

## FIP VLAN Discovery

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*This document defines the FIP VLAN discovery protocols in terms of modifications to 08-543v1.*

### 7.7.1 FCoE Initialization Protocol (FIP) overview

The FCoE Initialization Protocol (FIP) is used to perform the function of FC-BB\_E device discovery, initialization, and maintenance. To perform these functions, appropriate encapsulated FIP operations (see 7.7.6.2) are specified.

The FIP frame format (see 7.7.6.1) is different than the FCoE frame format (see 7.6) to enable the detection of discovery, initialization, and maintenance traffic from FCoE traffic.

FIP messages are used to perform the following protocols:

- a) FIP Discovery (see 7.7.2);
- b) FCoE Virtual Link instantiation (see 7.7.3); ~~and~~;
- c) FCoE Virtual Link maintenance (see 7.7.4); ~~and~~;
- d) FIP VLAN Discovery (see 7.7.5).

All FIP protocols are performed on a per-VLAN basis. It is recommended to use the FIP VLAN Discovery protocol on the default VLAN (see IEEE 802.1Q). All other FIP protocols shall be performed in each VLAN that provides FC-BB\_E services.

### 7.7.5 FIP VLAN Discovery protocol

When becoming operational, an ENode's MAC or an FCF-MAC may invoke the FIP VLAN Discovery protocol to discover the VLANs in the Lossless Ethernet network that provide FC-BB\_E services.

An ENode's MAC may send a FIP VLAN Request message to the MAC address All-FCF-MACs over an available VLAN (e.g., the default VLAN). VF\_Port capable FCF-MACs that receive a FIP VLAN Request message shall respond with a unicast FIP VLAN Notification message over the same VLAN. The FIP VLAN Notification message carries the list of VLAN IDs over which the originating FCF offers FC-BB\_E services. The ENode's MAC that received a FIP VLAN Notification message may enable one or more of these VLANs for subsequent operations.

NOTE 1 – FCFs may limit the number of VLAN IDs listed in a FIP Notification message on a per-requester basis.

A VE\_Port capable FCF-MAC may send a FIP VLAN Request message to the MAC address All-FCF-MACs over an available VLAN (e.g., the default VLAN). VE\_Port capable FCF-MACs that receive a FIP VLAN Request message shall respond with a unicast FIP VLAN Notification message over the same VLAN. The FIP VLAN Notification message carries the list of VLAN IDs over which the originating FCF offers FC-BB\_E services. The VE\_Port capable FCF-MAC that received a FIP VLAN Notification message may enable a one or more of these VLANs for subsequent operations.



The Fabric Provided (FP) bit and Server Provided (SP) bit setting is dependent on the FIP operation. These bits shall be set as specified in table 3 and are reserved for all other FIP operations.

**Table 3 – FP bit and SP bit setting**

Bit	FIP operation	Setting
FP	Discovery Solicitation Discovery Advertisement	Set to 1 if originating device supports FPMA. Set to 0 if originating device does not support FPMA.
	FLOGI Request <sup>a</sup> FDISC_NPIV Request <sup>a</sup>	Set to 1 if FPMA is requested. Set to 0 if FPMA is not supported.
	FLOGI LS_ACC FDISC_NPIV LS_ACC	Set to 1 if FPMA granted. Set to 0 if SPMA granted.
SP	Discovery Solicitation Discovery Advertisement	Set to 1 if originating device supports SPMA. Set to 0 if originating device does not support SPMA.
	FLOGI Request <sup>a</sup> FDISC_NPIV Request <sup>a</sup>	Set to 1 if SPMA is requested. Set to 0 if SPMA is not supported.
	FLOGI LS_ACC FDISC_NPIV LS_ACC	Set to 1 if SPMA granted. Set to 0 if FPMA granted.
a Both the FP bit and SP bit may be set to 1 in a FLOGI Request or FDISC_NPIV Request, but at least one of the bits shall be set to 1.		

The Solicited (S) bit shall be set to one in a Discovery Advertisement that is transmitted in response to a Discovery Solicitation. The S bit shall be set to zero in a Discovery Advertisement that is not transmitted in response to a Discovery Solicitation. The S bit is reserved for all other FIP operations.

The FCF (F) bit shall be set to one in a Discovery Solicitation or Discovery Advertisement [or in a FIP VLAN Request](#) if the originating device is an FCF. The F bit shall be set to zero in a Discovery Solicitation or Discovery Advertisement [or in a FIP VLAN Request](#) if the originating device is not an FCF. The F bit is reserved for all other FIP operations.

