

Terminology

Converged Network Adapter (CNA) Network Interface Card(NIC) that contains both Fibre Channel (FC) & TCP/IP Ethernet feature

Fibre Channel (FC) SCSI transport protocol that operates over FC and works with dedicated lossless FC switches. Limited by distance but well suited for latency sensitive and high I/O app

Fibre Channel over Ethernet (FCoE) Mapping of FC frames over Ethernet. Require Ethernet switch with FCF capability

iSCSI SCSI transport protocol that operates over TCP and encapsulate the SCSI command and data in TCP/IP byte stream. Works with any Ethernet switch without distance limitation. Not suitable for application with high I/O requirements

FCoE Protocol (T11)

FC-BB-5 defines two protocols required for an FCoE fabric

FCoE Data Plane, carry most of FC frames & all SCSI traffic, uses Fabric Assigned MAC address (FPMA) with Ethertype = 0X8906

FCoE Initialization Protocol (FIP) Control Plane, used to login/out from FC fabric and discover FC entities connected to an Ethernet Cloud, uses unique BIA on CNA for MAC with Ethertype = 0X8914

FCoE Protocol Enhancement (IEEE)

DCB defined additional technologies to enhance Ethernet to support FCoE

Priority Flow Control (PFC) - 802.1Qbb Enables lossless Ethernet using PAUSE frame, CoS assigned to “no-drop” will be PAUSED

Enhanced Transmission Selection (ETS) - 802.1Qaz Prevents a single traffic class of a “bursty” nature to starve other classes by allowing to create priority group and guarantee bandwidth

Data Center Bridging eXchange (DCBX) - 802.1Qaz Negotiate Ethernet capability's (PFC, ETS, CoS) using LLDP with other DCB capable device to simplifies management

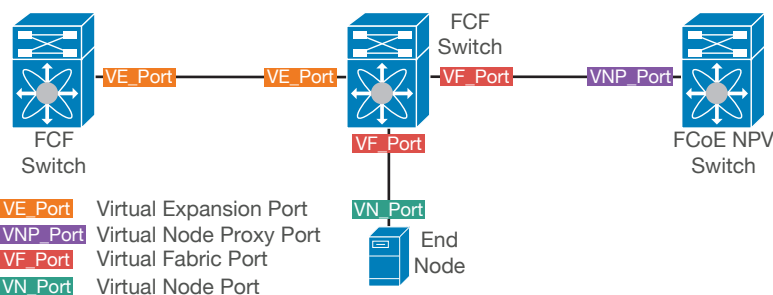
FCoE Addressing Scheme

After FLOGI process FCoE ENode gets a Fabric Provided MAC address (FPMA) for FCoE and use its regular MAC address for Ethernet LAN traffic

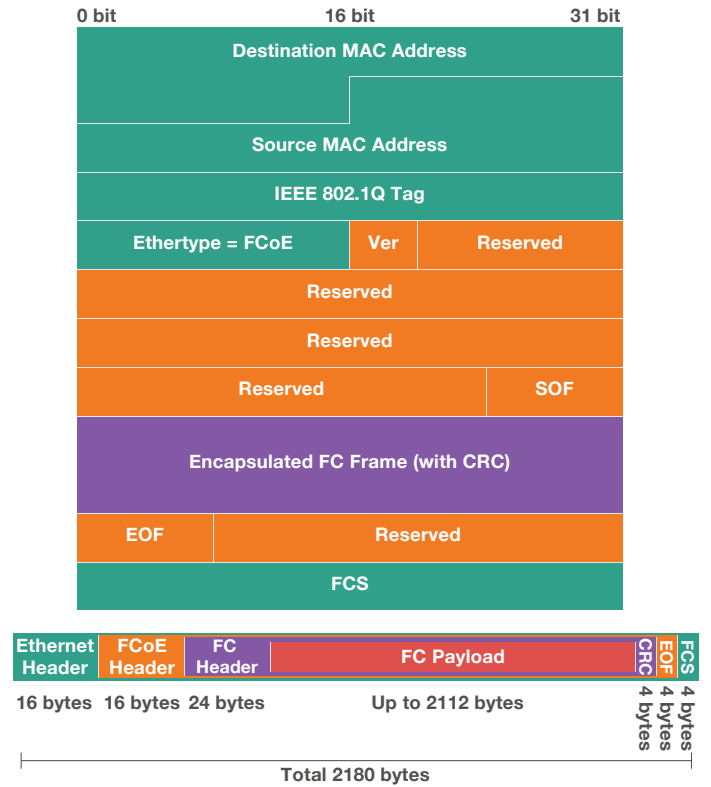
FCF switch is configured with a 3 byte FCoE MAC address prefix (FC-MAP) and will provide FC-ID with FC-MAP to ENode.

ENode appends FC-MAP to FC_ID to generate FPMA address
 $FC_MAP (3 \text{ byte}) + FC_ID (3 \text{ byte}) = FPMA (6 \text{ byte})$

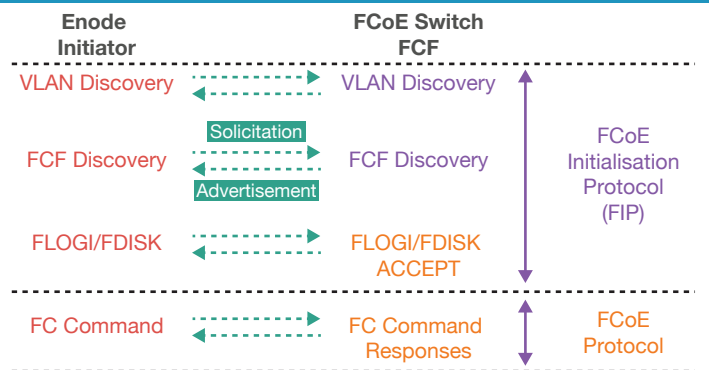
FCoE Port Types



FCoE Frame Format



FCoE Initialisation Protocol (FIP)



Step 1: FCoE VLAN Discovery FIP use native vlan to sendout a multicast to ALL_FCF_MAC address looking for the FCoE VLAN

Step 2: FCF Discovery FIP sends out a multicast to ALL_FCF_MAC on FCoE Vlan and FCF will respond back with their MAC Address

Step 3: Fabric Login FIP sends a FLOGI request to the FCF_MAC found in step 2 and establish virtual link between host and FCF (FIP doesn't carry any FC frames)

Fibre Channel Forwarder (FCF)

FCF is the Fiber Channel switching element inside an FCoE switch; Fibre Channel logins(FLOGIs) happens at the FCF and it consume a Domain ID

FCoE encap/decap happens within the FCF and forwarding based on FC information