this command is immediate.
Input Param	None.
Output Param	None.
Error Codes	Only the generic error codes defined in [Ref. 1] can be generated by this command.
Events	Only the generic events defined in [Ref. 1] can be generated by this command.
Comments	None.

5.5 WFS_CMD_VDM_SET_ACTIVE_INTERFACE

Description This command is used to indicate which interface should be used by supervisor/maintenance mode applications. A supervisor/maintenance mode application can issue this command before entry to VDM to ensure that a Vendor Dependent Application (VDA) starts on the correct interface.

Input Param LPWFSVDMACTIVEINTERFACE lpActiveInterface;

lpActiveInterface
Pointer to a WFSVDMACTIVEINTERFACE structure. For a description of the WFSVDMACTIVEINTERFACE structure refer to the WFS_INF_VDM_ACTIVE_INTERFACE 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_VDM_INTERFACE_NOT_AVAILABLE	The *wActiveInterface* provided in the input parameter is not present or not available.

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

Value	Meaning
WFS_SRVE_VDM_INTERFACE_CHANGED	The active VDM interface has changed.

Comments None.

6. Events

6.1 WFS_SRVE_VDM_ENTER_MODE_REQ

Description This service event is used to indicate the request to enter Vendor Dependent Mode.

Event Param None.

Comments None.

6.2 WFS_SRVE_VDM_EXIT_MODE_REQ

Description This service event is used to indicate the request to exit Vendor Dependent Mode.

Event Param None.

Comments None.

6.3 WFS_SYSE_VDM_MODEENTERED

Description This system event is used to indicate that the system has entered Vendor Dependent Mode.

Event Param None.

Comments None.

6.4 WFS_SYSE_VDM_MODEEXITED

Description This system event is used to indicate that the system has exited Vendor Dependent Mode.

Event Param None.

Comments None.

6.5 WFS_SRVE_VDM_INTERFACE_CHANGED

Description This service event is used to indicate that the required interface has changed. This can be as a result of a WFS_CMD_VDM_SET_ACTIVE_INTERFACE command, or when the active interface is changed through vendor dependent means while in VDM. The *wActiveInterface* field of the WFSVDMACTIVEINTERFACE structure indicates which interface has been selected.

Note: Applications must be prepared to allow the Vendor Dependent Application to display on the active interface. This means that applications should no longer try to be the foreground or topmost window to ensure that the Vendor Dependent Application is visible.

Event Param LPWFSVDMACTIVEINTERFACE lpActiveInterface;

lpActiveInterface
Pointer to a WFSVDMACTIVEINTERFACE structure. For a description of the WFSVDMACTIVEINTERFACE structure refer to the WFS_INF_VDM_ACTIVE_INTERFACE command.

Comments None.

