iSCSI components.

➢ If an iSCSI-capable storage array is deployed, then a host with the iSCSI initiator can directly communicate with the storage array over an IP network.

➢ However, in an implementation that uses an existing FC array for iSCSI communication, an iSCSI gateway is used.

➢ These devices perform the translation of IP packets to FC frames and vice versa, thereby bridging the connectivity between the IP and FC environments.

iSCSI Host Connectivity

The three iSCSI host connectivity options are:

- A standard NIC with software iSCSI initiator,

- a TCP offload engine (TOE) NIC with software iSCSI initiator,

- an iSCSI HBA

➢ The function of the iSCSI initiator is to route the SCSI commands over an IP network.

➢ A **standard NIC with a software iSCSI** initiator is the simplest and least expensive connectivity option. It is easy to implement because most servers come with at least one, and in many cases two, embedded NICs. It requires only a software initiator for iSCSI functionality. Because NICs provide standard IP function, encapsulation of SCSI into IP packets and decapsulation are carried out by the host CPU. This places additional overhead on the host CPU. If a standard NIC is used in heavy I/O load situations, the host CPU might become a bottleneck. TOE NIC helps reduce this burden.

➢ A **TOE NIC** offloads TCP management functions from the host and leaves only the iSCSI functionality to the host processor. The host passes the iSCSI information to the TOE card, and the TOE card sends the information to the destination using TCP/IP. Although this solution improves performance, the iSCSI functionality is still handled by a software initiator that requires host CPU cycles.

➢ An **iSCSI HBA** is capable of providing performance benefi ts because it offloads the entire

iSCSI and TCP/IP processing from the host processor. The use of an iSCSI HBA is also the simplest way to boot hosts from a SAN environment via iSCSI. If there is no iSCSI HBA, modifi cations must be made to the basic operating system to boot a host from the storage devices because the NIC needs to obtain an IP address before the operating system loads. The functionality of an iSCSI HBA is similar to the functionality of an FC HBA.

iSCSI Topologies

➢ Two topologies of iSCSI implementations are **native and bridged**.

➢ Native topology does not have FC components.

➢ The initiators may be either directly attached to targets or connected through the IP network.

➢ Bridged topology enables the coexistence of FC with IP by providing iSCSI-to-FC bridging functionality.

➢ For example, the initiators can exist in an IP environment while the storage remains in an FC environment.

Native iSCSI Connectivity

➢ FC components are not required for iSCSI connectivity if an iSCSI-enabled array is deployed.

➢ In Fig (a), the array has one or more iSCSI ports configured with an IP address and is connected to a standard Ethernet switch.

➢ After an initiator is logged on to the network, it can access the available LUNs on the storage array.

➢ A single array port can service multiple hosts or initiators as long as the array port can handle the amount of storage traffic that the hosts generate.