Cisco's PRE-FIP implementation
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1. Terminology

The following term are borrowed from FC-BB-5:

- FCoE (Fibre Channel over Ethernet);
- FIP (Fibre Channel Intialization Protocol);
- FCF (Fibre Channel Forwarder);
- ENode, aka CNA (Converged Network Adapter);
- FC-MAP (Fibre Channel – MAC Address Prefix);
- FPMAs (Fabric Provided MAC Addresses);
- SPMAs (Server Provide MAC addresses).

2. Purpose of this document

The primary purpose of this document is to document the original implementation of FCoE on the Cisco Nexus 5000 family of switches as released in June 2008. This implementation does not use FIP and therefore it is also referred to as "pre-FIP". Different CNA companies implemented hardware and software capable of interoperating with this pre-FIP release.

This document is not a standard.
Cisco has no intention to pursue standardization of pre-FIP.
Cisco fully supports the FC-BB-5 standard.

3. Pre-FIP

Cisco's pre-FIP works in the following way:

a) FIP is not supported;
b) FLOGI and other FC frames that in FC-BB-5 are carried in FIP are instead carried in FCoE;
c) FPMAs are the ONLY addresses supported, SPMAs are forbidden;
d) The FC-MAP value is set to DEFAULT_FC-MAP (i.e., to the value 0EFC00h);
e) FCoE frames contain an 802.1Q tag header priority-tagged (i.e., VID set to 0);
f) DCBX-CIN (Data Center Bridging Exchange – Cisco,Intel,Nuova version) is mandatory, as defined in [1];

g) PPP (Per Priority Pause) is mandatory, as defined in [2];
h) The default Priority used is 3;
i) Only a direct connection between an ENode and an FCFs is supported;
j) Intermediate Ethernet switches are absolutely forbidden.

4. Protocol details

Before an ENode may attempt to start FCoE, the ENode must run DCBX-CIN with a positive outcome. On the ENode the DCBX-CIN "willing bit" is set to one. On the FCF the DCBX-CIN "willing bit" is set to zero.

At minimum, the following DCBX Feature TLVs are present in each DCBX frame:

1. Per Priority Pause – Admin mode bit set to one for FCoE Application User Priority;
2. Application – Subtype FCoE and User Priority Map is set to three by default;
3. Logical Link Down – Subtype FCoE Logical Link status;
4. Logical Link Down – Subtype LAN Logical Link status.

If DCBX-CIN is not successful, FCoE cannot be started.

The first FCoE frame sent by an ENode is the FLOGI Request (encapsulated in FCoE). The ENode sends the FLOGI Request to the Well Known MAC address 0EFC-00FF-FFFEh and it uses its MAC as source address.

The FCF recognizes the Well Known MAC address 0EFC-00FF-FFFEh as one of the addresses assigned to it. Therefore the FCF-MAC receives the FCoE frame addressed to the Well Known MAC address 0EFC-00FF-FFFEh, processes the FLOGI Request assigning an FC address identifier to the ENode MAC, and then sends back an FLOGI LS_ACC encapsulated in an FCoE frame.

The FCF uses the source MAC address of the received FCoE frame encapsulating the FLOGI Request as destination MAC address of the FCoE frame encapsulating the FLOGI LS_ACC. The FCF uses its FCF-MAC address as source MAC address for the FCoE frame encapsulating the FLOGI LS_ACC.

On receiving the FCoE frame encapsulating the FLOGI LS_ACC, the ENode learns the FCF-MAC address of the FCF from the Ethernet MAC-SA field and its FC address identifier from the D_ID field of the encapsulated FC frame.

After a successful FLOGI the ENode starts to use as MAC-SA the FPMA obtained by concatenating the assigned FC address identifier to the DEFAULT_FC-MAP value 0EFC00h.

FDISCs are also sent to the Well Known MAC address 0EFC-00FF-FFFEh and the processing is identical to FLOGI.

5. Bibliography

Note: The documents listed below are, like this document, pre-standard:

[1] DCBX CIN: http://download.intel.com/technology/eedc/dcb_cep_spec.pdf
[2] PPP: http://www.ieee802.org/1/files/public/docs2007/new-cm-barrass-pause-proposal.pdf