#### 7.7.6.3.1 FIP descriptor overview

The FIP descriptors are specified using a TLV format (i.e., Type, Length, Value). The length field value shall be specified as the number of 32-bit words in the FIP descriptor including the TLV format. The FIP descriptor type space is split in two ranges, critical and non-critical, as follows:

- a) 0 .. 127: Critical. An FCoE Controller receiving a FIP message carrying an unknown critical descriptor shall ignore the entire message; and
- b) 128 .. 255: Non-critical. An FCoE Controller receiving a FIP message carrying an unknown non-critical descriptor shall ignore the unknown descriptor and process the message.



#### 7.7.6.4 FIP operations overview

Each FIP operation shall contain one or more FIP descriptors as specified in table 6. Table 6 specifies the FIP descriptors required in each FIP operation and the order in which they should be encapsulated by a transmitting FCoE Controller. Additional descriptors (e.g., Vendor Specific descriptors) may be present. A receiving FCoE Controller shall process unknown descriptors according to the criticality of the descriptor (see 7.7.6.3.1). Unless otherwise specified (e.g., for a FIP FLOGI Request), a receiving FCoE Controller shall be able to process the FIP descriptors in any order.

NOTE 2 – This is to provide flexibility for future protocol extensions.

**Table 6 – FIP operation payload and order**

FIP Operation	Originator	Payload and order	Reference
Discovery Solicitation	ENode	1) MAC address 2) Name_Identifier 3) Max FCoE Size	
Discovery Solicitation	FCF	1) MAC address 2) FC-MAP 3) Name_Identifier 4) Max FCoE Size	
Discovery Advertisement	FCF	1) Priority 2) MAC address 3) Name_Identifier 4) Fabric 5) FKA_ADV_Period	
FIP FLOGI Request <sup>a</sup>	ENode	1) FLOGI 2) MAC address	
FIP FLOGI LS_ACC <sup>a</sup>	FCF	1) FLOGI 2) MAC address	
FIP FLOGI LS_RJT <sup>a</sup>	FCF	1) FLOGI	
FIP NPIV FDISC Request <sup>a</sup>	ENode	1) FDISC_NPIV 2) MAC address	
FIP NPIV FDISC LS_ACC <sup>a</sup>	FCF	1) FDISC_NPIV 2) MAC address	
FIP NPIV FDISC LS_RJT <sup>a</sup>	FCF	1) FDISC_NPIV	
FIP Fabric LOGO Request <sup>a</sup>	ENode	1) LOGO 2) MAC address	
FIP Fabric LOGO LS_ACC <sup>a</sup>	FCF	1) LOGO 2) MAC address	
FIP Fabric LOGO LS_RJT <sup>a</sup>	FCF	1) LOGO	
FIP ELP Request <sup>a</sup>	FCF	1) ELP 2) MAC address	
a Strict ordering of descriptors is required.			

**Table 6 – FIP operation payload and order**

<b>FIP Operation</b>	<b>Originator</b>	<b>Payload and order</b>	<b>Reference</b>
FIP ELP SW_ACC <sup>a</sup>	FCF	1) ELP 2) MAC address	
FIP ELP SW_RJT <sup>a</sup>	FCF	1) ELP	
FIP Keep Alive	ENode	1) MAC address 2) Vx_Port Identification	
FIP Clear Virtual Links	FCF	1) MAC address 2) Name_Identifier 3) List of Vx_Port Identification	
FIP VLAN Request	ENode or FCF	1) MAC address	
FIP VLAN Notification	FCF	1) MAC address 2) List of VLAN	
Vendor Specific	ENode or FCF	1) Vendor_ID 2) List of Descriptors	
a Strict ordering of descriptors is required.			

#### 7.7.7.7 FIP VLAN Request

A FIP VLAN Request message may be generated by an ENode's MAC or by an FCF-MAC.

When generated by an ENode's MAC, the FIP VLAN Request message shall have the F flag set to zero and the MAC address field in the MAC address descriptor shall be set to the ENode's MAC address.

When generated by an FCF-MAC, the FIP VLAN Request message shall have the F flag set to one and the MAC address field in the MAC address descriptor shall be set to the FCF-MAC address.

#### 7.7.7.8 FIP VLAN Notification

A FIP VLAN Notification message is generated by an FCF-MAC.

The MAC address field in the MAC address descriptor shall be set to the FCF-MAC address.

The FCoE VID field of each of the FIP VLAN descriptors shall be set to a VID over which the FCF-MAC is offering FC-BB\_E services.