7. C-Header file

```
/******************************************************************************
*                                                                             *
* xfsvdm.h    XFS - Vendor Dependent Mode (VDM) definitions                   *
*                                                                             *
*             Version 3.50  (November 22 2022)                                *
*                                                                             *
******************************************************************************/

#ifndef __INC_XFSVDM__H
#define __INC_XFSVDM__H

#ifdef __cplusplus
extern "C" {
#endif

#include <xfsapi.h>

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

/* values of WFSVDMCAPS.wClass */

#define WFS_SERVICE_CLASS_VDM                   (9)
#define WFS_SERVICE_CLASS_VERSION_VDM           (0x3203) /* Version 3.50 */
#define WFS_SERVICE_CLASS_NAME_VDM              "VDM"

#define VDM_SERVICE_OFFSET                      (WFS_SERVICE_CLASS_VDM * 100)

/* VDM Info Commands */

#define WFS_INF_VDM_STATUS                      (VDM_SERVICE_OFFSET + 1)
#define WFS_INF_VDM_CAPABILITIES                (VDM_SERVICE_OFFSET + 2)
#define WFS_INF_VDM_ACTIVE_INTERFACE            (VDM_SERVICE_OFFSET + 3)

/* VDM Execute Commands */

#define WFS_CMD_VDM_ENTER_MODE_REQ              (VDM_SERVICE_OFFSET + 1)
#define WFS_CMD_VDM_ENTER_MODE_ACK              (VDM_SERVICE_OFFSET + 2)
#define WFS_CMD_VDM_EXIT_MODE_REQ               (VDM_SERVICE_OFFSET + 3)
#define WFS_CMD_VDM_EXIT_MODE_ACK               (VDM_SERVICE_OFFSET + 4)
#define WFS_CMD_VDM_SET_ACTIVE_INTERFACE        (VDM_SERVICE_OFFSET + 5)

/* VDM Messages */

#define WFS_SRVE_VDM_ENTER_MODE_REQ             (VDM_SERVICE_OFFSET + 1)
#define WFS_SRVE_VDM_EXIT_MODE_REQ              (VDM_SERVICE_OFFSET + 2)
#define WFS_SYSE_VDM_MODEENTERED                (VDM_SERVICE_OFFSET + 3)
#define WFS_SYSE_VDM_MODEEXITED                 (VDM_SERVICE_OFFSET + 4)
#define WFS_SRVE_VDM_INTERFACE_CHANGED          (VDM_SERVICE_OFFSET + 5)

/* values of WFSVDMSTATUS.wDevice */

#define WFS_VDM_DEVONLINE                       WFS_STAT_DEVONLINE
#define WFS_VDM_DEVOFFLINE                      WFS_STAT_DEVOFFLINE

/* values of WFSVDMSTATUS.wService */

#define WFS_VDM_ENTERPENDING                    (0)
#define WFS_VDM_ACTIVE                          (1)
#define WFS_VDM_EXITPENDING                     (2)
#define WFS_VDM_INACTIVE                        (3)

/* values of WFSVDMSTATUS.wActiveAccessLevel */

#define WFS_VDM_ACCESSNOTSUPPORTED          (0x0000)
#define WFS_VDM_ACCESSNA                    (0x0001)
#define WFS_VDM_ACCESSUNKNOWN               (0x0002)
```

```
#define WFS_VDM_ACCESSBASIC                (0x0004)
#define WFS_VDM_ACCESSINTERMEDIATE         (0x0008)
#define WFS_VDM_ACCESSFULL                 (0x0010)

/* values of WFSVDMACTIVEINTERFACE.wActiveInterface */

#define WFS_VDM_OPERATOR_INTERFACE              (0)
#define WFS_VDM_CONSUMER_INTERFACE              (1)

/* XFS VDM Errors */

#define WFS_ERR_VDM_INTERFACE_NOT_AVAILABLE     (-(VDM_SERVICE_OFFSET + 0))

/*=====================================================================*/
/* VDM Info Command Structures and variables */
/*=====================================================================*/

typedef struct _wfs_vdm_appstatus
{
    LPSTR                  lpszAppID;
    WORD                   wAppStatus;
} WFSVDMAPPSTATUS, *LPWFSVDMAPPSTATUS;

typedef struct _wfs_vdm_status
{
     WORD                  wDevice;
     WORD                  wService;
     LPWFSVDMAPPSTATUS     *lppAppStatus;
     LPSTR                 lpszExtra;
     WORD                  wAccessLevel;
} WFSVDMSTATUS, *LPWFSVDMSTATUS;

typedef struct _wfs_vdm_caps
{
     WORD                  wClass;
     LPSTR                 lpszExtra;
     WORD                  fwSupportedAccessLevels;
} WFSVDMCAPS, *LPWFSVDMCAPS;

typedef struct _wfs_vdm_active_interface
{
     WORD                  wActiveInterface;
} WFSVDMACTIVEINTERFACE, *LPWFSVDMACTIVEINTERFACE;

/*=====================================================================*/
/* VDM Execute Command Structures */
/*=====================================================================*/

typedef struct _wfs_vdm_enter_mode_req_cmd
{
     WORD                  wAccessLevel;
} WFSVDMENTERMODEREQCMD, *LPWFSVDMENTERMODEREQCMD;

/*=====================================================================*/
/* VDM Message Structures */
/*=====================================================================*/

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

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